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DOCUMENTATION REQUIREMENTS FOR AFSC COST ESTIMATES

AN ESTIMATOR'S AND REVIEWER'S GUIDE

AUGUST 1967

M. V. Jones

Prepared for
COMPTROLLER OFFICE
COST ANALYSIS DIVISION
ELECTRONIC SYSTEMS DIVISION
AIR FORCE SYSTEMS COMMAND
UNITED STATES AIR FORCE
L. G. Hanscom Field, Bedford, Massachusetts



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Project 800C
Prepared by
THE MITRE CORPORATION
Bedford, Massachusetts
Contract AF19(628)-5165

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ABSTRACT

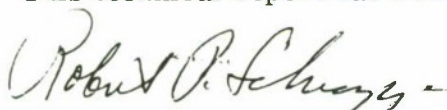
Major changes in the documentation requirements for all cost estimates prepared within the Systems Command have been established by AFSC L 173-1 (Cost Estimating Procedures).

The new requirements consist of fourteen separate worksheets and formats that constitute a Basic Documentation File. This paper seeks to provide an explicit, standardized, easily referenced guide to these requirements. It is hoped that estimators will find the paper helpful in preparing and in double-checking their estimates for compliance, completeness, and consistency prior to releasing them to reviewing and approving echelons. Hopefully, too, reviewing offices will find the paper useful in standardizing the reviews by different personnel reviewing cost estimates prepared by different offices, for different purposes, in different time periods, for different systems.

Although this paper is addressed primarily to Air Force cost estimators, it should also be of interest to industrial and non-profit contractors that work closely with Air Force estimators in preparing cost estimates to support system studies.

REVIEW AND APPROVAL

This technical report has been reviewed and is approved.



ROBERT P. SCHIAZZA
Supervisory Cost Estimator

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GLOSSARY

<u>Abbreviation</u>	<u>Full Title</u>
BDF	Basic Documentation File
BDS	Basic Data Sheet
CCI	Cost & Configuration Index
CECR	Cost Estimate Confidence Rating
CIS	Cost Information System
EF	Evaluation Format
ERR	Estimating Relationship Record
ESR	Expert Source Record
ET	Estimating Table
WS-A	Work Sheet A
WS-B	Work Sheet B
WS-C	Work Sheet C
WS-D	Work Sheet D

A SCHEMATIC EXHIBIT OF THE
BASIC DOCUMENTATION FILE

<u>DOCUMENT</u>	<u>PURPOSE</u>
WORK SHEET A	A <u>summary</u> of the background information on the cost study.
WORK SHEET B or COST CONFIGURATION INDEX	A list of all items to be costed.
WORK SHEET C	A historical journal-type record of the estimating procedure for each item.
WORK SHEET D	A bibliography of all documented sources used in making the estimate.
SYSTEM ESTIMATE	A tabular, item-by-item breakdown of the cost estimate.
SUPPLEMENTARY DATA (Form 216A)	A freeform document for recording any work-sheet or back-up information on an item-by-item basis.
BASIC DATA SHEET	A summary form that integrates all data used to derive the estimates for each item.
COST ESTIMATE CONFIDENCE RATING	A numerical statement and a narrative explanation of the estimator's degree of confidence in the estimate.
FUNCTIONAL COST-HOUR REPORT	A tabular breakdown of the cost estimate by functional (tooling, engineering, quality control, etc.) categories.
ESTIMATING TABLE	A step-by-step arithmetic derivation of each item's cost.

A SCHEMATIC EXHIBIT OF THE
BASIC DOCUMENTATION FILE (Continued)

<u>DOCUMENT</u>	<u>PURPOSE</u>
EVALUATION FORMAT	An alternative form to the Estimating Table used when variable weights have been assigned to different data used.
ESTIMATING RELATIONSHIP RECORD	A record of all estimating relationships developed or updated during the process of making the estimate.
EXPERT SOURCE RECORD	A record of all knowledgeable persons and organizations consulted in deriving the estimate.

SECTION I

INTRODUCTION

New requirements relative to the documentation of cost estimates constitute one of the major innovations of AFSC L 173-1 (Cost Estimating Procedures). These innovations are predominantly in the Basic Documentation File, the file retained by the office preparing the cost estimate. The format of the Program Documentation, the documentation submitted to higher headquarters, remains relatively simple and unchanged. The cost portion of the Program Documentation consists essentially of the total and subdivided cost estimate, itself, plus a narrative methodological statement explaining how the estimate was derived.

On the other hand, AFSC L 173-1 establishes approximately fourteen (14) new formats or sections of a Basic Documentation File (BDF). One of the key purposes of the BDF is to make available in a standardized, systematized fashion the information needed for preparing an informative narrative methodological statement to accompany the program cost estimate.

