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UNITED STATES GENERAL ACCOUNTING OFFICE
REGIONAL OFFICE
ROOM 201 415 FIRST AVENUE NORTH
SEATTLE, WASHINGTON 98109

MAY 10 1977

Dr. W R Lucas
Director, (DAOI)
George C. Marshall Space Flight Center
National Aeronautics and Space Administration
Marshall Space Flight Center, Alabama 35812

Dear Dr Lucas

We recently completed a survey of the pricing of contract NAS 8-31722 awarded by your office to the Eldec Corporation, Lynnwood, Washington, for production of the Dedicated Signal Conditioners and Signal Conditioner Modules These are parts of the Solid Rocket Booster, a component of the Space Shuttle Orbiter.

This firm fixed price contract was selected as part of a nationwide survey by our office of the pricing of negotiated, noncompetitive contracts over $100,000 awarded by civil agencies

Our survey was made at the Eldec Corporation. We also considered the preaward audit work of the Defense Contract Audit Agency and the technical analysis report developed by your staff

The results of our survey were presented to Eldec and its comments have been considered in developing this report A copy of these comments is enclosed

Our survey showed that the negotiated contract price was overstated by at least $65,000 for part numbers 5-684 and 5-685 because (1) the formula Eldec used to compute proposed labor hours overstated the hours required and (2) Eldec did not use accurate data when computing the proposed labor hours

Eldec's final price proposal, dated July 3, 1975, was $1,358,292, including a profit of $202,485 Price negotiations, concluded on August 27, 1975, resulted in a negotiated price of $1,190,000 There was no agreed allocation of this price to cost and profit elements.

Public Law 87-653, in essence, requires prime contractors and subcontractors to submit cost or pricing data in support of proposed prices for noncompetitive contracts and subcontracts expected to exceed $100,000 and to certify that this data is accurate, complete, and current Contract prices can be adjusted when the price to the Government has been increased significantly because the contractor or subcontractor furnished data that was inaccurate, incomplete, or noncurrent as certified

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Eldec certified, in accordance with the public law and National Aeronautics and Space Administration implementing regulations, that cost or pricing data provided to the contracting officer or his representative were accurate, complete, and current as of August 27, 1975, the date of the price agreement.

FORMULA USED OVERSTATES PROPOSED LABOR HOURS

The contractor advised us that the proposed labor hours per unit for part numbers 5-684 and 5-685 were estimated using the following formula.

$$\frac{\dfrac{\text{(Total block 4 labor hours)} - \text{(Block 4 machine shop hours)}}{\text{Quantity of parts released}}}{\text{Completion ratio}} \times \text{Yield factor}$$

Where the

$$\text{completion ratio} = \frac{\text{Quantity completed}}{\text{Quantity released}}$$

Block 4 was for the production of prototypes of the parts procured under this contract

The above formula for computing the completion ratio does not adequately consider work in process units (units released for production but not completed) Because the total hours in the formula included hours for both units completed and work in process, we believe the numerator of the completion ratio should have included both units completed and an estimated number of equivalent completed units for work in process For example, if 100 units have been released, 60 units have been completed and 40 units are 20 percent complete, the equivalent completed units would be 68 (60 + 20 percent of 40) and the completion ratio would be 68/100, or 68 percent Using Eldec's formula, however, the completion ratio would be 60 percent In Eldec's formula, understating the completion ratio increases the labor hours per unit

INACCURATE DATA USED

The table below shows (1) the data Eldec used in its formula to compute proposed magnetic assembly direct labor hours for part numbers 5-684 and 5-685, (2) the data which was available and should have been used, and (3) the effect of the data differences on the proposed hours The specific differences are discussed after the table

Step	No 5-684 Eldec proposal	No 5-684 Available data	No 5-684 Variance	No 5-685 Eldec proposal	No 5-685 Available data	No 5-685 Variance
1. Total labor hours a/	340	340 6		426	426 8	
2. Less· Nonmagnetic assembly hours	(66)	(90 7)		0	(24.0)	
3 Total magnetic assembly hours used	274	249.9		426	402 8	
4. Units released a/	123	133		269	259	
5 Hours used per unit released, step 3 / step 4	2 23	1.88		1.58	1.56	
6. Units completed	b/ 86	103		b/ 135	236	
7. Units completed as a percent of released a/, step 6 / step 4	70	77		50	91	
8 Estimated hours per unit at completion, step 5 / step 7	3 18	2 44		3.17	1.71	
Rounded by Eldec	3 25			3 00		
9. Yield factor	d/x 1 15	x 1 15		x 1.20	x 1.20	
10. Proposed hours per unit	c/ 3 75	2 81	.94	3 60	?.05	1.55
11. Units required, total contract			968			2,053
12 Excess proposed hours			910			3,182

a/Based on Block 4 production prototype experience

b/Eldec documents show only the percent of completion (step 7 of this table) Units completed computed by GAO from this percentage.

c/Rounded by Eldec from 3.74 to 3 75 hours

d/Based on engineering judgments

As shown above, Eldec's proposal differs from available data in three areas (1) magnetic assembly labor hours, (2) units released, and (3) units completed as a percent of units released In all cases, the "available data" figures are based on the most detailed manufacturing record reviewed These are the records provided by Eldec to us to support its price proposal

We used uniform cutoff dates in computing the average hours required for each completed unit

1 Total labor hours are from the May 6, 1975, computer printout which shows hours worked through March 27, 1975, for part-684 and April 3, 1975, for part-685.

