

GROUND SUPPORT EQUIPMENT
COST ESTIMATING,
SPECIFICATION FOR

PCN 80111

July 5, 1977

DESIGN ENGINEERING DIRECTORATE

National Aeronautics and
Space Administration

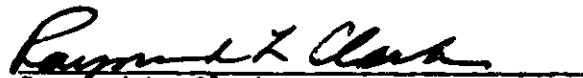
John F. Kennedy Space Center



GROUND SUPPORT EQUIPMENT
COST ESTIMATING,
SPECIFICATION FOR

This specification has been approved by the Design Engineering Directorate of the John F. Kennedy Space Center and is mandatory for use by KSC and associated contractors.

Approved:



Raymond L. Clark
Director of Design Engineering

July 5, 1977

JOHN F. KENNEDY SPACE CENTER, NASA

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1.0 SCOPE

1.1 Purpose. This specification prescribes the requirements for the preparation of Ground Support Equipment (GSE) cost estimates and establishes uniform practices for cost estimating preparation.

1.2 Application. This specification applies to all GSE under the responsibility of John F. Kennedy Space Center (KSC). All GSE installation and operational end items shall be estimated according to this specification. GSE is any equipment that is manufactured and can be used as Government furnished equipment on construction of facility (C of F) contracts, or for installation of operational end items by an operational and maintenance organization. Components fully assembled are also considered GSE. All construction GSE shall be estimated in accordance with KSC-SPEC-G-0002, Specification for Compiling Construction Cost Estimates and TR-1495, KSC Estimating Orientation.

1.3 GSE. GSE shall be classified according to one of the following functional designations (see TR-1287, KSC Support Equipment List):

1.3.1 Servicing. The servicing support equipment is defined as equipment capable of supplying fluids, gases, and ground power/generation (electrical, hydraulic, and pneumatic) to the flight hardware and/or associated GSE. Typical are the functions of transferring, flushing, purging, conditioning, vapor disposal, and decontamination.

1.3.2 Checkout and Test. The checkout and test support equipment is defined as equipment required in all test and checkout of flight hardware and associated GSE. Typical in this area are stimuli monitoring and evaluation equipment.

1.3.3 Handling and Transportation. The handling and transportation equipment is defined as equipment required for movement and support of flight hardware. Typical in this area are slings, dollies, trailers, and support stands.

1.3.4 Auxiliary. Auxiliary equipment is defined as that equipment that aligns, protects and calibrates flight hardware. This equipment includes, but is not limited to, protective devices and alignment and calibration sets.

1.3.5 Uncategorized. Miscellaneous equipment that does not fit the other categories and is required to support test, checkout, and launch operations falls in this category.

2.0 APPLICABLE DOCUMENTS

The following documents, of the latest issue, provide reference materials for guidance on preparing cost estimates. In the event of conflict between the documents referenced herein and the contents of this specification, the contents of this specification shall take precedence.

2.1 Government Publications.

John F. Kennedy Space Center (KSC)

KSC-SPEC-G-0002	Specification for Compiling Construction Cost Estimates
TR-1495	KSC Estimating Orientation
TR-1287	KSC Support Equipment List
DE-ID 1142.23	Implementing Directive for Special Handling Information on Procurement of Products and Services
NMI 7330.2	Management Instruction, Preliminary Engineering for NASA Facility Projects
TR-1508	Budget Cost Data For Facilities Construction Elements
TR-1511	KSC Monthly Facility Construction Cost Index

Department of Labor, Bureau of Labor Statistics

Bulletin 917 Handbook of Work and Output

Occupational Safety and Health Administration (OSHA)

Occupational Safety and Health Act, Volume III

2.2 Pricing Information Sources. Estimators shall have ready access to reference books, catalogs, and other documents usable as sources of current price information. Source documents recommended for use in compiling cost estimates for NASA/KSC projects are as follows:

General Estimating Publications

AACE-Twenty Year Publication Index 1956-1975	American Association of Cost Engineering, Morgantown, W.Va.
Cost and Optimization Engineering	F. C. Jelen, Lamar University, Beaumont, Tex.

Engineering News Record	McGraw-Hill, Inc., N.Y., N.Y.
Net Prices Catalog	McMaster-Carr Supply Company, Chicago, Ill.
Process Plant Construction Estimating Standard	Richardson Engineering Service, Inc., Solana Bch., Calif.
<u>Mechanical Estimating Publications</u>	
Bigam Insulation and Supply Co. Inc.	A. D. Bigam, Fort Lauderdale, Fla.
Cost Manual for Piping and Construction	H. Herkimer-Chemical Pub., N.Y., N.Y.
Crosby Laughlin - Cat. No. 950-6	Tulsa, Okla.
Lebus - Cat. No. 950-6	Tulsa, Okla.
Limitorque Catalog	Lynchburg, Va.
Machine Shop Estimating	Nordhoff, McGraw-Hill, N.Y., N.Y.
Mechanical Estimating Guidebook	John Gladstone, McGraw-Hill, N.Y., N.Y.
Mechanical Estimating Handbook	Craftman, Solana Beach, Calif.
Process Plant Estimating, Evaluation and Control	K. Guthrie, Craftman, Solana Beach, Calif.
The Crosby Ground Engineering Journal	No. ET-76, Tulsa, Okla.
<u>Electrical Estimating Publications</u>	
Cramer Magnacraft	Cramer, Orlando, Fla.
Electrical Engineers Master Catalog (EEM)	United Technical Publishers, Garden City, N.Y.
Electronic Industry Cost Estimating Data	Hartmeyer-Ronald Press, N.Y., N.Y.
Engineering Manual and Purchasing Guide	Allied Electronics, Ft. Worth, Tex.

Graybar Catalog
Newark Electronics

Graybar Electr., N.Y., N.Y.
Fort Lauderdale, Fla.

(Copies of the above listed documents are available through the KSC Library, Engineering Documentation Center, or KSC Cost Engineer.)

3.0 REQUIREMENTS

GSE cost estimating shall be accomplished in accordance with the following requirements.

3.1 Estimating Practices. A cost estimate is required for each design review, final design, and final government estimate for each procurement. The final government estimate shall include costs for special conditions and amendments.

3.1.1 Safeguarding Estimates and Supporting Data. Preparation of estimates for NASA/KSC shall be considered, at all times, as administratively confidential work (see DE-ID 1142.23). Records, interdepartmental and interagency correspondence, or material that in any way relates to preparation of estimates for NASA/KSC shall be accessible only to authorized NASA/KSC personnel or representatives. Code G-100 cost estimates shall be stamped FOR OFFICIAL USE ONLY. Supporting data that are not attached to the bid schedule estimates due to their bulky nature shall be retained under appropriate security measures. After bid opening, a copy of the supporting data shall be furnished to the NASA/KSC Procurement Office for evaluating contractor requests for payment and as an aid in negotiations.

3.1.2 Cancellation of Protective Markings. Protective markings on cost estimates shall be cancelled immediately after the announcement of the successful bidder.

3.1.3 Code Classification. Eight different types of cost estimates are used at KSC. Each type relates to a specific phase of a GSE project as follows:

3.1.3.1 Code G-1, Budget Cost Estimate. The Code G-1 budget cost estimate is used for project authorization. It is the initial determination of the project that can be completed for a stipulated monetary amount and serves as a basis for overall program planning and control, for establishing equitable design fees, and for comparative cost analyses.

The cost estimate shall be prepared using NASA/KSC Form 1510 or other forms as specified by NASA/KSC. Budget confidence factor shall be noted. General and Administrative (G&A) costs and profit should be included in Engineering Unit Costs.

3.1.3.2 Code G-2, Study or Preliminary Engineering Report (PER) Estimate. The Study or PER is the product of detailed analyses of user requirements determining a concept resulting in lowest possible life cycle cost for the GSE work proposed. The Study or PER incorporates all information needed to formulate a basis for design and includes the basis for requirements, analyses of GSE, evaluation of different approaches and recommended solutions, a detailed cost estimate that accommodates additional and reasonable cost escalation and contingency factors, drawings, schematics, equipment lists, etc.

Cost estimates for studies or PER's shall be prepared using KSC Form 21-193 and in accordance with NASA Management Instruction NMI 7330.2. The development of the estimated cost for design and engineering services shall be included with the estimate submittal.

3.1.3.3 Code G-U, Labor and Materials Unit Cost Estimate. Code G-U is based on combined unit labor and materials plus mark up.

These estimates may be required at any predetermined milestone established by the Lead Design Engineer in the design process up to and including the 49-percent point of design completion of design documents used for compiling the estimates. For example, an estimate prepared from 30-percent review design documents would be identified as a Code G-U-30 cost estimate.

Code G-U estimates shall be prepared using KSC Form 21-224, which combines costs for labor and materials into single unit costs.

3.1.3.4 Code G, GSE Cost Estimate. Code G estimates show separate costs for labor and materials associated with each divisional task estimated for GSE. Unless otherwise specified, they shall be prepared for the 30-, 60-, and 90-percent review milestones or as often as directed by the cognizant NASA/KSC lead designer. The code designation shall indicate the design review milestone (G-30, G-60, and G-90). Prices shown in cost breakdown shall be in the greatest detail possible.

Code G cost estimates shall be prepared using KSC Form 21-243. As required for code G-U estimates, code G estimates shall indicate the degree of completion of source design documents.

3.1.3.5 Code G-95, GSE Cost Estimate. This reflects the final estimate of project design or 100-percent design.

Code G-95 cost estimates shall be prepared using KSC Form 21-243. As required for code G-U estimates, code G-95 estimates shall indicate the degree of completion of source design documents.

3.1.3.6 Code G-100, GSE Cost Estimate. This estimate often called the final or Government Estimate, is a G-95 cost estimate to which costs for bid documentation and all special conditions and amendments have been added.

Code G-100 cost estimates shall be prepared using KSC Form 21-243.

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3.1.3.7 Code G-CO, Change Order Cost Estimate. Code G-CO cost estimates are used to determine cost of proposed changes and supplemental work to existing contracts and to support negotiations for additions and deletions.

Code G-CO cost estimates require considerably more detail than final design estimates. It may be desirable to organize the NASA/KSC estimate in accordance with the format used by the contractor to facilitate rapid resolution of cost differences existing between the two estimates and the contractor's proposal. Code G-CO cost estimates in final form, shall however, conform to requirements of this specification. The code designation shall indicate the review milestone (G-CO-30, G-CO-60, G-CO-95, and G-100). The degree of completion of source design documents shall also be indicated in the estimate.

Timing and issuance of contract change orders for which Code G-CO cost estimates are required are important factors. All facets of the work shall be studied, including status of materials, procurement by the contractor, change order impact on the contractor's work progress program, and other factors that may influence overall project costs.

3.1.3.8 Code G-0, (Other) Cost Estimate. Code G-0 estimates are compiled as specified by NASA/KSC to support special studies, surveys, program analyses, and effective GSE cost management. Format, item identifications, pricing, organization, and coverage shall be as specified by the Lead Designer.

3.1.4 Forms. NASA/KSC forms shall be used in preparation of GSE cost estimates.

3.1.5 General Practices.

3.1.5.1 Levels of Costing. The costing of GSE shall be accomplished at the following levels:

- (a) Production Quantities (Off-the-Shelf items)
- (b) Preproduction or Prototype Modifications to design units
- (c) Research and Development
- (d) Others

Consideration shall be given as to whether a unit will be fabricated by an in-house contractor or one not on site at KSC.

3.1.5.1.1 Confidence Factor. Design allowances shall be applied based on the complexity of the unit. A confidence factor should be considered to help determine accuracy in the four levels of budget estimates as follows:

- (a) Production Quantities (Off-the-Shelf items) = \pm 15 percent
 - (1) Minor changes, such as nameplates or indicator lights
 - (2) Escalation
- (b) Preproduction or Prototype Modifications to design units = \pm 50 percent
 - (1) Variation of design
 - (2) Based on rework, such as adding or deleting components or scope changes in units
 - (3) Escalation
- (c) Research and Development = \pm 100 percent
 - (1) Conceptual (never designed or built)
 - (2) Escalation
- (d) Others = \pm 100 to 500 percent
 - (1) Complexities
 - (2) Advanced technology
 - (3) Escalation

3.2 Work Flow. The steps necessary for the preparation and approval of a GSE cost estimate are shown in Figures 1 and 2.

4.0 PREPARATION OF THE ESTIMATE

4.1 General Instructions. Cost estimates shall be prepared on the forms cited in this specification. Originals shall be neatly prepared in pencil and on forms that are reproducible by dry bond (Photostat) type copying process. Originals and four copies shall be delivered to the Lead Designer or KSC Cost Engineer.

4.1.1 Contingencies. Design, estimating, or engineering contingencies shall not appear in a detail estimate.

4.2 Compilation and Submittal. Cost estimates shall be compiled and processed as required for the 30-, 60-, 90-, and 100-percent cost estimates in accordance with the applicable directives.

4.3 Acceptance Criteria. Cost estimates shall be prepared and formatted in accordance with this specification. General criteria to be used in the preparation are as follows:

- a. Cost estimates for all codes shall be prepared in the same careful manner as if NASA/KSC were bidding in competition with prudent, experienced, and well-equipped private contractors.
- b. Estimates shall be broken down in as much detail as possible. The greater the estimated cost, the greater detail required in the cost breakdown. Costs over \$1,000 are to be broken down in more detail

with backup data, quotes, analyses, and evaluation. Cost break-downs shall indicate materials by individual type, kind, and size and current labor rates.