Another closely related objective of the BDF is to insure that the office that has derived the cost estimate has, readily at hand, a back-up file in sufficient detail to enable an independent reviewer or a subsequent user of the estimate to retrace completely the step-by-step derivation of the estimate as made by the original estimator.

This paper aims to be useful both to cost estimators and to reviewers (including users) of cost estimates. First, estimators may find the paper helpful in double-checking their estimates for compliance, completeness, and consistency prior to releasing the estimates to reviewing

and approving echelons. Hopefully, reviewing offices will find the paper useful in standardizing the reviews by different reviewing personnel, of cost estimates prepared by different offices, for different purposes, in different time periods, for different systems.

A paper on this subject is considered advantageous because:

- a. The current, increased Department-of-Defense emphasis on accurate, traceable cost estimates means that henceforth Air Force cost estimates will be more closely reviewed than ever before.
- b. The various reviewers of cost estimates have not only different product backgrounds, but varying familiarity with the fine details of AFSC L 173-1 documentation requirements.
- c. Most important, in some areas 173-1 guidance is general, suggestive, and spread throughout the document rather than specific, directive, and consolidated in one section.

AFSC L 173-1 contains a useful four-page summary (preceding the Index) of documentation requirements. This paper, as indicated previously, seeks to go beyond this summary by providing guidance that will help both the estimator and subsequent reviewers judge the adequacy of the submissions.

SECTION II

THE TWO COST DOCUMENTATION FILES

AFSC L 173-1 provides direction on two cost estimate documentation files; these are described below.

PROGRAM DOCUMENTATION

This file constitutes the cost portion of the AFR-375 reports that must be prepared and submitted to higher echelons when program approval is requested from Hdq. USAF and the Office of the Secretary of Defense.

The cost portion (Section 11) of the various Program Documents (PTDP, PSPP, etc.) must contain:

- a. A narrative Introduction
- b. AFSC Form 216, System Estimate
- c. AFSC Form 216A, Supplementary Data for
System Estimates (Cost Methodology)

BASIC DOCUMENTATION

The Basic Documentation File is the complete file on the cost estimate, retained by the office preparing the estimate. From this file it should be possible to reconstruct the step-by-step methodology used to derive the estimate.

Some parts of the Basic Documentation File are mandatory; certain forms must be prepared for every cost estimate. Other parts of the Basic Documentation File are optional or contingent. Optional segments are those forms that may be prepared by the estimator if he wishes. Contingent segments are those forms and reports that must be completed

for certain types of estimates, but need not for others. The various forms are listed in Sections III and IV.

SECTION III
MANDATORY DOCUMENTS
WORK SHEET A

<u>TITLE:</u>	WORK SHEET A
<u>FORM NUMBER:</u>	AFSC FORM 216A
<u>PURPOSE:</u>	The cost estimator initially completes WS-A in rough draft shortly after he begins the estimating assignment and he revises this form throughout the project as his information changes. The purpose of WS-A is to briefly summarize the most important background information that the cost estimator plans to use in making the cost estimate. WS-A has a narrative type format; in other words, AFSC L 173-1 specifies only the major topics to be covered in WS-A.
<u>INSTRUCTIONS FOR PREPARATION:</u>	AFSC L 173-1, App 3, p. 12 [*]
<u>COMPLETED SAMPLE FORMS:</u>	173-1, 3, pp 3-12 [*]

* The numbers cited in Instructions for Preparation and Completed Sample Forms on all the forms listed in Sections III and IV refer to a particular Chapter or Appendix, including page numbers, in AFSC L 173-1, -2, or -3.

BASIC CONTENT:

Although there is no detailed, completely specified list of points that must be included on the WS-A for every cost estimate, the following major questions should be answered:

- a. Who requested the cost estimate, and for what purpose?
- b. What major types or categories of costs, if any, are to be excluded from the estimate, and why?
- c. What organizational units or individuals are to participate in deriving the estimate; how much time will they be allowed to make the estimate?
- d. What access constraints, if any, are placed on the cost estimators relative to seeking data or expert assistance?
- e. How has the system or requirement to be costed been described?
- f. What previous analogous system, program or requirement can provide a useful data base for costing this new requirement?
- g. What are the major areas of uncertainty surrounding this estimate that could cause errors in the completed estimate.

COMPLIANCE AND CONSISTENCY
CHECKS:

- a. The statements relative to scope of costs covered (items included vs. items excluded) in Section 3c and 3d of WS-A should be consistent with the breakdown of the items to be costed provided on Work Sheet B.
- b. The analogous items and systems identified in Section 1 (Background) of WS-A should agree with the analogies actually used or cited in the item-by-item derivations on Work Sheet C, the Basic Data Sheets, and AFSC Form 216A.
- c. The scope of costs specified in 3c and 3d of WS-A should be appropriate to the purpose of the estimate as also prescribed in WS-A. For instance, if the objective is to make a "total activity" cost estimate for a proposed new system, development and operating costs as well as investment costs should be included on AFSC Form 216.
- d. Information reported on WS-A under "constraints" and that reported under "areas of uncertainty" should be consistent. For instance, if WS-A states that the estimator is denied access to the contractor responsible

for developing the major hardware for the new system, the uncertainty areas identified in WS-A should very likely include uncertainty relative to the hardware costs.

