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Cost-Effectiveness Specification for Computer-Based Training Systems

Volume II

PROCUREMENT

by

Robert J. Seidel
Harold Wagner

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The purpose of this cost-effectiveness specification is to facilitate the purchase, monitor, and evaluation of computer-based training systems. This standardized structure for deriving and communicating training system costs and effectiveness is presented in three volumes, corresponding to the life cycle of a computer-based training system: (1) development, (2) procurement, and (3) operation and maintenance. The cost methodology focuses on identifying and quantifying total inputs required by the system over its life cycle. Effectiveness dimensions include objectives-based achievement and time measures for within-		

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course and end-of-course criteria. Other measures, such as attrition rates, instructor ratings, and attitude scales, are also discussed.

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12

6 **Cost-Effectiveness Specification
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PREFACE

This is Volume II of the Cost-Effectiveness Specification for Computer-Based Training Systems. It is part of a three-volume set which correspond to the three phases of a training system's life cycle (Volume I - Development; Volume II - Procurement; Volume III - Operations and Maintenance). An Executive Summary document is included which provides the reader with general guidance and instructions on how to go through and respond to the various parts of the specification. This Cost-Effectiveness Specification was developed for DARPA as part of Contract #MDA903-76-C-0210. Dr. Harold F. O'Neil was the Technical Monitor.

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TABLE OF CONTENTS

	<u>Page</u>
PREFACE	i
A SYSTEM DESCRIPTION	1
B GENERAL COSTING ASSUMPTIONS AND DEFINITIONS	5
C COMPUTER-BASED TRAINING SYSTEM ELEMENTS: DEFINITIONS AND COSTS	13
D TRAINING COST BREAKDOWN STRUCTURE	57

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Part A
SYSTEM DESCRIPTION

INSTRUCTIONS

The purpose of Part A is to describe some of the characteristics of the computer-based training system and to identify the individuals who are using this specification.

- ① Print the name or descriptive title of the computer-based training system.
- ② Enter the year which represents the system's current life cycle status. In this, the Procurement Phase, indicate the year following the final year of the Development Phase.
- ③ Check the type of hardware configuration supporting the system.
- ④ Enter the maximum number of time-sharing trainees per system.
- ⑤ List the courses to be taught or supported by the computer-based training system.
- ⑥ Estimate the number of trainees who are to be served by the system in each course, and in all courses per year.
- ⑦ Print your name, job title, and organization.

SYSTEM DESCRIPTION

① Computer-Based Training System _____

② System Life Cycle

Phase II - Procurement 19 __ __

③ Configuration

☐ Stand-Alone

☐ Remote

☐ Combination Stand-Alone and Remote

④ Time-Sharing Capacity _____

⑤ Courses Supported by System (Specify)

⑥

No. of Trainees
Per Year

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
Total	=====

⑦

Your Name

Job Title

Organization

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Part B
GENERAL COSTING ASSUMPTIONS AND DEFINITIONS

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Part B

GENERAL COSTING ASSUMPTIONS AND DEFINITIONS

PROCUREMENT PHASE

Activities related to the production, purchase, and installation of the operational computer-based training system. Included in these activities are: fabrication, communication, reproduction, packaging and shipping, instructional preparation, etc. Procurement costs are all costs (in-house and contractor), irrespective of how funded, which are necessary to transform or copy the tested, prototype system into a fully operational system consisting of the hardware, software, facilities, training, and support necessary to initiate operations. These costs include the following components:

- Equipment. The costs associated with purchasing, manufacturing, shipping, and installing the hardware (all parts and equipment necessary for the system) as well as costs necessary to process, assemble, and integrate the final end-items in a workable system.
- Facilities. The costs of real estate, construction, conversion, utilities and equipment to provide all facilities required to house the operational computer-based training system.
- Software. The costs of reproduction, packaging, shipping, installation, and operational checkout of computer programs supporting the training system.
- Instructional Preparation. The costs of training a cadre of initial site personnel to operate and maintain the system.
- Instructional Methods/Materials. The costs of fabrication, reproduction, communication, packaging and shipping of all training materials required by the operational system.
- Acceptance Test/Management. The costs of managing the production, purchase and installation of the system as well as the costs of acceptance testing, site checkout/activation, and making engineering changes if necessary.
- Other Direct Costs. Any direct procurement costs not included in the previous components.

COMPUTER-BASED TRAINING SYSTEM

The application focus of this costing specification is *formal, school-based* training. The specification is oriented toward training which is

administered, aided, or managed by computer (hence, *computer-based*). The system component costs are distributed across the training system's life cycle which consists of three phases: Development, Procurement, Operation and Maintenance.

CONSTANT DOLLARS

In order to make valid comparisons between alternatives, the cost for each alternative must be stated in the same terms. In Part D of the specification all costs are to be adjusted so that they are expressed in constant year dollars. Constant year dollars express all costs expended in various years in terms of the general purchasing power of the dollar for a given base year. An estimate is said to be in constant dollars if costs for all work, both prior, current, and future, are adjusted so that they reflect the level of prices of the base year. *For purposes of this specification, the base year is the calendar year in which the costing analysis is performed.*

If cost data or estimates are available in other than constant year dollars, constant year dollars are arrived at by applying the appropriate adjustment factors. Current dollars reflect purchasing power current to the year in which they are expended. Prior costs stated in current dollars are the actual amounts paid out in these years. Future costs stated in current dollars are the projected actual amounts which will be paid. Care should be exercised to preclude the mixing of current dollars with constant dollars in a single display of costs. *Any cost figures provided in current dollars are to be clearly identified as such.*

DISCOUNTED RATES

Discounting is a technique for converting various cash flows occurring over time to equivalent amounts at a common point in time, considering the time value of money to facilitate a valid comparison. The appropriate interest rate is used to discount or calculate future costs and benefits so as to arrive at their present values. Each year's expected yearly cost is multiplied by its discount factor and then summed over all years. (The current discount rate specified by OSD is 10 percent.)

INDIRECT COSTS

An overhead or indirect cost factor is attached or "burdened" atop direct costs by each contractor to account for general support and administrative expenses. At each Government or sponsor site used during the life cycle of the training system, an indirect cost factor needs to be established. If no specific indirect factor, per site, can be determined, a "standard" service or DoD rate will be used.