- c. Estimated costs shall be based on current prices from reliable sources. A comparison of all major labor and material prices shall be made against current prices for similar features of work and adjusted for differences in site, local vendors, and sub-contractor prices. The date and source of comparison shall be noted on the estimate sheet. If quoted prices or studies of conditions in the geographical area show labor and material costs varying considerably from those in published pricing guides, costs resulting from specific evaluation of job site conditions shall be used. Excessive price variations shall be investigated and justified.
- d. Estimates shall cover all work shown or implied on the plans, specifications, and other pertinent documents. The estimator/cost engineer shall obtain the information to estimate the project in the detail required.
- e. Items off-the-shelf shall be costed. The total delivered cost for off-the-shelf (commercial) equipment and devices shall be shown as material dollars on KSC Form 21-370.
- f. Each and every cost total shall be rounded to the nearest dollar.
- g. All mechanical and electrical labor shall be estimated in manhours and marked up with current G and A overhead, profit, and warranty. Labor rates shall be based on a normal 40-hour week, and shall provide for adjustments if overtime is anticipated (see TR 1508, Budget Cost Data For Facilities Construction Elements and TR 1511, KSC Monthly Facility Construction Cost Index for labor rates).
- h. Direct quotations shall be obtained from KSC-reliable sources (those companies who have successfully completed projects for KSC/NASA and/or have the capability and intention to bid on new projects), when no published prices are available, to verify estimated prices, and for unusual applications of products and equipment. To the extent possible, quotes shall only be used to verify estimated prices and shall not be substituted for estimated prices.
- i. Lump sums may appear in Budget and Preliminary Engineering Estimates; however, they shall not be used in detail cost estimates since they cannot be properly evaluated.
- j. When a Government estimate varies 15 percent or more from the low bid, a detailed review and critique shall be required from the firm or agency responsible for the Government estimate. When errors in fact or judgment are uncovered, or when the scope of work changes subsequent to NASA/KSC approval, the estimate shall be revised in accordance with KSC-SPEC-G-0002, paragraph 4.20. This review and critique shall be used in the evaluation of the bidder's proposal.

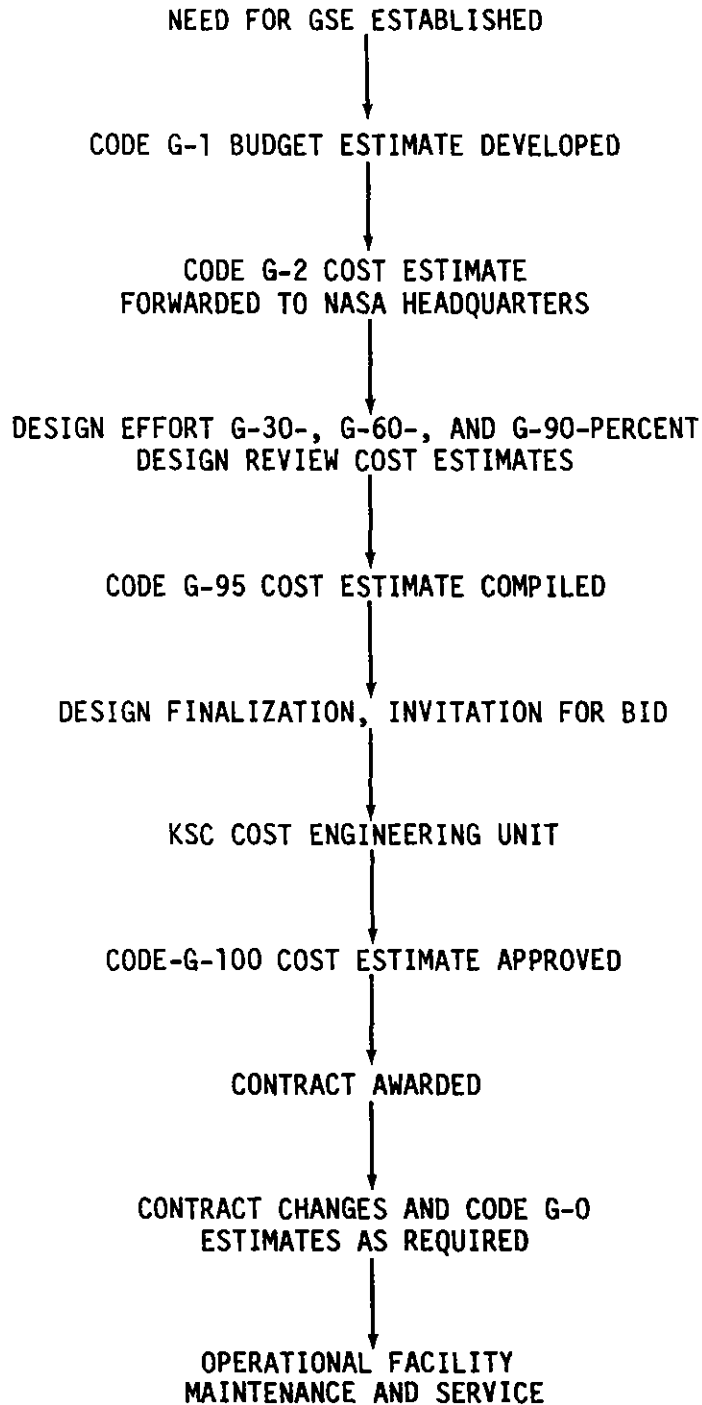


Figure 1. Idealized Flow Plan for Major KSC GSE

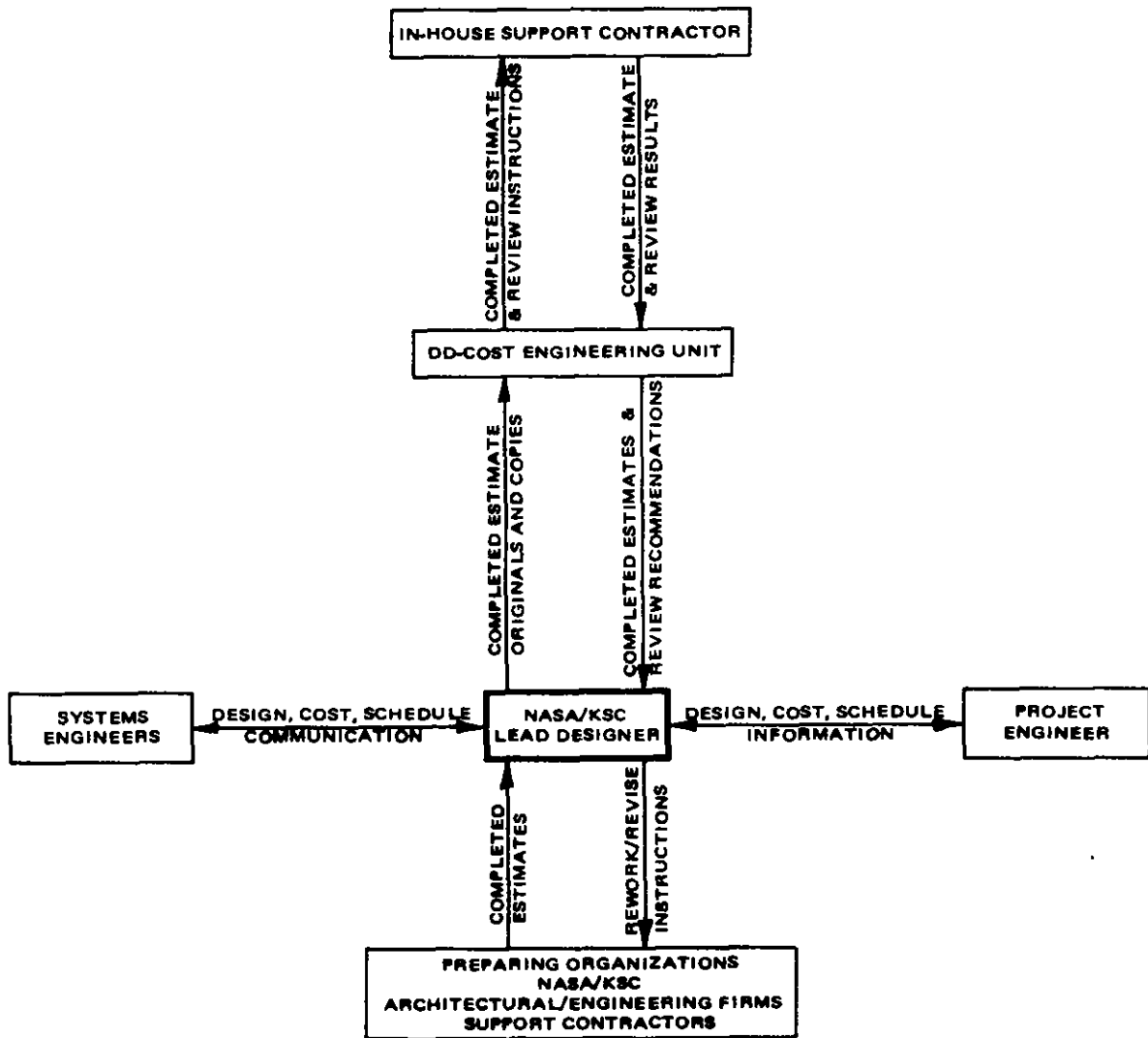


Figure 2. Design Engineering Operating Concept

4.4 Format. Cost estimate submittals shall consist of five parts: cover sheet, estimated GSE bid cost summary, comparison of budgeted and estimated costs summary, labor and materials cost summary, and supporting data (see Appendix A, Exhibit A-1 through A-5). See Appendices B through F for samples illustrating the following types of estimates: electrical, electronics, mechanical, machinery, and structural.

The final Government estimate (G-100) shall include Solicitation Offer and Award Summary (see Appendix A-2, Exhibit A-2)

4.4.1 Cover Sheet. This sheet shall identify the project title and location, drawing number, project control number (PCN), work order (W.O.) number, contract number or program model number (as applicable), appropriate estimate code identification and date submittal. The preparing organization shall be identified by name, address and phone number. Final estimates shall be signed and approved by duly authorized persons to commit the firm or agency to the estimate.

4.4.2 Estimated GSE Bid Cost Summary. A GSE bid cost summary shall be prepared for each item that NASA/KSC designated for the bid schedule.

4.4.3 Comparison of Budgeted and Estimated Costs. Comparisons of budgeted and estimated costs provide early indications of design and cost changes that may impact the project. Each submittal package shall include the current comparison of budget and estimated costs as well as comparisons from previous submittals.

4.4.4 Labor and Material Cost Summary. This part shall list labor and material costs, marked up with taxes, overhead, profit, and G and A for each trade identified in the cost estimate.

4.4.5 Supporting Data. This part shall provide trade summaries identification of price sources, quoted prices, price computations, quantity surveys, mark-ups, value engineering data, comments and recommendations, and other information as required to verify prices in cost estimates.

4.5 Estimate Sheet Headings. The information on the cover sheet shall be inserted in the appropriate heading block of each sheet in the estimate except that the date of completion shall be substituted for the date of submittal. The full names of the estimator(s) and checker(s) shall appear in printed (or typed) and signature form in the heading of each sheet.

4.6 Direct Quotations. When requesting a price quotation, the estimator shall identify himself as representing a Government agency seeking to obtain price information for estimating purposes only. A specified quotation shall supersede published prices. Quotations shall be identified, dated, and submitted with the estimate as directed or maintained for future reference. Quotations are to be considered informal and should be evaluated by the estimator with the logic that a manufacturer or vendor will not compromise his interests or violate the confidence of his customers.

4.7 Utilization of Pricing Guides and Quotations. Prices obtained from pricing guides and direct quotations shall be used solely to verify the estimator's prices for labor, materials, and equipment. The estimator shall break down in detail, prices obtained from pricing guides and quotes into labor, material, equipment, and contractor costs applicable to each task associated with the total project.

4.8 Waivers. The NASA/KSC Lead Designer, with the KSC Cost Engineer's written concurrence, is authorized to waive requirements of this specification. Waivers are justified when project design schedules, scope, or complexity indicate that preparation of certain submittal elements imposes unwarranted or unnecessary work.

5.0 NOTES

When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

Custodian

NASA-John F. Kennedy Space Center

Preparing Activity

John F. Kennedy Space Center
Design Engineering Directorate
Facilities Engineering Division

6.0 APPENDICES

APPENDIX A

GENERAL. The following exhibits and backup data are samples of KSC cost estimate and supporting data and the type of information necessary for the completion of these forms.

A-1 Cover Sheet

A-2 Totals from final Government Estimated listed and referenced in Solicitation Offer and Award Bid Form 36 and backup data.

A-3 Comparison of Budgeted and Estimated Costs Summary

A-4 Labor and Material Cost Summary

A-5 Supporting Data

- (1) Backup Data for final Labor and Engineering Rates (to be included with each cost estimate submittal)
- (2) Forecast of Labor Rates and Backup Data
- (3) Computation Sheet Backup Data for G and A, Engineering, Material Handling, and Production
- (4) Detail Backup Data for:
 - (a) Manufacturing/Engineering Cost Summary
 - (b) Production Labor Cost Summary
 - (c) Vendor Data Bid Cost Summary

APPENDIX B

ELECTRICAL. This cost estimating exhibit for electrical items includes Budgetary (G-1), Preliminary (GU-30), and Final (G-95) Estimates.

- B-1. Budgetary Estimate, G-1 (Two-sided form)
- B-2. Preliminary Cost Estimate, GU-30
- B-3. Design Estimate, G-95

APPENDIX C

ELECTRONICS. This cost estimating exhibit for electronic items includes Budgetary (G-1), Preliminary (GU-30), and Final (G-95) Estimates.

- C-1. Budgetary Estimate, G-1 (Two-sided form)
- C-2. Preliminary Cost Estimate, GU-30
- C-3. Final Design Estimate, G-95

APPENDIX D

MECHANICAL. This cost estimating exhibit for mechanical items includes Budgetary (G-1), Preliminary (GU-30), and Final (G-95) Estimates.

- D-1. Budgetary Estimate, G-1 (Two-sided form)
- D-2. Preliminary Cost Estimate, GU-30
- D-3. Final Design Estimate, G-95

APPENDIX E

MACHINERY. This cost estimating exhibit for machinery items includes Budgetary (G-1), Preliminary (GU-30), and Final (G-95) Estimates.

- E-1. Budgetary Estimate, G-1 (Two-sided form)
- E-2. Preliminary Cost Estimate, GU-30

E-3 Final Design Estimate, G-95

APPENDIX F

STRUCTURAL. This cost estimating exhibit for structural items includes Budgetary (G-1), Preliminary (GU-30), and Final (G-95) Estimates.