- e. The statements under "areas of uncertainty" on WS-A should correlate with the "Explanations" on the Cost Estimate Confidence Rating Sheets.

WORK SHEET B
COST CONFIGURATION INDEX (CCI)

<u>TITLE:</u>	WORK SHEET B
<u>FORM NUMBER:</u>	AFSC FORM 216A
<u>PURPOSE:</u>	WS-B is an intermediate step between the general, high-level system description reported on WS-A and the detailed item-by-item cost estimates on AFSC Form 216. The documentation requirement for WS-B can be fulfilled either by: a. Completing the WS-B form. b. Completing the Cost and Configuration Index form (CCI), AFSC Form 334.
<u>INSTRUCTIONS FOR PREPARATION:</u>	WS-B--AFSC L 173-1, A3, p 3 CCI-AFSC L 173-2, 4, pp 1-6
<u>COMPLETED SAMPLE FORMS:</u>	WS-B--AFSC L 173-1, 3, pp 13-15 CCI-AFSC L 173-2, 3, p 9 (blank form, not completed)
<u>BASIC CONTENT:</u>	WS-B or the CCI should list each item of the system or program to be costed. Each item should be subdivided on WS-B or the CCI to the level of detail at which it will be costed on AFSC Form 216.

COMPLIANCE AND CONSISTENCY
CHECKS:

- a. The item nomenclature on the WS-B or CCI should agree with that shown in the Program-Work Breakdown Structure (AFSC L 173-1, Attachment 2).
- b. The scope of items covered on the WS-B or CCI should agree with the scope of items implied in the project ground-rules as set forth on WS-A. In other words, all areas of cost that WS-A states are to be costed should be listed on WS-B or the CCI, and no areas of cost that have been ground-ruled out on WS-A should be listed on WS-B or the CCI.
- c. The level of item detail shown on WS-B or the CCI should agree with that shown on AFSC Form 216. In other words, AFSC Form 216 should report an estimated cost for each listed WS-B or CCI; similarly WS-B or CCI should list no WS-B item for which AFSC Form 216 does not have a cost estimate.

WORK SHEET C

TITLE: WORK SHEET C (SUPPLEMENTARY DATA)

FORM NUMBER: AFSC FORM 216A

PURPOSE : WS-Cs are used at the start of an estimating study to describe how the estimator intends to accomplish the item-by-item cost estimate. The WS-Cs are continually updated throughout the period of the estimate's derivation as new information is received and/or estimating procedures change. Consequently at any time during the course of a cost study and at completion, the WS-Cs should provide an updated statement of the item-by-item estimating procedure. Updating, except for very minor changes, is accomplished by completing new WS-Cs and appending them to the previously completed sheets.

INSTRUCTIONS FOR PREPARATION: AFSC L 173-1, 8, p 2, A pp 3-4

COMPLETED SAMPLE FORMS: AFSC L 173-1, 3, pp 16-19

BASIC CONTENT:

- a. WS-C should describe what type estimating method will or has been used to cost the designated item.
- b. If the choice of estimating method is considered conjectural, WS-C should explain why this particular estimating method has been chosen vs. other possible estimating methods.
- c. WS-C should list the particular data, such as technical characteristics and the specific costs of analogous systems, that have been used to derive the estimated cost for this item.

COMPLIANCE AND
CONSISTENCY CHECKS:

Both external and internal consistency checks should be made on Part C:

- a. External - It should be verified that all changes in estimating method and data sources used in deriving the Basic Data Sheets and the cost estimates appearing on AFSC Form 216 have been fully explained on WS-C.

Any knowledgeable person or organization used in deriving the estimate and recorded on AFSC 12 (Expert Source Record) should be noted on the appropriate WS-C.

COMPLIANCE AND
CONSISTENCY CHECKS
(Continued):

Any estimating relationships recorded on Work Sheets E should be indexed by the appropriate item on WS-C.

- b. Internal - The logic of Subsection C of WS-C, "Proposed Method of Estimating" should be completely clear. An independent reviewer should be able to trace how the estimator selected the proposed estimating method described in Subsection C from the information reported in Subsection B of WS-C.

WORK SHEET D

BIBLIOGRAPHY

TITLE: WORK SHEET D (BIBLIOGRAPHY)

FORM NUMBER: AFSC FORM 216A

PURPOSE : The purpose of WS-D is to provide a complete record of all documented sources of information used in deriving the cost estimate for each item.