INHERITED ASSETS

The use of assets already available (inherited assets) requires careful evaluation when preparing a cost estimate. The fact that a given system component is already available does not automatically equate to zero cost to the computer-based training system. Each inherited asset must be evaluated

on its own merit and in terms of whether its use in connection with the system being costed will cause some future expense. If so, that expense must be included in some cost element in the system's life cycle. If there will be no future expense, the cost of the item will be included in the total life cycle cost but will be highlighted as a sunk cost. Such existing assets will be included at their fair market value (as measured by market price, scrap value, or alternative use) and the basis for arriving at the estimate will be documented.

INSTRUCTION

An organized, open information-exchange process in which the student and instructional agent (human, programmed text, or intelligent machine) continually interact. The purpose of the interaction is to enable the student to reach some criterion of understanding or skill proficiency called mastery of a given set of objectives. A computer can aid this process directly by reducing all or portions of a strategy for interaction to an explicit algorithm or set of algorithms. The computer can also help by providing accurate, reliable massive storage and retrieval for records of student progress.

INSTRUCTIONAL SYSTEM DEVELOPMENT (ISD)

"A systematic procedure for assuring application of instructional technology to course planning and development."¹ The five phases of ISD are treated in detail in the five volumes of:

Air Force--"Handbook for Designers of Instructional Systems"²
Army--"Interservice Procedures for Instructional Systems Development"³
Navy/Marines--"Interservice Procedures for Instructional Systems Development"⁴

There is some disagreement between the Services on how the Phases are numbered. In this specification, we will adopt the Army's terminology of: Analyze, Design, Develop, Implement and Control to represent Phases I-V, respectively.

An issue to consider in working with this specification is that the instructional development process does not coincide with the computer-based training system life cycle for hardware and software.

¹"Instructional System Development," Department of the Air Force, AFM 50-2, 31 July 1975, p. 1.1.

²AFP 50-58, 15 July 1973.

³TRADOC PAM 350-30, 1 August 1975.

⁴NAVEDTRA106-A, August 1975.

The ISD Phases do not fit the Development, Procurement, and Operation and Maintenance Phases of the system's life cycle unless it is a completely new course of instruction. For most training, sections of the course will be designed, developed, tested, revised, adapted, and integrated throughout the entire life cycle of the computer-based training system. (For example, one-third of Air Force instructional hours are revised each year on the average.)

One problem in obtaining cost data for ISD activities is that functionally related cost data are generally not available from existing records. That is, information regarding personnel time and non-personnel costs related to such functions as job analysis, media selection, or preparation of learning objectives, are generally not recorded. Thus, such data must be collected during these activities or projected by the analyst who is complying with this specification. One approach would be to designate an individual with the responsibility of maintaining a detailed log of on-going instructional system development.

For purposes of this specification, the costs associated with all activities related to the first three ISD Phases (Analyze, Design, and Develop) will be documented as part of the Development Phase of the system life cycle. The costs associated with the ISD activities of Phases IV and V (Implement and Control) will be accounted for in the Operations and Maintenance Phase. No ISD activities will be shown as part of the Procurement Phase--but rather, this Phase will involve only the cost of purchasing the completed instructional products, materials and programs.

LIFE CYCLE/LIFE CYCLE COSTS

The life-cycle cost is the total cost of an item or system over its full life. The computer-based training system life cycle is encompassed in three phases: Development, Procurement, and Operation and Maintenance. These three phases are of variable lengths depending upon each specific system. Although the three phases overlap, for purposes of this specification, they will be considered to occur sequentially. The Development Phase can take up to 6 years, the Procurement Phase is shown as one year, and the Operation and Maintenance Phase can be up to 8 years. Although Procurement can take more than one year, this specification requires an assumption of all Procurement activities occurring within the year following development of a tested prototype system. Also, although such systems are usually phased in, it is assumed in this specification that Procurement will be followed by instantaneous operation of all systems acquired.

The specific years in which each Phase occurs are to be noted, the information coming either from the contractor or service monitor. The respondent needs to enter the year in which the system and its components are procured.

Life cycles are different for various system components. These life times established by the *Economic Analysis Handbook*, 2nd edition, Department of Defense, are as follows:

ADP Equipment	8 years
Buildings	25 "
Operating Equipment	10 "
Utilities, Plants & Utility	
Distribution Systems	25 "
Weapon/Support Systems	Variable

PAY AND ALLOWANCES

The cost of civilian and military personnel paid at annual rates will be gross pay in current pay tables, plus the Government's contribution for civilian retirement, disability, health, life insurance, and, where applicable, social security programs. Factors to weight the base pay of civilian and military personnel will be based on guidance from the Office of the Assistant Secretary of Defense (Comptroller), "Economic Cost of Military and Civilian Personnel," and recent policies of the Office of Management and Budget regarding civilian personnel pay. The latter will be used to weight the pay of civilian Government personnel who are directly involved in the life cycle of the computer-based training system. The following percentages of base pay will be used in computing the costs of civilian personnel services:

Retirement	24.7%
Health Insurance	3.5%
Life Insurance	.5%

The military and civilian pay rates, as weighted, do not include special pay, such as flying pay or hazardous duty pay. These costs must be added to the rates whenever they are required by the job or location. If appropriate, pay should be increased to cover leave and other benefits such as the average cost of sick leave taken and annual, holiday and other paid leave accruals, plus the average Government contributions for other benefits.

SUNK COST

A cost which is irrevocably committed to a project. Each cost analysis will make explicit any cost which is sunk at the time the analysis is prepared. All costs which reflect irreversible decisions will be treated as sunk.

Part C

COMPUTER-BASED TRAINING SYSTEM ELEMENTS:
DEFINITIONS AND COSTS

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Part C

COMPUTER-BASED TRAINING SYSTEM ELEMENTS: DEFINITIONS AND COSTS

In this section you are to provide costing information for each element of the computer-based training system. For Equipment or Facilities, four items of information are required for accurate costing: the type of device or unit, the unit cost, the number of units or the proportion of one unit allocated to the system, and whether or not the units are to be supplied by the government (e.g., GFE) or by the contractor. If you are a contractor and the units are to be provided by the government, check the GFE space; otherwise, give the unit cost. Maintenance costs should be included wherever applicable.

Definitions of all system elements are provided on the left-hand pages, with examples of how these items are to be costed. For Software, Instructional Preparation, Instructional Methods/Materials, and Acceptance Test/Management, units are hard to define and unit costs are difficult to obtain or are not applicable. In these areas, you are to provide as meaningful a description of the item and its characteristics as possible. Enter the total costs of elements in these categories in the appropriate spaces. In some cases you will need to delineate the personnel costs of certain elements. To assist you in identifying these costs, Personnel Cost Worksheets accompany this specification.