- F-1. Budgetary Estimate, G-1 (Two-sided form)
- F-2. Preliminary Cost Estimate, GU-30
- F-3. Final Design Estimate, G-95

Appendix A

EXHIBIT A-1. SAMPLE COVER SHEET

PROJECT Space Shuttle
LOCATION Kennedy Space Center
IFB NO. 387
BID DATE 6-21-76
AMENDMENT #1, dated 5/16/76
#2, dated 5/23/76
ESTIMATE CODE G-100
PCN 77823
CONTRACT W.O. 0750

~~FOR OFFICIAL USE ONLY~~

Cancelled
6/30/76
GAB

DRAWING NO. 79K09876 SHTS 1-6

PREPARED BY (FIRM) General Engineering, Inc

LOCATION Kennedy Space Center

MODEL NO. UL 251

SUBMITTAL DATE 6-21-76

LEAD DESIGNER T.A. Cadwell

ESTIMATED BY R Long

KSC COST ENGINEER J.A. Brown

REVIEWED BY J. Smith

PROJECT ENGINEER J.J. Kelley

APPROVED BY Joe A. Jones

STANDARD FORM 36, JULY 1966 GENERAL SERVICES ADMINISTRATION FED. PROC. REG. (41 CFR) 1-16.101		CONTINUATION SHEET		REF. NO. OF DOC. BEING CONT'D 10-0023-7	PAGE 6	OF
NAME OF OFFEROR OR CONTRACTOR General Engineering, Inc. Est: W. T. Long Ck. by: C. F. Smith Date: 1-6-77						
ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT	
<u>SECTION I - ENGINEER & FURNISH EQUIPMENT</u>						
1	MR 74653 (F) Engineer, fabricate, assemble, test, mark, package and deliver one E. T. Hydrogen Vent Umbilical and Intertank Swing Arm, in accordance with KSC Specification 1093 Revision A dated 12/21/76, and KSC Drawing 79K01016 Revision A dated 12/21/76.	1	ea	435,890	435,890	
<p>FOR OFFICIAL USE ONLY <i>(Ref. to Est. Shts. 61 of 62)</i> <i>-Cancelled 2/1/77 JAB</i></p>						
2	Vendor Data in accordance with Clause entitled "Vendor Data Requirements"	1	ea	5,500	5,500	
	Reproducible Copies	3	ea	15.73	47-	
3	Quality Control Plan in accordance with the "Quality Requirements" Clause.	4	ea	491.25	1,965	
4	Certificate of Compliance in accordance with the "Quality Requirements".	1	ea	500	500	
5	Shop Drawings	2	ea	5,500	11,000	
	Reproducibles Copies	5	ea	31.47	157	
6	"As-Built" Drawings	2	ea	3,665	7,330	
	Reproducibles Copies	5	ea	26.22	130	
7	Proafs of compliance in accordance with KSC Specification 79K01016.	2	ea	250	500	
8	Test Procedures in accordance with "Acceptance Checkout Procedure Criteria".	1	ea	11,137	11,137	
	Reproducibles Copies	2	ea	31.47	63	
9	Test Results and Records in accordance with KSC Specification 79K01016.	3	ea	733.33	2,200	

KSC-SPEC-G-0003
July 5, 1977

<input checked="" type="checkbox"/> GROUND SUPPORT EQUIPMENT		COST ESTIMATE				<input type="checkbox"/> CONSTRUCTION	
CODE G-100	DATE COMPLETED 1-6-77	SHEET <u>61</u> OF <u>62</u>		SHEET _____ OF _____			
PROJECT ET H ₂ Vent & Swing Arm		DRAWING NO(S) 79K01016	SHEET NO 1-6, A1, M1-5				
LOCATION LC-39, KSC	PROG. MODEL NO. 738B	PCN 72480					
ARCHITECT OR ENGINEER General Engineering, Inc.		WORK ORDER OR CONTRACT NO 0019					
ESTIMATOR R. Long <i>R. Long</i>	CHECKER J. Smith <i>J. Smith</i>	APPROVED DD FED-1 <i>Joe C. Blaw</i>					
Bid _____ SUMMARY	QUANTITY		LABOR (\$ OR MH)		MATERIAL		TOTAL COST
	NO. UNITS	UNIT MEAS.	PER UNIT	<input type="checkbox"/> FIELD <input type="checkbox"/> TOTAL <input type="checkbox"/> FAB.	PER UNIT	TOTAL	
ITEM 1 Eng. Fab. & Assembly							\$435,890
							(Ref. to Est. Shts 2 & 3)
ITEM 2 Reproducibles (15) Copies (45)	300 3	Hrs EA	18.33	5,500		15.73 47	5,550
ITEM 3 Qual. Control Plan Eng.	4 80	EA, Hrs			52.00 22.00	204 1,760	1,965
ITEM 4 Certificate of Compliance							500
FOR OFFICIAL USE ONLY							
ITEM 5 Shop Drawings (30) Reproducibles (2) Copies							Cancelled 2/11/77 <i>JAS</i>
	600 5	Hrs EA	19.33	11,000		31.47 157	11,157
ITEM 6 "As Built" Dwgs. (25) Reproducibles (2) Copies							
	400 5	Hrs EA	18.33	7,330		26.22 130	7,450
ITEM 7 Proofs of Compliance	2	EA	250.	400			500

COMPARISON OF BUDGETED AND ESTIMATED COSTS										SHEET 1 of 1		
DRAWING NUMBER		SHEETS		PCH		LOCATION		PROJECT		CHECKER		
79K01016		65 SHEETS		72480		L.E.T.F. KSC		E.T. H2 Vent f Swing Room		C.F. Smith		
ARCHITECT/ENGINEER		ESTIMATOR		W.T. Song		W.T. Song		C.F. Smith		C.F. Smith		
0019		General Engineering Inc.		W.T. Song		W.T. Song		C.F. Smith		C.F. Smith		
BUDGETED COSTS		ESTIMATED COSTS		ESTIMATED COSTS		ESTIMATED COSTS		ESTIMATED COSTS		ESTIMATED COSTS		
BUDGETED LINE ITEMS	% DIP	CODE A-2	% DIP	CODE B-30	% DIP	CODE C-60	% DIP	CODE C-90	% DIP	CODE C-100	% DIP	REMARKS
STRUCTURAL		135,678	59	346,773	59	142,475	59	149,791	59	225,441	59	
Mechanisms (Equip't)		-	80	405,794	80	80,922	80	151,458	80	159,225	80	
Mechanical		122,501	117	261,747	117	90,165	117	101,262	117	109,193	117	
ELECTRICAL		-	57	1,201	57	2,245	57	11,549	57	12,356	57	
Sub Total (EERC)		258,179	249	1,015,515	249	315,807	249	414,060	249	536,845	249	
ESCALATOR		51,36	482	275,103	482	155,620	482	147,074	482	26,842	482	
SPECIAL CONDITIONS		-	87	294,499	87	57,897	87	-	87	6092	87	
SOFTWARE		-		-		-		-		55429		
STAIR PARTS		-		-		-		-		94114		
ROM A-1-C (RIP) TOTAL		509,000		1,595,117		509,324		561,134		719,332		
PCT DIFFERENCE, BUDGETED/ESTIMATED TOTALS												

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 3/11/77
 JAS

NOTE: B-30 ESTIMATE BASED ON SKETCHES & VERBAL DISCUSSIONS
 (1) BASED ON RE-FURNISHING EXISTING MECHANISMS
 (2) INCREASED QUANTITIES ADJUSTED
 (3) INCREASE IN MATERIAL & LABOR COSTS

DRAWING NO.		SHEETS	PROJECT LOCATION	PROJECT	SHEET	OF
0019		65 SHEETS	72480	LET F KSC	1	1
DATE ORDER CD 74		ARCHITECT/ENGINEER	TERMINATOR	CHECKER	CODE	SUBMITTED
11/20/10		GENERAL ENGINEERING INC	WT Long	CF Smith	8-110	April 3, 1977
SITE BORN		ARCHITECTURAL STRUCTURAL	ELECTRICAL	SPECIALIZED CONSTRUCTION	OTHER & QUILT	PROJECT TOTALS
LABOR	MATERIAL	LABOR	MATERIAL	LABOR	MATERIAL	
LINE 1-6	55826	136564				192,390
MECHANICAL						
MECHANICAL SYS A/C	5971	1744				7,715
MECHANICAL SYS WATER						
MECHANICAL SYS FIRE PROTECTION	2423	26784				29,707
MECHANICAL SYS CYCLOANE	9255	10,069				19,344
MECHANICAL SYS HYDROLY	7006	5,315				12,221
MECHANICAL SYS ENVIR CONTAM	6985	1,355				8,340
MECHANICAL SYS INSULATION						
MECHANICAL SYS						
ELECTRICAL						
ELECTRICAL SYS POWER AND LIGHTING	3054	5687				8,763
ELECTRICAL SYS WTR & COND						
ELECTRICAL SYS LPT						
ELECTRICAL SYS UPS						
ELECTRICAL SYS						
ELECTRICAL SYS						
OTHER EQUIPMENT						
OTHER EQUIPMENT SYS						
SUBTOTAL LABOR	55826	136564	32150	45187		124,909
SUBTOTAL MATERIAL						211,377
SALES TAX 4%						10,855
TOTAL						347,141
CONTR OWO						
CONTR PROFIT						
CONTR PROFIT SUBTOTAL						
PRIME MARKUP						
BOND						
TOTAL						
<p>FOR OFFICIAL USE ONLY</p> <p><i>Cancelled 5/1/77 JRS</i></p>						
SUBTOTAL LABOR	32150	45187	3096	5687		119,786
SUBTOTAL MATERIAL						126,909
SALES TAX 4%						211,377
TOTAL						347,141
CONTR OWO						
CONTR PROFIT						
CONTR PROFIT SUBTOTAL						
PRIME MARKUP						
BOND						
TOTAL						
<p>NOTE: ① Primarily Architectural/Structural assumed to be paid with 5% of work. No prime mark up required.</p>						

EXHIBIT A-5 (1)
Backup Data for Final Labor and Engineering Rates
-COMPUTATION - FISCAL YEAR ENDING 3/31/77

(In 000's)

DESCRIPTION	G&A	ENGINEERING	MATERIAL HANDLING	PRODUCTION
Indirect Labor	817	1027	403	687
Vacation Expense	40		18	
Sick Leave (Unused)	2		2	
Employee Welfare	42	464	30	440
Employee Welfare (Disab.)				
Employee Relocation	3			
Employee Recruitment	18			
Severance	4			
Payroll Taxes	33		20	
Job Shopper		31	6	23
Supplies & Expenses	20	57	19	74
Outside Services	3			7
Travel	75	60	7	32
Misc. Travel	6	2	2	4
Entertainment				
Rent	63	132	44	135
Rental-Mech. & Equip.	7	7	3	14
Light, Heat & Power	22	41	16	55
Telephone & Telegraph	43	38	25	29
Maint. & Repair (Bldg. Only)	11	9	7	30
Protective Service	19	15	9	34
Cleaning & Sanitation				
Labor Allocation to Subs. & Corp.				12
Maint. & Repair (Equip.)	7	4		38
Dues & Subscriptions	10	5		1
Office Equipment Maint.	2			
Freight Out			3	
Commissions				
Interest Expense				
Professional Fees	71	12	1	1
Contributions				
Postage	10			
Interplant Exp.				3
Data Processing	51		3	
Auto Expense	8			
Advertising Inst.				
Sales Promotion	6			
Taxes - Other	52	9	2	9
Bid & Proposal		48		1
Moving Expense		6		67
Depreciation - Test Equip.		62		
Insurance Expense	24			
Allocated Charge - Corp	342			
Test Main. to Engineering		49		53
Depre. Furn. & Fixt.	13			
Depre. Auto	1			
Amort - Leasehold Imp.	10	7	4	17
Cash Discounts	(31)			
Depre. Mach. & Equip.	1080	13		25
Independent R&D Costs	339			
Less R&D Cost Sharing	-93			
TOTAL	2054	2098	624	1663
Dir. Eng. Labor/Mat./Prod. Labor		1189	7459	1356
Total Mfg. Costs	10,004			
Overhead Rate	20.5%	176.45%	8.37	122.64

Computation Sheet

The overhead rate for each category, such as G&A Engineering, material handling, and production was arrived at as follows:

$$\text{G\&A \%} = \frac{\text{TOTAL}}{\text{Total Mfg Cost}} \quad \text{or} \quad \frac{2054}{10,004} = 20.5\%$$

Sum of Engineering, Material Handling, and Production = Total Mfg. Cost.

$$\text{G\&A \%} = \frac{\text{TOTAL G\&A COST}}{\text{TOTAL MFG COST}} \quad \text{MAT'H HOLS \%} = \frac{\text{TOTAL M.H. COST}}{\text{DIRECT M.H. COST}} \quad \text{or} \quad \frac{6243}{7459} = 8.37\%$$

$$\begin{aligned} & * \text{ Sum of ENGINEERING DIRECT LABOR} && - \$ 2,098 \\ & \text{MATERIAL HANDLING} && 6,243 \\ & \text{PRODUCTION DIRECT LABOR} && 1,663 \\ & && \underline{\$10,004} \end{aligned} \quad \text{PROD \%} = \frac{\text{TOTAL PROD. COST}}{\text{DIRECT PROD. LABOR}} \quad \text{or} \quad \frac{1663}{1356} = 122.64\%$$

$$\text{ENG \%} = \frac{\text{TOTAL ENG. COST}}{\text{DIRECT ENG. LABOR}} \quad \text{or} \quad \frac{2098}{1189} = 176.45\%$$

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EXHIBIT A-5 (2)

KSC-SPEC-G-0003
July 5, 1977

FORECAST OF LABOR RATES

COMPANY GENERAL ENGINEERING
CONTROLLER L. B. STANG
DATE 7-4-77

PROFESSIONAL EMPLOYEES RATES BASED ON PREVAILING WAGES IN BIG APPLE, N.Y.