2. Units released, from work order status sheets, include all lots started prior to March 27 and April 3, 1975.

3. Units completed, from work order status sheets, represent all units in above lots completed prior to March 27 and April 3, 1975

Magnetic assembly labor hours

The contractor used a May 6, 1975, computer printout summarizing actual Block 4 manufacturing labor hours by part number and department as the source of labor hour data. This printout shows the following information·

	Hours for part number	
	5-684-01	5-685-01
Sheet metal shop	23.2	23 0
Machine shop	66 5	-
Magnetic assembly	249 9	402.8
Functional test	1.0	1.0
Total hours	340 6	426 8

The contractor also provided us with two undated pages of computation notes and stated that these showed the basis for the proposed magnetic assembly direct labor hours for these parts. The notes show that the sheet metal shop hours and the functional test hours shown above were included in the labor hours used in the formula The contractor advised us that the labor hours used in the formula had inadvertently included sheet metal shop hours. Both sheet metal shop hours and functional test hours should have been excluded from the computation because they were proposed as separate cost elements.

Units released

For units released (step 4 of the table on page 3), the contractor used the number shown on the May 6, 1975, computer printout discussed above

The detailed manufacturing records do not support the printout's data The units released data shown in the previously discussed computation notes, the printout, and the detailed manufacturing records are summarized as follows.

Document	Units released for part number 5-684	5-685
Computation notes	123	269
Computer printout	123	269
Parts Accountability Ledger	133	267
Work Order Status Sheet	133	259

The contractor concurred that the above information was accurate and was unable to explain the differences shown.

Units completed as a percent of units released

The contractor's computation notes show that the completion percentages used in the formula were 70 percent for part 5-684 and 50 percent for part 5-685.

The differences in step 7 of the table on page 3 for this item result from differences in the number of units released and in the number of units completed The differences in units released were discussed above

As shown below, neither the computer printout nor the detailed manufacturing records supported the completion percentages used in the formula.

	Part number	
	5-684	5-685
Units completed (including rejects)		
Work Order Status Sheet	103	236
Units released		
Computer printout	123	269
Work Order Status Sheet	133	259
Units completed as a percent of units released		
Computation notes	70	50
Computer printout	84	88
Work Order Status Sheets	77	91

The contractor concurred that the information in the above table was accurate and stated that (1) reasons explaining the differences in the table could not be documented, (2) the employee who developed the completion percentages used in the formula has left the company, and (3) the Parts Accountability Ledger may have been used to develop the completion percentages shown in the computation notes but this ledger cannot be analyzed to show data available at the time the proposal was prepared

INDICATED EXCESS NEGOTIATED COST

The excess negotiated price computation is based on the 4,092 (910 + 3,182) excess proposed hours shown in the table on page 3. These hours were computed using the contractor's formula which overstates the required labor hours as discussed on page 2 We did not extend our survey to develop an estimate of the additional excess price that resulted from the use of this formula

Your prenegotiation position shows that all proposed manufacturing labor costs were accepted as proposed by the contractor, therefore, the proposed labor rate can be used to compute the excess direct manufacturing labor cost resulting from excessive magnetic assembly labor hours. We computed a composite proposed and negotiated magnetics assembly labor rate of $4.016 as follows

Fiscal year	Hours	Rate	Labor cost
1976	1,285	$3 28	$ 4,215
1977	2,138	3.61	7,718
1978	6,423	3.97	25,499
1979	5,958	4 37	26,036
Total	15,804		$63,468
Composite labor rate		$4 016	

Using the negotiated composite magnetic assembly labor rate, the excess negotiated direct manufacturing labor cost is computed as follows.

Excess labor hours	4,092
Composite labor rate	$ 4.016
Excess direct manufacturing labor	$16,433

Marshall Space Flight Center's (MSFC) prenegotiation position shows that the proposed costs for manufacturing overhead and general and administrative (G&A) expenses were not accepted as proposed by the contractor. Thus, some of the negotiated lump-sum price reduction is applicable to these two cost elements

We allocated the negotiated lump-sum price reduction to cost and profit elements on the following basis

1. We assumed that the contractor's profit objective was achieved. The profit rate computed from the July 1975 proposal was 14 9 percent of the total proposed price. Based on this rate, the negotiated profit is $177,310 (14 9 percent of $1,190,000) and the negotiated total cost is $1,012,690 ($1,190,000 - $177,310).