INSTRUCTIONS FOR PREPARATION: AFSC L 173-1, 8, pp 2-3, A3 pp 5-6

COMPLETED SAMPLE FORM: AFSC L 173-1, A3, p 6

BASIC CONTENT: The following information should be recorded for each documented source reported on WS-D:

- a. The title of the document.
- b. The author or issuing agency.
- c. The publication date of the document.
- d. The date of the specific information taken from the document when this date differs from the publication date of the document.
- e. The Cost Information System file location or other library source from which this publication was obtained.

BASIC CONTENT:
(Continued)

- f. An accession number to identify the document. This accession number will be used throughout the file covering the cost estimate whenever it is necessary to reference the document.

COMPLIANCE AND
CONSISTENCY CHECKS:

WS-D should be checked for consistency (freedom from duplication or contradiction) with WS-C, the Basic Data Sheets (BDS), and the Expert Source Record (AFSC Form 12). For instance, no document should be recorded on WS-D that is not referenced on at least one BDS; similarly, no documents should be referenced on the BDS that are not recorded on WS-D. In numerous cases the source for a given item cost estimate will be an undocumented expert source or a calculation on WS-C rather than a particular documented source.

SYSTEM ESTIMATE

<u>TITLE:</u>	SYSTEM ESTIMATE
<u>FORM NUMBER:</u>	AFSC FORM 216
<u>PURPOSE:</u>	AFSC FORM 216 serves two purposes: a. Columns A through L and P and Q record the total and subdivided cost estimate. b. Columns M, N, O, and R record changes in cost estimates for purposes of the Estimate Tracking System.
<u>INSTRUCTIONS FOR PREPARATION:</u>	a. For cost estimating - AFSC L 173-1, 7, p 1; 8, p 4, 9; A3, pp 12-14 b. For cost tracking - AFSC L 173-1, 7, p 11
<u>COMPLETED SAMPLE FORMS:</u>	a. For cost estimating - AFSC L 173-1, 7, pp 2-3 b. For cost tracking - AFSC L 173-1, A1, pp 2-3
<u>BASIC CONTENT:</u>	a. For cost estimating: Form 216 subdivides the total cost estimate by: 1. Type of cost--cost category, appropriation code, Budget Program Activity Code (BPAC),

BASIC CONTENT (Continued):

Material Program Code, or
Program-Work Breakdown
Structure Item Code.

2. Fiscal year for each type of
costed listed above.

b. For cost tracking: Form 216
records the changes in each item's
cost from one estimating period to
the next.

COMPLIANCE AND CONSISTENCY
CHECKS:

a. For cost estimating: Form 216 con-
solidates the individual item's
derivation reported in detail on
the BDS and WS-C. Therefore,
there should be a BDS and a WS-C
for each item for which a cost
estimate is reported on Form 216,
and the estimates shown on Form
216 should be readily derivable by
the methodology described on the
BDSs and WS-Cs. The Cost Es-
timate Confidence Rating (CECR)
in Column 0 should agree with that
shown on AFSC Form 27 (Cost
Estimate Confidence Rating).

b. For cost tracking: The classi-
fication of the type of change in
Columns M and N should agree
with the change category reported

COMPLIANCE AND
CONSISTENCY CHECKS
(Continued):

in Column 0 and the corresponding
narrative explanations on Form
216A, (Column B).

SUPPLEMENTARY DATA FOR SYSTEM ESTIMATE

TITLE:

SUPPLEMENTARY DATA FOR
SYSTEM ESTIMATE

FORM NUMBER:

AFSC FORM 216A

PURPOSE:

AFSC Form 216A is a "free-form," multi-purpose form that has two major uses:

- a. The Estimate Tracking System uses the form to record item-by-item explanations for deviations between the cost estimate recorded on AFSC Form 216 and those contained in the approved OSD program.
- b. A second major general-purpose use of the form is to record any type of information that helps document the derivation of the completed cost estimate. For instance, the form may be used to record Work Sheets A, B, C, and D, the Basic Data Sheets, and the Evaluation Formats. It may also be used to record narrative summaries of the Work Sheet data or for conveying a reviewer's evaluation of an estimate to a decision maker.

INSTRUCTIONS FOR
PREPARATION:

AFSC L 173-1, A3. 15-18

AFSC L 173-3, pp 12-14. Also, see instructions on Work Sheets A, B, C, and D, Basic Data Sheets, and Evaluation Formats.

COMPLETED SAMPLE FORM:

AFSC L 173-3, A1, pp 4-5A

BASIC CONTENT:

The instructions covering the various Work Sheets (A, B, C, etc.) should be referenced when using 216A to document the derivation of an estimate. In using 216A for cost-tracking purposes it is important to note both the reason for the change and the organizational unit responsible for the change.