CAT NO.	DESCRIPTION	8/75	9/75	12/75	3/76	6/76	9/76	12/76	3/77	6/77
08	PROD SUPERVISOR	\$ 8 3 1	\$ 8 3 1	\$ 8 5 0	\$ 8 8 3	\$ 7 1 7	\$ 7 1 7	\$ 7 1 7	\$ 7 1 7	\$ 7 5 3
10	TEST SUPERVISOR	8 8 0	7 0 0	7 0 0	7 3 5	7 3 5	7 7 2	7 7 2	7 7 2	8 1 1
11	QC TECH	4 8 3	4 8 3	4 9 7	5 2 2	5 2 2	5 4 8	5 4 8	5 4 8	5 7 5
12	QC ENGINEER	7 3 1	7 3 1	7 5 3	7 5 3	7 9 1	7 9 1	8 3 1	8 3 1	8 7 3
13	QC SUPERVISOR	7 8 5	7 8 5	8 0 9	8 0 9	8 4 9	8 4 9	8 9 1	8 9 1	9 3 6
17	FIELD ENGINEER	8 9 5	8 9 5	7 1 7	7 1 7	7 5 3	7 5 3	7 9 1	7 9 1	8 3 6
23	PROTOTYPE TECH	4 8 9	4 8 9	5 0 4	5 0 4	5 2 9	5 2 9	5 5 5	5 5 5	5 8 3
24	RELIABILITY ENGR	7 9 9	7 9 9	8 2 3	8 2 3	8 6 4	8 6 4	9 0 7	9 0 7	9 5 2
34	METHODSMAN	6 7 8	6 7 8	6 9 8	6 9 8	7 3 3	7 3 3	7 7 0	7 7 0	8 0 9
40	ELECT ENGINEER	9 0 8	9 0 8	9 3 5	9 3 5	9 8 2	9 8 2	1 0 3 1	1 0 3 1	1 0 8 3
41	MECH ENGINEER	7 1 9 7	7 1 9 7	7 2 1	8 2 1	8 6 2	8 6 2	9 0 5	9 0 5	9 5 0
42	DESIGN TECH	5 0 2	5 0 2	5 1 7	5 1 7	5 4 3	5 4 3	5 7 0	5 7 0	5 9 9
44	RELIABILITY TECH	5 8 7	5 8 7	6 0 4	5 8 4	6 1 3	6 1 3	6 4 4	6 4 4	6 7 6
46	DRAFTSMAN	4 9 4	4 9 4	5 0 9	5 0 9	4 3 4	5 3 4	5 6 1	5 6 1	5 9 9
48	PARTS LIST	6 8 4	6 8 4	6 0 2	6 0 2	6 3 2	6 3 2	6 6 4	6 6 4	6 9 1 7
47	PUBLICATIONS	6 8 8	6 8 8	7 0 9	7 0 9	7 4 4	7 4 4	7 8 1	7 8 1	8 2 0
48	MATERIAL CONT	4 2 7	4 2 7	4 4 0	4 4 0	4 6 2	4 6 2	4 8 5	4 8 5	5 0 9
55	COORDINATOR	7 1 5	7 1 5	7 9 8	7 9 8	8 3 8	8 3 8	8 8 0	8 8 0	9 2 4
20	ELECT ENGINEER	1 0 3 7	1 0 3 7	1 0 6 8	1 0 6 8	1 1 2 1	1 1 2 1	1 1 7 7	1 1 7 7	1 2 3 6
21	MECH ENGINEER	9 2 5	9 2 5	9 5 3	9 5 3	1 0 0 1	1 0 0 1	1 0 5 1	1 0 5 1	1 1 0 4
22	DESIGN TECH	5 0 6	5 0 6	5 2 1	5 2 1	5 4 7	5 4 7	5 7 4	5 7 4	6 0 3
25	DRAFTSMAN	4 9 4	4 9 4	5 0 9	5 0 9	5 3 4	5 3 4	5 6 1	5 6 1	5 8 9
26	PROGRAM MGT	8 3 4	8 3 4	8 5 8	8 5 8	9 0 2	9 0 2	9 4 7	9 4 7	9 9 4
27	PUBLICATIONS	6 8 8	6 8 8	7 0 9	7 0 9	7 4 4	7 4 4	7 8 1	7 8 1	8 2 0
29	RFI ENGINEER	1 0 3 7	1 0 3 7	1 0 6 8	1 0 6 8	1 1 2 1	1 1 2 1	1 1 7 7	1 1 7 7	1 2 3 6
37	TYPIST	2 8 7	2 8 7	2 9 6	2 9 6	3 1 1	3 1 1	3 2 7	3 2 7	3 4 3
38	PC DESIGNER	7 8 6	7 8 6	8 1 0	8 1 0	8 5 1	8 5 1	8 9 4	8 9 4	9 3 9
39	HUMAN FACTORS SPEC	1 0 3 7	1 0 3 7	1 0 6 8	1 0 6 8	1 1 2 1	1 1 2 1	1 1 7 7	1 1 7 7	1 2 3 6
50	PRIN SYS ANALYST	1 2 4 2	1 2 4 2	1 2 7 9	1 2 7 9	1 3 4 3	1 3 4 3	1 4 1 0	1 4 1 0	1 4 8 1
51	SR SYS ANALYST	1 0 7 2	1 0 7 2	1 1 0 4	1 1 0 4	1 1 5 9	1 1 5 9	1 2 1 7	1 2 1 7	1 2 7 8
52	SYSTEM ANALYST	9 5 5	9 5 5	9 9 4	9 9 4	1 0 4 4	1 0 4 4	1 0 9 6	1 0 9 6	1 1 5 1
53	ANALYST	7 8 1	7 8 1	8 0 4	8 0 4	8 4 4	8 4 4	8 8 6	8 8 6	9 3 0
53	ASSOC ANALYST	4 8 2	4 8 2	4 7 6	4 7 6	4 8 0	4 8 0	5 2 5	5 2 5	5 5 1
INTERNATIONAL UNION OF ELECTRICAL WORKERS (UNDER CONTRACT)										
7/76-8/77										
7/77-8/78										
7/78-8/79										
30	INSTRUMENT ASSEMBLER		4 0 5		4 4 5		4 9 1			
	WIRER & SOLDERER									
	ASSEMBLERS									
	REWORK & REPAIR									
07	SPRAYER & PLATER		4 1 8		4 6 0		5 0 6			
31	TEST & TROUBLESHOOT		5 3 2		5 8 5		6 4 4			
32	SHEET METAL SHOP		5 5 6		6 1 1		6 7 2			
33	PACKERS		3 7 8		4 1 6		4 5 8			
16	LINE INSPECTION		4 5 4		4 9 9		5 4 9			

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 5/1/77
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EXHIBIT A-5 (3)

Computation Sheet Backup Data

Labor Rate

This is a sample of backup data for labor and overhead rates to be furnished with each cost estimate submittal.

Labor rate of \$15 was arrived at as follows:

Technician-Test	Cat. 31	\$5.85	Factor 1/3	Page 22, Exh A-5 (2)
Machinist	Cat. 32	6.11	Factor 1/3	Page 22, Exh A-5 (2)
Wire & Assy	Cat. 30	4.46	Factor 1/3	Page 22, Exh A-5 (2)
		<u>16.42</u>		
		3	= \$5.47 use \$5.50 for average	

Average	5.50		Page 22, Exh A-5 (2)
Supervision Cat. 10	1.10	Factor 1/7	Page 22, Exh A-5 (2)
Mfg. Overhead 122.64%	8.09		
	<u>\$14.69</u>	Round-off & use \$15/hr.	

Labor rate of \$18 was arrived at as follows:

Draftsman	Cat. 25	5.61	*	Page 22, Exh A-5 (2)
Eng.	Cat. 20 & 21	.93	Factor 1/12	Page 22, Exh A-5 (2)
Eng. overhead 176.45%		11.54		Page 22, Exh A-5 (2)
		<u>\$18.08</u>	Use \$18/hr for Eng. Aver.	

* Cat. 20 = \$11.77/hr
 Cat. 21 = \$10.51/hr

$$\frac{\$22.28}{2} = \text{Aver. Eng} = \frac{11.14}{12} = .93$$

(Used in Cost Estimate Samples in Appendix B, C, D, E, & F.)

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6/2/77
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MANUFACTURING/ENGINEERING COST SUMMARY

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ENGINEERING
LABOR COST ESTIMATE
MATERIAL COST ESTIMATE

Cancelled 6/2/77 JAB

BID NO. 7705

TITLE			ITEM (1)	QTY	ITEM (2)	QTY	ITEM (3)	QTY	ITEM (4)	QTY
KU BAND RCVR			DDT&E+①		QUAL. TEST REFURB.		SOFTWARE			
LABOR TITLE	CAT	RATE	HOURS	DOLLARS	HOURS	DOLLARS	HOURS	DOLLARS	HOURS	DOLLARS
ENGINEERING	HUMAN ENG	39								
	RFI ENG	29								
	ELECT ENG	20	11.77	2000	23540	100	1177	1000	11770	
	MECH ENG	21	10.51	2000	21020	100	1051	1500	15165	
	DESIGN TECH	22								
	DRAFTSMAN	25	5.61	1000	5610			2000	11220	
	PC ENGINEER	38	8.94	1500	13410					
	PUBLICATIONS	27	7.81					2000	15620	
	PUB TYPIST	37	3.27					500	1635	
MANUFACTURING	SHEET METAL	32	6.11	320	1955					
	TRAINING CO-ORD	56								
	FIELD ENG	17								
	REL TECH	44	6.44			500	3220			
	REL ENG	24	9.07	1000	9070	500	4535			
	PROTO TECH	23	5.55	1500	8325					
	PROD DESIGN TECH	42								
	QC ENG	13	8.91	500	4455	100	891	100	891	
	PARTS LISTER	46	6.64					500	3320	
	MAT'L CONTROL	48	4.85	350	1698			100	485	
	PROD EE	40								
	PROD ME	41								
	PROD ENG	34								
	QC TECH	11								
	GRAND TOTAL - TOTAL BASIS ENG				63580		2228		56010	
GRAND TOTAL - UNIT BASIS ENG										
GRAND TOTAL - TOTAL BASIS MFG				25503		8646		4696		
GRAND TOTAL - UNIT BASIS MFG										

MATERIAL	TOTAL DOLLARS	UNIT DOL	TOTAL DOLLARS	UNIT DOL	TOTAL DOLLARS	UNIT DOL	TOTAL DOLLARS	UNIT DOL
BREADBOARD MATERIAL	20000				3000			
PROTOTYPE	12000	*	3600					
SPECIAL TEST EQUIP								
PUBLICATIONS					2000			
SPECIAL TOOLING								
SUBCONTRACTS								
OUTSIDE SERVICES								
TRAVEL & SUBSISTENCE	2500							
* 30% OF PROTO TYPE MAT'L								
CAPITAL EQUIPMENT								

COMPUTED BY: John Doe ALPHA Co.	DATE: 3-17-77	PAGE 1 OF 3 EXHIBIT NO. _____
CHECKED BY: Al Green ALPHA Co.	DATE: 3-17-77	

PRODUCTION SUPPORT/LABOR COST SUMMARY

BID NO. 7705

TITLE			ITEM ①	QTY	ITEM	QTY	ITEM	QTY	ITEM	QTY	
KU BAND RCVR			DDTE								
			+								
			-								
LABOR TITLE		CAT	RATE	HOURS	DOLLARS	HOURS	DOLLARS	HOURS	DOLLARS	HOURS	DOLLARS
BASIS	INSTRUMENT ASS'Y	01	4.46	100	446						
	WIRERS & SOLDERERS	30	4.46	300	1338						
	SPRAYERS/PLATERS	07									
	SHEET METAL SHOP	32									
	PACKAGING	33									
A	SUB TOTAL			400							
B	TESTERS	31	5.85	300	1755						
LABOR	PROD SUP 10 % LINE A	08	7.17	40	287						
	TEST SUP 10 % LINE B	10	7.72	30	232						
	LINE INSP 15 % LINE A	15	4.99	60	299						
	QC SUP 15 % CAT 15+11	13	8.91	21	187						
	QC TECH 20 % LINE A	11	5.48	80	438						
C	SUB TOTAL - UNIT BASIS				4982						
SUPPORT LABOR - BASIS	REL ENG	24									
	REL TECH	44									
	MAT'L EXP	48									
	PROD ENGINEERING	34									
	TECH	42									
	QC ENG	12									
	PARTS LISTER	46									
	STATISTICAL TYP	37									
	E. E.	40									
	M. E.	41									
PROD DRAFT	45										
D	SUB-TOTAL - TOTAL BASIS										
E	D ÷ QTY = UNIT COST										
F	C+LINE E (GRAND)TOTAL-UNIT-BASIS				4982						
G	MATERIAL										
H	O.D.C.										
I	TRAVEL & SUBSIST										
J	VENDOR TOOLING										

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6/2/77
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ESTIMATED BY	DATE	
COMPUTED BY <i>John Doe ALPHA Co.</i>	DATE <i>3-17-77</i>	PAGE <i>2</i> OF <i>3</i>
CHECKED BY <i>al Green ALPHA Co.</i>	DATE <i>3-17-77</i>	EXHIBIT NO. _____

BID NO. 7705

TITLE KU BAND KGVK

PAGE 3 OF 3

VENDOR DATA BID COST SUMMARY

CUSTOMER

ITEM	ITEM I D.D. T & E +	ITEM II QUAL. TEST REFURB.	ITEM III SOFTWARE
1 DIRECT MATERIAL	12000	3600	3000
2 ENGINEERING MATERIAL	20000		
3 PACKAGING MATERIAL			
4 TOTAL OF LINES 1, 2 & 3	32000	3600	3000
5 FREIGHT IN	128	14	12
6 TOTAL OF LINES 4 & 5	32128	3614	3012
7 ATTRITION & REWORK	1606	181	151
8 TOTAL MATERIAL	33734	3795	3163
9 MATERIAL HANDLING	2824	318	265
10 DIRECT ENGINEERING LABOR	63580	2228	56010
11 ENGINEERING OVERHEAD	112187	3931	98830
12 DIRECT MANUFACTURING LABOR	30485	8646	4696
13 MANUFACTURING OVERHEAD	37387	10603	5759
14 TRAVEL & SUBSIST	2500		
15 SPECIAL TEST EQUIPMENT			
16 SPECIAL TOOLING			
17 OUTSIDE SERVICE			
18 PUBLICATIONS MATERIAL			
19			
20 TOTAL MFG COST	282697	29521	170723
21 G & A EXPENSE	56539	5904	34145
22 WARRANTIES	3392	354	2049
23 TOTAL COST	342628	35779	206917
24 PROFIT OR FEE	51394	5367	31038
25			
26			
27 UNIT PRICE			
28 TOTAL PRICE	394,022	41,146	237,955
<p>FOR OFFICIAL USE ONLY</p> <p>Cancelled 6/2/77 GAB</p>			
GENERAL MANAGER	NAME	DATE	
DIRECTOR OF ENG'G	Geo. Heit	3-15-77	
MANUFACTURING	J.D. MIMS	3-15-77	
ACCOUNTING	A.T. HART	3-15-77	
CONTRACTS	R. Rodale	3-16-77	
ESTIMATING MANAGER	G. Nelson	3-16-77	
COMPUTER	H. Wong	3-16-77	
CHECKED	ALPHA CO. John Doe	3-17-77	
	AL GREEN	3-17-77	
<p>TOTAL \$ 673,123</p> <p>REMARKS: THIS IS A HYPOTHETICAL EXAMPLE</p> <p>ADDITIONAL CAPITAL EQUIPMENT REQUIRED \$</p>			

