RAYTHEON

GENERAL POLICIES AND PROCEDURES

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AUTHORIZED BY	
Vice President - Controller	

SUBJECT: COST REDUCTION PROGRAM

1. PURPOSE - Minimum criteria is needed to support the Company's formal Cost Reduction Program established as a result of the affirmative response of the Company to the request of the Department of Defense for the establishment of a formal program.

2. STATEMENT OF POLICY

2.1 The formal Cost Reduction Program has been established by the Executive Council.

2.2 The Raytheon Cost Reduction Program, for administration and reporting purposes, will feature standardized policies, definitions, and nomenclature.

2.3 Although it is recognized that cost reduction efforts are widespread throughout the Company, additional improvement can take place by the use of more formal procedures. The principal guidelines are contained in this statement.

2.4 Methods and procedures have been developed and implemented to document, within the framework of the definitions supplied, what can be reported as cost reductions.

2.5 The ability to collect, evaluate, and report cost reductions is entirely dependent upon the generation of ideas for a cost reduction. In this very fundamental area, organizational entities throughout the Company are to extend and reinforce their systematic, continuous search for cost improvements, using the benefits of full-time assignments, such as Value Engineering and Purchase Analysis, wherever possible.

2.6 The following parameters guide Divisions in their consideration of the general coverage and the principal objectives of the Raytheon Cost Reduction Program.

2.6.1 A distinction is made between cost control and cost reduction. Cost control is, and will continue to be, a way of life at Raytheon, where all employees strive to operate in accordance with the cost objectives and budgets established by decentralized Division management. Cost reduction concerns itself with new actions which tend to improve these cost objectives permanently.

2.6.2 As specifically related to the Raytheon Program, all valid cost savings (as defined under paragraphs 3.2 and 3.3) are reportable except those:

(a) excluded specifically through contractual agreement, such as costs applicable to firm fixed-price contracts, or the Raytheon share of cost reductions as provided within the framework of incentive-type contracts, and

(b) excluded by principle, such as cost allocations of overhead and G & A expense. (See paragraph 6.4.5 d for the handling of cost allocations as required in VECP estimates.)

2.6.3 Each business function at the cost center level participate, and each supervisor responsible for any element of cost throughout the Company should be the focal point of this participation.

2.6.4 The Program provides for establishment of semi-annual goals (expressed in terms of annual rates) which, by and large, is in addition to the "task" normally negotiated into Division operating budget commitments. Achievement of cost reductions throughout the year against such goals will not cause changes in current year budgets, but rather will form the basis for budget reductions in the following year.

2.6.5 Cost savings are developed by means of a computational approach which is conceptually consistent throughout the Company and acceptable to the Company Program Administrator and to the functional Staff involved. For example, questions which arise relative to the computation of manufacturing labor savings beyond the guides set forth in this manual will be discussed with the Company's Manufacturing Consulting Staff.

2.6.6 Records are maintained and made available to Staff Office representatives, Cost Reduction Program representatives, or internal auditors for review and examination of reported savings, and such records will be maintained for no less than two years. Decisions to dispose of these records must be cleared in advance with the Program Administrator.

2.6.7 Evaluation and acceptance of cost reduction projects, and the recording of indicated savings in line with the definitions as set forth in the statement, must be documented so that the achievement of projected savings can be verified. The use of a policy involving a forward estimating period offers administrative simplicity in Cost Reduction Programs, but reasonable conciliation must exist as between the expected performance of a project and the actual accomplishment.

2.6.8 Periodically, but not less often than each quarter, Division Cost Reduction Program Chairmen furnish the Company Program Administrator and other Division Cost Reduction Program Chairmen a list of all projects developed and placed in effect by the Division which have potential for use elsewhere in the Company. This procedure provides for the necessary interchange of information between Divisions of the Company and is also used to determine the number of exchange ideas successfully implemented in the Company (see CS-102).

2.6.9 Administrative procedures are established by each Division in concert with the guidelines expressed herein and directly in accordance with the attached exhibits to

(a) evaluate cost reduction proposals,

(b) supervise the acceptance and/or rejection of proposals,

(c) provide for proper filing of, access to, and approval for, projects,

(d) provide for reporting to the Controller, where over-all reports will be developed and forwarded to the DOD,

(e) validate accepted projects for compliance with stated benefits, and

(f) develop, with Corporate Staff, efficient means to disseminate specific accomplishments to other Divisions throughout the Company.

2.6.10 Motivation for significant and continuing cost reduction effort is best accomplished by taking direct cognizance of such creative work in the administration of the Company's employee compensation and promotion programs.

2.6.11 At the discretion of Division General Managers, specific motivational programs such as Suggestion Systems, PEP (a zero defects-type program), and the like, may be used to intensify the submission of ideas which, among other advantages, support the Cost Reduction Program. In these cases, when approved by the Executive Office, recognition may be additionally accomplished through an award program consistent with the value of cost savings actually developed.

3. DEFINITIONS

3.1 Program Cost Reductions - Dollar savings resulting from changes in the requirement for Direct Material, Direct Labor, and/or any Indirect Expense on products and/or activities within the Company through improved management, techniques, procedures, or processes, in relation to the dollars that would have been incurred had the cost reduction not been made, but resulting in products of acceptable quality and reliability.

3.2 Cost Reduction Project - A specific change in operating practice which has been proposed and accepted through Form CS-101 and which demonstrates a computed cost reduction with appropriate support and validation information, including consideration of the costs associated with installation of the change. Projected savings are generally computed for (a) the next 12 months in the case of recurring savings, or (b) the remaining life of an existing contract or program in the case of non-recurring savings (unless the savings are applicable to NASA where this share is also to be calculated for the next 12 months). Problems arising because of classification decisions between (a) and (b) should be referred to the Company Program Administrator.

3.3 Reportable Savings from Cost Reduction - Has been adopted by the DOD and NASA as descriptive of actions which result in savings through the contractor's reduction, elimination, or avoidance of expenditures of funds which, had they been incurred, would have been (a) recognized as allowable costs by, or (b) reimbursed by, the Government.

3.4 Principal Technique - A key method of investigation and analysis which can be positively identified and consistently applied toward the development of improved, and thereby less costly, procedures for the conduct of any function in a business enterprise.

3.5 Goals - Objectives for annual rates of cost savings, expressed in dollars and developed for each Principal Technique scheduled for use in the six-month period, against which monthly achievement will be measured.

3.6 Major Programs - Company-wide cost reduction projects suggested to or by senior management and approved for installation by the Executive Council under the cognizance of a Staff Office Head. The parts of such programs applicable to a Division will be treated the same as a normal Division project, with savings added to the Division's other cost reduction accomplishments and included as part of the Division's measurement against their Goals.

3.7 NASA Standards - A set of statements made effective in a NASA Management Instruction of January 15, 1966 providing reasonableness tests for the conduct of contractor programs and for the evaluation of contractor reports. In general, these statements are compatible with the requirements developed by the DOD Guidelines and implemented within the Raytheon Program.

3.8 Cost Reduction/Cost Avoidance Relationship - Cost Reductions result in changes made to improve the present way of doing things. Cost Avoidance projects describe savings resulting from doing a job differently from the way it might have been done, or differently than it had been planned to have been done -- in other words, savings generated because of improvements in practice or procedure developed before any costs are incurred on the initial or "old" practice. As a point of verification to test the existence of a valid avoidance, the project reviewer must establish, within reasonable doubt, that the initial, or "old" way of doing a job would have, indeed, come to pass. Examples of intent to proceed without the improvement would be

(a) approved budgets authorizing expenditures for the "old" practice,

(b) target cost levels established by customers as being acceptable to accomplish the stated specifications, or

(c) cost estimates for contracts actually submitted by the Company.

In matters of avoidance, care must be exercised to prevent duplication in those instances where "follow-on" contracts are accepted by the Company at cost performance levels not yet achieved. Such savings are clearly Cost Avoidance to the customer; to the Company they represent advance reductions -- promised, but yet to be accomplished. The accomplishment, if developed, will take the form of regular Cost Reduction projects which, if "counted" again, would generate unwanted duplication in the Company's reporting.

3.9 Reportable Savings from Cost Avoidance - Rules for estimating cost avoidances are the same as for cost reductions except where the avoidance is valid at the "sales" level (that is, including all costs plus fee). In these cases, the procedure is the same as that for Value Engineering Change Proposals (see paragraph 6.4.5 d).

3.10 Monitor: NASA Representative - A senior-ranking person appointed by DOD or NASA to whom Raytheon semi-annual reports are directed and by whom official review and evaluation is made of such reports and of Raytheon's conduct of its program.

3.11 Validation - A review process, normally scheduled some 3-6 months after a cost reduction project is placed in effect, which re-examines the assumptions and circumstances employed in developing the project savings. The objective is not to recompute the CS-101 for the project, but rather to be reasonably satisfied that the changes proposed have been fully implemented and that the values used in the calculations are not seriously in error.

4. APPLICABILITY - This policy is mandatory for divisions of the Government Group and for all other divisions or subsidiaries who engage significantly in U.S. Government business. Divisions or subsidiaries who are not included in the aforementioned description are directed to utilize the formal system or a reasonable alternative as part of their profit improvement activities.

5. RESPONSIBILITIES

5.1 The Vice President-Controller has been assigned responsibility for program initiation and administration throughout the Company.

5.2 The Assistant Controller-Management Analysis has been appointed Company Program Administrator.

5.3 General Managers have been assigned the responsibility to implement and conduct a formal program in their Divisions, and must not redelegate this responsibility.

5.4 For purposes of standardization throughout the Company, each Division General Manager has established a Cost Reduction Committee representing all major functions (preferably as part of an existing group serving the General Manager) and appointed a Committee Chairman who is the single Division representative directly responsible to the Division General Manager for the administrative conduct of the Cost Reduction Program in that Division. Division Committees arrange for the establishment of Plant Committees and Chairmen to extend the activities of the Cost Reduction Program to the cost center responsibility level.

5.5 Division General Managers are responsible for primary validation. Random audits will be accomplished by representatives of the various Staff Offices and/or through the Internal Audit function. All projects developing savings of $100,000 or more must be fully validated.

5.6 In Divisions where budget representatives are used, it is suggested that these people also assume the task of assisting supervisors in the initiation of Cost Reduction proposals; in other cases, it is suggested that analysts from Budgets and Planning (or an organization with equivalent capability for handling cost data) be designated to work with specific groups to aid in the development of Cost Reduction projects.

6. PROCEDURES

6.1 Goals, as defined in paragraph 3.5, are submitted to the Administrator, cleared as appropriate with Staff or Group Executive, on or before the end of January (for the January-June period) or the end of July (for the July-December period).

6.2 Project Initiation and Review Procedures

6.2.1 Proposed projects are prepared by supervision (usually with the assistance of an analyst, as suggested above), and forwarded after whatever local approvals are considered appropriate, to the Division Cost Reduction Committee for consideration.

6.2.2 Projects approved on behalf of the Division by the Committee Chairman become part of the Cost Reduction Program contribution at the effective date specified in the project. It is important to be aware of the fact that only the Division Committee Chairman (or a higher authority, as set forth below) can officially accept a project which will be "counted" as part of the program.

6.2.3 Projects are presented on Form CS-101, standard throughout the Company, and available from Stationery Stores. Substantiating documentation will usually be in workpaper form, but may include properly executed forms in existing programs, such as the Purchasing Form 10-0409, or the Work Measurement form shown in the sample project.

6.2.4

Range of "Improvement"	Approval Signature Required
Up to $24,999	Chairman of Division Cost Reduction Committee
$25,000 to $99,999	Assistant General Manager or Division Controller
$100,000 or more, or if related AR exceeds $25,000	Division General Manager

6.3 Program Reporting Procedures

6.3.1 Identification and numbering of projects are made in accordance with the notes furnished in support of Form CS-101, as described on pages 13 through 16. Reporting to Monitors or NASA Representatives may require, from time to time, the use of randomly-selected projects in CS-101 format.

6.3.2 Monthly reporting for purposes of reviewing Company progress against Goals is conducted via Form CS-102. Reports are due in the Administrator's office at the close of business on the 9th working day.

6.3.3 Semi-annual reporting to DOD and NASA is developed by the Program Administrator and approved for release from the Company by the Vice President-Controller. Forms CS-102 and CS-103 are to be forwarded to the Company Administrator on the last day before the annual vacation shutdown (based on estimated data as appropriate) for the January-June period, and no later than the 10th working day in January for the July-December period. Details of preparation are given under "Notes to Forms CS-102 and CS-103."

6.3.4 EDP equipment should be utilized to summarize project cost savings and the validation requirements so that subsequent review, analysis, and reporting will be simplified. A standard IBM card format has been developed for this purpose (Exhibit B).

6.4 Computational Basis for Project Reporting

6.4.1 All cost reduction reporting will be based on changes to Direct and Indirect Labor, Direct Material, and/or Indirect Expense (the latter in the Overhead sense, as well as the General and Administrative sense). The following comments relate to the organization of the Savings Computation section of CS-101 and to specific methods for handling changes in the above-named costs:

a. Previous Cost and Proposed Cost should reflect the "steady state" basis of these two operating modes. The cost of moving from one mode to the other is represented as Implementation Cost.