COMPLIANCE AND
CONSISTENCY CHECKS:

- a. When 216A is used as a Work Sheet form (Work Sheet A, B, C, D, etc.), the consistency checks noted under the appropriate Work Sheet section of this paper are relevant.
- b. When 216A is used for cost-tracking purposes, it is important that the changes in cost estimates be fully traceable to the reasons specified on 216A.

BASIC DATA SHEETS

<u>TITLE:</u>	BASIC DATA SHEETS
<u>FORM NUMBER:</u>	AFSC FORM 216A
<u>PURPOSE:</u>	The Basic Data Sheet is a summary-type indexing form, prepared on an item basis, that integrates the internal and external documented sources of information used in deriving the completed estimate.
<u>INSTRUCTIONS FOR PREPARATION:</u>	AFSC L 173-1, pp 8-3
<u>COMPLETED SAMPLE FORMS:</u>	AFSC L 173-1, pp 8-3
<u>BASIC CONTENT:</u>	The BDS lists the specific catalog-type data (e. g. , per unit vehicle costs) used in making the cost estimate; also the page number of the source of such data. The BDS also gives the Cost Estimate Confidence Rating for the item, plus the specific page number of the Basic Document File where the full details covering the Cost Estimate Confidence Rating for the item can be found.
<u>COMPLIANCE AND CONSISTENCY CHECKS:</u>	The BDSs should be checked to insure that they correlate with WS-Cs and WS-Ds:

COMPLIANCE AND
CONSISTENCY CHECKS
(Continued):

- a. The WS-Cs and the BDSs are both concerned with recording the method used to derive the estimate of each item's cost, and, therefore, should be checked for consistency. WS-C aims to give the detailed, step-by-step, historical account of how each item's estimate was planned and ultimately derived. The BDSs aim to summarize the salient detail of the ultimate derivation, especially when this derivation consisted of a simple catalogue-type extraction.
- b. WS-Ds and BDSs should also correlate since they both are bibliographic in nature. The BDS should give the specific page number of the general source document listed on WS-D that is applicable to the item covered by the particular BDS. The full title of each source listed on a BDS should be identified on the WS-D, and at least one BDS should reference each title reported on WS-D.

COST ESTIMATE CONFIDENCE RATING

<u>TITLE:</u>	COST ESTIMATE CONFIDENCE RATING (CECR)
<u>FORM NUMBER:</u>	AFSC Form 27
<u>PURPOSE:</u>	The CECR expresses the estimator's degree of confidence in the total cost estimates as well as in the estimated costs for the major individual items of cost.
<u>INSTRUCTIONS FOR PREPARATION:</u>	AFSC L 173-1, Attachment 3, pp 8-11, 1
<u>COMPLETED SAMPLE FORM:</u>	AFSC L 173-1, Attachment, p 10
<u>BASIC CONTENT (Revised Edition):</u>	Four sections (A, B, C, and D) comprise the CECR: - Section A states the magnitude of the particular item covered by the CECR as a per cent of the total Development, Investment, or Operating Cost. - Section B gives the estimated range of cost--most likely, lower bound, upper bound. - Section C records the numerical CECR for the item. - Section D provides narrative statements plus numerical CECRs covering the specific factors

BASIC CONTENT
(Revised Edition) (Continued):

COMPLIANCE AND
CONSISTENCY CHECKS:

contributing to the relative certainty or uncertainty of the cost estimate for the item.

- a. A CECR should be prepared for each item for which a cost estimate appears on AFSC Form 216.
- b. Section B (Range of Cost) need be completed only when the percentage entry in Section A exceeds 10% and when the CECR recorded in Section C is 3, 4, or 5.
- c. Each of the five (5) major factors in Section D must be completed. Completion of the lower-level subdivisions of these factors is optional.
- d. The consolidated CECR recorded in Section C reflects the estimator's judgment in totally assessing the information in Section D. As such, the consolidated rating recorded in Sections C and D need not be a simple arithmetic average of the ratings for the individual factors in Section D.
- e. If the ratings in Sections C and D are low (e.g., 4 or 5), the range of costs reported in Section B should be relatively wide (e.g., at least 50-100% from low to high).

COMPLIANCE AND
CONSISTENCY CHECKS
(Continued):

- f. The ratings in Section D should be subjected to an internal consistency check. For instance, if a rating of five is assigned to "State of the Art" under "Nature of the Item" with a narrative explanation that the item will require a major technological development, then "Specification Status" under "Item Descriptions" should be 4 or 5 rather than 1 or 2.
- g. Section D of the CECR and WS-A statements relative to "Areas of Uncertainty" should represent an extraction of the "Explanations" on the CECRs.
- h. The CECR for the total cost estimate, recorded in Column "0" of AFSC Form 216 should be checked for arithmetic accuracy and for compliance with completion instructions. These instructions are contained in AFSC L 173-1, pp 8-4 and A 3-15.