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION BUDGETARY PROJECT COST ESTIMATE		<input type="checkbox"/> OTHER _____
INSTALLATION/PROGRAM OFFICE KSC INDUSTRIAL AREA		CONTROL NO 72866 G-1
PROJECT TITLE AND LOCATION 28-Volt Distributor Servicing		DATE MAY 15, 1976
BASIS OF COST ESTIMATE Previous Shuttle Estimate		REVISION NO

I SUMMARY OF COST ESTIMATE

DESCRIPTION	AMOUNT a.	PERCENT b.
(1) ENGINEERING ESTIMATE	10,324	
(2) CONTINGENCIES, GOVERNMENT <i>(Enter percentage of item (1) a to right in col (2)b)</i>	1,032	10%
(3) SUPERVISION, INSPECTION AND ENGINEERING SERVICES <i>(Enter percentage of items (1)a and (2)a to right in col (3)b)</i>	1,136	10%
SUBTOTAL ((1) + (2) + (3))	12,492	
(5) COST ADJUSTMENT <i>(Enter percentage of item (4)a to right in col (5)b)</i>	3,408	27.3%
(6) OTHER BURDEN COSTS		
(7) TOTAL BUDGET ESTIMATE ((4) + (5) + (6))	\$15,900	
(8) IDENTIFICATION OF ADJUSTMENT AND BURDEN COSTS, AND ESCALATION <i>Based on Jan 76 cost with escalation @ 1% per mo. From Jan 76 to July 76 - for FY 1978 funding 25 mos</i>		

II. PLANNING AND DESIGN

DESCRIPTION	STATUS				
	NEEDED a.	IN-WORK b.	COMPLETE c.	IN-HOUSE/ AE d.	COST e.
(1) PRELIMINARY ENGINEERING REPORT	✓	—	—	In-house	300
(2) SPECIAL STUDIES <i>(Specify)</i>	—	—	—	—	
(3) FINAL DESIGN	✓	—	—	In-house	600
(4) SUPERVISION AND ADMINISTRATION OF DESIGN SERVICES	✓	—	—	In-house	125
TOTAL PLANNING AND DESIGN COST					\$1,025

III. RELATED COST DATA

(Not included in this approved project cost estimate but required to make the system complete)

(1) RELATED COSTS INVOLVED <input type="checkbox"/> a YES <i>(Identify in items (2) through (10))</i> <input checked="" type="checkbox"/> b NONE		(2) PER (Amount)	(3) DESIGN (Amount)
OTHER RELATED EQUIPMENT	ITEM	AMOUNT	ITEM
	(4) TO BE PURCHASED		(8) GFE
	(5) TRANSFER OF EXCESS		(9) OTHER <i>(Specify)</i>
	(6) EXISTING		
	(7) FUTURE FUNDING		

INSTALLATION/PROGRAM OFFICE KSC LETF	CONTROL NO 72 866	DATE MAY 15, 1976
--	-----------------------------	-----------------------------

GSE IV. PROJECT COST ESTIMATE OTHER

DESCRIPTION TYPE, SIZE, KIND, ETC.	UNIT OF MEASURE 1.	QUANTITY 2.	UNIT COST		TOTAL COST	
			ENGG * 3.	ENGG 4.	BUDGET 5.	
28-V DISTRIBUTOR						
Chassis Assy	EA	1	485	485	747	
Front Panel Alum	EA	1	362	362	557	
BAR Insulators	EA	6	108	648	998	
Bus BAR	EA	56	19.88	1113	1714	
Circuit Brkrs 1, 2 & 3P	EA	48	39.77	1909	2940	
Cables	EA	4	397.75	1591	2450	
Misc Hd. screws, nuts, etc	EA	380	5.94	2256	3474	
Installation	-	-	1323	1323	2037	
clo - Valid - test	EA	1	636	636	979	
TOTAL				\$10,324	\$15,900	

*G & A OF 20.5% & PROFIT OF 10%
included

(7) SOURCE OF COST DATA, ESTIMATOR'S NAME, COMPANY OR AGENCY
LETF PHASE I, JOE BROWN, FED-1

(8) ESTIMATE OF THE BUDGET CONFIDENCE

CONFIDENCE FACTOR

A. OFF-THE-SHELF ± 15 C. R&D ± 100

B. PREPRODUCTION ± 50 D. OTHER _____

V. RELATED ITEMS/ACTIONS

(EXPLAIN AS APPROPRIATE USE EXTRA SHEETS, AS NECESSARY, FOR THIS BLOCK AND ABOVE)

KSC PRELIMINARY COST ESTIMATE WORK SHEET

G.S.E.

W.O. NO. 0488	ECN 77613	DATE PREPARED 9-2-76	SHEET <u>1</u> OF <u>1</u>
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PROJECT **28 VOLT DISTRIBUTOR CHECKOUT**

LOCATION KSC INDUSTRIAL AREA	CODE GU-30-A
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ARCHITECT-ENGINEER PRC	ESTIMATOR W.T. LONG
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DRAWING NO. 79K06823, SHEETS E1-3	CHECKED BY C.F. SMITH	APPROVED BY
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ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE MATERIAL & LABOR	ESTIMATED AMOUNT
	28 VOLT DISTR. ASS'Y				
	CHASSIS ASS'Y	1	EA	440	440
	FRONT PANEL	1	EA	327	327
	INSULATOR BARS	6	EA	98.33	590
	BUS BARS	38	EA	20.36	774
	BREAKERS 20AMP, 3P, 3Φ-208V	30	EA	35.96	1,079
	CONNECTOR	4	EA	90	360
	WIRE	870	L.F.	.14	115
	LUGS	340	EA	1.52	517
	CLAMPS	12	EA	2.42	29
	CABLE ASS'Y	4	EA	269.75	1,079
	MARK & IDENT.	24	EA	11.96	287
	MISC. HDWRE.	200	EA	1.80	360
	INSTALLATION	50	EA	18	900
	TOTAL				6,854
	G & A	20.5	%		1,405
				SUB-TOTAL	8,259
	PROFIT	10	%		826
	ESTIMATED COMPETITIVE BID COST				# 9,085

<input checked="" type="checkbox"/> GROUND SUPPORT EQUIPMENT		COST ESTIMATE		<input type="checkbox"/> CONSTRUCTION	
CODE G-95	DATE COMPLETED 10-5-76	SHEET <u>1</u> OF <u>1</u>	SHEET _____ OF _____		
PROJECT 28 VOLT DISTRIBUTOR PANEL ASSY		DRAWING NO(S) 79K06823	SHEET NO 1-6		
LOCATION KSC - L.E.T.F.		PCN 77613			
ENGINEER PRC	PROGRAM MODEL NO RU-127	WORK ORDER OR CONTRACT NO 0488			
ESTIMATOR W.T. LONG W.T. Long	CHECKER C.F. SMITH C.F. Smith	APPROVED			

<u>ELECTRICAL</u> SUMMARY	QUANTITY		LABOR (\$ OR MH)		MATERIAL		TOTAL COST
	NO. UNITS	UNIT MEAS.	PER UNIT	TOTAL	PER UNIT	TOTAL	
79K06823-1 DIST. PANEL ASSY	1	EA					
79K06823-2 CHASSIS ASSY	1	EA	20	20	6	6	
79K06823-4 FRONT PANEL	1	EA	18	18	3	3	
79K06823-5 BAR INSULATOR	2	EA	6	12	1.50	3	
79K06823-6 BAR INSULATOR	4	EA	5	20	1.50	6	
79K06823-7 BUS BAR LARGE	8	EA	1	8	1.75	14	
79K06823-8 BUS BAR SMALL	48	EA	1	48	1.75	84	
79K06823-10 BRKT STIFFENER	4	EA	2	8	2	8	
7.5 AMP-5M3 CIRCUIT BKR	48	EA	.25	12	26.85	1260	
MS3122-24-6IP CONNECTOR	4	EA	.25	1	60.32	241	
WIRE MIL 16878/1 B-16	300	EA	.006	2	.021	6	
WIRE MIL 16878/1 B-20	570	EA	.006	4	.017	10	
MS25036 LUGS ASSY	340	EA	.08	27	.06	20	
MS21919-8 CHAMP SUPPORT	12	EA	.1	1	.25	3	
60c #20 CABLE ASSY	4	EA	25.0	100	-	-	
INSTALLATION	10	EA	5.0	50	-	-	
MISC. MARK IDENTIFICATION	2	EA	8.0	16	-	-	
MISC. HARDWARE	1506	EA	.01	15	.05	75	
CHECKOUT-VALIDATE-TEST	-3	EA	8	24			
SUB-TOTAL				386.0		1739	
LABOR HOURS X RATE	386.0	HRS	\$15	5790			
SALES TAX		%			4	70	
SUB-TOTAL				5790		1809	\$ 75 99
GENERAL & ADMINISTRATION	20	%					152
						SUB-TOTAL	9117
PROFIT	10	%					912
ESTIMATED COMPETITIVE BID COST							\$10,031
* SEE APPENDIX A-5 (3) (P 23)							

(Two-sided form)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION BUDGETARY PROJECT COST ESTIMATE		<input type="checkbox"/> OTHER _____
INSTALLATION/PROGRAM OFFICE KSC - LC39 SHUTTLE		CONTROL NO 76954 G-1
PROJECT TITLE AND LOCATION Checkout & Test Equip Fuse Interrupt Box LC39		DATE MAY 15, 1976
BASIS OF COST ESTIMATE PREVIOUS SHUTTLE ESTIMATE		REVISION NO

I. SUMMARY OF COST ESTIMATE

DESCRIPTION	AMOUNT a.	PERCENT b.
(1) ENGINEERING ESTIMATE	18,425	
(2) CONTINGENCIES, GOVERNMENT <i>(Enter percentage of item (1) a to right in col (2)b)</i>	1,843	10%
(3) SUPERVISION, INSPECTION AND ENGINEERING SERVICES <i>(Enter percentage of items (1)a and (2)a to right in col (3)b)</i>	2,027	10%
SUBTOTAL ((1) + (2) + (3))	22,295	
(5) COST ADJUSTMENT <i>(Enter percentage of item (4)a to right in col (5)b)</i>	6,080	27.23%
(6) OTHER BURDEN COSTS		
(7) TOTAL BUDGET ESTIMATE ((4) + (5) + (6))	\$ 28,375	
(8) IDENTIFICATION OF ADJUSTMENT AND BURDEN COSTS, AND ESCALATION BASED ON JAN '76 COST WITH ESCALATION @ 1% PER MO. FROM JAN '76 TO JULY '76 - For F/Y 1978 FUNDING 25 MOS		

II. PLANNING AND DESIGN

DESCRIPTION	STATUS				
	NEEDED a.	IN-WORK b.	COMPLETE c.	IN-HOUSE/ AE d.	COST e.
(1) PRELIMINARY ENGINEERING REPORT	✓	-	-	In-House	500
(2) SPECIAL STUDIES <i>(Specify)</i>	-	-	-	-	
(3) FINAL DESIGN	✓	-	-	In-House	1,100
(4) SUPERVISION AND ADMINISTRATION OF DESIGN SERVICES	✓	-	-	In-House	240
TOTAL PLANNING AND DESIGN COST					

III. RELATED COST DATA

(Not included in this approved project cost estimate but required to make the system complete)

(1) RELATED COSTS INVOLVED <input type="checkbox"/> a YES <i>(Identify in items (2) through (10))</i>		(2) PER <i>(Amount)</i>		(3) DESIGN <i>(Amount)</i>	
		<input checked="" type="checkbox"/> b NONE			
OTHER RELATED EQUIPMENT	ITEM	AMOUNT	ITEM	AMOUNT	
	(4) TO BE PURCHASED		(8) GFE		
	(5) TRANSFER OF EXCESS		(9) OTHER <i>(Specify)</i>		
	(6) EXISTING				
	(7) FUTURE FUNDING				

INSTALLATION/PROGRAM OFFICE HSC LC39 SHUTTLE	CONTROL NO 76954	DATE MAY 15, 1976
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GSE

IV. PROJECT COST ESTIMATE

OTHER

DESCRIPTION TYPE, SIZE, KIND, ETC.	UNIT OF MEASURE 1.	QUANTITY 2.	UNIT COST		TOTAL COST	
			ENGN ^G 3.	ENGN ^G 4.	BUDGET 5.	
FUSE INTERRUPT BOX	EA	1	1500	1500	2310	
BANANA JACK MOLDED NYLON	EA	256	3.31	848	1306	
FUSE HOLDER	EA	128	11.23	1437	2213	
HARNESS & INSTALL.	EA	1	1025	1025	1579	
CHECKOUT - VALIDATE & TEST	EA	1	795	795	1224	
MISC SMALL ITEMS	EA	35	32	1120	1725	
ENG HOURS DESIGN & SUPV	HRS	250	18	4500	6930	
DRFT HOURS	HRS	400	18	7200	11088	
* G & A @ 20.5% & PROFIT INCLUDED						
TOTAL				\$18,425	\$28,375	

(7) SOURCE OF COST DATA, ESTIMATOR'S NAME, COMPANY OR AGENCY

ENG. JUDGEMENT - W. T. LONG -

(8) ESTIMATE OF THE BUDGET CONFIDENCE

CONFIDENCE FACTOR

A. OFF-THE-SHELF ± 15

B. PREPRODUCTION ± 50

C. R&D ± 100

D. OTHER

V. RELATED ITEMS/ACTIONS

(EXPLAIN AS APPROPRIATE USE EXTRA SHEETS, AS NECESSARY, FOR THIS BLOCK AND ABOVE)