6.4.2 Direct and Indirect Labor - Changes in labor costs must be related to a change in the cost per unit of activity measure for either direct or indirect labor to qualify within the Cost Reduction Program. The computation is based upon average basic rates for the job classifications involved, plus the current plant or lab factor for fringe benefit and payroll taxes. Data required should be obtained from the Budgets and Planning Group.

6.4.3 Division General Managers must satisfy themselves that savings claimed in this area are accomplished by actual reduction in labor payroll costs and by identification to the Cost Reduction project only. In many cases, for example, any single project will not conveniently provide for "whole person" changes, and there will be excesses generated in certain labor classifications.

Records which show the labor excesses in (a) hours per week, and (b) the job classification, should be made available to executives responsible for filling requisitions.

6.4.4 Purchased Material Procedures

a. All changes in Purchased Material cost due to type or content of material must be reflected in Manufacturing (or Engineering) costs per unit of activity measure to qualify within the Cost Reduction Program. The development of purchase price changes resulting from Cost Reduction projects originated in areas other than the Purchasing departments must nonetheless obtain their price estimates from their Purchasing representatives. Additionally, buyer motivation programs already in existence throughout Raytheon generate cost reductions and reporting savings under Purchasing Procedure, Section III-704, "Cost Savings Reports" (but see paragraph 6.4.4 c). Care must be exercised by Divisions in the establishment of material cost savings to be assured that duplication does not exist in reporting savings as between Purchasing and other functions.

b. The prosecution of material cost reductions by functional organizations other than Purchasing is summarized directly on CS-101. In the case of cost reductions generated by the Purchasing function, it is necessary that the person responsible for Cost Reduction Program administration in each Division analyze Form 10-0409, as provided in the above-named Purchasing procedure, to be assured that the estimating bases are consistent with the forward reporting requirements of the Cost Reduction Program. (To reduce paperwork, a month's accumulation of Form 10-0409 savings may be summarized on a CS-101.) The Director of Purchasing, Office of Manufacturing and Purchasing, issue separate advisories to Purchasing managers and buyers discussing these modifications which will be developed in addition to their regular reporting procedures. For administrative simplicity, computations are not made to separate the effects of changes in national economics.

c. Cost savings from Company-wide purchasing arrangements are NOT reported by Divisions on CS-101 or CS-102. These savings are developed centrally at the end of each six-month reporting period.

6.4.5 Indirect Expense Procedures

a. Must be shown on an "out-of-pocket" cost basis (except as noted below for depreciation and/or amortization and for certain computations controlled by Government contract rules), and must specifically identify the category of expense involved. Care should be used to exclude as savings any costs estimated from allocations or application of accounting rates, except as may be approved in the case of general office assessments by the cognizant Corporate or Division Staff Office Head and by the Company Program Administrator.

b. Depreciation "savings" are related to the eventual disposal of equipment released from service. However, depreciation cost is considered "out-of-pocket" in this program, and should be properly identified on the CS-101 under Previous Cost and/or Proposed Cost. Depreciation will not be shown under Implementation Cost. Accounting rates are used in all cases.

c. Amortization is normally related to some type of deferred cost, such as major rearrangement. The effect on a project would usually arise from the deletion of existent locations (in the form of unamortized cost which must be written-off) or from an extraordinary cost of getting to the improvement. In either case, the amounts involved should be identified on the CS-101, and explanatory notations should be attached to describe the basis for amortization in the "steady state" costs of Previous and/or Proposed Cost. Write-offs required when deleting facilities or operations represented by Previous Cost will be shown under Implementation Cost.

d. VECP's, and to some minor extent other contract modifications, require changes to contracts with data based on rules different than those prescribed for the Raytheon Cost Reduction Program. In these cases, it is permissible to calculate savings through the use of full (that is, fixed and variable together) overhead rates, G & A rates, and fee, as may be required under the circumstances. However, in all such cases, the Savings Computation section must be fully labelled for "Other Overhead Costs" (to cover the non-out-of-pocket costs), "G & A", and "Fee", and the requisite Contract Modification Data section of the CS-101 must be completed, with at least an identification of the document signifying acceptance of the VECP (or other modification) if the official modification number has not been establish

6.5 Validation Procedure - Validation audits are controlled by use of the project IBM cards. These cards are supplied to data processing (preferably Lexington Data Processing Service), where lists are developed in advance of each quarter and furnished to Chairmen indicating those projects for which validation was scheduled during the subsequent three months. Upon completion of the validation, new input information is furnished on IBM cards to Lexington Data Processing Services, where results will be tabulated for analysis.

RAYTHEON

10-0141 (4-66)

COST REDUCTION PROGRAM
PROJECT SUMMARY
CS - 101

PROJECT NO. — —

DATE EFFECTIVE

PROJECT				PRINCIPAL TECHNIQUE		
PROJECTED SAVINGS	ANNUAL - 5A $	ANNUAL - 3 $	LIFE - 5B $	PROPOSED BY	EXT.	DEPT.
PROP. VALIDATION DATE	ACT. VALIDATION DATE AND AMOUNT $	BY		INTERCHANGE	AR NUMBER/AMOUNT	

PROJECT SUMMARY

SAVINGS COMPUTATION (ATTACH ASSUMPTIONS AND COMPUTATIONAL DETAIL AS APPROPRIATE)

ITEM	1 PREVIOUS COST	2 PROPOSED COST	3 IMPROVEMENT	4 IMPLEMENTATION COST	5 NET SAVINGS	6 REPORTABLE SAVINGS
DIRECT LABOR						
INDIRECT LABOR						
FRINGE BENEFITS ON LABOR						
DIRECT MATERIAL						
INDIRECT MATERIAL						
OTHER EXPENSE						
TOTAL	*					

* SAVINGS FOR NEXT 12 MONTHS ONLY

TO DOD @ ____ %

TO NASA @ ____ % *

CONTRACT MODIFICATION DATA

CONTRACT NUMBER	MODIFICATION NUMBER OR DOCUMENT REFERENCE	AMOUNT

APPROVALS	INITIALS	DATE	APPROVALS	INITIALS	DATE
LOCAL COST REDUCTION COMMITTEE			DIV. COST REDUCTION COMMITTEE		
PLANT MANAGER					
OPERATION MANAGER					
			DIV. GENERAL MANAGER		

Notes to Form CS-101

Cost Reduction Program Project Summary

Project Number: A control number assigned to each Cost Reduction project as follows:

A - 12 - 1234

- A: Technique Identifier assigned by Division Cost Reduction Committee.
- 12: Location Identifier (reference Finance Policies & Procedures Manual, 23-4103-310).
- 1234: Sequential number assigned by location.

A control number assigned to each Cost Avoidance project as follows:

ZA - 12 - 1234

- ZA: Technique Identifier assigned by Division Cost Reduction Committee; the "Z" used to identify avoidance projects -- all other parts of the control number are the same as for cost reduction, above.

Date Effective: Date at which the changes proposed by the project will be implemented. This is the date at which savings will be credited to Cost Reduction Program, if project is accepted.

Project: Title of project being submitted. A part or assembly number and name should be included, as appropriate.

Principal Technique: The name of the cost reduction technique within which this project was developed. Typical examples would be Value Engineering, Clerical Work Measurement, Joint Procurement. A complete list of approved principal techniques, including the assigned technique identification code, is given at the conclusion of these notes.

Notes to Form CS-101 (Continued)

Projected Savings: The amounts shown here are made available from the total line under "Net Savings", below. If the savings are recurring, and therefore computed for the next 12 months, the total amount under column 5 will be inserted as Annual 5A.

Continuing savings, under the same circumstances as column 5, but exclusive of one-time-only implementation costs (costs to "maintain" the proposed method or procedure would remain as a reduction of savings under the continuing period idea), are shown under column 3, and are inserted here as Annual 3.

If the savings are of a non-recurring nature and have therefore been computed for the duration of a contract or a specific program, the amount will be available under column 5, but will be inserted as Life 5B.

All costs on this summary are shown before consideration of income taxes.

Proposed By: Name, department, and phone extension of individual submitting idea.

Proposed Validation Date: A check point date, some 3 to 6 months after the effective date, scheduled by the Cost Reduction Committee so that a reviewer can see the change in operation and examine the circumstances of the implemented change to verify the reasonableness of the specified savings.

Actual Validation: Date, validation amount, and name of the person performing the verification review.

Interchange: Check (X) if this project results from information provided by another location through the Idea Interchange procedure.

A.R. No. & Amount: To be entered if the project requires an Appropriation Request.

Notes to Form CS-101 (Continued)

Project Summary: A brief description of the action to be taken to effect the cost reduction. Although brevity is of interest, the description of the project should be reasonably complete so that summaries can be prepared centrally for submission to Governmental agencies.

Savings Computation: This part of the form provides for a specific summary of the differences in cost incurrence as between the previous method of operation and the proposed method of operation.

The improvement (column 3) is the difference between "previous cost" and "proposed cost" (columns 1 and 2), and agrees in definition with the term, "Program Cost Reductions." The costs shown, although on an out-of-pocket basis only, reflect the "steady state" operation of the modes represented in columns 1 and 2.

Column 4 (Implementation Cost) should be used at all times where costs to be incurred to place the proposed change in effect are readily identifiable. Note that costs to retain the benefit of the proposed method or procedure would be part of the steady state costs and therefore part of the column 2 data.

The 'Net Savings/Initial Period (column 5)" is the difference between columns 3 and 4.

In the area under Savings Computation and below the total line, space has been provided to summarize the amounts applicable to cost-sensitive contracts with DOD and with NASA. These amounts are given by multiplying the "sharing percentages" (see discussion below) by the number in the box on the total line under column 5. The box headed "Next 12 Months Only" is a requirement of the revised NASA standards (see general remarks in 3.7), and will represent some fraction of the total NASA amount when the project uses a "life" estimating period; otherwise, this amount will be the same as "to NASA" under column 6.

For purposes of this program, cost savings applicable to DOD and to NASA business may be computed by developing analytically-derived, forward twelve-month estimates of the mix relationship between (a) total Division business, and (b) the contract business involved as a result of the cost reduction project, but excluding firm fixed price, and adjusted as appropriate to reflect the expected

Notes to Form CS-101 (Continued)

Savings Computation: (Continued)

composite cost sharing factors from incentive provisions. These forward estimates will vary from 0% (in the case of a cost reduction project solely applicable to a commercial product) to 100% (in the case of a cost reduction project solely applicable to a specific contract). Cost savings of a general nature which apply across-the-board should use a percentage representative of the Division's over-all mix of cost-sensitive contract business. Inasmuch as the amounts the Company will report to the Government every six months depends upon the proper development of the mix percentage, Cost Reduction Committee Chairmen should give careful consideration to this factor in their review of the project.

The cost classificatioons along the left margin (direct labor, indirect labor, and the like) must be used to summarize all costs involved in the proposed project. In the case of "Other Expense", specify significant costs; otherwise, a breakdown of these expenses should be included as part of the attached assumptions and computational details.

Contract Modification Data:

This information forms the basis for reporting the effects on contracts from official modifications accepted by the Government from cost reduction actions. In most cases, these modifications will result from VECP authorizations. The Amount column contains the share of savings available to the Government and is the "fully priced" change in contract value.

See paragraph 6.4.5d for additional discussion on computational methods.

Approvals:

The Raytheon policy requires identification of approvals by the Cost Reduction Committee Chairman, and, under certain circumstances, the Assistant General Manager or Division Controller, and the Division General Manager. Provision has been made for these approvals on the right-hand side of the form, and only the signatures of management representatives specified above should be displayed here. Other approvals, as may be established in the review cycle by Divisions in their detailed procedures, should be shown only on the left side of the Project Summary sheet.

List of Principal Techniques:

C	Work Measurement - Direct and Indirect Hourly Labor
D	Organization Analysis
E	Suggestion Systems
F	Purchase Analysis (excluding Company-wide purchase agreements)
K	Value Engineering
L	Methods Improvement (production-oriented)
M	Systems Improvement (business-oriented, including data mechanization)
N	Overhead Expense Analysis
O	Inventory Analysis
P	Labor Efficiency Improvement
Q	Make or Buy Analysis
R	Scrap/Rework Analysis
S	Salvage Program
T	Work Measurement - Direct & Indirect Salaried Labor
U	Design Improvement (Other than K)
V	Wage Analysis
W	Defect Analysis
X	Engineering Standardization

Note: Avoidance projects are identified with the prefix "Z" applied to the appropriate Principal Technique as listed above.

Projects from PEP suggestions which may properly be identified to a formal investigative discipline are marked with the prefix "Y" applied to the appropriate Principal Technique as listed above.