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DEFINITIONS

EQUIPMENT

Included in this category are all the components of equipment related to a computer-based training system (e.g., the computer and its associated auxiliary memory requirements, terminals, carrels, auxiliary audiovisual devices). Also included are local interface hardware, telephone lines, special lines, satellites, receivers, power generating equipment, associated test and checkout equipment, etc. In the Procurement Phase, this category also includes initial spares and repair test equipment. Maintenance costs, derived from factors such as mean time before failure and mean time or cost to repair, should be included in the costs of every piece of equipment maintained.

EXAMPLE					
1. EQUIPMENT					
1.3 Auxiliary Audiovisual Devices					
Description	No. Units	x	Unit Cost	Total Cost	GFE (✓)
a. <i>Singer Caramate 35 mm slide/tape units</i>	9		\$ 285	\$ 2565	—
b. " " " " <i>master</i>	1		343	343	—
c. <i>Bell & Howell Film O. Louis 8 mm projector</i>	1		400	400	—
d. _____	—		—	—	—
e. _____	—		—	—	—
\$3,308					

Computer(s): This refers to the hardware, either contractor or in-house, required to produce the automatic data processing capability of the system. It includes the installed machine or group of inter-connected machines consisting of input, storage, computing, control and output devices which use circuitry in the main computing element to automatically perform arithmetic and/or logical operations by means of internally stored or externally controlled programmed instructions. This element includes, for example, a central processor, large capacity storage data channels, and input/output.

Terminal(s): Refers to the hardware required to produce the data display portion of the system. It includes the equipment necessary to provide visual presentation of processed data or instruction by means of specifically designed electronic or electromechanical devices interconnected with the computing/processing subsystem, such as flat panel displays, projection screens, image data storage and retrieval equipment.

Auxiliary Audiovisual Devices: This subcategory consists of equipment which presents audiovisual instructional material. Included are such devices as: slide projectors, slide/tape units, film strip and overhead projectors, various movie film projectors, videotape recorders/players, etc.

1. EQUIPMENT

1.1 Computer(s)

Description	No. Units	x	Unit Cost	=	Total Cost	GFE (✓)
a. _____	_____		\$ _____		\$ _____	_____
b. _____	_____		_____		_____	_____
c. _____	_____		_____		_____	_____
d. _____	_____		_____		_____	_____
e. _____	_____		_____		_____	_____

\$ _____

(To Part D p. 61)

1.2 Terminal(s)

a. _____	_____		\$ _____		\$ _____	_____
b. _____	_____		_____		_____	_____
c. _____	_____		_____		_____	_____
d. _____	_____		_____		_____	_____
e. _____	_____		_____		_____	_____

\$ _____

(To Part D p. 61)

1.3 Auxiliary Audiovisual Devices

a. _____	_____		\$ _____		\$ _____	_____
b. _____	_____		_____		_____	_____
c. _____	_____		_____		_____	_____
d. _____	_____		_____		_____	_____
e. _____	_____		_____		_____	_____

\$ _____

(To Part D p. 61)

Auxiliary Memory: Storage capability designed to extend the core memory of a computer. It may consist of serial access devices (e.g., magnetic tape) or random access (e.g., disc or drum) or possibly extended core storage (ECS) or shift registers added to the main memory. The medium is electro-magnetic although paper tape could be used.

Local Interfaces: Direct transmission connectors linking various peripheral devices (disc, tape drivers, CRTs, etc.) with the computer or in some cases with each other.

Telephone Lines: Standard public commercial voice grade channels (generally up to 3000 cps) usable in computer-based training systems.

1.4 Auxiliary Memory

Description		No. Units	x	Unit Cost	=	Total Cost	GFE (✓)
a.				\$		\$	
b.							
c.							
d.							
e.							
						\$	

(To Part D p. 61)

1.5 Local Interfaces

a.				\$		\$	
b.							
c.							
d.							
e.							
						\$	

(To Part D p. 61)

1.6 Telephone Lines

a.				\$		\$	
b.							
c.							
d.							
e.							
						\$	

(To Part D p. 61)

Special Lines: Electrical communication channels designed to handle computer data transmission between two or more points. The circuits are constructed to transmit baud rates (or bits per second) relevant to various grades of transmission; e.g., 300-3000 cps for voice grade channels or up to 50,000 baud (or higher) for high speed, wide-band digital transmission.

Satellites: Earth orbiting electronic transmitters designed as high altitude means to cover a large geographic area and to reduce signal interference caused by high natural or man-made structures. Satellite transmission is typically at higher frequencies than is standard for receivers and therefore requires frequency converters at reception points.

Receivers: Devices at the instructional site designed to capture the transmitted signals to convert them to instructor/trainee usable form as a basis for training materials. These include, for example, radios, TV monitors, ground receiving equipment relevant to satellite signals, etc., along with related equipment such as antenna, mount, amplifiers, converter, batteries and cable.

Power Generating Equipment: Where non-electrified areas (or minimal power areas) are used as reception sites electrical generating equipment, or batteries are required to activate receivers (or amplify) transmittal signals over appropriate receivers.

1.7 Special Lines

Description		No. Units	x	Unit Cost	=	Total Cost	GFE (✓)
a.				\$		\$	
b.							
c.							
d.							
e.							
						\$	

1.8 Satellites

(To Part D p. 61)

a.				\$		\$	
b.							
c.							
d.							
e.							
						\$	

1.9 Receivers

(To Part D p. 61)

a.				\$		\$	
b.							
c.							
d.							
e.							
						\$	

1.10 Power Generating Equipment

(To Part D p. 61)

a.				\$		\$	
b.							
c.							
d.							
e.							
						\$	

Carrels: Small enclosures for individual study that are moveable. If firmly fixed or built into the structure of the building, they would be categorized as Facilities.

Initial Spares and Repair Test Equipment: This subcategory includes cost of initial spare components, subassemblies, and repair parts used for replacement purpose in a major end item of equipment during the early stages of production. It also includes test equipment such as meters required for troubleshooting and repair of other equipment components.