KSC PRELIMINARY COST ESTIMATE WORK SHEET

W.O. NO. 0850	ECN 76954	DATE PREPARED 10-15-76	SHEET <u>1</u> OF <u>1</u>
PROJECT FUSE INTERRUPT Box - C HeCKOut & TEST			
LOCATION KSC-LC-39 SHUTTLE			CODE GU-30
DESIGNED ENGINEER PERRY PRC 1965		ESTIMATOR W. T. LONG W.T. Long	
DRAWING NO. 40M6727, SHEET E1	CHECKED BY C.F. Smith	APPROVED BY	

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE MATERIAL & LABOR	ESTIMATED AMOUNT
	FUSE INTERRUPT Box				
	Cover	1	EA	73	101
	Box Alum 12"x10"x10"	1	EA	1125	1560
	Conn. Receipt (128)	1	EA	87	120
	Conn. Plug (128)	1	EA	56	78
	Rivnut	4	EA	2.25	12
	BANANA JACK molded NYLON	128	EA	2.50	444
	FUSE Holder	128	EA	8.47	1504
	FUSES	128	EA	1	177
	IDENT. PLATE	1	EA	11	15
	wire #20	150	L.F.	.22	46
	ASSY - (WIRING) (HARNES) (30)	30	EA		624
	CheckOut, validate & test (30)	1	EA		750
	CONN	20	EA	43	860
	ENG (160) DFT (240)	500	HRS	18*	9000
	TOTAL Cost				15291
	G & A	20.5	%		3135
				Sub-total	18426
	PROFIT	10	%		1842
	ESTIMATED COMPETITIVE BID COST				* 20268

* SEE APPENDIX A-5 (3) (P23)

<input checked="" type="checkbox"/> GROUND SUPPORT EQUIPMENT		CONSTRUCTION COST ESTIMATE		<input type="checkbox"/> CONSTRUCTION	
CODE G-95		DATE COMPLETED 1-3-77		SHEET <u>1</u> OF <u>1</u> SHEET _____ OF _____	
PROJECT FUSE INTERRUPT BOX				DRAWING NO(S) 40M6727	
				SHEET NO EL-3	
LOCATION LC-39 KSC SHUTTLE				PCN 76954	
ARCHITECT OR ENGINEER PERRY PRC 1965				WORK ORDER OR CONTRACT NO 0850	
ESTIMATOR W.T. LONG <i>W.T. Long</i>		CHECKER C.F. SMITH <i>C.F. Smith</i>		APPROVED	
PRC 1965		PRC 1965			

<u>ELECTRONIC</u> SUMMARY	QUANTITY		LABOR (\$ OR MH)		MATERIAL		TOTAL COST
	NO. UNITS	UNIT MEAS.	PER UNIT	<input type="checkbox"/> FIELD TOTAL <input type="checkbox"/> FAB.	PER UNIT	TOTAL	
CARRYING CASE *X105-11-22R-PI0	1	EA	8.0	8.0	1250	12.50	ZERO MFG.
PANEL 12 X 20 X 1/8 ALUM	1	EA	24.0	24.0	35	35	ZERO MFG.
JPO0-RE-24-1P RECEPT.	2	EA	.5	1.0	74.24	148	
M53114 E-24-61P "	2	EA	.5	1.0	46.90	94	
M53114 E-20-41P "	2	EA	.5	1.0	32.26	65	
M53114 E-22-21P "	2	EA	.5	1.0	27.70	55	
JPO6-RE-24-1S PLUG	2	EA	.5	1.0	98.59	197	
M53116 E 24 - 61S "	2	EA	.5	1.0	43.42	87	
M53116 E 20 - 41S "	2	EA	.5	1.0	30.82	62	
M53116 E 22 - 21S "	2	EA	.5	1.0	24.06	48	
RIVNOT	4	EA	.25	1.0	1.	4	
BANANA JACK MOLDED NYLON	256	EA	.25	64.0	1.25	320	
FUSE HOLDER	128	EA	.25	32.0	4.72	604	
FUSES 2A	128	EA	.05	6.4	.25	32	
IDENT. PLATE	1	EA	.5	.5	3.00	3	
WIRE MIL-W-16878D B20	300	L.F.	.006	1.8	.027	8	
ASSY WIRING		A/R	50.0	50.0	-	-	
CHECKOUT-VALIDATE & TEST	1	EA	40.0	40.0	-	-	
SUB-TOTAL				235.7		3012	
LABOR HRS X RATE --- SALES TAX	235.7	HRS	\$15*	3536	4%	120	
ENG & DRAFT	200.0	HRS	\$18*	3600			
*SEE APP. A-5 (3) (P23) SUB-TOTAL				7136		3132	10,268
G & A @	20.5	%					2,105
SUB-TOTAL							12,373
PROFIT	10	%					1,230
ESTIMATED COMPETITIVE BID COST							\$13,610**
** COST REDUCED FROM G-30 DUE TO							
CHANGE IN SCOPE & LESS ENG. HOURS							

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION BUDGETARY PROJECT COST ESTIMATE		<input type="checkbox"/> OTHER _____
<input checked="" type="checkbox"/> GSE		
INSTALLATION/PROGRAM OFFICE KSC INDUST. AREA		CONTROL NO 72867 G-1A
PROJECT TITLE AND LOCATION Checkout & Test PRSD GN₂/GHe SERVICE - SSAT PAD		DATE April 20, 1976
BASIS OF COST ESTIMATE Previous Shuttle Estimate		REVISION NO

I. SUMMARY OF COST ESTIMATE

DESCRIPTION	AMOUNT a.	PERCENT b.
(1) ENGINEERING ESTIMATE	23,200	
(2) CONTINGENCIES, GOVERNMENT <i>(Enter percentage of item (1) a to right in col (2)b)</i>	2,320	10%
(3) SUPERVISION, INSPECTION AND ENGINEERING SERVICES <i>(Enter percentage of items (1)a and (2)a to right in col (3)b)</i>	2,552	10%
SUBTOTAL ((1) + (2) + (3))	28,072	
(5) COST ADJUSTMENT <i>(Enter percentage of item (4)a to right in col (5)b)</i>	7,651	27.3%
(6) OTHER BURDEN COSTS		
(7) TOTAL BUDGET ESTIMATE ((4) + (5) + (6))	\$35,723	

8) IDENTIFICATION OF ADJUSTMENT AND BURDEN COSTS, AND ESCALATION
*Based on Jan '76 Cost w/Escalation @ 1% Per Month
 From JAN 76 To July 76 - For FLY 1978 Funding 26 Months*

II. PLANNING AND DESIGN

DESCRIPTION	STATUS				
	NEEDED a.	IN-WORK b.	COMPLETE c.	IN-HOUSE/ AE d.	COST e.
(1) PRELIMINARY ENGINEERING REPORT	✓			IN HOUSE	700
(2) SPECIAL STUDIES (Specify)	-	-	-	-	-
(3) FINAL DESIGN	✓			IN HOUSE	1,300
(4) SUPERVISION AND ADMINISTRATION OF DESIGN SERVICES	✓			IN HOUSE	300
TOTAL PLANNING AND DESIGN COST					

III. RELATED COST DATA

(Not included in this approved project cost estimate but required to make the system complete)

(1) RELATED COSTS INVOLVED <input type="checkbox"/> a YES (Identify in items (2) through (10)) <input checked="" type="checkbox"/> b NONE		(2) PER (Amount)	(3) DESIGN (Amount)
OTHER RELATED EQUIPMENT	(4) TO BE PURCHASED	AMOUNT	(8) GFE
	(5) TRANSFER OF EXCESS		(9) OTHER (Specify)
	(6) EXISTING		
	(7) FUTURE FUNDING		

INSTALLATION/PROGRAM OFFICE KSC LETF	CONTROL NO 72867	DATE April 20, 1976
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GSE

IV. PROJECT COST ESTIMATE

OTHER _____

DESCRIPTION TYPE, SIZE, KIND, ETC.	UNIT OF MEASURE 1.	QUANTITY 2.	UNIT COST		TOTAL COST	
			ENGGG # 3.	ENGGG 4.	BUDGET 5.	
GN₂ / GHe SERVICE PANEL						
PRESSURE XDUCER	EA	1	1,790	1,790	2,756	
PRESSURE REGULATORS	EA	2	635	1,270	1,955	
ASSY VALVES	EA	20	242	4,840	7,453	
PRESSURE GAGES	EA	4	218.75	875	1,347	
FILTER, TEE TYPE	EA	2	3215	6,430	9,902	
TUBE ASSY	EA	33	4.85	160	246	
MISC BRACKETRY	LBS	250	6.64	1,660	2,556	
KC FITTINGS, etc	EA	250	21.14	5,285	8,138	
CLEAN TUBE ASSYS ^{LEVEL}₃₀₀	EA	16	45.43	730	1,124	
LEAK TEST PANEL ASSY	EA	1	160	160	246	
* G & A @ 20.5 % PROFIT @ 10%						
INCLUDED						
TOTAL				\$23,200	\$35,723	

(7) SOURCE OF COST DATA, ESTIMATOR'S NAME, COMPANY OR AGENCY

EXPERIENCE - W. T. LONG

PAD "A"

(8) ESTIMATE OF THE BUDGET CONFIDENCE

CONFIDENCE FACTOR

A OFF-THE-SHELF ± 15

C. R&D ± 100

B PREPRODUCTION ± 50

D OTHER _____

V. RELATED ITEMS/ACTIONS

(EXPLAIN AS APPROPRIATE. USE EXTRA SHEETS, AS NECESSARY, FOR THIS BLOCK AND ABOVE)

KSC PRELIMINARY COST ESTIMATE WORK SHEET

G S E

W.O. NO. 0877	ECN 24668	DATE PREPARED APRIL 24 1976	SHEET <u>1</u> OF <u>1</u>
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PROJECT **PRSDGN₂/GHE SERVICE - SSAT (PAD)**

LOCATION LC 39	CODE GU-30-A
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ARCHITECT ENGINEER PRC 1965	ESTIMATOR W.T. LONG W.T. Long
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DRAWING NO. 79K08499, SHEETS MI-3	CHECKED BY C.F. SMITH	APPROVED BY
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ITEM NO.	MECHANICAL DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE MATERIAL & LABOR	ESTIMATED AMOUNT
AL	FACE PLATE & BRACKETRY-36"x28"x250	114	LB	4.61	526
	SUPPORT ALUM.	210	LB	1.74	366
	PAINT ETCH & ANODIZE	60	SF	1.15	69
	REDUCR, PRESSURE	1	EA	1714	1714
	REGULATOR PRESSURE	1	EA	539	539
	METERING VALVE	4	EA	169.25	677
	SHUT OFF VALVE	5	EA	308.	1540
	RELIEF VALVE	2	EA	567	1134
	PRESSURE GAGE	2	EA	165	330
	FILTER TEE	3	EA	2060	6180
	ORIFICE	1	EA	260	260
	TUBE ASSY	16	EA	330	660
	BULKHEAD REDUCR	2	EA	81	162
	KC TEES	10	EA	38.50	385
	KC ADAPTGR	10	EA	15.50	155
	KC UNION	4	EA	32.50	130
	KC NUT	34	EA	3.82	130
	KC SLEEVE	34	EA	3.82	130
	KC SEAL RING	86	EA	2.91	250
	INDENT. TAG	33	EA	3.03	100
	INDENT. PLATE	41	EA	10.24	420
	CAP	4	EA	15	60
	PANEL LABEL	55	EA	10.18	560
	LEAK TEST PANEL ASSY.	1	EA	150	150
	SUB-TOTAL				16627
	G & A	20.5			3409
	SUB-TOTAL				20036
	PROFIT	10			2004
	ESTIMATED COMPETITIVE BID COST				22040

<input checked="" type="checkbox"/> GROUND SUPPORT EQUIPMENT		COST ESTIMATE		<input type="checkbox"/> CONSTRUCTION	
CODE G-95	DATE COMPLETED 5-2-76	SHEET <u>1</u> OF <u>2</u>		SHEET _____ OF _____	
PROJECT PRSD GN₂/GHe SERVICE-SSAT (PAD)		DRAWING NO(S) 79K084 99	SHEET NO 3		
LOCATION LC 39		PCN 77729			
ENGINEER PRC	PROGRAM MODEL NO. LU-287	WORK ORDER OR CONTRACT NO 0877			
ESTIMATOR W.T. LONG W.T. Long	CHECKER C.F. SMITH C.F. Smith	APPROVED			

<u>MECHANICAL</u> SUMMARY	QUANTITY		LABOR (MH)		MATERIAL		TOTAL COST
	NO. UNITS	UNIT MEAS.	PER UNIT	TOTAL	PER UNIT	TOTAL	
FACE PLATE & BRACKETRY	114	LB	.22	25.1	.30	34	
SUPPORT 79K06529 TYPE 2	210	LB	.07	14.7	.30	63	
PAINT ABOVE	60	S.F.	.05	3.0	.15	9	
79K03438 GC 10 XCLUCER PRESS	1	EA	.80	.8	1336	1336	SCIENTIFIC COLUMBUS 4/24/6
79K08002-7 REGULATOR PRESS 3/8"	1	EA	.96	1.0	406	406	
79K08009-7 REGULATOR PRESS	1	EA	.96	1.0	392	392	
79K08049-1 VALVE, SHUT-OFF 1/4"	4	EA	.80	3.2	116	464	
79K08050-1 VALVE, METERING 1/4"	4	EA	.80	3.2	120	480	
79K08057-1 VALVE, SHUT-OFF 3/8"	5	EA	.96	4.8	200	1003	
79K08156-3 VALVE, RELIEF 1/2"x1"	2	EA	1.12	2.2	425	851	
79K08235-1 VALVE, VENTCHECK 1/4	4	EA	.80	3.2	122	490	
79K08173-3 GAGE, PRESS 4-1/2" DIAL	2	EA	.40	.8	123	247	
79K08173-9 GAGE, PRESS 4-1/2" DIAL	2	EA	.40	.8	127	255	
79K08229-6 FILTER TEE 3/8	2	EA	.96	1.9	2409	4819	WINTEC CO.
79K08239-91 ORIFICE 3/8	1	EA	.48	.5	196	196	
79K08239-97 ORIFICE 3/8	1	EA	.48	.5	196	196	
TUBE ASSY 1/4"x.035 304S.S	17	EA	1.60	27.2	1.84	31	
TUBE ASSY 3/8"x.035 304S.S	16	EA	2.0	32.0	2.36	38	
KC106C6-4 REDUCER, ADAPTER	6	EA	.24	1.4	6.25	38	
KC144C6-8 REDUCER, BULKHEAD	2	EA	.28	.6	59.50	119	
KC107C6 TEE	2	EA	.36	.7	18.18	36	
KC109C4 TEE	1	EA	.30	.3	14.30	14	
KC109C6 TEE	2	EA	.36	.7	18.18	36	
KC110C4 TEE	6	EA	.30	1.8	19.45	117	
KC110C6 TEE	5	EA	.36	1.8	24.90	125	
KC111C16 TEE	2	EA	.66	1.3	59.97	109	
KC112C4 ADAPTER	10	EA	.20	2.0	8.60	86	
KC112C6 ADAPTER	13	EA	.24	3.1	12.-	156	
SUB-TOTAL TO SHEET #2				139.6		12,146	