Supplemental Identification of DOD Cost Reduction Program Areas of Interest

In addition to the Principal Technique identification discussed elsewhere, we will also identify, where feasible, the fact that certain Raytheon projects have applicability to cost reduction "areas of interest" in the so-called "internal" DOD Cost Reduction Programs. Such supplemental identification will be made in the Project Number series, as follows:

A or ZA - 1 2 - 1 2 3 4 -- PP

(See Page 14)

PP ← Or other supplemental identifier

PP Technical Manuals

Savings on technical manuals resulting from the analysis of (a) quantitative and qualitative requirements, (b) the preparation of specifications and statement of work, (c) manuscript production, (d) printing, and (e) distribution. Standardization, the utilization of parts of existing manuals, the development of economical means for writing, illustrating, and the like, and the use, where feasible, of commercial manuals, will be involved. Both Cost Reduction and Cost Avoidance actions are applicable.

QQ Technical Data and Reports

Savings resulting from actions associated with the total process by which (a) the requirements for technical data and technical reports are determined, and (b) such administrative and statistical reports and information are acquired and disseminated. Both Cost Reduction and Cost Avoidance actions are applicable.

RR Excess Contractor Inventory

Savings resulting from the use of excess property residual to terminated, completed, or current, contracts, excluding (a) property transferred to depots, or production equipment controlled by the Defense Industrial Production Equipment Center, and (b) plant, equipment, special tooling, or test equipment utilized on follow-on contracts for the same items or similar services.

SS Value Engineering (Supported by contract-related VE Change Proposals)

These Value Engineering activities are no different than any involved in the Raytheon Cost Reduction Program or the Raytheon Value Engineering Program. The point of separation is to identify the Government share of savings resulting from accepted VECP's, as provided within clauses contained in Raytheon-held contracts. Both Cost Reduction and Cost Avoidance actions are applicable.

Supplemental Identification of DOD Cost Reduction Program Areas of Interest
(Continued)

TT Transportation and Traffic Management

Savings resulting from actions which reduce the cost of moving defense contract material, either inbound to, or outbound from, Raytheon facilities where work will be performed. Within the framework of Raytheon's Principal Technique concept, the savings here would be the Government share of systems changes to Raytheon-wide methods or procedures. Both Cost Reduction and Cost Avoidance actions are applicable.

UU Packaging, Preserving, and Packing

Savings resulting from (a) more realistic requirements for the use of packaging, preservation, and packing material, and (b) changes in packaging methods and packing practices. Both Cost Reduction and Cost Avoidance actions are applicable.

RAYTHEON CS 102g
10-0142(2-66)

COST REDUCTION PROGRAM
PROGRESS REPORT

(Dollars in Thousands)

Memo: Total of Related AR's
$

Division _____ Month Ending _____ 19__

PRINCIPAL TECHNIQUE	⑧ Goal	⑤ Projected Savings Initial Period	⑥ Projected Savings Continuing Period	⑦ Contract Savings DOD	⑦ Contract Savings NASA

Memo: 12 Mo. Only

PROJECT STATUS	Current Month	Within the Current Six-Month Measurement Period	Since Inception (7-1-64)
Number of Projects:			
Approved and put in effect			
Approved but not yet put in effect			
Submitted to Division Chairmen but not approved			
In process with local Chairmen			
			Since (1-1-66)
Number of Interchange Projects: (Included above)			
Made available from other Locations			
Selected for application study			
Developed into CS-101 acceptance			
Placed in effect			

Note: Be sure PEP dollar totals are separately available

RAYTHEON CS103c

COST REDUCTION PROGRAM

PROGRESS REPORT

Division _____ Six Mos Ending ____ 19__

(Dollars in Thousands)

SALES INFORMATION

	Amounts	% of Total
Army		
Navy		
Air Force		
Sub-Total		
NASA		
AEC		
Other		
Total		

CONTRACT MIX

____ % cost-sensitive DOD business (for Company wide purchasing savings)

____ % " " NASA " " " " " "

SPECIAL INTEREST AREAS

	Projected Savings		
	Initial Period	Continuing Period	Contract Savings DOD
Technique PP			
QQ			
RR			
SS			
TT			
UU			

CONTRACT MODIFICATIONS

Contract Number	Modification Number or Document Reference	Amount

Note: Attach Required Narratives as Additional Pages to This Report.

Notes to Forms CS-102 and CS-103

Cost Reduction Program Progress Reports

Cumulative progress reporting is accomplished each month by Raytheon Divisions through the use of Form CS-102. Miscellaneous information required for reporting to DOD is set forth on CS-103, and is submitted semi-annually by Divisions to the Cost Reduction Program Administrator.

CS-102

This report format summarizes all Cost Reduction projects (as set forth on Form CS-101), against each "Principal Technique".

The Goals, by Principal Technique developed within each Division for the current six-month measurement period being reported, are set forth in CS-102/column 8.

Information from "Annual 5A" or "Life 5B" is summarized from CS-101 to Form CS-102/ column 5; Annual 3 information from CS-101 is summarized to CS-102/column 6.

Column 7 of Form CS-102 is summarized directly from the DOD and NASA "boxes" under column 6 of Form CS-101. The "12 months only" summary on CS-102 is accumulated directly from that data given on CS-101.

PEP dollar totals, as they affect the Cost Reduction Program, are to be made separately available in a memorandum line under the total of the Principal Techniques.

The total of AR amounts set forth on all CS-101's are summarized at the top of Form CS-102 in the box headed "Total of Related AR's".

A current and cumulative status report on the number of projects in effect and under consideration is provided on the lower part of CS-102 under "Project Status". This data should be supplied directly from Committee Chairmen records. The "within the current six-month measurement period" refers to the key reporting periods to DOD, and is in reference to either January through June, or July through December. The "since inception (7/1/64)" is the official start date of the formal Cost Reduction Program.

A similar summary for "interchange" projects is also provided under "Project Status", and is of particular importance in measuring the effectiveness of a key criteria in the DOD and NASA Guidelines.

CS-103

The Sales numbers requested summarize all Government activity applicable to consideration under the DOD Guideline Policy, and are therefore restricted to cost-sensitive contracts (that is, this summary will EXCLUDE sales activity under firm fixed-price contracts).

Notes to Forms CS-102 and CS-103 (Continued)

CS-103 (Continued)

Estimates of cost reductions resulting from Company-wide purchase agreements and amounts applicable to each Division are developed by Central Purchasing. For DOD and NASA reporting, it is necessary to estimate the over-all percentage of business within the Division which is composed of cost-sensitive contracts. The applicable percentages for DOD business and NASA business will be shown on the appropriate line under the heading "Contract Mix".

The savings from Cost Reduction Program areas of special interest (discussed on page 19) require reporting to the DOD at six-month intervals. The summation of such savings, whether or not included on related CS-102's, should be entered in CS-103 under the heading "Special Interest Areas" within the "projected savings" and "contract savings" columns.

Contract modification data finalized during the six-month period being reported is presented under the "Contract Modification" section, exactly in accordance with the amounts developed for, and inserted under, the corresponding section on Form CS-101. The listing of individual modifications should be grouped by, and summarized under, the appropriate contract number.

Narratives as required for all projects generating savings of $100,000 or more to the Government (either at annual rates or in total), should be attached to CS-103. As is the case with the comments under Project Summary on Form CS-101, brevity is of interest, but the discussion of the project accomplishment should be reasonably complete.

RAYTHEON

10-0141 (4-66)

COST REDUCTION PROGRAM
PROJECT SUMMARY
CS - 101

PROJECT NO. C - XX - 0017

DATE EFFECTIVE 10/1/65

PROJECT				PRINCIPAL TECHNIQUE			
Standards Installation - Final Assembly				Work Measurement			
PROJECTED SAVINGS	ANNUAL - 5A	ANNUAL - 3	LIFE - 5B	PROPOSED BY		EXT.	DEPT.
	$ 74,250	$ 76,800	$	John Harden		3472	2524
PROP. VALIDATION DATE	ACT. VALIDATION DATE AND AMOUNT		BY	INTERCHANGE	AR NUMBER/AMOUNT		
3/1/66	$						

PROJECT SUMMARY

The Final Assembly Department established last year for the new Component X line has grown to the point where an Engineered Standards Installation should materially assist in improving the utilization of assembly direct labor. Labor representatives have been briefed on the program. A six-month installation is planned.

SAVINGS COMPUTATION (ATTACH ASSUMPTIONS AND COMPUTATIONAL DETAIL AS APPROPRIATE)

ITEM	1 PREVIOUS COST	2 PROPOSED COST	3 IMPROVEMENT	4 IMPLEMENTATION COST	5 NET SAVINGS	6 REPORTABLE SAVINGS
DIRECT LABOR	360,000	283,250	76,750	-	76,750	
INDIRECT LABOR						
FRINGE BENEFITS ON LABOR	72,000	56,650	15,350	-	15,350	
DIRECT MATERIAL						
INDIRECT MATERIAL						
OTHER EXPENSE (a)		15,300	(15,300)	2,550	(17,850)	
TOTAL	432,000	355,200	76,800	2,550	74,250	

* SAVINGS FOR NEXT 12 MONTHS ONLY

5,200

TO DOD 38 % 28,200

TO NASA 7 % 5,200 *

CONTRACT MODIFICATION DATA

CONTRACT NUMBER	MODIFICATION NUMBER OR DOCUMENT REFERENCE	AMOUNT

APPROVALS	INITIALS	DATE	APPROVALS	INITIALS	DATE
LOCAL COST REDUCTION COMMITTEE			DIV. COST REDUCTION COMMITTEE James Bond		
PLANT MANAGER			Division Controller Peter Gray		
OPERATION MANAGER					
			DIV. GENERAL MANAGER		

(a) Directly chargeable costs of Industrial Engineering personnel.

C-XX-0017

SAMPLE CASE

TO ILLUSTRATE METHOD OF EVALUATING PROPOSED PROJECTS IN WORK MEASUREMENT

Assume a work measurement installation is planned for a production department, previously unmeasured. It is intended to measure the labor utilization of direct labor people in the department, using the techniques of an Engineered Standards Installation (ESI).

There are 100 direct operators now, with an average straight-time rate of $2.00 per hour. This represents a present annual payroll of $400,000 (line 1). However, dropoffs in volume are anticipated in the next 12 months, which will probably reduce this crew to 90% of its present size (line 2). Anticipated direct labor annual payroll would therefore be only $360,000 (line 3).

Of all the direct labor work done, only 85% of it is estimated to be the kind that will be feasible to measure; the balance may be experimental, or rework, or impossible to measure, for example (line 4). Thus, the annual payroll likely to be covered by work measurement will be only $307,000 (line 5).

It is estimated that present efficiency is running about 60% of standard, but is capable of being raised to an average 80% within a year (lines 6 and 7). If it does, the resultant savings would be $76,750 (lines 8 and 9).

Work measurement installation will take two standards engineers a half-year, at their average cost of $170/week each, or $8,500 (line 13). Following the installation, the full time of one of these men, plus half the time of the other, will be needed for the remaining half-year to maintain standards coverage (line 14).

This department is in a plant which has a 20% labor-connected-expense factor (LCE) to account for fringes and fund contributions paid by the company.

(NOTE: The calculations on the next page, showing use of the form for the above sample case of a new installation, would change only slightly if the project were improvement of an existing installation. For example, assume the production department already is being measured, but an intensified use of work measurement studies and reports is expected to raise productivity. Line 1 would show the annual payroll value of time now worked against standards. Line 4 would then be 100%, since all such work would be considered measurable. Line 6 would be actual (not estimated) present efficiency. Lines 13 and 14 would contain only the extra measurement costs required for the special improvement project.)

ATTACHMENT TO FORM CS 101

COMPUTATIONAL DETAIL FOR EVALUATING PROPOSED PROJECTS IN WORK MEASUREMENT

PROJECT TITLE: SAMPLE : PRODUCTION DEPT. WORK MEASUREMENT

☑ ESI or ☐ TMI ☑ Direct or ☐ Indirect Labor

1.	Present straight-time payroll subject to W.M. (annualized)	$ 400,000
2.	Percent of volume change anticipated next 12 months	DOWN TO 90%
3.	Anticipated straight-time payroll subject to W.M. (1 x 2)	$ 360,000
4.	Percent of anticipated payroll considered measurable	85 %
5.	Anticipated payroll to be measured (3 x 4)	$ 307,000
6.	Present efficiency or productivity (add * if estimated)	* 60 %
7.	Anticipated efficiency or productivity, average next 12 months	80 %
8.	Percent of anticipated saving from productivity rise (7-6) ÷ (7)	25 %
9.	Gross anticipated saving from productivity rise (5 x 8)	$ 76,750
10.		$
11.		$
12.	Total anticipated Gross Saving	$ 76,750
13.	Anticipated W.M. Installation Cost	$ 8500
14.	Anticipated Post-Installation W.M. Maintenance Cost, balance of 12 months	$ 6375
15.	Total Anticipated Project Cost (13 + 14)	$ 14,875
16.	Anticipated Net Saving, w/o LCE fringe	$ 61,875
17.	Anticipated Net Saving, including 20 % LCE fringe	$ 74,250

NOTE: THE SAMPLE ESTIMATES ENTERED ON LINES 4, 6, 7, 8 + 17 ARE MERELY ILLUSTRATIVE, AND SHOULD NOT BE USED AS GENERAL GUIDELINES.