SECTION IV
OPTIONAL OR CONTINGENT DOCUMENTS
FUNCTIONAL COST HOUR REPORT

<u>TITLE:</u>	FUNCTIONAL COST HOUR REPORT
<u>FORM NUMBER:</u>	AFSC FORM 329
<u>PURPOSE:</u>	This form, applicable mainly to air-craft systems, is used when a detailed analysis of costs by individual equipment manufacturer is required.
<u>INSTRUCTIONS FOR PREPARATION:</u>	AFSC L 173-2, EX VI-33-34
<u>BLANK SAMPLE FORM:</u>	AFSC L 173-2, pp 3-10
<u>BASIC CONTENT:</u>	The form subdivides an item's cost according to: - Contractor - Recurring/non-recurring classification - Functional classification (engineering, tooling, quality control etc.) - Fiscal year Except for internal arithmetic consistency, this form is more directly related to other Cost Information System forms than it is to the Cost Estimating forms described in this paper. (See AFSC L 173-2, -3, p 6.)
<u>COMPLIANCE AND CONSISTENCY CHECKS:</u>	

ESTIMATING TABLES

<u>TITLE:</u>	ESTIMATING TABLES (ET)
<u>FORM NUMBER:</u>	AFSC FORM 216A
<u>PURPOSE:</u>	The purpose of an ET is to exhibit the step-by-step arithmetic calculations used in deriving the estimated cost for an item.
<u>INSTRUCTIONS FOR PREPARATION:</u>	AFSC L 173-1, p 4
<u>COMPLETED SAMPLE FORM:</u>	AFSC L 173-1, pp 8-5
<u>BASIC CONTENT:</u>	An ET contains a self-explanatory, summary-type tabulation that shows each sequential step used in converting the basic financial and non-financial data collected into an estimated cost for an item including the fiscal year phasing of the costs. The form of the table is unstructured to allow for different estimating methods and different types of data used in different cases.
<u>COMPLIANCE AND CONSISTENCY CHECKS:</u>	a. The arithmetic calculations of an ET should be spot-checked. b. The ET should correlate with the WS-C, the BDS, and the Evaluation Formats (EF). The ET should not

COMPLIANCE AND
CONSISTENCY CHECKS
(Continued):

use data not initially reported in WS-C. An ET should not duplicate summary data shown in BDS. The EFs also aim to show the procedures used for converting basic data inputs into a completed item cost estimate. Normally, therefore, either an ET or EF will suffice; both should not be prepared. If the various data inputs are to be accorded equal weight, a simple ET will suffice. If different weights are to be used, an EF is appropriate.

EVALUATION FORMATS

<u>TITLE:</u>	EVALUATION FORMATS (EF)
<u>FORM NUMBER:</u>	AFSC FORM 216A
<u>PURPOSE:</u>	Like an ET, an EF aims to show and explain the step-by-step arithmetic calculations used in deriving the estimated cost for an item.
<u>INSTRUCTIONS FOR PREPARATION:</u>	AFSC L 173-1, 4, pp 6-8; 8, 3
<u>COMPLETED SAMPLE FORM:</u>	AFSC L 173-1, pp 4-7
<u>BASIC CONTENT:</u>	An EF has two sections: the self-explanatory arithmetic calculations showing the step-by-step derivation of the estimate, and a narrative section explaining the variable weights assigned to each of the data used in making the estimate.
<u>COMPLIANCE AND CONSISTENCY CHECKS:</u>	- The arithmetic calculations should be spot-checked. - The data sources cited on EFs should correlate with those reported on WS-C. - The "Explanations for Weightings" (Section B) should be clear, complete, and plausible.

COMPLIANCE AND
CONSISTENCY CHECKS
(Continued):

The logic of the weighting should correlate with information contained on AFSC Forms 12, "Expert Source Record" that accompany the estimate.

ESTIMATING RELATIONSHIP RECORD

<u>TITLE:</u>	ESTIMATING RELATIONSHIP RECORD (ERR)
<u>FORM NUMBER:</u>	AFSC FORM 216A
<u>PURPOSE:</u>	The ERRs provide a record of all ERs developed or updated during the process of making a cost estimate. These ERRs are inputs to a permanent, cumulative file in the Cost Information System that serves as a quick index of the sum total of ERs developed to date for all Program-WBS items.
<u>INSTRUCTIONS FOR PREPARATION:</u>	AFSC L 173-1, pp A3-7
<u>COMPLETED SAMPLE FORM:</u>	AFSC L 173-1, pp 5-13
<u>BASIC CONTENT:</u>	Each ERR includes the following: - Nomenclature of item covered. - Brief description of the estimating relationship. - A statement as to what information is needed to use the ER (e.g., the values of what independent variables must be known). - Precautions and qualifications on use of the ER.