<input checked="" type="checkbox"/> GROUND SUPPORT EQUIPMENT		COST ESTIMATE		<input type="checkbox"/> CONSTRUCTION	
CODE G-95	DATE COMPLETED 5-2-76	SHEET <u>2</u> OF <u>2</u>		SHEET _____ OF _____	
PROJECT PRSD GN₂/GHe SERVICE- SSAT (PAD)		DRAWING NO(S) 79K08499	SHEET NO MI-5		
LOCATION LC39-PAD		PCN 77729			
ENGINEER PRC 1965	PROGRAM MODEL NO. LU-287	WORK ORDER OR CONTRACT NO. 0877			
ESTIMATOR W.T. LONG <i>W.T. Long</i> PRC 1965	CHECKER C.F. SMITH <i>C.F. Smith</i> PRC 1965	APPROVED			

<u>MECHANICAL</u> SUMMARY	QUANTITY		LABOR (MH)		MATERIAL		TOTAL COST
	NO. UNITS	UNIT MEAS.	PER UNIT	TOTAL	PER UNIT	TOTAL	
KC 124C4 UNION	4	EA	.20	.8	10.60	42	
KC 124C6 UNION	5	EA	.24	1.2	11.90	60	
KC 150C6 CAP ASSY	5	EA	.12	.6	3.25	16	
KC 142C4 NUT	34	EA	.10	3.4	.80	27	
KC 142C6 NUT	38	EA	.12	4.6	.95	36	
KC 143C4 SLEEVE	34	EA	.10	3.4	.80	27	
KC 143C6 SLEEVE	32	EA	.12	3.8	.95	30	
KC 103-4, -6 SEAL RINGS	86	EA	.10	3.6	.25	22	
75M04185 IDENT. TAG	33	EA	.10	3.3	.30	10	
AN924-6K NUT	7	EA	.12	.8	.50	4	
AA1509-0504 J CAP	4	EA	.10	.4	8.95	36	
79K05922 PANEL LABEL	55	EA	.50	27.5	.15	8	
IDENT. PLATE	41	EA	.50	20.5	.30	12	
MS21104-4 CLAMP	2	EA	.10	.2	.40	1	
MISC. HARDWARE	120	EA	.10	12.0	.25	30	
CLEAN TUBE ASSY'S LEVEL 300	33	EA	1.0	33.0	3.25	107	
LEAK TEST PANEL ASSY	1	EA	6.0	6.0	1-	1	
SUB-TOTAL THIS SHEET				130.1		469	
SUB-TOTAL SHEET # 1				139.6		12,146	
SUB-TOTAL				269.7		12,615	
LABOR HRS X RATE	269.7	HRS	\$15*	4046			
SALES TAX		%			4	505	
SUB-TOTAL				4046		13120	17166
G & A	20.5	%					3519
						SUBTOTAL	20685
PROFIT	10	%					2069
ESTIMATED COMPETITIVE BID COST							\$22754
* SEE APPENDIX A-5 (3) (P.23)							

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
BUDGETARY PROJECT COST ESTIMATE

GSE

OTHER

INSTALLATION/PROGRAM OFFICE KSC - LC39	CONTROL NO 78654 G-1-B
PROJECT TITLE AND LOCATION ACCESS ARM MECHANISM	DATE MAY 25, 1976
BASIS OF COST ESTIMATE PREVIOUS ESTIMATE MOD	REVISION NO

I. SUMMARY OF COST ESTIMATE

DESCRIPTION	AMOUNT a.	PERCENT b.
(1) ENGINEERING ESTIMATE	24,500	
(2) CONTINGENCIES, GOVERNMENT <i>(Enter percentage of item (1) a to right in col (2)b)</i>	2,450	10%
(3) SUPERVISION, INSPECTION AND ENGINEERING SERVICES <i>(Enter percentage of items (1)a and (2)a to right in col (3)b)</i>	2,675	10%
SUBTOTAL ((1) + (2) + (3))	29,645	
(5) COST ADJUSTMENT <i>(Enter percentage of item (4)a to right in col (5)b)</i>	8,085	27.3%
(6) OTHER BURDEN COSTS		
(7) TOTAL BUDGET ESTIMATE ((4) + (5) + (6))	\$37,730	

(8) IDENTIFICATION OF ADJUSTMENT AND BURDEN COSTS, AND ESCALATION
**BASED ON JAN '76 COST W/ESCALATION @ 1% PER MONTH
FROM JAN '76 TO JULY '76 - FOR F/Y 1978 FUNDING 25 MONTHS**

II. PLANNING AND DESIGN

DESCRIPTION	STATUS				
	NEEDED a.	IN-WORK b.	COMPLETE c.	IN-HOUSE/ AE d.	COST e.
(1) PRELIMINARY ENGINEERING REPORT	✓	-	-	IN-HOUSE	700
(2) SPECIAL STUDIES (Specify)	-	-	-	-	-
(3) FINAL DESIGN	✓	-	-	IN-HOUSE	1,200
(4) SUPERVISION AND ADMINISTRATION OF DESIGN SERVICES					600
TOTAL PLANNING AND DESIGN COST					2,500

III. RELATED COST DATA

(Not included in this approved project cost estimate but required to make the system complete)

(1) RELATED COSTS INVOLVED <input type="checkbox"/> a YES (Identify in items (2) through (10)) <input checked="" type="checkbox"/> b NONE		(2) PER (Amount)	(3) DESIGN (Amount)
OTHER RELATED EQUIPMENT	ITEM	AMOUNT	ITEM
	(4) TO BE PURCHASED		(8) GFE
	(5) TRANSFER OF EXCESS		(9) OTHER (Specify)
	(6) EXISTING		
	(7) FUTURE FUNDING		

INSTALLATION/PROGRAM OFFICE KSC - LC 39 SHUTTLE	CONTROL NO 78654 G-1-B	DATE 5-25-76
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GSE **IV. PROJECT COST ESTIMATE** OTHER _____

DESCRIPTION TYPE, SIZE, KIND, ETC.	UNIT OF MEASURE 1.	QUANTITY 2.	UNIT COST		TOTAL COST	
			ENGRG 3.	ENGRG 4.	BUDGET 5.	
3/8" PLATE	LB	808	1.62	1308	2014	
5/8" PLATE	LB	6,881	1.62	11128	17137	
3/4" PLATE	LB	1000	1.51	1511	2327	
G3 X 6.0"	LB	452	1.56	706	1087	
4" x 4" x 1/2" ANGLE	LB	492	1.56	769	1184	
LOCKING DET. 1" x 1 7/8" x 6 1/2"	EA	4	162.-	648	998	
SHOCK ABSORBER (ASA-2-3-B5-54)	EA	4	564.50	2258	3477	
MISC HARDWARE	EA	142	20.59	2925	4505	
1" PLATE	LB	1,086	1.56	1698	2615	
FAB DET "F"	EA	16	42.18	675	1040	
* INCLUDES G&A @ 20.5% &						
PROFIT 10%						
TOTAL				\$24,500	\$33,730	

(7) SOURCE OF COST DATA, ESTIMATOR'S NAME, COMPANY OR AGENCY
EXPERIENCE J. White ABC Co

(8) ESTIMATE OF THE BUDGET CONFIDENCE

CONFIDENCE FACTOR

A OFF-THE-SHELF ± 15 C. R&D ± 100

B PREPRODUCTION ± 50 D OTHER _____

V. RELATED ITEMS/ACTIONS

(EXPLAIN AS APPROPRIATE USE EXTRA SHEETS, AS NECESSARY, FOR THIS BLOCK AND ABOVE)

July 5, 1977

CALCULATED

KSC PRELIMINARY COST ESTIMATE WORK SHEET

W.O. NO. 0725	ECN 78654	DATE PREPARED JUNE 10 - 1976	SHEET <u>1</u> OF <u>2</u>
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PROJECT **ACCESS ARM MECHANISM**

LOCATION **L.E.T.F.** CODE **4-30**

ARCHITECT/ENGINEER **ABC Co. J.R. FORD** ESTIMATOR **J. WHITE ABC Co.**

DRAWING NO. **79K03756, SHEETS MAI-2** CHECKED BY **S. CART ABC Co.** APPROVED BY

ITEM NO.	MACHINERY MECH. DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE MATERIAL & LABOR	ESTIMATED AMOUNT
	LAUNCH PIVOT FIXTURE				
	3/8" PLATE	835	LB	1.11	926
	5/8" PLATE	7098	↑	1.11	7879
	3/4" PLATE	964	↑	1.11	1070
	C3 x 6.0"	450	↑	1.11	500
	4" x 4" x 1/2" ANGLE	490	↑	1.11	544
	LOCKING DET. 1" x 1 7/8" x 6 1/2"	4	↓	114.68	459
	LOCKING DET. 1" x 2" x 2" - 2 1/2"	14	LB	27.85	390
	ASSEMBLY FAB. PKG.	1	EA	180.00	180
	MISC. HARDWARE	41	EA	16.33	670
	SUB-TOTAL				12,618
	WITHDRAWAL MECH.				
	1/4" PLATE	161	LB	1.11	179
	1/2" PLATE	276	↑	1.11	306
	3/8" PLATE	412	↑	1.11	457
	1" PLATE	520	↑	1.11	577
	1 3/4" x 4 3/4" x 6" ST'L BAR	15	↑	18.83	282
	FAB DET. "B"	1	↓	322.67	323
	FAB DET. "F"	1	LB	617.82	618
	EYE BOLT	2	EA	80.14	160
	MISC. HARDWARE	49	EA	15.24	747
	SHOCK ABSORBER (ASA-2-3-35-54)	2	EA	400.10	800
	SUB-TOTAL				4,449
	SUB-TOTAL				17,067

KSC PRELIMINARY COST ESTIMATE WORK SHEET

W.O. NO. 0725	ECN 78654	DATE PREPARED June 10, 1976	SHEET <u>2</u> OF <u>2</u>
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PROJECT Access Arm Mechanism

LOCATION L.E.T.F. CODE G-30

ARCHITECT ENGINEER ABC Co. J.R. Ford J.R. Ford ESTIMATOR J. White ABC Co. J. White

DRAWING NO. 79K03456, SHEETS MAI-2 CHECKED BY S. CART S. Cart APPROVED BY ABC Co.

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE MATERIAL & LABOR	ESTIMATED AMOUNT
	DECELERATION UNIT				
	1/2" PLATE	398	LB	1.11	442
	3/4" PLATE	245	↑	1.11	272
	1" PLATE	563	↑	1.11	625
	1 3/4" x 4 3/4" x 6" STL. BAR	15	↑	18.79	282
	2" DIA x 5 3/4" CRES BAR	16	↓	23.29	373
	1" HEX CRES BAR	8	↓	15.79	126
	1/2 x 6 1/2" x 5" CRES BAR	16	LB	29.89	478
	MISC. HARDWARE	52		12.57	654
	SHOCK ABSORBER (ASA-2-3-BS-54)	2		400.10	800
	SUB-TOTAL THIS SHEET				4,052
	" " SHEET #1				17,067
			SUB-TOTAL		21,119
	G&A	20.5	%		4,329
			SUB TOTAL		25,448
	PROFIT	10	%		2,545
	ESTIMATED COMPETITIVE BID COST				27,993

<input checked="" type="checkbox"/> GROUND SUPPORT EQUIPMENT		COST ESTIMATE		<input type="checkbox"/> CONSTRUCTION	
CODE G-95	DATE COMPLETED 6-30-76	SHEET <u>1</u> OF <u>2</u>		SHEET _____ OF _____	
PROJECT ACCESS ARM MECHANISM		DRAWING NO(S) 79KD3456	SHEET NO MAI-4		
LOCATION L.E.T.F		PCN 78654			
ENGINEER ABC CO J.R.FORD	PROGRAM MODEL NO. UL-632	WORK ORDER OR CONTRACT NO. 0725			
ESTIMATOR J. WHITE	CHECKER S. CART	APPROVED S. Cart.			