				1st	Continuing
Memo:	Labor Saving	76,750	Initial Cost	14,875	12,750
	LCE @ 20%	15,350	LCE @ 20%	2,175	2,550
	TOTAL	92,100		17,050	15,300

GENERAL POLICIES AND PROCEDURES

COST REDUCTION PROGRAM

PAGE	FILE CODE
27 of 28	10 4001 110
REVISES ISSUE DATED	EFFECTIVE DATE
Sept. 10, 1965	July 1, 1966

SEMIANNUAL NASA CONTRACTOR COST REDUCTION PROGRAM REPORT

1. REPORT PERIOD	
FROM	TO

Budget Bureau No. 104-R027.1
Approval Expires Jan. 31, 1970

2. TO: *(Name and address of NASA Installation Cost Reduction Officer)*

3. FROM: *(Name and address of Contractor)*

4. DEFINITIONS

a. Contractor's Cost Reduction Report - is a report of the contractor's cost reduction efforts applied to NASA business, including his prime and subcontracts *(other than fixed price)* and including NASA's allocable share of overhead or indirect savings.

b. Cost Reduction - is achieved when the total cost, individually or collectively, of labor, material or overhead is decreased through improved management techniques, procedures or processes when compared with previous methods or operations, without sacrifice of requisite quality and reliability; or when quality reliability or performance characteristics are improved with the objective of fulfilling necessary mission requirements and with no increase in cost. Reportable savings result from the reduction or elimination of fund expenditures which had they been incurred, would have been recognized as allowable costs and reimbursed by the National Aeronautics and Space Administration.

5. STANDARDS

NASA's standard for measuring the validity and reasonableness of a reported cost reduction action is that: (a) It must represent a change to an existing practice or technique, an established policy or procedure, or a firm technical or management decision. (b) It must stem from an identifiable action which was directed towards improvement in efficiency, effectiveness or economy and was not the result of uncontrolled circumstances. (c) It must be susceptible to verification. The price or estimate of what would have been spent had the saving not been effected must have been established on a reliable basis.

(See Reverse Side For Preparation Instructions)

6. TOTAL COST REDUCTION *(This period)*

7. EXPLANATORY REMARKS

8. INDIVIDUAL EXAMPLES *(To be attached)*

9. APPROVALS

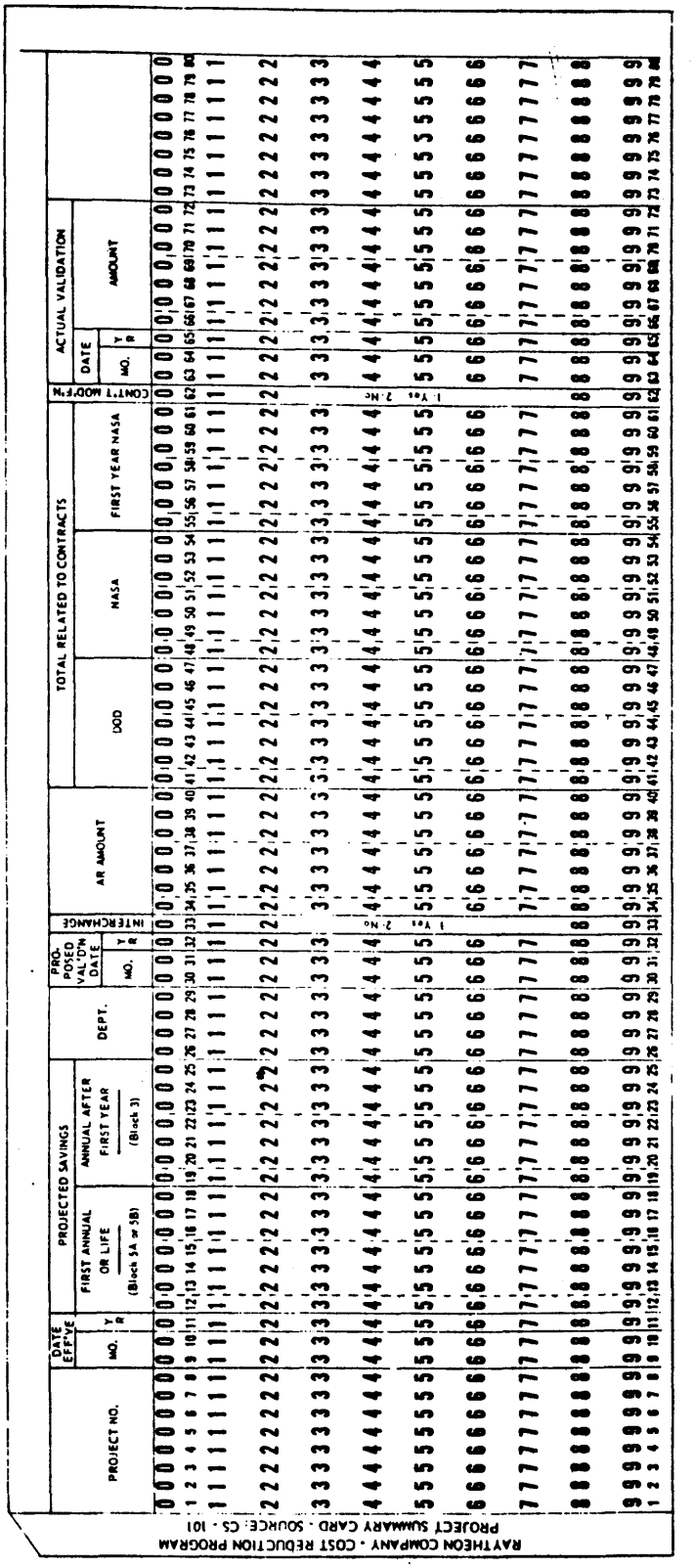
DATES	TYPED NAMES	SIGNATURES
	CONTRACTOR COST REDUCTION PROGRAM COORDINATOR	
	SENIOR CONTRACTOR OFFICIAL *(Include title)*	
	NASA INSTALLATION COST REDUCTION OFFICER	

Exhibit B

GENERAL POLICIES AND PROCEDURES

COST REDUCTION PROGRAM

PAGE	FILE CODE
28 OF 28	10 4001 11
REVISES ISSUE DATED	EFFECTIVE DATE
Sept. 10, 1965	July 1, 1966



COST REDUCTION PROGRAM-CHECK LIST

I. ADMINISTRATION

1. Is every cost reduction chairman and coordinator well acquainted with Company Policy 10-4001-110 July 1, 1966? _____

2. Does management at all levels direct cost reduction activities and hold monthly meetings to review results? _____

3. Does each business function participate actively and produce results in the program? _____

4. Are proper reporting procedures followed accurately and timely? _____

5. Does each manager and individual contributor know his responsibilities to the program? _____

6. Do all key employees who can contribute to the program have a copy of "Raytheon Cost Reduction Program" brochure and has it been reviewed with them at staff meetings? _____

7. Have difficult goals been set and equitably allocated to all key techniques and each business functior ? _____

8. Does each key employee have a personal goal and does his supervisor measure his achievements in this area? _____

9. Is a proper balance maintained between cost reductions and cost avoidances? _____

10. Is there an attempt to insure that all cost reduction efforts are documented? _____

11. Are all cost centers the object of cost reduction effort? _____

12. Are cost reduction projects purposely and systematically selected, and targets and time tables set? _____

13. Are cost reductions properly validated? _____

14. Are periodic progress reports on cost reduction projects required at staff meetings? _____

15. Are all the sub programs given the appropriate attention and direction? _____

16. Are sufficient people and time allocated to administer an effective program in all areas? _____

17. Are suggestions answered promptly and is follow-up and implementation expedited? _____

II. MOTIVATION

1. Is each employee encouraged by management to contribute regularly to the program? _____

2. Is suitable recognition, rewards and compensation provided to each contributing employee? _____

3. Are posters, articles, news sheets and other promotional methods used to keep the program dynamics and provide continual individual motivation? _____

4. Does each employee understand his responsibilities to contribute regularly to the cost reduction program? _____

5. Is the cost reduction effectiveness of each business function and individual measured and are they informed of this measurement? _____

III. TECHNIQUES

1. Are all key decision makers trained in value analysis techniques? _____

2. Are all analytical techniques applied to appropriate cost centers? _____

3. Is creativity encouraged and does a creation atmosphere exist? _____

4. Are creative techniques broadly employed in problem solving? _____

5. Is teamwork prevalent in decision making and cost reduction project work? _____

6. Are cost targeting or product cost control concepts employed? _____

7. Are new materials, products, processes, sources, techniques etc. given wide publicity? _____

8. Are information seminars held? _____

9. Are special task forces conducted? _____

10. Are all cost centers the object of cost reduction efforts such as:

    procedures _____
    paperwork, publications _____
    scrap _____
    traffic _____
    filing systems _____
    shipping and packaging _____
    telephone _____
    lighting and services _____
    maintenance _____
    inventories _____
    warehousing _____
    capital equipment _____
    heating, air conditioning _____
    food services _____
    test and calibration _____
    inspection _____
    engineering drawings _____

11. Is every effort made to capitalize on the profit making aspects of value engineering and cost incentive contractual clauses? _____

12. Is cost information well organized and quickly available for analysis? _____

13. Is cost estimating done rapidly and efficiently? _____

14. Are work measurement and simplification techniques widely used? _____

There are many more check list questions that could be asked but any company which can answer yes to all the above will have an excellent cost reduction program.

FSS:np
12 September 66

COST REDUCTION PROGRAMME

GUIDELINES

F.S. SHERWIN

9th June 1969.

GOALS:

Established for Group and Divisions on basis of Sales volume. Goals represent annual net savings resulting from actions initiated during period.

Allocated to Functional Decision making areas -

- Engineering
- Manufacturing
- Purchasing
- Management
- Marketing
- Financial
- Employee Relations
- Quality

Each cost centre should be included in areas of activity.

Every technique should be applied to every applicable cost centre. Achievements may be targeted and measured against technique areas as well as business functions.

Functions Participating :

Engineering

Manufacturing

Purchasing

Marketing

Financial

IR

General Management

QUALITY.

Types of Changes -

Design -

- Configuration
- Tolerance
- Material

Manufacturing -

- Process
- Machine
- Method
- Tooling
- Operation
- INSPECTION
- TEST

Purchasing -

- Make vs Buy
- Buy vs Make
- New source
- Negotiation

Organisation

Systems and Procedures

Cost Centres :

Material

Direct Labour

Indirect Labour

Overhead -
- Procedures
- Paperwork
- Filing systems
- Food services
- Engineering Drawings
- Manuals, Policies, Standards
- Quality Control
- Inspection
- Scrap, Rework
- Traffic
- Materials Handling
- Shipping & Packaging
- Telephone, Communications
- Lighting & Services
- Heating, Air conditioning
- Maintenance (Buildings/Machines)
- Inventories
- Warehousing
- Vehicles, Transportation
- Vehicles, Repairs, Maintenance
- Test and Calibration
- Tools, supplies

General and Administrative

Sales

Capital Equipment

Techniques Used :

Value Engineering/Analysis
Design Improvements)
Technological Improvements) Standardisation
Suggestion system (scheme)

Industrial Engineering

Work Measurement
Improved productivity, efficiency

Methods Improvement
Work simplification, small tooling
Tool improvement
Materials handling improvement
Jig & Fixture improvement
Reduced set up time
Improved scheduling, lot sizes

Facilities & Process Consolidation
Better utilisation of equipment and facilities

Advanced Manufacturing Engineering
Modernising manufacturing techniques
Mechanisation, Automation
New machines, processes

Maintenance Improvement
Preventive
Work-Time scheduling
Methods and Equipment

Quality, Cost [illegible]
Salvage, scrap and waste Improvement
Material utilisation improvement
Reclamation improvement

Techniques Used (cont'd)

Price Negotiation
Price and Cost Analysis

Purchase Agreements
Company, Group wide

Multiple or New Sources

Make or Buy Analysis
Value Analysis

Supplier & Subcontractor Suggestions
Value Analysis

Management Analysis
Organisational Analysis
Systems Improvements
Overhead Expense Analysis
Inventory Analysis
Transportation & Traffic Management
Wage & Salary Structure Analysis
Labour Relations - Improvements
Electronic Data Processing
OR.

REPORTING :

System, frequency and format of reporting should be uniform throughout Company. (Simple, concise, informative).

Administrative Procedures should be established per Company guidelines.

Records should be maintained for verification and auditing.

Computational and accounting methods used should be consistent with Company guidelines.

A summary management report should be issued monthly to measure achievements against goals. Only that information needed for management direction and control should be reported at each level.

RAYTHEON

COMPANY OBJECTIVES ORGANIZATION AND POLICIES

PAGE 1 OF 2	FILE CODE 43 0001 010
REVISES ISSUE DATED	EFFECTIVE DATE Sept. 14, 1966
AUTHORIZED BY Senior V. P. - Company Staff	
FUNCTION Engineering & Research	

SUBJECT: VALUE ENGINEERING - NATURE AND SCOPE OF PROGRAMS

1. PURPOSE - Value engineering programs are considered to be necessary to help achieve lowest product and operating costs.