1.11 Carrels

Description	No. Units	x	Unit Cost	=	Total Cost	GFE (v)
a. _____	_____		\$ _____		\$ _____	_____
b. _____	_____		_____		_____	_____
c. _____	_____		_____		_____	_____
d. _____	_____		_____		_____	_____
e. _____	_____		_____		_____	_____
					<u>\$ _____</u>	

(To Part D p. 61)

1.12 Initial Spares and Repair Test Equipment

a. _____	_____		\$ _____		\$ _____	_____
b. _____	_____		_____		_____	_____
c. _____	_____		_____		_____	_____
d. _____	_____		_____		_____	_____
e. _____	_____		_____		_____	_____
					<u>\$ _____</u>	

(To Part D p. 61)

1.13 Other Equipment

a. _____	_____		\$ _____		\$ _____	_____
b. _____	_____		_____		_____	_____
c. _____	_____		_____		_____	_____
d. _____	_____		_____		_____	_____
e. _____	_____		_____		_____	_____
					<u>\$ _____</u>	

(To Part D p. 61)

FACILITIES

Included in this category are all the physical facilities required for housing the equipment components, administrators, and users of the computer-based training system. This category includes classrooms, laboratories, large group instruction spaces, offices, individual learning spaces, libraries and other information resource centers, etc. Units should be specified as the number of square feet required to house all components of the computer-based training system.

EXAMPLE					
2. FACILITIES					
2.4 Offices					
Description	No. Units	x	Unit Cost	= Total Cost	GFE (✓)
a. <u>Administrative Personnel</u>	<u>450 sq ft</u>		<u>\$ 380</u>	<u>\$ 1,710</u>	—
b. <u>Instructor Cadre</u>	<u>1440 "</u>		<u>380</u>	<u>\$ 5,472</u>	—
c. <u>Contractor Personnel</u>	<u>150 "</u>		<u>380</u>	<u>570</u>	—
d. _____	_____		_____	_____	—
e. _____	_____		_____	_____	—
				<u>\$ 2752/yr.</u>	

Classrooms: Places within buildings in which training is administered to students.

Laboratories: Places providing opportunity for observation, practice, or experimentation. Included in this category are simulated job settings which can be room-size or as large as warehouses, depending upon the particular training situation.

Large Group Instruction Spaces: Included in this element are such places as auditoria, study halls, demonstration rooms, etc., where large numbers of students can be trained.

Offices: Places in which the personnel who develop, manage, administer, and support the computer-based training system perform their functions.

2. FACILITIES

2.1 Classrooms

Description	No. Units	x	Unit Cost	=	Total Cost	GFE (✓)
a. _____	_____		\$ _____		\$ _____	_____
b. _____	_____		_____		_____	_____
c. _____	_____		_____		_____	_____
d. _____	_____		_____		_____	_____
e. _____	_____		_____		_____	_____
					\$ _____	
						(To Part D p. 61)

2.2 Laboratories

a. _____	_____		\$ _____		\$ _____	_____
b. _____	_____		_____		_____	_____
c. _____	_____		_____		_____	_____
d. _____	_____		_____		_____	_____
e. _____	_____		_____		_____	_____
					\$ _____	
						(To Part D p. 61)

2.3 Large Group Instruction Spaces

a. _____	_____		\$ _____		\$ _____	_____
b. _____	_____		_____		_____	_____
c. _____	_____		_____		_____	_____
d. _____	_____		_____		_____	_____
e. _____	_____		_____		_____	_____
					\$ _____	
						(To Part D p. 61)

2.4 Offices

a. _____	_____		\$ _____		\$ _____	_____
b. _____	_____		_____		_____	_____
c. _____	_____		_____		_____	_____
d. _____	_____		_____		_____	_____
e. _____	_____		_____		_____	_____
					\$ _____	
						(To Part D p. 61)

Individual Learning Spaces: This category includes built-in carrels and small cubicles which serve as spaces for individuals to study or work by themselves. If such carrels are moveable, they would be classified as Equipment.

Libraries and Other Information Resource Centers: Places in which printed and other forms of mediated information is stored and arranged for use. Included in this element are learning resource centers, dial-in TV and other information retrieval systems, etc.

2.5 Individual Learning Spaces

Description	No. Units	x	Unit Cost	=	Total Cost	GFE (✓)
a. _____	_____		\$ _____		\$ _____	_____
b. _____	_____		_____		_____	_____
c. _____	_____		_____		_____	_____
d. _____	_____		_____		_____	_____
e. _____	_____		_____		_____	_____
					\$ _____	

(To Part D p. 61)

2.6 Libraries and Other Information Resource Centers

a. _____	_____		\$ _____		\$ _____	_____
b. _____	_____		_____		_____	_____
c. _____	_____		_____		_____	_____
d. _____	_____		_____		_____	_____
e. _____	_____		_____		_____	_____
					\$ _____	

(To Part D p. 61)

2.7 Other Facilities

a. _____	_____		\$ _____		\$ _____	_____
b. _____	_____		_____		_____	_____
c. _____	_____		_____		_____	_____
d. _____	_____		_____		_____	_____
e. _____	_____		_____		_____	_____
					\$ _____	

(To Part D p. 61)

SOFTWARE

This category of the computer-based training system includes systems programming support, general applications programs, diagnostic and checkout software, utility programs, etc.

EXAMPLE		
3. SOFTWARE		
3.1 Systems Programs		
Description	Cost	GFE (%)
a. Executive System	\$ 32,340	
b. System Error Routine	7,120	
c. System Initialization	12,475	
d. Keyboard Handlers	11,671	
	\$ 63,606	

Systems Programs: The underlying software necessary for the control of a computer system, including operating systems, monitors, executives, peripheral device interfaces, etc.

General Applications Programs: Those computer programs which are dependent on data bases for their use but which can be run on various machines and have usefulness independent of a specific course of instruction (e.g., SPSS, BioMed Statistical Packages, Compilers, Assemblers and Interpreters such as FORTRAN, BASIC, COURSEWRITER, or certain interactive CAI functions).

Diagnostic/Test Programs: Special purpose programs used primarily to test the operation of computer system hardware components. Examples include diagnostics to locate damaged tape or disk surfaces, faulty sections of computer memory, or transmission errors on telecommunication links. Diagnostic programs often operate independently of a computer's operating system software.

3. SOFTWARE

3.1 Systems Programs

Description	Cost	GFE ()
a. _____	\$ _____	_____
b. _____	_____	_____
c. _____	_____	_____
d. _____	_____	_____
e. _____	_____	_____
	<u>\$ _____</u>	
	(To Part D p. 61)	

3.2 General Applications Programs

a. _____	\$ _____	_____
b. _____	_____	_____
c. _____	_____	_____
d. _____	_____	_____
e. _____	_____	_____
	<u>\$ _____</u>	
	(To Part D p. 61)	

3.3 Diagnostic/Test Programs

a. _____	\$ _____	_____
b. _____	_____	_____
c. _____	_____	_____
d. _____	_____	_____
e. _____	_____	_____
	<u>\$ _____</u>	
	(To Part D p. 61)	

Utility Programs: Generalized data and file manipulation software used to create, copy, modify or delete machine-readable data. Such utilities include programs to copy tapes, print tape and disk files, convert files from one data representation (e.g., ASCII) to another, etc.