<u>MACHINERY</u> SUMMARY	QUANTITY		LABOR (\$ OR MH)		MATERIAL		TOTAL COST
	NO. UNITS	UNIT MEAS.	PER UNIT	<input type="checkbox"/> FIELD TOTAL <input type="checkbox"/> FAB.	PER UNIT	TOTAL	
① LAUNCH PIVOT FIXTURE							
3/8 PLATE	618	LB	.03	18.5	.70	433	RYERSON
5/8 PLATE	5031	LB	.03	150.9	.70	3522	U.S. STEEL
3/4 PLATE	764	LB	.03	22.9	.70	535	RYERSON
C3 x 6.0	315	LB	.03	9.5	.70	221	KAISER
4" x 4" x 1/2" ANGLE	430	LB	.03	12.9	.70	301	FLA. STL.
LOCKING DET 3/4" x 1" x 3/4"	1	LB	4.0	4.0	180.00	180	
LOCKING DET. 1" x 1 7/8" x 6 1/2"	4	LB	4.0	16.0	40.00	160	
LOCKING DET. 1" x 2" x 2" - 2 1/2"	15	LB	4.0	60.0	20.00	300	
ASSEMBLY FAB. PKG	1	EA	80.0	80.0	100.00	100	
MISC. HARDWARE	46	EA	.43	19.8	8-	368	
SUB-TOTAL				394.5		6120	
② WITHDRAWAL MECH.							
1/4 PLATE	160	LB	.03	4.8	.70	112	RYERSON
1/2 PLATE	235	LB	.03	7.1	.70	165	U.S. STEEL
3/8 PLATE	390	LB	.03	11.7	.70	273	RYERSON
1" PLATE	415	LB	.03	12.5	.70	291	IND. STL.
1 3/4 x 4 3/4 x 6" BAR	16	LB	.03	0.5	18.33	275	FLA. STL.
FAB DETAIL "B" M-15	1	LB	1.0	1.0	205	205	
FAB DETAIL "F" M-15	1	LB	1.0	1.0	400	400	
FAB DETAIL "D" M-15	1	LB	1.0	1.0	300	300	
EYE BOLT	2	EA	0.5	1.0	45.25	90	MCMASTERS
MISC. HARDWARE	56	EA	.43	24.1	8-	448	
SHOCK ABSORBER (ASA-23-B5-54)	2	EA	.40	0.8	300	600	EFDYK
SUB-TOTAL				65.5		3159	

<input checked="" type="checkbox"/> GROUND SUPPORT EQUIPMENT		COST ESTIMATE		<input type="checkbox"/> CONSTRUCTION	
CODE G-95	DATE COMPLETED 6-10-76	SHEET <u>2</u> OF <u>2</u>		SHEET _____ OF _____	
PROJECT ACCESS ARM MECHANISM		DRAWING NO(S) 79K03456	SHEET NO MAI-4		
LOCATION L.E.T.F.		PCN 78654			
ENGINEER ABC CO J.R.FORD	PROGRAM MODEL NO UL-632	WORK ORDER OR CONTRACT NO. 0725			
ESTIMATOR J. WHITE <i>J. White</i>	CHECKER S. CART. <i>S. Cart. ABC CO</i>	APPROVED			

SUMMARY	QUANTITY		LABOR (\$ OR MH)		MATERIAL		TOTAL COST
	NO. UNITS	UNIT MEAS.	PER UNIT	TOTAL	PER UNIT	TOTAL	
DECELERATION UNIT							
1/2" PLATE	315	LB	.03	9.5	.70	221	RYERSON
3/4" PLATE	195	LB	.03	5.9	.70	137	U.S. STEEL
1" PLATE	360	LB	.03	10.8	.70	252	KAISER
1 3/4" x 4 3/4" x 6" BAR	15	LB	.03	0.5	13.20	198	RYERSON
1 1/4" x 2" x 2"	24	LB	.03	0.7	5.75	138	FLA. STL.
2" DIA x 5 3/4" CRES BAR	16	LB	.03	0.5	22.80	365	FLA. STL.
1" HEX CRES BAR	8	LB	.03	0.2	15.30	122	
1/2" x 6 1/2" x 5" CRES BAR	18	LB	.03	0.5	18.27	329	
MISC. HARDWARE	59	EA	.43	25.4	3.31	195	
SHOCK ABSORBER (ASA-2-3-B5-54)	2	EA	.40	0.8	300.	600	EFDYN
SUB-TOTAL THIS SHEET				54.8		2557	
① " " SHEET #1				399.8		6120	
② " " SHEET #1				65.5		3159	
SUB-TOTAL				515.1		11,836	
LABOR HOURS X RATE		515.1	HRS	13.60	7005		
SALES TAX			%		4	473	
SUB-TOTAL				7005		12309	19314
G&A		20.5	%				3959
PROFIT		10	%				2327
ESTIMATED COMPETITIVE BID COST							\$25,600

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION BUDGETARY PROJECT COST ESTIMATE		<input type="checkbox"/> OTHER _____
<input checked="" type="checkbox"/> GSE INSTALLATION/PROGRAM OFFICE KSC LC-39 SHUTTLE	CONTROL NO 77823 G-1-B	
PROJECT TITLE AND LOCATION INTERTANK ACCESS ARM & STRUCTURAL ACCESSORIES	DATE MAY 25, 1976	
BASIS OF COST ESTIMATE PREVIOUS SHUTTLE ESTIMATE MOD.	REVISION NO	

I. SUMMARY OF COST ESTIMATE		
DESCRIPTION	AMOUNT a.	PERCENT b.
(1) ENGINEERING ESTIMATE	156,000	
(2) CONTINGENCIES, GOVERNMENT <i>(Enter percentage of item (1) a to right in col (2)b)</i>	15 600	10 %
(3) SUPERVISION, INSPECTION AND ENGINEERING SERVICES <i>(Enter percentage of items (1)a and (2)a to right in col (3)b)</i>	17 160	10 %
SUBTOTAL ((1) + (2) + (3))	188 760	
(5) COST ADJUSTMENT <i>(Enter percentage of item (4)a to right in col (5)b)</i>	51 480	27.3 %
(6) OTHER BURDEN COSTS		
(7) TOTAL BUDGET ESTIMATE ((4) + (5) + (6))	240 240	
(8) IDENTIFICATION OF ADJUSTMENT AND BURDEN COSTS, AND ESCALATION BASED ON JAN '76 COST W/ESCALATION @ 1% PER MONTH FROM JAN '76 TO JULY '76 - FOR F/Y 1978 FUNDING 25 Mo\$.		

II. PLANNING AND DESIGN					
DESCRIPTION	STATUS				
	NEEDED a.	IN-WORK b.	COMPLETE c.	IN-HOUSE/ AE d.	COST e.
(1) PRELIMINARY ENGINEERING REPORT	✓	-	-	In-House	4 600
(2) SPECIAL STUDIES (Specify)	-	-	-	-	-
(3) FINAL DESIGN	✓	-	-	In-House	9 000
(4) SUPERVISION AND ADMINISTRATION OF DESIGN SERVICES	✓	-	-	In-House	15,600
TOTAL PLANNING AND DESIGN COST					

III. RELATED COST DATA			
<i>(Not included in this approved project cost estimate but required to make the system complete)</i>			
(1) RELATED COSTS INVOLVED <input type="checkbox"/> a. YES (Identify in items (2) through (10))	<input checked="" type="checkbox"/> b. NONE	(2) PER (Amount)	(3) DESIGN (Amount)
OTHER RELATED EQUIPMENT	ITEM	AMOUNT	ITEM
	(4) TO BE PURCHASED		(8) GPE
	(5) TRANSFER OF EXCESS		(9) OTHER (Specify)
	(6) EXISTING		
	(7) FUTURE FUNDING		

INSTALLATION/PROGRAM OFFICE KSC - LC 39 SHUTTLE	CONTROL NO 77823	DATE 5-25-76
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GSE

IV. PROJECT COST ESTIMATE

OTHER

DESCRIPTION TYPE, SIZE, KIND, ETC.	UNIT OF MEASURE 1.	QUANTITY 2.	UNIT COST		TOTAL COST	
			ENGG 3.	ENGG 4.	BUDGET 5.	
ϕ 3/8"	LB	300	2.00	600	924	
ϕ 1/2"	LB	200	2.00	400	616	
ϕ 1"	LB	900	2.00	1,800	2,772	
ϕ 1 1/4"	LB	50	2.00	100	154	
ϕ 2 1/2"	LB	800	2.00	1,600	2,464	
2" SCH 80	LB	20000	2.00	40,000	61,600	
3 1/4" SCH 40	LB	6000	2.00	12,000	18,480	
3 1/2" ϕ SCH 40	LB	13000	2.00	26,000	40,040	
5" ϕ SCH 40	LB	20000	2.00	40,000	61,600	
6" ϕ SCH 40	LB	10000	2.00	20,000	30,800	
GRATE	LB	2000	2.00	4,000	6,160	
HANDRAIL	LB	400	20.00	8,000	12,320	
STAIRS	RISER	30	50.00	1,500	2,310	
*INCLUDES G&A @ 20.5 %						
AND PROFIT @ 10%						
TOTAL				\$156,000	\$240,240	

(7) SOURCE OF COST DATA, ESTIMATOR'S NAME, COMPANY OR AGENCY
EXPERIENCE **JOHN JONES** **LETF PHI SYSTEM**

(8) ESTIMATE OF THE BUDGET CONFIDENCE

CONFIDENCE FACTOR

A. OFF-THE-SHELF ± 15

B. PREPRODUCTION ± 50

C. R&D ± 100

D. OTHER _____

V. RELATED ITEMS/ACTIONS

(EXPLAIN AS APPROPRIATE. USE EXTRA SHEETS, AS NECESSARY, FOR THIS BLOCK AND ABOVE)

July 5, 1977

UNIVERSITY

KSC PRELIMINARY COST ESTIMATE WORK SHEET

G. S. E.

W.O. NO 0750	ECN 77823	DATE PREPARED 6-7-76	SHEET 1 OF 1
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PROJECT **INTER TANK ACCESS ARM & ACCESSORIES**

LOCATION **L.E.T.F.** CODE **G-U-30**

ARCHITECT-ENGINEER **ABC Co. J. SILVER** ESTIMATOR **JOHN JONES ABC Co.**

DRAWING NO. **79K09876, SHEETS S1-S3** CHECKED BY **AL GREEN ABC Co.** APPROVED BY

ITEM NO.	STRUCTURAL DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE MATERIAL & LABOR	ESTIMATED AMOUNT
	BUILT-UP-GIRDER				
	PL 3/8"	300	LB	1.00	300
	PL 1/2"	250	LB	1.00	250
	PL 1"	800	LB	1.00	800
	PL 1 1/4"	20	LB	1.00	20
	PL 2 1/2"	800	LB	1.00	800
	WASTE 10%	217	LB	1.00	217
	INTER TANK ACCESS ARM				
	2" φ SCH. 80	19500	LB	1.10	21450
	3" φ SCH. 40	6600	LB	1.10	7260
	3 1/2" φ SCH. 40	13800	LB	1.10	15180
	5" φ SCH. 40	22800	LB	1.10	25080
	6" φ SCH. 40	13000	LB	1.10	14300
	5"-3 1/2" REDUCER	30	LB	1.10	33
	6"-5" REDUCER	21	LB	1.10	23
	WT 2x2.75	50	LB	1.10	55
	WT 3x7.75	230	LB	1.10	253
	GRATE	3150	LB	1.10	3465
	MISC. PL	3600	LB	1.10	3960
	MISC. METALS				
	REMOVABLE HANDRAIL	350	LF	20.00	7000
	KICK PL 1/4"	1400	LB	.80	1120
	STAIRS	32	RISER	70.00	2240
	SUB-TOTAL				103 806
	G & A @	20.5	%		21 280
				SUB-TOTAL	125 086
	PROFIT @	10	%		12 509
	ESTIMATED COMPETITIVE BID COST				137 595

<input checked="" type="checkbox"/> GROUND SUPPORT EQUIPMENT		COST ESTIMATE		<input type="checkbox"/> CONSTRUCTION	
CODE G-95	DATE COMPLETED 6-21-76	SHEET <u>1</u> OF <u>2</u>		SHEET _____ OF _____	
PROJECT INTERTANK ACCESS ARMS & ACCESSORIES		DRAWING NO(S) 79K09876	SHEET NO 51-56		
LOCATION L.E.T.F.		PCN 77823			
ENGINEER ABC CO J. SILVER	PROGRAM MODEL NO UL-251	WORK ORDER OR CONTRACT NO. 0750			
ESTIMATOR JOHN JONES ABC CO	CHECKER AL GREEN ABC CO	APPROVED			

<u>STRUCTURAL</u> SUMMARY	QUANTITY		LABOR (\$ OR MH)		MATERIAL		QUOTES
	NO. UNITS	UNIT MEAS.	PER UNIT	TOTAL	PER UNIT	TOTAL	
BUILT-UP GIRDER							
R 3/8"	306	LB.	.30	92	.70	214	IND. STL.
R 1/2"	254	LB.	.30	76	.70	178	
R 1"	796	LB.	.30	239	.70	557	
R 1 1/4"	20	LB.	.30	6	.70	14	
R 2 1/2"	816	LB.	.30	245	.70	571	
WASTE 10%	219	LB.	.30	66	.70	153	
INTERTANK ACCESS ARM							
2"Ø SCH. 80	18958	LB.	.30	5687	.90	17062	IND. STL.
3"Ø SCH. 40	6641	LB.	.30	1992	.90	5977	"
3 1/2"Ø SCH. 40	12866	LB.	.30	3860	.90	11579	"
5"Ø SCH. 40	21618	LB.	.30	6485	.90	19456	"
6"Ø SCH. 40	11080	LB.	.30	3324	.90	9972	"
5"-3 1/2" REDUCER	34	LB.	.30	10	.90	31	
6"-5" REDUCER	22	LB.	.30	7	.90	20	
CORROSION INHIBITOR	6254	LF	.39	2439	.06	375	
WT 2 x 2.75	55	LB.	.30	17	.90	50	
WT 3 x 7.75	233	LB.	.30	70	.90	210	
GRATING	2200	LB.	.30	660	.90	1980	DORDEN CO
MISC. R	2600	LB.	.30	780	.90	2340	
SHEET SUBTOTAL				26056		70739	

<input checked="" type="checkbox"/> GROUND SUPPORT EQUIPMENT		COST ESTIMATE		<input type="checkbox"/> CONSTRUCTION	
CODE G-95	DATE COMPLETED 6-21-76	SHEET 2 OF 2	SHEET _____ OF _____		
PROJECT INTERTANK ACCESS & ACCESSORIES			DRAWING NO(S) 79K09876	SHEET NO 51-56	
LOCATION L.E.T.F			PCN 77823		
ENGINEER J. Silver ABC CO J. SILVER	PROGRAM MODEL NO. UL-261	WORK ORDER OR CONTRACT NO. 0750			
ESTIMATOR JOHN JONES ABC CO	CHECKER AL GREEN A. Green	APPROVED			

STRUCTURAL SUMMARY	QUANTITY		LABOR (\$)		MATERIAL		TOTAL COST
	NO. UNITS	UNIT MEAS.	PER UNIT	TOTAL	PER UNIT	TOTAL	
MISC. METALS							
REMOVABLE RAILING	366	LF	5.	1830	15	5490	
KICK R 1/4"	1412	LB	.30	424	.60	847	
STAIRS	32	RISER	22.	704	60	1920	
SUB TOTAL				2958		8257	
SUB TOTAL FROM SHT. 1				26055		70739	
S/T				29013		78996	108009
G&A 20.5%							22192
S/T							130151
PROFIT 10%							13015
ESTIMATED COMPETITIVE BID COST							\$ 143,166