2. STATEMENT OF POLICY

2.1 Establishment of formal value engineering programs is required as a matter of Company policy in each division, operation, plant and laboratory where decisions affecting product and operating costs are made.

2.2 Detailed policies and procedures are established and published by the Company Engineering and Research Staff to provide all areas of the Company with minimum requirements for acceptable minimum programs. Particular emphasis is given to:

2.2.1 Establishment of required formal value engineering programs and organizations.

2.2.2 Detailed definition of policies, requirements and procedures.

2.2.3 Assignment of responsibilities to appropriate positions.

2.2.4 Minimum parameters of value engineering techniques.

2.2.5 Requirements which comply with Government and Military Value Engineering Specifications and Contractual Requirements.

2.2.6 Seeking out and implementing advantageous value engineering contractual arrangements or clauses.

3. APPLICABILITY - This policy is mandatory and applies to all activities of the Company.

4. RESPONSIBILITIES

4.1 Responsibility for the success of the value engineering programs will be specifically assigned to and identified with the following positions:

4.1.1 Division General Managers for achievement of objectives of the programs and establishment of formal programs.

4.1 (Continued)

4.1.2 Vice President, Engineering and Research for establishment of policies, procedures, functional direction and guidance and for monitoring performance.

4.1.3 Value engineering functions and/or groups to conduct formal value engineering programs.

4.1.4 All functional management, both corporate and divisional, shall support value engineering programs.

5. PROCEDURES - Detailed policies and procedures to be followed are filed in the Engineering and Research Policies and Procedures Manual (File Code #42-0001-210).

1. PURPOSE

1.1 Organized, well-defined value engineering programs are necessary to help minimize Company product and operating costs, increase profits, improve competitive position, provide high value products and comply with contractual requirements.

2. STATEMENT OF POLICY

2.1 The use of value engineering techniques in Raytheon is prescribed within the following minimum parameters:

2.1.1 The use of value engineering methods at all stages of a product life cycle.

2.1.2 Identification of specific decision making responsibilities for value engineering programs.

2.1.3 Compliance with essential elements of a value engineering program that meet DoD requirements and specifications.

2.2 More detailed policies and procedures to assure achievement of minimum requirement are established in subsequent sections of this statement. Company policy requires:

2.2.1 Establishment of value engineering programs in each division, operation, plant and laboratory where decisions that affect product and operating costs are made.

2.2.2 Application of cost target and value engineering concepts to all products and "systems" whenever applicable.

2.2.3 Establishment of a formal value engineering organization in each division, operation, plant and laboratory of the Company where appropriate to achieve the purposes of the policy and carry out the functions described in Section 6.2.5 of this statement. This organization will generally be a staff or support function consisting of people qualified by experience and training to carry out the specified administrative and analytical value engineering functions.

2.2.4 Compliance with Government and Military Value Engineering Specifications and Contractual Requirements, and effective performance on value engineering incentive contracts.

2.2.5 Seeking out and implementing value engineering contractual arrangements or clauses which are advantageous to the Company.

2.2.6 Response to customer requests and requirements for the preparation of value engineering plans, programs and work statements.

2.2.7 Encouragement and maintaining of active and continued interest in professional, industrial and trade associations efforts and programs related to value engineering.

3. DEFINITIONS

3.1 Value Engineering, as a methodology, is an organized arrangement of specific decision making techniques that:

3.1.1 clearly identify the function of a system, element or area.

3.1.2 establishes an appropriate value or worth for that function, and

3.1.3 then causes the required knowledge and creativity to be used to provide that function for the least total cost to the user.

3.2 Value Engineering as a methodology is synonymous with Value Analysis. Value engineering is a functional approach which embodies a job plan and numerous fact finding, creative, and analytical techniques. An outline of these techniques is included as Exhibit C.

3.3 A Value Engineering Program is a plan of procedures and activities that brings about the application of value engineering principles at all desirable phases of a product life cycle for the purpose of minimizing the total cost to achieve the essential functional performance. The essential elements of the plan include:

3.3.1 An educational program.

3.3.2 Management direction.

3.3.3 Line participation.

3.3.4 Value specialists activities.

3.4 Value Engineering Study or Project is the organized application of value engineering techniques to a system, equipment, product, functional element, assembly area, part or procedure. In this document, the word "system" shall be used to designate functional equipments, products, or procedures.

3.5 Value Engineer, Value Analyst, Value Specialist is a person technically qualified by experience and training to conduct and/or guide others in value engineering program activities such as training, consultation or other responsibilities which are defined in more detail in Section 6.2.5.

3.6 Value Engineering Change Proposal (V. E. C. P.) is a formal recommendation resulting from a value engineering study. This could be either an internal recommendation for a change or a formal document submitted for customer approval.

3.7 Total Cost (Overall Cost) is the total of all costs which the user must expend to obtain the satisfactory performance of desired functions. In addition to purchase price, this includes such costs as installation, operation, maintenance, and logistics.

4. APPLICABILITY - This policy is mandatory and applies to all activities of the Company.

5. RESPONSIBILITIES

5.1 Division General Managers are responsible for maintaining formally organized and functioning value engineering programs in all applicable areas.

5.2 All Functional management, both corporate and divisional, is responsible for supporting value engineering programs.

5.3 The Office of the Vice President, Engineering and Research, is responsible for providing functional direction and guidance for value engineering programs, for coordinating interdivisional value engineering activities, and representing the Company in the profession.

5.4 Each value engineering function or group has responsibility for a broad motivational and educational program aimed at making value engineering techniques practical working tools for all decision making.

6. PROCEDURE

6.1 Procedural Guidelines

6.1.1 Selecting a "system" for the application of value engineering. A "system" shall be designated as suitable for the application of value engineering techniques by management direction resulting from marketing and financial analyses. Value engineering methods shall be applied to all "systems" where costs are significant to the life cycle, competitive position and profits, as well as where contractual requirements or opportunities exist.

6.1.2 Areas for Value Engineering Application.

The total "system" shall be subjected to value engineering studies and shall include the following areas:

a. Technical Requirements
b. Specifications and Drawings
c. Hardware (Procured and Fabricated)
d. Processes and Tooling
e. Facilities and Personnel
f. Testing, Test Equipment, and Procedures
g. Packing and Packaging
h. Technical, Logistics Data and Manuals
i. Field Operating and Training

6.1.3 Selecting Specific "System" Elements and Areas for Value Engineering Studies.

Those elements and areas which offer the maximum potential for savings and achievements shall be identified for value engineering studies using the following techniques:

a. Functional Analysis. A technique of defining and evaluating functions to establish the relationship of estimated cost to functional worth. These cost/value indices can be used to identify areas with high potential improvement (high unnecessary cost).
b. Cost Analysis. Cost information shall be developed to identify high dollar functional areas and major cost elements as prime projects for value engineering studies.
c. Cost Analysis Techniques. Applicable techniques such as the following shall be used:

    1. Functional tree cost analysis (cost/function).
    2. Cost/pound
    3. Cost/dimension, tolerance
    4. Cost/volume
    5. Cost/increment or element
    6. Cost/property
    7. Cost/year or contract
    8. Weighted cost ranking (A.B.C. Listing)
    9. Cost models

d. Cost Targets (Product Cost Control). Cost target concepts shall be applied at an early stage in product design and shall be used to guide Value Engineering study project selection as well as program control. A separate policy and procedure defines cost targeting in more depth.

e. Pert/Time, Pert/Cost. As applicable, Pert/Time/Cost techniques can be employed to help identify areas for value engineering studies, establish priorities, and measure progress against planned schedules for value engineering application (Section 6.1.2 above).

6.1.4 Conducting Value Engineering Studies and Activities.

a. When appropriate "systems", elements and areas have been selected for value engineering studies, qualified personnel shall be assigned to perform the necessary work.

b. Value engineering studies may be conducted in one or more of several ways depending on the organization, product, schedule and scope of work.

1. The responsible person may apply value engineering techniques to assist him in meeting cost targets. He may select certain areas or projects for a more intense and formal value engineering study and use the consulting services of a value engineer and other staff or functional specialists.
2. A team of qualified people may be assigned projects for value studies and designate team leadership to a responsible person. Members of the team would include value engineers and other support staff and functional specialists.
3. The value specialists may be assigned projects for value engineering studies. They will then complete the study and make recommendations back to the responsible group for implementation.

c. Adequate documentation shall be made on each value engineering project to permit preparation of reports to the customer, internal cost reduction or avoidance submission, measurement of level of effort, and qualitative and quantitative evaluation audits. Some of the data which shall be required includes:

1. Project identification and description.
2. Person assigned responsibility.
3. Labor and material expended on study.
4. Estimated net savings (total savings less implementation costs).
5. Complete cost data related to before and after design.
6. Technical information and data.
7. Disposition (implementation date or effectivity date).
8. Other pertinent manufacturing and procurement data.
9. Contract identification

d. Status and project reports on value engineering studies shall be submitted as required by the contract or customer specifications. Usually monthly status reports and/or quarterly summary progress reports are required.

Copies of monthly status reports will be sent to the Office of Director - Value Engineering Services. In cases and areas where contractual reporting is not required, a monthly report summarizing all value engineering activities shall be sent to this office in a format similar to that presented as Exhibit A to this statement.

6.2.1 Continued

g. Set targets, goals and objectives for value engineering accomplishments in each activity area. Measure results and take corrective action as necessary to improve effectiveness.

6.2.2 Program (or Project) Management should:

a. Provide guidance and direction in the organizing, planning, implementing and control of all value engineering activities aimed at meeting program contractual requirements or opportunities.
b. Provide necessary funding and assign responsibility for the program's value engineering effort.
c. Define the value engineering objectives and monitor milestones and accomplishments.
d. Resolve any differences which may arise among functional areas.
e. Assist in the submission and expedite processing of V.E.C.P.'s.

6.2.3 Functional Management.

a. Engineering, Manufacturing and Purchasing should:

1. Assign individuals to participate in value engineering studies and activities as directed by general or program management.
2. Participate in the selection of application areas and study projects for value engineering efforts.
3. Plan, schedule and document their value engineering effort.
4. Initiate design improvements, recommend changes and V.E.C.P.'s and take appropriate implementation actions as a result of value engineering studies.
5. Encourage participation in value engineering training programs, the broad application of value engineering techniques and consultation with value engineering specialists.
6. Measure accomplishments of their value engineering activities.
7. Provide technical, manufacturing and purchasing support as required for value engineering studies.
8. Purchasing should administer the subcontractor value engineering program with assistance from other line and support functions.

b. Contracts should:

1. Review all Government inquiries for value engineering contractual requirements or opportunities and notify interested or responsible management.
2. Inform management (general, program, functional and support) of all value engineering contractual requirements or opportunities.
3. Negotiate and secure optimum value engineering coverage in all contractual documents, including updating to latest clauses.

6.2.3 b. Continued

4. Encourage all appropriate management levels to comply with value engineering contractual requirements or opportunities.
5. Interpret contractual clauses.
6. Assist in preparation and transmission of value engineering reports, V.E.C.P.'s and customer required data.

c. Controller should:

1. Provide cost data as requested and in the form needed for value engineering studies, V.E.C.P.'s and other value engineering activities.
2. Perform cost analysis studies as requested.
3. Assign individuals to participate in value engineering activities.
4. Establish financial controls for value engineering activities.

d. Marketing should:

1. Participate in the selection of the "system" where value engineering efforts are required for competition, profit, sales or contractual reasons.
2. Advise management regarding customer attitudes, requirements or interests concerning value engineering activities.
3. Review value engineering proposals, quotations, plans and activities to help insure that they are responsive to customer interests or desires.
4. Sell the Company's value engineering capability and actively seek customer funded or incentive value engineering programs.

e. Industrial Relations should:

1. Provide advice and assistance in establishing a suitable value engineering organization with position levels and responsibilities commensurate with functional requirements.
2. Provide assistance and share responsibility for value engineering workshop training courses, management indoctrination, general orientation and communications.
3. Assist in the acquisition of suitable personnel to carry out value engineering program activities.

6.2.4 Reliability, Quality Assurance, Quality Control, Maintainability, Components, Standards, Materials, Manufacturing and Process Specialists, and other Support Functions should:

a. Designate individuals to participate in value engineering studies, team projects or other activities.
b. Provide specialized data, information and guidance in each area to support value engineering studies and change proposals.

6.2.4 Continued

c. Submit documentation and reports on test, evaluation, operation, and other data for back-up on V. E. C. P.'s.

d. Participate in the selection of application areas and study projects for value engineering efforts.