3.4 Utility Programs

Description	Cost	GFE (✓)
a. _____	\$ _____	_____
b. _____	_____	_____
c. _____	_____	_____
d. _____	_____	_____
e. _____	_____	_____
	<u>\$ _____</u>	

(To Part D p. 61)

3.5 Other Computer Programs

a. _____	\$ _____	_____
b. _____	_____	_____
c. _____	_____	_____
d. _____	_____	_____
e. _____	_____	_____
	<u>\$ _____</u>	

(To Part D p. 61)

INSTRUCTIONAL PREPARATION

This category includes all training costs necessary for initial site personnel to acquire sufficient skills to operate, maintain, and support the computer-based training system. Included are the costs of training initial site personnel cadre as well as their pay and allowances during the period in which they receive training.

EXAMPLE					
4. INSTRUCTIONAL PREPARATION					
4.1 Training of Initial Site Personnel Cadre					
Description	Personnel Hours	Personnel Costs	Non Personnel Costs	Total Costs	GFE (x)
a. In plant Instructor Training	160	\$ 4,067	\$ 870	\$ 4,937	
b. In plant Maintenance Training	160	3,820	1,860	5,680	
c. _____	_____	_____	_____	_____	
d. _____	_____	_____	_____	_____	
e. _____	_____	_____	_____	_____	
				<u>\$10,617</u>	

Training of Initial Site Personnel Cadre: This subcategory refers to all the training services, courses, devices, accessories, aids, equipment, facilities, and parts used to facilitate instruction through which initial site personnel will acquire the skills necessary to operate and maintain the computer-based training system.

Site Personnel Pay and Allowances: This subcategory refers to the initial site personnel costs (civilian and military) while they are in a training status.

4. INSTRUCTIONAL PREPARATION

4.1 Training of Initial Site Personnel Cadre

Description	Personnel Hours	Personnel Costs	Non Personnel Costs	Total Costs	GFE ()
a. _____	_____	\$ _____	\$ _____	\$ _____	_____
b. _____	_____	_____	_____	_____	_____
c. _____	_____	_____	_____	_____	_____
d. _____	_____	_____	_____	_____	_____
e. _____	_____	_____	_____	_____	_____

\$ _____
(To Part D p. 61)

4.2 Site Personnel Pay and Allowances

a. _____	_____	\$ _____	\$ _____	\$ _____	_____
b. _____	_____	_____	_____	_____	_____
c. _____	_____	_____	_____	_____	_____
d. _____	_____	_____	_____	_____	_____
e. _____	_____	_____	_____	_____	_____

\$ _____
(To Part D p. 61)

4.3 Other Instructional Preparation Costs

a. _____	_____	\$ _____	\$ _____	\$ _____	_____
b. _____	_____	_____	_____	_____	_____
c. _____	_____	_____	_____	_____	_____
d. _____	_____	_____	_____	_____	_____
e. _____	_____	_____	_____	_____	_____

\$ _____
(To Part D p. 61)

INSTRUCTIONAL METHODS/MATERIALS

Included here are all forms of instructional methods, materials, and tests in the computer-based training program. All print and mediated instruction is included, as well as specific applications computer programs when appropriate. Printed materials would include such items as training manuals, instructor guides, printouts, books, programmed texts, etc. Other mediated forms of instruction include film, audio, audiovisual, video and computer displays, etc. Indicate the estimated number of course hours for each element of instruction procured.

EXAMPLE			
5. INSTRUCTIONAL METHODS/MATERIALS			
5.2 Audiovisual			
Description	Est Course Hours	Cost	GFE (.)
a. <i>Orientation to Maintenance Job: 35mm slide/tape presentation</i>	<i>1</i>	<i>\$ 412</i>	
b. <i>Electronic Equipment Repair: Basic Principles (8mm sound)</i>	<i>1.5</i>	<i>2,100</i>	
c. _____	_____	_____	_____
d. _____	_____	_____	_____
e. _____	_____	_____	_____
		<i>\$2,512</i>	

Audio: In this subcategory are included instructional materials in forms presented only for listening. Tape recordings, phonograph records, radio broadcasts, etc., comprise this subcategory.

Audiovisual: Mediated instructional materials which are to be seen and heard in an integrated fashion. Included in this subcategory are slide/tape programs, sound filmstrips, sound motion pictures, videotape and other television programs, etc.

Film/Text/Visual: Mediated instructional materials on film designed to be viewed only. Included in this subcategory are slides, overhead transparencies, film strips, silent motion pictures, etc., in which text as well as pictures are presented.

Lecture/Demonstration: A portion of instruction in which facts or concepts to be learned are presented by the instructor, or a skill to be mastered may be introduced. Active student participation may be elicited at critical points with (1) questions or (2) by directing attention to certain features demonstrated.

5. INSTRUCTIONAL METHODS/MATERIALS

5.1 Audio

Description	Est. Course Hours	Cost	GFE (✓)
a. _____	_____	\$ _____	_____
b. _____	_____	_____	_____
c. _____	_____	_____	_____
d. _____	_____	_____	_____
e. _____	_____	_____	_____
		\$ _____	

(To Part D p. 62)

5.2 Audiovisual

a. _____	_____	\$ _____	_____
b. _____	_____	_____	_____
c. _____	_____	_____	_____
d. _____	_____	_____	_____
e. _____	_____	_____	_____
		\$ _____	

(To Part D p. 62)

5.3 Film/Text/Visual

a. _____	_____	\$ _____	_____
b. _____	_____	_____	_____
c. _____	_____	_____	_____
d. _____	_____	_____	_____
e. _____	_____	_____	_____
		\$ _____	

(To Part D p. 62)

5.4 Lecture/Demonstration

a. _____	_____	\$ _____	_____
b. _____	_____	_____	_____
c. _____	_____	_____	_____
d. _____	_____	_____	_____
e. _____	_____	_____	_____

\$ _____
(To Part D p. 62)

Group Discussion/Seminar: A small number of students engaged in interactive exchange of information about a given topic. The instructor may or may not participate.