BASIC CONTENT

(Continued):

- e. Title, author, and date description of the basic document in which the ER and its supporting documentation can be found.

COMPLIANCE AND CONSISTENCY CHECKS:

- a. The WS-Cs, the BDS, ETs and the EFs (since they describe the item-by-item estimating methodology) provide clues relative to what ERs have been developed or updated during the process of making an estimate. The ERRs actually prepared should be checked against these other forms that indicate what ERs were developed.
- b. The statements contained in the "Nature of the ER," "Information to Use," and "Qualifications in Use" blocks of the ERR should be sufficiently clear and complete so that an estimator can assess the likely coverage and applicability of the ER to his problem without retrieving the basic documentation file of the ER.
- c. The title, author, and date information should be sufficiently complete to enable quick retrieval of the basic file on the ER from the issuing

COMPLIANCE AND CONSISTENCY
CHECKS (Continued):

agency, Defense Documentation
Center, or any AFSC Cost Analysis
Library.

EXPERT SOURCE RECORD

TITLE: EXPERT SOURCE RECORD (ESR)

FORM NUMBER: AFSC FORM 12

PURPOSE: The ESRs provide a permanent, documented record of all knowledgeable persons and organizations consulted and found useful in deriving the estimate.

INSTRUCTIONS FOR USE: AFSC L 173-1, pp 4-10

COMPLETED SAMPLE FORM: AFSC L 173-1, pp 4-10

BASIC CONTENT: Each ESR will include:

- a. A description of the information provided.
- b. The person and organizational affiliation providing the information.
- c. The estimator's assessment of the reliability and validity of the information received.
- d. The date that the ESR was prepared.
- e. The name and organizational affiliation of the estimator preparing the ESR.

COMPLIANCE AND CONSISTENCY CHECKS: a. The information furnished on the ESR should be sufficiently complete so that a reviewer or subsequent estimator, if he so desires, could

COMPLIANCE AND CONSISTENCY
CHECKS: (Continued):

- expeditiously inquire further into the referenced data either with the estimator or with the expert source.
- b. The reliability coding should correlate with the relative weighting assigned the designated source on any applicable EFs.
 - c. The WS-Cs, the BDS, the ETs and the EFs (since they describe the item-by-item estimating methodology) provide clues relative to what ERs have been developed or updated during the process of making an estimate. The ERRs actually prepared should be checked against these other forms that indicate what ERs were developed.
 - d. The statements contained in the "Nature of the ER," "Information to Use," and "Qualifications in Use" blocks of the ERR should be sufficiently clear and complete so that an estimator can assess the likely coverage and applicability of the ER to his problem without retrieving the basic documentation file of the ER.

COMPLIANCE AND CONSISTENCY
CHECKS (Continued):

e.

The title, author, and date information should be sufficiently complete to enable quick retrieval of the basic file on the ER from the issuing agency, Defense Documentation Center, or any AFSC Cost Analysis Library.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R&D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) The MITRE Corporation Bedford, Massachusetts		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE Documentation Requirements for AFSC Cost Estimates An Estimator's and Reviewer's Guide		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) N/A		
5. AUTHOR(S) (Last name, first name, initial) JONES, Martin V.		
6. REPORT DATE AUGUST 1967	7a. TOTAL NO. OF PAGES 42	7b. NO. OF REFS 0
8a. CONTRACT OR GRANT NO. AF 19(628)-5165	9a. ORIGINATOR'S REPORT NUMBER(S) ESD-TR-67-93	
b. PROJECT NO. 800C		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	MTR-269	
10. AVAILABILITY/LIMITATION NOTICES This document has been approved for public release and sale; its distribution is unlimited.		
11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY Cost Analysis Division, Electronic Systems Division, L. G. Hanscom Field, Bedford, Mass.	
13. ABSTRACT Major changes in the documentation requirements for all cost estimates prepared within the Systems Command have been established by AFSC L 173-1 (Cost Estimating Procedures). The new requirements consist of fourteen separate worksheets and formats that constitute a Basic Documentation File. This paper seeks to provide an explicit, standardized easily referenced guide to these requirements. It is hoped that estimators will find the paper helpful in preparing and in double-checking their estimates for compliance, completeness, and consistency prior to releasing them to reviewing and approving echelons. Hopefully, too, reviewing offices will find the paper useful in standardizing the reviews by different personnel reviewing cost estimates prepared by different offices, for different purposes, in different time periods, for different systems. Although this paper is addressed primarily to Air Force cost estimators, it should also be of interest to industrial and non-profit contractors that work closely with Air Force estimators in preparing cost estimates to support system studies.		