6.2.5 The workscope of the value engineering function is divided into two general categories, the Administrative-Motivational-Educational category and the Analytical-Product Evaluation-Consultation category. The following defines the work content in these two areas:

a. Administrative-Motivational - Educational

1. Organize, staff and direct the activities of the value engineering function.
2. Plan, organize and conduct value engineering educational programs to orient management in the concepts and techniques of value engineering.
3. Plan, organize and conduct value engineering workshop seminars to develop depth capabilities in all decision makers who influence product or operating costs.
4. Assist in the organizing, planning, and implementing of product cost control and value control programs aimed at control of product costs from design through production.
5. Assist in strengthening the teamwork and integration of effort among engineering, manufacturing, purchasing and other functions.
6. Develop improved methods and procedures in the following areas:

   (a) Cost and value standards, targets, models and associated data.
   (b) Cost and value data storage and retrieval. (Mechanization of data handling).
   (c) Effective utilization of specialists and vendors during design, design review, and production.
   (d) Communication of new information on materials, products, processes, vendors, standards and costs as related to value work.
   (e) Improved teaching methods for training personnel in the use of value engineering techniques (audio visual and teaching machine techniques).

7. Plan, organize and conduct value specialists training programs.
8. Participate in company-wide, professional, trade associations and other outside company value engineering activities to keep abreast of the field.
9. Integrate the work of the value engineering function with other business functions where functional lines are crossed and co-responsibilities exist, such as Controller, Purchasing, Training, etc.

6.2.5 a. Continued

10. Arrange for special information presentations by specialists in different fields as part of a broad educational effort to keep people up-to-date on new materials, methods, processes and products.
11. Advise management on all aspects of value engineering contractual commitments or proposals. Provide guidance in the implementation, documentation, and management of value engineering contractual requirements.

b. Analytical-Product Evaluation - Consultation

1. Provide consultation and assistance to design engineers and other line personnel by:

   (a) Helping to establish and meet cost or value targets for new designs.
   (b) Reviewing specification and requirements to identify elements which will lead to high cost.
   (c) Accumulating, documenting, and disseminating information needed by decision makers to arrive at good value products, such as:
      (1) Value standards.
      (2) Costs related to functions, products, processes, materials, and standards. Development of cost models.
      (3) Sources for information, such as specialists, vendors, catalogs, articles, brochures, etc.
      (4) Case histories of value improvements or alternate design approaches
   (d) Participating in design and manufacturing reviews to help identify areas of unnecessary costs and point the way to lower cost solutions.

2. Organize and conduct special task forces or teamwork Value Engineering studies for intensive cost prevention or reduction programs.
3. Perform depth Value Engineering product studies to develop lower cost alternate approaches to achieve desired functions in conjunction with and support of the responsible engineers.
4. Identify for engineering, manufacturing and purchasing areas where unnecessary costs exist so that appropriate effort can be directed to reduce these costs.
5. Participate in Value Engineering contractual programs.
6. Support, strengthen and contribute to other Company cost prevention and reduction efforts.
7. Serve as a Value Engineering consultant at the following stages of product life cycle:

6.2.5 b. 7. Continued

(a) Systems Review & Early Engineering Phase
Functional & Specification Review
Cost or Value Objectives
Cost Estimating

(b) Design Engineering Phase
Layout Review
Breadboard Review
Information During Detailing

(c) The Development Phase
Identifying Areas of Unnecessary Cost
Manufacturing, Cost, and Vendor Information
Measure Product Cost Against Cost Targets

(d) The Production Phase
Evaluating Vendors, Manufacturing Methods, Costs
Considering New Development for Future Application
Recommending Cost Reduction Changes
Feedback New Information to Engineering

6.3 Organization and Relationships - Although organizational placement and relationships may vary somewhat from one division, operation, plant or laboratory to another, the following guidelines should be followed:

6.3.1 To have a fully effective value engineering program, the organization should consist of the following positions:

a. A value engineering manager, supervisor, coordinator or administrator.
b. Value engineering specialists reporting functionally and administratively to a value engineering manager.
c. Value engineering specialists reporting administratively or assigned to other functional areas but receiving functional guidance and direction from a value engineering manager.

6.3.2 Since value engineering activities service several line functions, the administrative element should report within the jurisdiction of general management of the area to be served. In this situation, the educational program and integrated activities of value engineering efforts can best be administered.

6.3.3 The value engineering manager (administrator) may have value specialists reporting to him to help carry out the various value engineering activities. These specialists could be assigned to specific program areas or activities as required. In addition, value specialists who report administratively to line functions should take functional guidance from the value engineering administrator.

6.3.4 The value specialists may be assigned to carry out certain activities within the administrative and educational elements of the value program as part of their responsibilities. For the most part, however, they will be performing or assisting others to perform value engineering analytical and product evaluation studies. In addition, they will provide a consultation service and disseminate information as defined by paragraph 6.2.5.b.

6.3.5 The number of administrators and sepcialists within any division, operation, plant or laboratory would be determined by several factors such as: product lines, number of engineers, contractual requirements or opportunities, competitive pressures and profit improvement needs. One method to determine the optimum organization is to initiate value engineering by establishing a one- or preferably a two-man function and assigning them to conduct or lead value engineering study projects and measure the results. Usually a 5/1 or better return on investment should result. The effort, organization and activities are then expanded to increase the quantitative results and maintain a desirable level of return on investment. The measure of the return on investment from a value engineering organization should be both direct (results of their value studies) and indirect (the results achieved by line personnel whom they influence).

6.4 Position Levels and Description.

6.4.1 In all cases, the position level should be such as to attract and hold senior, capable personnel into the value engineering activity. Suggested levels should range from a Grade 6 for a value engineering trainee to a Grade 12 for a value engineering manager or top coordinator.

6.4.2 Since the value engineering workscope is rather broad and covers many areas, different personal qualifications and strengths will be required to cover the total function. Generally, this can be divided into the same two areas listed in section 6.2.5 above. Persons capable of administration and education should have strength in the managerial and motivational areas, where value specialists should have more capability in the creative and analytical areas.

VALUE ENGINEERING ACTIVITIES REPORT

Reporting Area _____ **Month** _____
Division, Operation, Plant, Lab, Program

Summary of Value Engineering Studies or Projects.

A.	The number of studies completed and submitted.	_____
B.	The number of proposals accepted.	_____
C.	The number of proposals implemented.	_____
D.	The net value engineering savings achieved and recorded in company cost reduction program.	_____
E.	The number of V.E.C.P.'s submitted to customer.	_____
F.	The number of V.E.C.P.'s accepted by customer.	_____
G.	The cost of the value engineering effort to produce D.	_____
H.	The ratio of D to G.	_____

Summary of Other Value Engineering Activities.

A.	Number of people trained by workshop seminars.	_____
B.	Number of people oriented in value engineering.	_____
C.	Number of task forces conducted.	_____
D.	Number of requests for consultations.	_____
E.	Number of design reviews participation.	_____

Submit to Corporate Office, Director of Value Engineering Services
Lexington, Massachusetts

VALUE ENGINEERING RESPONSIBILITY MATRIX

	General Mgmt.	Program Mgmt.	Engineering	Manufacturing	Purchasing	Contract	Financial	Marketing	Industrial Relations	Value Engineering	Reliability, Maint., Q. A., Q. C., etc.	Supplier	Customer or User
Establish V. E. Organization	*	X							A	X			O
Select Programs for VE	*	X	A			A		X		A			A*
Set Objectives for VE	*	X	+	+	+			+		AX			O
Select Projects for VE		OX	X+	+X	+X					AX O+	+	+	A
Establish Cost Targets		O	X	X	X		+			X		+	
Conduct VE Studies		O	X	X	X		+			XA	+	+	
Process V.E.C.P.'s		O	X	+	+	+				X			X
Report on VE Studies	O	O	+X	+X	+X		+			X*	+	+	O
Specification Reviews		O	*	+	+					+	+	+	A
Design Reviews		O	*	+	+			O		+	+	+	O
Production Reviews		O	+	*	X		+			+		+	O
Subcontractor VE		O	+	A		A				X	A	+	O
Make or Buy		A	+	X	X					A	A		
VE Training	O		+	+			+	+	X	*	+	+	+O
VE Indoctrination	+	+	+	+	+	+	+	+	X	*	+	+	+O
V.E.C.P. Approval		O	+	+	+	X	+			+A	+		+
V.E.C.P. Implementation		O	*	X	X					A			O
VE Data Dissemination	O	O	+	+	+	+	+	+	+	*	+	+	
VE Activity Reporting	O	O	+	+	+					*			O

* Prime Responsibility
\+ Active Participation
X Shared Responsibility
A Advisory
O Monitoring

VALUE ENGINEERING JOB PLAN & TECHNIQUES

Job Plan	Objectives	Key Questions	Key Techniques	Supporting Techniqu
INFORMATION PHASE	Obtain background information and define functional requirements.	What is it? What does it cost? What does it do? What must it do?	Get all the facts. Determine costs. Define functions. Put $ on specifications and requirements.	Get info from best source. Examine & question specs & requirement Analyze costs. Analyze functions. Work on specifics nc generalities.
CREATION PHASE	Create new ideas.	What else will do the job?	Blast and create.	Think creatively. Defer judgement. Use teamwork.
EVALUATION PHASE	Evaluate functions and ideas.	What is the value of the function? What are the best ideas?	Evaluate by comparison. Evaluate basic functions. Put a $ on each idea. Refine ideas.	Evaluate functional a Evaluate ideas. Re-apply creative thinking. Overcome roadblocl
INVESTIGATION PHASE	Develop the best alternate solutions.	What is the best solution? What will that cost?	Consult vendors. Consult Company & Industrial Specialist Consider alternate products, processes, and materials. Consider standards. Determine costs	Use Search techniqu Use good human rela Use good business judgement. Apply new informati Use best sources.
RECOMMENDATION PHASE	Summarize and document the best solutions.	How can this solution be implemented?	Motivate positive action.	Use one page recommendation form. Sell the best solutior Give credit.

RAYTHEON

GENERAL POLICIES AND PROCEDURES

PAGE	FILE CODE
1 OF 1	43 1002 110
REVISES ISSUE DATED	EFFECTIVE DATE
	July 10, 1967
AUTHORIZED BY	
V.P. - Engineering & Research	
FUNCTION	
Engineering and Research	

SUBJECT: PRODUCT COST TARGETING

1. PURPOSE - Product cost targeting is needed as a management tool during product design to establish better control of product costs, improve cost effectiveness, increase cost avoidance and assure product profitability.

2. POLICY

   2.1 Product cost targeting is applied to all new product design where management has a need to control manufacturing costs to meet competition and assure adequate profit margins. Generally, management should select those programs which have ample scheduled design time and anticipated production on fixed price or incentive type contracts where control of costs is most important to profitability.

   2.2 Product cost targeting is a technique by which objectives for product manufacturing costs are established and measured during design. It does not replace normal budgeting procedures, but is an additional management tool to help measure and control segments of the budgets that are related to product manufacturing costs. Cost targeting techniques can be applied to control costs of low volume-high dollar programs or engineering prototypes as well as higher production programs.

3. APPLICABILITY - This policy is applicable to all Raytheon Divisions and separate Operations, foreign subsidiary Companies, and independent subsidiary companies except Amana Refrigeration Inc.

4. RESPONSIBILITIES

   4.1 General Managers of Divisions and separate Operations, and Presidents of applicable subsidiary Companies are responsible for initiating, conducting, and measuring cost targeting programs in each division, operation, plant, laboratory or company where decisions that effect product costs are made.

   4.2 The Office of the Vice President, Engineering and Research is responsible for providing functional direction and guidance for cost targeting programs, and for coordinating interdivisional activities in this area.

5. PROCEDURE - Detailed procedures to be followed are filed in the Engineering and Research Policies and Procedures Manual (File Code No. 43 1002 210).

RAYTHEON

ENGINEERING AND RESEARCH POLICIES AND PROCEDURES

PAGE	FILE CODE
1 OF 6	43 1002 210
REVISES ISSUE DATED	EFFECTIVE DATE
	Jan. 17, 1967
AUTHORIZED BY	
Vice Pres.-Engineering & Resea	

SUBJECT: PRODUCT COST TARGETING STANDARD PRACTICE AND PROCEDURE

1. PURPOSE - Product cost targeting concepts, practices and procedures are needed to encourage uniform application throughout the company, establish better control of product costs, improve cost effectiveness, increase cost avoidance and assure product profitability.

2. POLICY - The use of cost targeting techniques in Raytheon is prescribed within the following minimum parameters:

   2.1 Cost targeting shall be applied to all new product design where one or more of the following conditions exist:

      2.1.1 Fixed price or incentive type contract.
      2.1.2 Ample production quantity (anticipated).
      2.1.3 Technical and performance problems largely solved.
      2.1.4 Ample scheduled design time.
      2.1.5 Cost, competition and profit problems.

   2.2 Cost targeting shall be used in each division, operation, plant and laboratory where decisions that effect product costs are made.

   2.3 Cost targeting shall be used as a measure of cost effectiveness work during product design.

   2.4 Cost targeting shall be employed in conjunction with and in support of the Value Engineering and Design Review programs - (Policies 43-0001-010, 43-0001-210, 42-1001-210).