Performance/Practice: Exercise for the student to rehearse a skill (1) with feedback (guided practice), or (2) without feedback (unguided practice) on the student's performance of the skill.

Tutoring (peer or other): A form of instruction involving one-to-one dialogue between instructional agent (teacher, fellow student or other) and student.

Printed Text/Visual: Instructional materials that are printed on paper. Included in this subcategory are books, training manuals, programmed texts, printouts, forms, as well as printed photographs, etc.

5.5 Group Discussion/Seminar

Description	Est. Course Hours	Cost	GFE ()
a. _____	_____	\$ _____	_____
b. _____	_____	_____	_____
c. _____	_____	_____	_____
d. _____	_____	_____	_____
e. _____	_____	_____	_____

\$ _____

(To Part D p. 62)

5.6 Performance/Practice

a. _____	_____	\$ _____	_____
b. _____	_____	_____	_____
c. _____	_____	_____	_____
d. _____	_____	_____	_____
e. _____	_____	_____	_____

\$ _____

(To Part D p. 62)

5.7 Tutoring (peer or other)

a. _____	_____	\$ _____	_____
b. _____	_____	_____	_____
c. _____	_____	_____	_____
d. _____	_____	_____	_____
e. _____	_____	_____	_____

\$ _____

(To Part D p. 62)

5.8 Printed Text/Visual

a. _____	_____	\$ _____	_____
b. _____	_____	_____	_____
c. _____	_____	_____	_____
d. _____	_____	_____	_____
e. _____	_____	_____	_____

\$ _____

(To Part D p. 62)

Computer-Administered Instructional Materials. Instructional materials that are prepared for presentation on computer output devices such as cathode ray tubes, plasma panels, teletypes, etc. A variety of instructional strategies can be applied using the computer as described below.

Drill and Practice: Following presentation of a concept and a test of knowledge comprehension, the trainee interacts with a series of example instances. The purpose of this activity is to strengthen performance skills in the designated concept. Computer-based drill and practice permits repeated presentations of a wide range of randomly generated or specially programmed instances. Acceleration or remediation of instruction can be made contingent on student performance.

Simulation: An instructional situation which allows a participant to interact in a situation closely resembling an actual experience. Depending on the sophistication of the computer system involved, the computer houses the simulation rules and enables complex simulated decision-making, monitors student progress and maintains instructional records for subsequent training use. Justification for simulation: safety in performing dangerous and critical criterial tasks, telescoping real-world time, and permitting abstraction of essential task elements from potentially confusing total criterial environment.

Games: A cooperative or competitive environment in which the student interacts with real or artificial participants to achieve specified goals. Points can be offered for degree of cooperative or competitive achievement. In combination, simulation and games are often used as instructional tools for teaching problem-solving. They are justified as strong motivating forces for learning. In addition to the automated functions ascribed to simulation, the computer can provide the rules for real players to interact; or it also can be the source through artificial intelligence of other simulated players.

5.9 Computer-Administered Instructional Materials

5.9.1 Drill and Practice

Description	Est. Course Hours	Cost	GFE (✓)
a. _____	_____	\$ _____	_____
b. _____	_____	_____	_____
c. _____	_____	_____	_____
d. _____	_____	_____	_____
e. _____	_____	_____	_____
		\$ _____	
		(To p. 43)	

5.9.2 Simulation

a. _____	_____	\$ _____	_____
b. _____	_____	_____	_____
c. _____	_____	_____	_____
d. _____	_____	_____	_____
e. _____	_____	_____	_____
		\$ _____	
		(To p. 43)	

5.9.3 Games

a. _____	_____	\$ _____	_____
b. _____	_____	_____	_____
c. _____	_____	_____	_____
d. _____	_____	_____	_____
e. _____	_____	_____	_____
		\$ _____	
		(To p. 43)	

Tutorial: An instructional situation in which the trainee interacts with a model of a teacher, the model being resident in the computer. It can encompass all or some of the instructional program, governing (dialogue) sequence of materials, feedback rules, strategies for simulation, games, drill and practice, or other related instructional paradigms. Depending upon computer sophistication and instructional needs, automation of instructional prescription, resource allocation, and record-keeping can be partial or total.

Problem Solving: One of the most common instructional forms consists of quantitative problems generated by stored algorithms. The trainee interacts by inputting step-by-step process solutions at a terminal device or the trainee solves the problem on paper and inputs his answer.

Inquiry: The trainee forms questions which he addresses to the computer system. He may use natural language or some easy-to-learn subset of the language. The system processes the questions usually using key words and searching stored algorithms to provide an answer. This activity is often called information retrieval.

5.9.4 Tutorial

Description		Est. Course Hours	Cost	GFE (✓)
a.			\$	
b.				
c.				
d.				
e.				
			\$	
			(To p. 43)	

5.9.5 Problem-Solving

a.			\$	
b.				
c.				
d.				
e.				
			\$	
			(To p. 43)	

5.9.6 Inquiry

a.			\$	
b.				
c.				
d.				
e.				
			\$	
			(To p. 43)	

Specific Applications Programs: Computer programs written to satisfy a specific instructional logic requirement in a given course. These programs are both data and course dependent (such as unique algorithms written for Physics I problems for a particular instructor). They are usually written in a CAI language although they could also be written in a machine assembly language.

Total Computer-Administered Instructional Materials Costs: Enter total costs obtained in subcategories 5.9.1 thru 5.9.8 in the spaces provided. Sum these costs to arrive at a total cost of 5.9 subcategory. Transfer this sum to the appropriate line of the TCBS (Part D).

5.9.7 Specific Applications Programs

Description	Est. Course Hours	Cost	GFE (✓)
a. _____	_____	\$ _____	_____
b. _____	_____	_____	_____
c. _____	_____	_____	_____
d. _____	_____	_____	_____
e. _____	_____	_____	_____
		\$ _____	
		(below)	

5.9.8 Other Computer-Administered Instructional Materials

a. _____	_____	\$ _____	_____
b. _____	_____	_____	_____
c. _____	_____	_____	_____
d. _____	_____	_____	_____
e. _____	_____	_____	_____
		\$ _____	
		(below)	

Total Computer-Administered Instructional Materials Costs (5.9)

Drill & Practice (5.9.1)	\$ _____
Simulation (5.9.2)	_____
Games (5.9.3)	_____
Tutorial (5.9.4)	_____
Problem-Solving (5.9.5)	_____
Inquiry (5.9.6)	_____
Specific Applications Programs (5.9.7)	_____
Other Computer-Administered Instructional Materials (5.9.8)	_____

Total 5.9

\$ _____
(To Part D p. 62)

Tests: In the broadest sense, tests are materials presented to targeted individuals or groups in order to measure their status with respect to a specified domain of behavior. The tests may be direct, the behavior sampled is from the domain, e.g., the student must actually change a tire. On the other hand, the tests may be indirect, e.g., the student describes by paper and pencil how he would change a tire. In instruction, these materials sample student performance during or at the end of a learning sequence. They may be used solely to diagnose current level of achievement or they may be used in addition to prescribe sequences of instruction. If used strictly for diagnosis, the test items are usually presented without feedback of correct answers.