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Basic Documentation File Cost Estimating Procedures Documentation Requirements Estimating Reviewing						

INSTRUCTIONS

1. **ORIGINATING ACTIVITY:** Enter the name and address of the contractor, subcontractor, grantee, Department of Defense activity or other organization (*corporate author*) issuing the report.
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13. **ABSTRACT:** Enter an abstract giving a brief and factual summary of the document indicative of the report, even though it may also appear elsewhere in the body of the technical report. If additional space is required, a continuation sheet shall be attached.

It is highly desirable that the abstract of classified reports be unclassified. Each paragraph of the abstract shall end with an indication of the military security classification of the information in the paragraph, represented as (TS), (S), (C), or (U).

There is no limitation on the length of the abstract. However, the suggested length is from 150 to 225 words.

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE SYSTEMS COMMAND
ANDREWS AIR FORCE BASE, WASHINGTON, D.C. 20331



16 OCT 1967

REPLY TO
ATTN OF

SCTLI

SUBJECT

Non-Technical Data in DDC

TO

ESD (ESTI/Mr. Doherty)

The attached copies of ESD-TR-67-93 have been removed from DDC for the reasons indicated in the attached correspondence. The documents are returned for your disposition.

FOR THE COMMANDER

Raymond E. Owens
RAYMOND E. OWENS, LtCol, USAF
Chief, Technical Information Office
Directorate of Technical Liaison/DOL

4 Atchs

1. SCCCE Ltr, 12 Oct 67
2. SCTLI Ltr, 5 Oct 67
3. SCFPD Ltr, 29 Sep 67
4. ESD-TR-67-93 (20 cys)

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE SYSTEMS COMMAND
ANDREWS AIR FORCE BASE, WASHINGTON, D.C. 20331



REPLY TO
ATTN OF: SCKPR

12 OCT 1967

SUBJECT: Non-technical Data in DDC (Your letter to SCKPR, 5 Oct 67)

TO: SCKPR

1. Referenced letter was forwarded to this directorate as the office of primary responsibility.

2. We concur with the removal of the Mitre Corporation report MPR-269 from PDP, mainly because AFSC L 173-1, on which it is based, has been revised into a manual, now in print. The references to AFSC L 173-1 and to specific page and paragraph numbers, therefore, are incorrect.

3. It is suggested, however, that AFSCR 80-20 be reviewed with the thought of possibly revising paragraphs 2 and 2b. This suggestion is based on the fact that a report identifying technical advances without consideration of the resources involved is, in a large sense, incomplete.

W. L. S. S. S.
WILLIAM L. SUTCOMB, JR, Colonel, USAF
Director of Cost Analysis
DCS/Comptroller

1. Attached is a document in DDC

2. (Mr. Nowak)

3. The document was prepared by the MITRE Corporation
4. as a Defense Force contractual effort and was submitted to DDC as
5. a technical report.

6. Only copies of this document were removed from DDC as
7. stated in the attached SCFPD 29 Sep 67 letter, since the document
8. does not satisfy the requirements of a technical report. Paragraphs
9. 1 and 2 of AFM CR 80-20 state in part that "management, operational,
10. tactical or administrative reports, although such reports may be
11. directly associated with a technical effort, and may reflect technical
12. efforts, status, plans, or proposals, their purpose is not to report
13. technical information resulting from the effort, but rather the adminis-
14. trative details essential for the continued management of the effort,"
15. and should not be entered into the DOD STINFO structure.

16. In view of the above circumstances, request this document be
17. reviewed and advise this office whether special consideration should
18. be given to enter the document into the DOD STINFO structure.
19. Justification and your views as to how this document will benefit the
20. scientific and engineering community should also be furnished.

21. Your prompt attention to this matter would be appreciated.

22. J. W. MATTHEWSON
23. Technical Information Office
24. Directorate of Technical Liaison

25. 2 Atchs

26. 1. SCFPD Ltr, 29 Sep 67
27. 2. ESD-TR-67-93

THE MITRE CORPORATION

BEDFORD, MASSACHUSETTS

16 September 1967

C51-1219

Commander
Electronic Systems Division
Air Force Systems Command
L. G. Hanscom Field
Bedford, Massachusetts

Attention: E. M. Doherty, ESTIP

Subject: ESD-TR-67-93

Gentlemen:

We are enclosing 63 copies of ESD-TR-67-93, 20 for DDC, two for your files, one for the Air Force University, and 40 for distribution to the agencies on the primary distribution list. Publication and distribution of this document have been mutually agreed on by MITRE and ESD project personnel.

Sincerely,

Patricia J. Chatta

Patricia J. Chatta
Publications

PJC:1b

Attachments (63)

cc: Major P. J. Roux, ESZ

MTR-269, "Documentation Requirements for AFSC's Cost Estimates: An Estimator's and Reviewer's Guide."

3 March 1967

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