3. APPLICABILITY - This policy is mandatory and applies to all activities of the company.

4. RESPONSIBILITIES

   4.1 Division General Managers are responsible for initiating, conducting and measuring cost targeting programs in all applicable areas.

   4.2 All functional managers both corporate and divisional are responsible for supporting cost targeting efforts.

   4.3 The Office of the Vice President, Engineering and Research is responsible for providing functional direction and guidance for cost targeting programs, and for coordinating interdivisional activities in this area.

5. DEFINITIONS

   5.1 Cost targeting is a procedure by which objectives for product manufacturing costs are established and measured during design. It also includes methods to concentrate the necessary knowledge on cost areas which exceed targets and thus control product costs to meet objectives.

   5.2 Cost targeting concepts are sometimes identified by other names such as "Unit Product Cost Control," and are described in more detail in the procedure section. Cost targeting does not replace normal budgeting procedures, but is a management tool to help measure and control segments of the budgets which are related to product manufacturing costs.

5. (Continued)

5.3 Product cost is the sum of the material, labor and overhead costs to manufacture a product. Cost targets should be extended from product cost of a unit to total product cost (including tooling) for a quantity of units, and possibly to other procurement, operating and service costs in cases where customers may specify total life cycle cost objectives or these costs substantially affect the price of the equipment.

6. PROCEDURE

6.1 Product Selection.

Specific products, equipments or systems shall be designated as suitable for the application of cost targeting procedures during the product design and development phases. Generally those products that offer production and profit potential are selected, although low volume - high dollar programs or even engineering prototypes may be cost targeted.

6.2 Specific Program Elements.

6.2.1 Establish anticipated product costs based on estimating production manufacturing cost for each end item of the equipment from known data such as:

a. Specifications and requirements.
b. Systems block diagrams.
c. Preliminary or past designs.
d. Work statements or task descriptions.

6.2.2 Establish cost targets by adjusting the anticipated costs to meet market or contract price objectives.

6.2.3 Measure design progress in meeting targets by making periodic cost estimates as product design develops.

6.2.4 Adjust effort, as necessary, to meet cost targets, i.e., modify or change design concepts to meet cost targets.

6.2.5 Document results by comparing the final product cost estimate with target and anticipated costs.

6.3 Procedural Implementation.

6.3.1 General management should designate systems, equipment or products for the application of cost targeting procedures. They may also wish to review and approve cost targets on certain major programs. Generally, cost targeting concepts are initiated after the design concept or system approach is established. However, in certain programs the concepts may be applied and cost targets established during the contract definition or proposal phase.

6.3.2 Program or project management should be responsible for directing the application of cost targeting concepts, monitoring progress and measuring results. They may designate a specific individual, group or team as responsible for the cost targeting program administration.

6.3.3 Other line and staff personnel should participate in all the program elements as follows: (See Chart I).

6.3 (Continued)

a. Establish anticipated product costs. This step is performed generally by a cost estimating function based on inputs from design engineering, manufacturing, and purchasing. Cost accounting may produce and distribute the anticipated cost model.

b. Establish cost targets. This is a teamwork effort by a number of line and staff personnel. With anticipated costs and market price objectives as a guideline, cost targets for each end item should be established and agreed to by design engineering, manufacturing, and purchasing. Cost estimating, value engineering and other functions may contribute information which is useful in establishing the cost targets. A cost target model should be produced and distributed to all contributing and responsible personnel.

c. Measure design progress. As the detail design progresses continual or periodic cost estimates are made by qualified personnel. Progress is measured by comparing these estimates with established cost targets. Cost design reviews or informal reviews on request may be held to to assist design engineering in measuring progress and meeting targets. Value engineering and other support specialists should play an important part in these reviews, as well as manufacturing, purchasing, cost estimating and test personnel.

d. Adjust effort to meet cost targets. If measurement indicates that cost targets are not going to be met then two things should happen:

Cost target should be reviewed to determine if there are any new inputs which would justify revising the target.

Additional assistance should be provided to the responsible design engineer to help him meet the target.

A number of different specialists may contribute assistance such as value engineering, components, reliability, manufacturing, purchasing, and design. It may even be desirable to establish a specific design task team to work on the problem with the design engineer. Assistance would take the form of creative design, information on costs, materials, products, processes, sources, tooling, test, reliability, and the use of value engineering techniques.

e. Document results. At the completion of the design, cost estimates should be made and a final cost model developed. This and other cost target program documentation should be completed for program measurement and marketing purposes.

f. Supplemental and support tasks should be carried out in each program element to apply value engineering techniques and develop cost models. (See Chart II)

6.4 Cost Target Program Measurement.

General and program management should measure the effectiveness of the cost target program as applied to any product by the following indices:

6.4 (Continued)

6.4.1 Total cost improvement =

$$\frac{\text{Total anticipated costs-total final actual cost X 100}}{\text{Total anticipated costs}}$$

6.4.2 Cost effectiveness = $\frac{\text{Total target costs X 100}}{\text{Total final actual costs}}$

6.4.3 Return on investment = $\frac{\text{Total cost improvement (\$)}}{\text{Extra cost of C.T. Program}}$

6.5 Cost Target Program Reporting.

6.5.1 Cost avoidance which result from the cost target program should be reported into the company cost reduction program.

6.5.2 Value engineering change proposals which result from the cost target program should be processed according to prescribed procedures.

CHART I

COST TARGET PROGRAM

Elements and Contributing Personnel

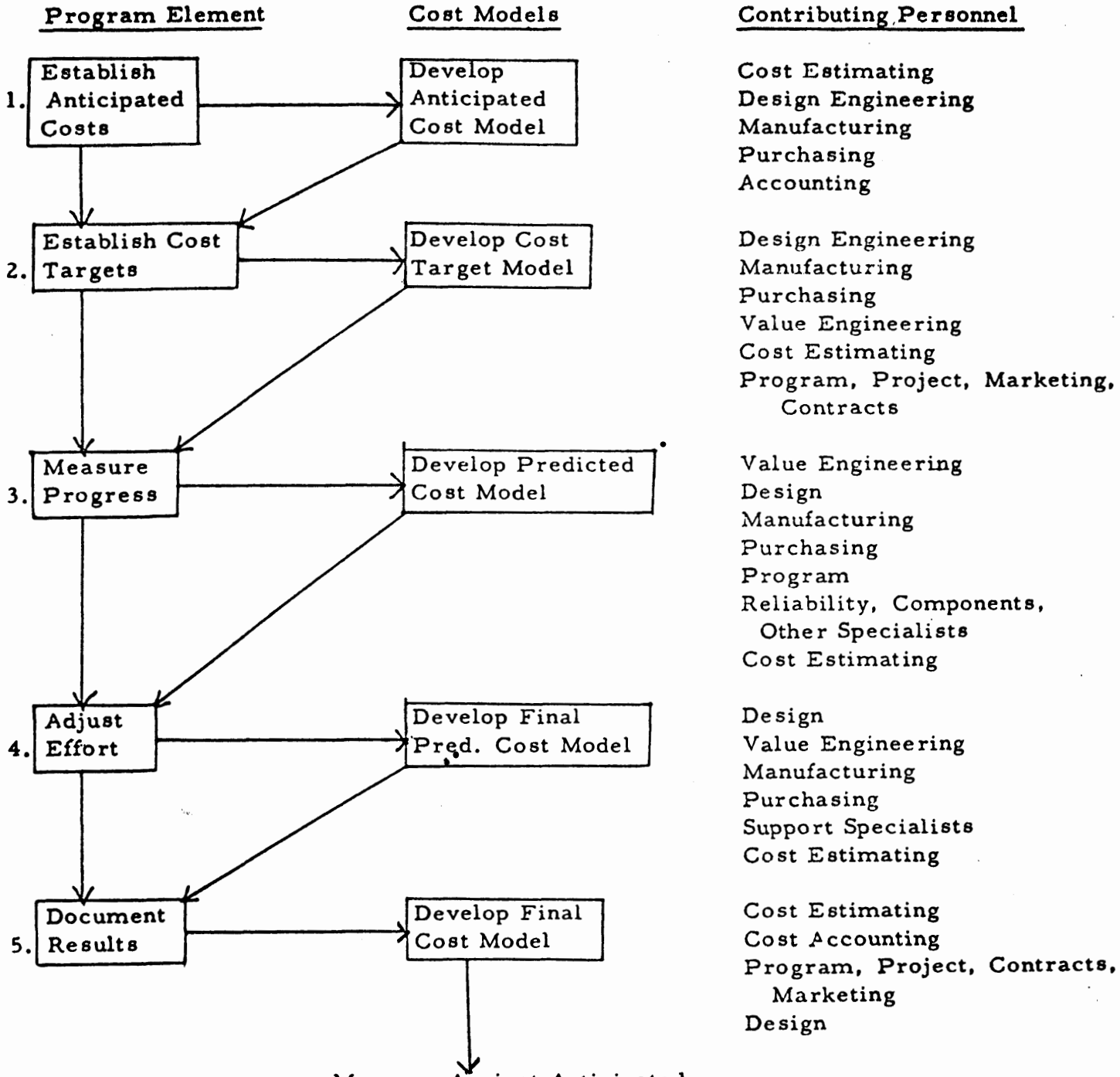


CHART II

COST TARGET PROGRAM

Supplemental and Support Tasks

Program Element	Value Engineering	Cost Models
1. Establish Anticipated Costs	Challenge specs and reqmts. Analyse system. Apply cost analysis techniques. Functional definition.	Identify high cost areas.
2. Establish Cost Targets	Functional tree analysis. Functional evaluation. Cost/value indices. Identify 2nd degree and unnecessary costs. Select V. E. Projects. Establish priority, schedule and PERT.	Provide cost visibility.
3. Measure Progress	Develop V.E.C.P.'s. Search for new materials, products, processes and vendors. Identify problem areas.	Estimate costs. Develop breakeven points for alternates. Review targets. Estimate tooling costs.
4. Adjust Effort	Depth study problem areas. Develop V.E.C.P.'s Assist designers. Establish V.E. teams.	Finalize predicted cost model. Modify unrealistic targets.
5. Document Results	Develop functional cost manual. Identify areas for future V.E. Disseminate cost data. Submit V.E.C.P.'s and C.S. 101's.	Compare final predicted costs to anticipated costs and target costs.

COST TARGET PROGRAM

TO

- CONTROL PRODUCT COSTS
- IMPROVE COST EFFECTIVENESS
- INCREASE COST AVOIDANCES
- ASSURE PRODUCT PROFITABILITY

BY.

ASSISTING DESIGN ENGINEERS

F.S. SHERWIN 3-10-6

OBJECTIVES ACHIEVED BY:

1. PROVIDING COST VISIBILITY
   a. COST MODELS
   b. COST - DESIGN PARAMETER
   c. MEASURE COST EFFECTIVENESS.
   d. ACCELERATING COST FEEDBACK & CORRECTIVE ACTION.
2. INTEGRATING EFFORTS - ENGR'G, MFG, SUPPORT.
   a. COST [illegible] - TARGET TEAM.
   b. COST ANALYSIS TEAM -
   c. DESIGN REVIEW TEAM
   d. TASK TEAM
3. DIRECTING EFFORTS -
   a. UNNECESSARY COST AREAS
   b. SLACK PATH AREAS
   c. OVER TARGET AREAS
   d. HIGH COST AREAS

FSS

CRITERIA FOR APPLICATION OF COST TARGET PROGRAM CONCEPTS.

1. FIXED PRICE OR INCENTIVE TYPE CONTRACT.
2. AMPLE PRODUCTION QUANTITY
3. COMPETITION
4. AMPLE SCHEDULED TIME
5. SUFFICIENT SUPPORT PERSONNEL
6. AMPLE $ FOR PRODUCTION HARDWARE
7. TECHNICAL & PERFORMANCE PROBLEMS LARGELY SOLVED
8. PROFIT PROBLEMS.
9. COST PROBLEMS.
10. HAS FUTURE PRODUCTION POTENTIAL.

KEY ELEMENTS

- ESTABLISH ANTICIPATED COSTS
- ESTABLISH COST TARGETS
- MEASURE PROGRESS
- ADJUST EFFORT
- DOCUMENT RESULTS.

ESTABLISH ANTICIPATED COSTS

- EST. COSTS OF DESIGN CONCEPT* FROM KNOWN DATA:
  - SPECS & REQ'MTS
  - SYSTEMS BLOCK DIAG.
  - PRELIM. DESIGNS
  - WORK STATEMENTS - TASK DESC.

*CONFIGURATION OF MATERIALS & PRODUCTS WHICH MEET REQUIRED FUNCTIONS

ESTABLISH COST TARGETS

- ADJUSTING ANTICIPATED COSTS TO MEET MARKET PRICE OBJECTIVES.

- PROVIDE COST TARGETS TO RESPONSIBLE DESIGN GROUPS

MEASURE PROGRESS

- MAKING PERIODIC COST ESTMATES AS DESIGN PROGRESSES.