Paper and Pencil: These are verbal materials. Generally these materials form an indirect measure of the student's level of knowledge or comprehension. The student writes answers to an item by choosing from among alternatives, constructs a short answer to complete a sentence, or writes an essay. The inference is made that achievement on these items provides a valid and reliable index for predicting achievement in the criterion environment (e.g., job proficiency).

Performance Tests: Materials are those with which the student has to do something, i.e., non-verbal. They are generally of two types: (1) intermediate or indirect--in which the student manipulates symbols, patterns, or physical items said to be correlated with some desired performance not readily measured in a testing environment; or (2) job-sample (direct)--in which the student is given portions of job-tasks to perform. These tasks are representative, critical to job-performance, or both.

5.10 Other Instructional Methods/Materials

Description	Est. Course Hours	Cost	GFE (✓)
a. _____	_____	\$ _____	_____
b. _____	_____	_____	_____
c. _____	_____	_____	_____
d. _____	_____	_____	_____
e. _____	_____	_____	_____
		\$ _____	

(To Part D p. 62)

5.11 Tests

5.11.1 Paper and Pencil

a. _____	_____	\$ _____	_____
b. _____	_____	_____	_____
c. _____	_____	_____	_____
d. _____	_____	_____	_____
e. _____	_____	_____	_____
		\$ _____	

(To p. 47)

5.11.2 Performance Tests

a. _____	_____	\$ _____	_____
b. _____	_____	_____	_____
c. _____	_____	_____	_____
d. _____	_____	_____	_____
e. _____	_____	_____	_____
		\$ _____	

(To p. 47)

Computer-Supported Testing: If a test is administered at a display device connected to a computer (a terminal), the test is said to be administered on-line. If it is administered manually by paper and pencil or by performing tasks on devices or equipment not connected to the computer, the test is said to be administered off-line. The support roles of the computer can include any or all of the following: (a) to store and retrieve banks of test items, allowing efficient generation of numerous alternate test forms; (b) to score and print out results of the test administrations; (c) to maintain testing records for purposes of test validation and/or student diagnosis and prescription; and (d) to administer tests on-line.

Total Test Development Costs: Enter total costs obtained in subcategories 5.11.1 thru 5.11.4 in the spaces provided. Sum these costs to arrive at a total cost of 5.11 subcategory. Transfer this sum to the appropriate line of the TCBS (Part D).

5.11.3 Computer-Supported Testing

Description	Est. Course Hours	Cost	GFE (✓)
a. _____	_____	\$ _____	_____
b. _____	_____	_____	_____
c. _____	_____	_____	_____
d. _____	_____	_____	_____
e. _____	_____	_____	_____
		\$ _____	
		(below)	

5.11.4 Other Tests

a. _____	_____	\$ _____	_____
b. _____	_____	_____	_____
c. _____	_____	_____	_____
d. _____	_____	_____	_____
e. _____	_____	_____	_____
		\$ _____	
		(below)	

Total Test Development Costs (5.11)

Paper & Pencil (5.11.1)	\$ _____
Performance Tests (5.11.2)	_____
Computer-Supported Testing (5.11.3)	_____
Other Tests (5.11.4)	_____

Total 5.11	\$ _____
	(To Part D p. 62)

ACCEPTANCE TEST/MANAGEMENT

This category includes costs of the technical and business management effort expended in the process of producing, purchasing, and installing the tested, operational computer-based training system. It includes costs associated with program management, acceptance testing, engineering changes, site check-out/activation, etc.

EXAMPLE					
6. ACCEPTANCE TEST/MANAGEMENT					
6.1 Program/Project Management					
Description	Personnel Hours	Personnel Costs	Non Personnel Costs	Total Costs	GFE (%)
a. <i>Program Management</i>	<i>160</i>	<i>\$5,549</i>	<i>\$ -</i>	<i>\$5,549</i>	
b. <i>Project Direction</i>	<i>400</i>	<i>12,468</i>	<i>-</i>	<i>12,468</i>	
c. _____	_____	_____	_____	_____	_____
d. _____	_____	_____	_____	_____	_____
e. _____	_____	_____	_____	_____	_____
				<i>\$18,017</i>	

Program/Project Management: This subcategory contains costs for planning, directing, and controlling the production of a system and assuring that planning is accomplished by organizations responsible for the complementary functions of logistics and maintenance support, personnel training, operational testing, activation, or deployment of a system.

Acceptance Test: This subcategory contains costs of system acceptance test activities including cost of the detailed planning, conduct, support, data reduction and reports from such testing, and all test items which are consumed in the conduct and support of the acceptance test program.

Engineering Changes: This subcategory contains costs associated with official alterations made to a system while it is still in the manufacturing process (before official acceptance as operational).

6. ACCEPTANCE TEST/MANAGEMENT

6.1 Program/Project Management

Description	Personnel Hours	Personnel Costs	+	Non- Personnel Costs	=	Total Costs	GFE (✓)
a. _____	_____	\$ _____		\$ _____		\$ _____	_____
b. _____	_____	_____		_____		_____	_____
c. _____	_____	_____		_____		_____	_____
d. _____	_____	_____		_____		_____	_____
e. _____	_____	_____		_____		_____	_____
<u>\$ _____</u> (To Part D p. 62)							

6.2 Acceptance Test

a. _____	_____	\$ _____		\$ _____		\$ _____	_____
b. _____	_____	_____		_____		_____	_____
c. _____	_____	_____		_____		_____	_____
d. _____	_____	_____		_____		_____	_____
e. _____	_____	_____		_____		_____	_____
<u>\$ _____</u> (To Part D p. 62)							

6.3 Engineering Changes

a. _____	_____	\$ _____		\$ _____		\$ _____	_____
b. _____	_____	_____		_____		_____	_____
c. _____	_____	_____		_____		_____	_____
d. _____	_____	_____		_____		_____	_____
e. _____	_____	_____		_____		_____	_____
<u>\$ _____</u> (To Part D p. 62)							

Site Checkout/Activation: This subcategory includes conversion of the operational site, system assembly, checkout, and installation into the site facility to achieve operational status.