2. The $143,117 reduction between the contractor's July 1975 proposed total cost of $1,155,807 and the negotiated total cost of $1,012,690 was allocated to cost elements based on the degree of difference between the contractor's proposal and MSFC's prenegotiation position for each cost element For example, the cost element manufacturing overhead accounted for 12 35 percent of the total difference between the proposal and the prenegotiation position. Accordingly, 12 35 percent of that $143,117 reduction was allocated to this cost element.

Using the cost element figures resulting from the above allocation, the negotiated manufacturing overhead and G&A expense rates were 138 31 and 43.46 percent, respectively

Using the negotiated composite magnetic assembly labor rate, manufacturing overhead rate, G&A expense rate, and 14 9 percent profit rate, the excess negotiated price is computed as follows.

Excess direct manufacturing labor	$16,433
Excess manufacturing overhead (138 31 percent of $16,433)	22,728
Excess G&A expense (43 46 percent of $39,161)	17,019
Excess total cost	56,180
Excess profit (14.9 percent of $56,180)	8,371
Excess price	$64,551

CONCLUSIONS AND RECOMMENDATIONS

We found that the data used by Eldec to compute proposed magnetic assembly hours was not current, complete, and accurate as certified at the time of negotiation We believe, had such data been provided, the contracting officer would have had a sound basis for negotiating a lower contract price

Accordingly, we recommend that you direct the contracting officer to evaluate the data we obtained from Eldec records and determine the extent the Government may be entitled to a price adjustment under the contract. We also recommend that you take appropriate action to assure that in other contract awards to Eldec the method of computing the percentage of work completed properly recognizes work in process.

The Seattle Branch Manager, Defense Contract Audit Agency (DCAA), advised us that a defective pricing review of this contract has been scheduled for fiscal year 1978 You may wish to ask DCAA to specifically determine whether these or similar problems also exist in other cost elements.

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Your comments and advice on actions taken on these matters will be appreciated. We are sending a copy of this report to the Eldec Corporation and to the Chairman, Renegotiation Board

Sincerely yours,

John P Carroll
Regional Manager

Enclosure

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April 22, 1977

General Accounting Office
415 1st North
Seattle, Washington

Attention: Mark Miller

Subject: Statement of Facts
General Accounting Office Survey of
the Pricing of Contract NAS 8-31722

Gentlemen:

ELDEC would like to thank you for this opportunity to review and comment on your report titled "Statement of Facts General Accounting Office Survey of the Pricing of NAS 8-31722". We found this report to be an accurate analysis of the section of the cost proposal in question. Furthermore, we found it to also accurately analyze certain additional information not used in the proposal.

There are, however, two major errors that should be noted in this report. First of all the report is titled "Statement of Facts", and yet various conclusions have been drawn, and interspersed within the report represented as facts. Secondly, the conclusions that were drawn presuppose that any information available should have been used while computing the projected costs.

The misrepresented conclusions start on page 4 where two columns are titled "Should Have Proposed". The figures are actually an alternate approach to arriving at the projected unit hours. The figures are basically factual, however, whether or not these figures should have been used is in fact the question at hand. ELDEC recommends that these columns

be labeled "An Alternate Approach", and all subsequent discussion be modified appropriately. Furthermore, a section of the report should be devoted to the reason this information should have been used. Using this approach would avoid misleading people and keep the facts clearly separated from subjective interpretation of a very general regulation.

The second area of discussion is concerned with the relevance of the alternate data as it relates to the cost proposal for the subject contract. The implication of this report is that this "alternate" information should have been used by a prudent manager in preparing the cost proposal. The fact is that there are two places where the same information is available. In the Magnetics Manufacturing department, a log is kept of the parts being built by that shop. The purpose of that document is to give status of the hardware to the shop supervisor. The second source of information is the parts accountability ledger kept in the Manufacturing Scheduling and Production Control area. This is the document used to record the quantity of parts requested to be built by the planner, and to also record the completion for, again, the use of the planner. This document is considered important and every attempt is made to keep it current. It can be assumed that this information on the average is current within 15 to 20 days of the actual completion of the hardware.

Correspondingly, the labor hour report would log the actual hours expended by 30 days on the average. Even though the information is stored and printed by the computer; the information is updated only once a month. In fact, the Job File spread sheets are dated 5-6-75, with the latest labor information of 4-3-75. It is evident that these two pieces of information should be accurate to the same time period, and consequently used together.

Although it cannot be stated conclusively, it is believed the information on the parts accountability ledger was used by the cost analyst, and that the numbers presented in the proposal accurately reflect what was on those ledgers at that time. Furthermore, it would appear that

the cost analyst was fully justified and correct in using this data as a basis for the cost proposal. ELDEC's position is that there is no basis for the "Excess Negotiated Direct Manufacturing Labor Costs". Should you have any questions or need any additional information, please contact the undersigned.

Very truly yours,

ELDEC CORPORATION

Jack Day
Operations Manager
Data and Control Systems

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