- COMPARE WITH TARGETS

ADJUST EFFORT

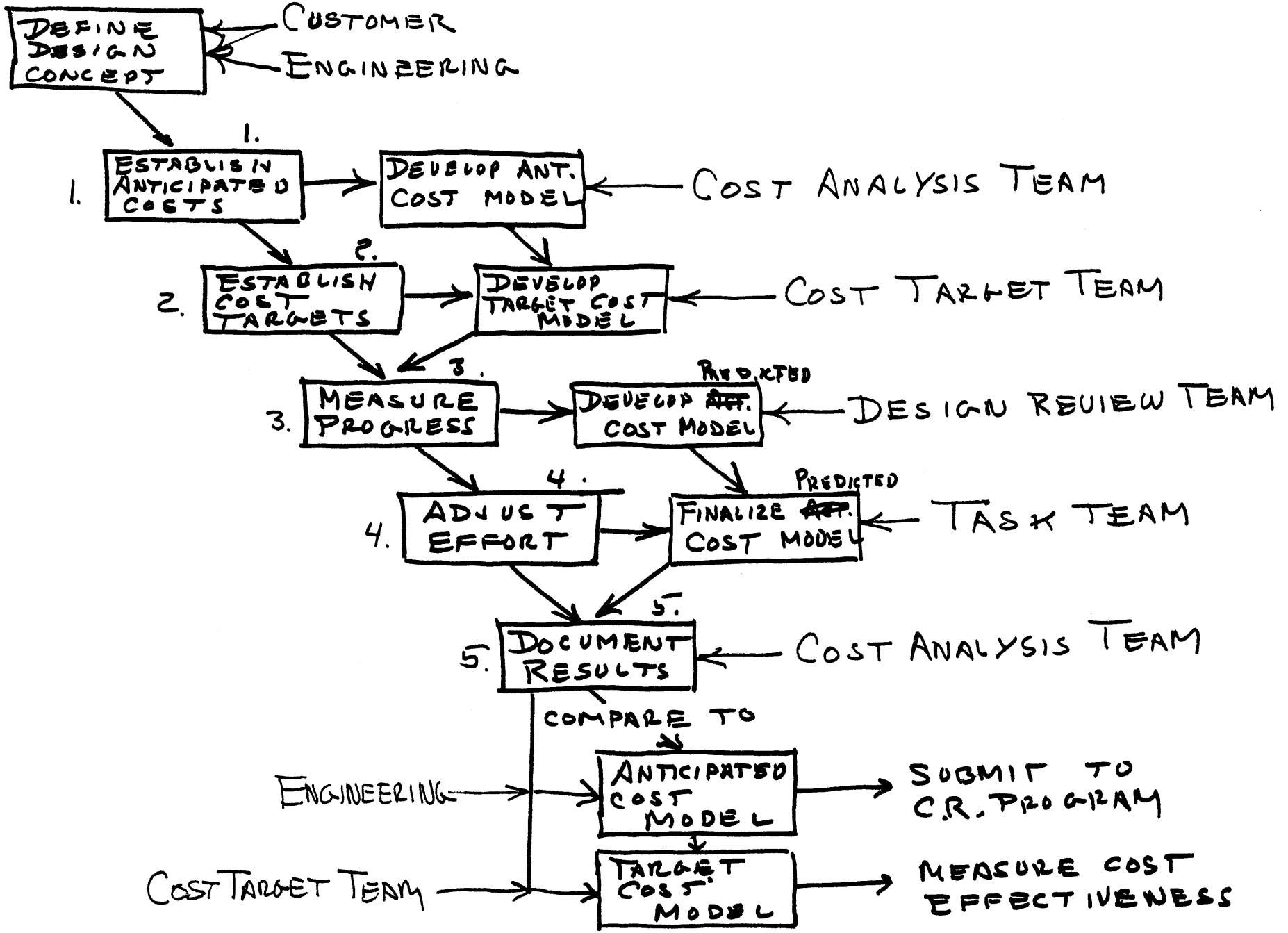
- MODIFYING OR CHANGING DESIGN CONCEPT IF OVER TARGETS.
- INCREASING EFFORT TO MEET COST TARGETS

DOCUMENT RESULTS

- COMPARE FINAL DESIGN COST WITH TARGET AND ANTICIPATED COSTS
- REPORT COST AVOIDANCE* TO COMPANY C. R. PROGRAM

* ANTICIPATED COST - FINAL DESIGN COST

FLOW CHART FOR I.C.P.



C. T. PROGRAM

RESPONSIBILITIES.

COST ANALYSIS TEAM – ESTIMATE COSTS
PROVIDE COST DATA
DEVELOP COST MODELS
DOCUMENT RESULTS

- COST ESTIMATORS
- MANUFACTURING-METHODS
- PURCHASING
- ~~FINANCIAL~~ COST ACCOUNTING

COST TARGET TEAM – ESTABLISH COST TARGETS
MONITOR RESULTS
REVISE TARGETS
ANALYSE & REPORT RESULTS.

- PROGRAM-CONTRACTS-MKTG.
- PROJECT-DESIGN
- VALUE ENGINEERING
- MFG.
- PURCH.

DESIGN REVIEW TEAM – REVIEW DESIGNS FOR
COST
MFG FEASIBILITY
SOURCES
TOOLING.

- V.E.
- DESIGN
- MFG., METHODS, COST EST. TEST.
- PURCH.
- REL.
- PROGRAM
- OTHER ~~SPECIALISTS~~ SPECIALISTS

TASK TEAM — SUPPORT EFFORT TO MEET COST TARGETS

DESIGN
V.E.
MFG.
PURCH.
SUPPORT SPECIALISTS

PROVIDE INFORMATION-
(COST, MATERIALS, PRODUCTS, PROCESSES, SOURCES)
APPLY VALUE ENGINEERING TECHNIQUES
RECOMMEND LOWER COST ALTERNATES.

COST TARGET PROGRAM.

- SUPPLEMENTAL & SUPPORT TASKS -

PHASE		
1. ESTABLISH ANTICIPATED COSTS	• APPLY V.E. TECHNIQUES. CHALLENGE SPECS. & REQMTS. ANALYSE SYSTEM APPLY COST ANALYSIS TECHNIQUES FUNCTIONAL DEFINITION	• DEVELOP COST MODELS. IDENTIFY HI COST AREAS.
2. ESTABLISH COST TARGETS	• APPLY V.E. TECHNIQUES. FUNCTIONAL TREE ANALYSIS FUNCTIONAL EVALUATION - C/U INDICES IDENTIFY SECONDARY & UNNECESSARY COSTS. SELECT V.E. PROJECTS. - PRIORITY - SCHEDULE - PERT.	• DEVELOP COST MODELS PROVIDE TARGET VISIBILITY.
3. MEASURE PROGRESS	• APPLY V.E. TECHNIQUES DEVELOP V.E.C.P.s SEARCH FOR NEW MATLS, PROD, PROC; VEND. IDENTIFY PROBLEM AREAS.	• DEVELOP COST MODELS. ESTIMATE COSTS DEVELOP B.E.P.'s FOR ALTERNATES REVIEW TARGETS. EST. TOOLING COSTS
4. ADJUST EFFORTS	• APPLY V.E. TECHNIQUES. DEPTH STUDY OF PROBLEM AREAS. DEVELOP V.E.C.P.s ASSIST DESIGNERS ESTABLISH V.E. TEAM.	• DEVELOP COST MODELS. FINALIZE ~~ACTUAL~~ PREDICTED COST MODEL MODIFY UNREALISTIC TARGETS
5. DOCUMENT RESULTS.	• DEVELOP FUNCTIONAL COST MANUAL IDENTIFY AREAS FOR FUTURE V.E. WORK DISSEMINATE COST DATA. SUBMIT V.E.C.P.s - CS 101's	• MEASURE RESULTS. FINAL ~~ACTUAL~~ PREDICTED COSTS TO ANTICIPATED COSTS & TARGET COSTS

FSS.

COST TARGET PROGRAM

MEASURE EFFECTIVENESS - BENEFITS

1. TOTAL COST IMPROVEMENT = TOTAL ANTICIPATED COSTS - TOTAL FINAL ACTUAL COSTS
2. COST EFFECTIVENESS = $\frac{\text{TARGET COST}}{\text{FINAL ACT. COST}} \times 100$
3. RETURN ON INVESTMENT = $\frac{\text{TOT. COST IMP.}}{\text{EXTRA COST INCURRED BY C.T.P.}}$

OTHER BENEFITS -

- AVOIDED OVERRUNS
- FEWER PROD. PROBLEMS.
- INCREASED PROFITS.
- MEET PROD. SCHEDULE.
- REDUCE # OF CHANGES
- MORE ACCURATE BIDS
- FASTER COST ESTIMATING
- BETTER TEAMWORK
- IMPROVED MORALE
- REDUCED TOOLING COSTS.
- IMPROVED QUALITY/- RELIABILITY.
- INCREASED SALES
- IMPROVED MARKETING
- IMPROVED CONTRACTUAL-CUSTOMER RELATIONS

FSS.

Cost Target Program

To

Control Product Costs

Improve Cost Effectiveness

Increase Cost Avoidances

Assure Product Profitability

Key Elements

Establish Anticipated Costs

Establish costs of design concept* from known data:

Specs and reqm'ts
Systems block diagram
Preliminary designs
Work Statements - task desc.

* Configuration of materials and products which meet required functions.

Establish Cost Targets

Adjusting anticipated costs to meet market price objectives.

Provide cost targets to responsible design groups.

Measure Progress

Making periodic cost estimates as design progresses.

Compare with targets.

Adjust Effort

Modifying or changing design concept if over targets.

Document Results

Compare final design cost with target and anticipated costs.

Report cost avoidance* to company C. R. Program.

* Anticipated cost - final design cost.

Establish Anticipated Costs

Sub Tasks -

Use cost analysis techniques - record results
Develop cost models - document
Challenge specs. or requirements
Use value engineering technqiues

Support People-

Value Engineering
Manufacturing - Production
Purchasing
Cost Accounting
Cost Estimating
Reliability

Establish Cost Targets

Sub Tasks -

Make functional tree analysis - V. E. Techniques
Identify high secondary cost areas
Select high seniority projects
Identify slack time areas
Evaluate functional areas -
Comparison -
Subdivide targets - as necessary
Establish cost/value indexes
Identify unnecessary cost areas
Reduce targets in areas where desirable - high cost/value
Revise cost models -

Support -

Same and others as needed
Reliability and maintainability

Measure Progress

Sub Tasks-

Challenge specs and requirements for V.E.C.P.'s
Use V. E. Techniques
Make rapid cost evaluations
Search for new materials, products, processes, sources
Identify problem areas for special effort
Chart results on functional tree organization
Develop cost (breakeven) curves for alternates

Support -

Value Engineering Team
Others Listed
Component and Process Specialists

Adjust Effort

Sub Tasks -

Use Value Engineering Techniques
Apply value engineering task team - V. E. Specialists
Revise cost curves and models
Consider spec. and requirement change - V.E.C.P.
Identify tooling cost targets
Document data for future use

Support -

Manufacturing
Value engineering
Purchasing - vendors
Cost Estimating
Accounting
Others

Document Results

Sub Tasks -

Develop cost manual of functional/cost data
Identify areas for future value engineering work - Hi C/V
Plan a program to verify cost estimates and measure accuracy
Accumulate and develop cost-function, cost-quantity curves for cost estimating and functional evaluation purposes

Support -

Design
Value Engineering
Value Analysis
Purchasing
Manufacturing - I. E.
Others

INCREASE COMPANY PROFITS AND EARNINGS BY INCREASING EFFECTIVENESS OF THE COST REDUCTION PROGRAM THRU. MORE SYSTEMATIC METHODS.

NEEDED

I. MANPOWER INVESTMENT

II. WORK PRIORITY-MOTIVATION

I MANPOWER.

A. ADMINISTRATORS-COORDINATORS.

B. SUPPORT PERSONNEL.

II WORK PRIORITY - MOTIVATION

A. COST TARGET CONCEPTS

B. GROUP & INDIVIDUAL GOALS

C. MEASUREMENT

D. CORRECTIVE ACTION

E. SUGGESTION SYSTEM

I. MANPOWER.

A. ADMINISTRATORS - COORDINATOR

1. FULL TIME ASSIGNMENT.

2. SPECIFIC RESPONSIBILITIES.

3. C.R. SPECIALIST.

B. SUPPORT PERSONNEL.

1. VALUE ENGINEERING
TRAINING, SUPPORT, CONSULTING, RESEARCH

2. COST SPECIALISTS
ESTIMATING, METHODS, COST DATA

II Work Priority - Motivation.

A Cost Target Concepts
Apply in product design

B. Group & Individual Goals
Assign by function
- Gen. Mgmnt.
- Engrg.
- Mfg.
- Purch.
- Fin.

Apply to all cost centers.
- Material
- Labor
- Overhead
- G&A.
- Capital Equipment

C. Measorement -

Montnly

D. Corrective Action.

Increase effort needed to meet goals

E. Suggestion System.

Monetary awards
Eligibility rules.

Recognition for all achievements