6.4 Site Checkout/Activation

Description	Personnel Hours	Personnel Costs	+	Non- Personnel Costs	=	Total Costs	GFE ()
a. _____	_____	\$ _____		\$ _____		\$ _____	_____
b. _____	_____	_____		_____		_____	_____
c. _____	_____	_____		_____		_____	_____
d. _____	_____	_____		_____		_____	_____
e. _____	_____	_____		_____		_____	_____

\$ _____

(To Part D p. 62)

6.5 Other Direct Management Costs

a. _____	_____	\$ _____		\$ _____		\$ _____	_____
b. _____	_____	_____		_____		_____	_____
c. _____	_____	_____		_____		_____	_____
d. _____	_____	_____		_____		_____	_____
e. _____	_____	_____		_____		_____	_____

\$ _____

(To Part D p. 62)

OTHER DIRECT COSTS

This category contains elements which are not covered in other categories. Costs related to travel, supplies, consultants, contracts and subcontracts, etc., not identified otherwise are represented here.

EXAMPLE	
7. OTHER DIRECT COSTS	
7.4 Contracts/Subcontracts	
Description	Cost
Technical Advisory Services: Acceptance	\$24,593
Test Design (Instructional Technology Corporation)	
	\$24,593

Supplies: This subcategory consists of all expendable supplies directly employed in the procurement of the computer-based training system.

Travel: Included here are all transportation costs, per diem costs, etc., required in the procurement of the system.

Consultants: This subcategory includes costs associated with unique personal services required in the direct procurement of the computer-based training system, arranged for by the prime contractor or Government or other sponsor.

7.1 Supplies

7.2 Travel

7.3 Consultants

53

Contracts/Subcontracts: This subcategory includes materials and services to be supplied by private firms/institutions/organizations, required for the direct procurement of the computer-based training system. These are arranged or contracted for by the prime system contractor, or by the Government or other sponsor.

7.4 Contracts/Subcontracts

Description	Cost
	\$
	\$

(To Part D p. 6)

7.5 Other Direct Costs

§ _____

§ _____

(To Part D p. 62)

Part D
TRAINING COST BREAKDOWN STRUCTURE (TCBS)

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Part D

TRAINING COST BREAKDOWN STRUCTURE (TCBS)

In this part of the specification, a form is provided for entering the total costs of procuring the computer-based training system. All Procurement costs should be shown as having been spent at one time (in the first year following the Development Phase). As noted in Part B, General Costing Assumptions and Definitions, all costs should be expressed in constant dollars (using the present year as the base year). For purposes of obtaining total Procurement costs, the element costs shown in Part C are to be summed for each subcategory and entered into the appropriate spaces on this form. Total costs for each category are to be calculated and entered. These total category costs are then to be summed to arrive at the total Procurement costs of the system.

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TRAINING COST BREAKDOWN STRUCTURE (TCBS) PROCUREMENT PHASE

YEAR 19 ____

1. Equipment

1.1 Computer(s)	\$ _____	1.8 Satellites	\$ _____
1.2 Terminal(s)	_____	1.9 Receivers	_____
1.3 Auxiliary AV Devices	_____	1.10 Power Generating Equipment	_____
1.4 Auxiliary Memory	_____	1.11 Carrels	_____
1.5 Local Interfaces	_____	1.12 Initial Spares & Repair Test Equipment	_____
1.6 Telephone Lines	_____	1.13 Other Equipment	_____
1.7 Special Lines	_____	TOTAL EQUIPMENT COSTS	\$ _____

2. Facilities

2.1 Classrooms	\$ _____	2.5 Individual Learning Spaces	\$ _____
2.2 Laboratories	_____	2.6 Libraries & Other Info. Resource Ctrs.	_____
2.3 Large Group Instruction Spaces	_____	2.7 Other Facilities	_____
2.4 Offices	_____	TOTAL FACILITIES COSTS	\$ _____

3. Software

3.1 Systems Programs	\$ _____	3.4 Utility Programs	\$ _____
3.2 General Applications Programs	_____	3.5 Other Computing Programs	_____
3.3 Diagnostic/Test Programs	_____	TOTAL SOFTWARE COSTS	\$ _____

4. Instructional Preparation

4.1 Training of Initial Site Personnel Cadre	\$ _____	4.3 Other Instructional Preparation Costs	\$ _____
4.2 Site Personnel Pay and Allowances	_____	TOTAL INSTRUCTIONAL PREPARATION COSTS	\$ _____

5. Instructional Methods/Materials

5.1 Audio \$ _____
5.2 Audiovisual _____
5.3 Film/Text/Visual _____
5.4 Lecture/Demonstration _____
5.5 Group Discussion/Seminar _____
5.6 Performance/Practice _____

5.7 Tutoring (peer or other) \$ _____
5.8 Printed Text/Visual _____
5.9 CAI Materials _____
5.10 Other Instructional Methods/Materials _____
5.11 Tests _____
TOTAL INSTRUCTIONAL METHODS/
MATERIALS COSTS \$ _____

6. Acceptance Test/Management

6.1 Program/Project Management \$ _____
6.2 Acceptance Test _____
6.3 Engineering Changes _____

6.4 Site Checkout/Activation \$ _____
6.5 Other Direct Management Costs _____
TOTAL ACCEPTANCE TEST/
MANAGEMENT COSTS \$ _____

7. Other Direct Costs (Not Included Above)

7.1 Supplies \$ _____
7.2 Travel _____
7.3 Consultants _____

7.4 Contracts/Subcontracts \$ _____
7.5 Other Direct Costs _____
TOTAL OTHER DIRECT COSTS \$ _____

Total Procurement Costs \$ _____

N O T E

COST-EFFECTIVENESS ANALYSIS

FOR PURPOSES OF THIS SPECIFICATION, THE TRAINING EFFECTIVENESS DATA, AND COST-EFFECTIVENESS ANALYSES TO BE CALCULATED FOR THE COMPUTER-BASED TRAINING SYSTEM ARE TO BE DOCUMENTED AS PART OF THE DEVELOPMENT AND/OR OPERATION AND MAINTENANCE PHASES OF THE SYSTEM LIFE CYCLE (VOLUMES I & III), AND ARE NOT FOUND IN THIS VOLUME.