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UNITED STATES GENERAL ACCOUNTING OFFICE  
REGIONAL OFFICE  
5705 THURSTON AVENUE  
VIRGINIA BEACH, VA 23455

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April 23, 1976

1 Major General A. B. C. Crawford, Commander  
United States Army Electronics Command  
ATTN: DRSEL-PP-P  
Fort Monmouth, New Jersey 07703

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Dear General Crawford:

2 As part of our continuing review of contract prices negotiated under Public Law 87-653 and the Armed Services Procurement Regulations, the United States General Accounting Office has examined the reasonableness of prices negotiated for three contracts awarded by the United States Army Electronics Command to the International Telephone and Telegraph Corporation, Electro-Optical Products Division, Roanoke, Virginia, for night vision goggles. We found that the price paid for the contract items may have been about \$3.3 million lower had the contractor submitted accurate, complete, and current data at the time of negotiation. Also, additional items purchased under modifications to two contracts may have been overpriced and, based on data available, the price for a contract now under negotiation probably can be reduced. D4594

Detailed information relative to the pricing of night vision goggles under the contracts is presented in the attached summary of information obtained during our review. This information is being reported in order that a determination can be made of the Government's legal entitlement to a price adjustment under contracts already awarded and in establishment of an equitable price for future contract awards.

We would appreciate notification of any adjustment in current contract prices or reduction of future prices as a result of this summary.

Sincerely,

Alfonso J. Strazzullo  
Regional Manager

~~7/10/79~~

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## SUMMARY OF INFORMATION

### INTRODUCTION

The price of night vision goggles purchased under three contracts by the United States Army Electronics Command (ECOM), Fort Monmouth, New Jersey from International Telephone and Telegraph Corporation (ITT), Electro-Optical Products Division, Roanoke, Virginia, may have been about \$3.3 million lower if all available data had been made readily available during negotiations.

ITT was awarded a research and development contract in June 1968 to develop and produce night vision goggles. Subsequently, four major contracts have been awarded for the production of night vision goggles and tubes. Under the contracts, ITT manufactures the tubes and assembles them into night vision goggles. The tubes are used in at least one other product produced by ITT, a pocketscope.

A large number of the tubes manufactured by ITT have not met ECOM specifications. A significant number of the rejected tubes have been sold to commercial sources<sup>1/</sup> at unit prices which, in most cases, exceeded the contract unit prices. The following schedule gives details regarding each contract including related commercial sales of tubes.

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<sup>1/</sup> Commercial sales includes sales to Federal agencies other than ECOM, foreign Governments, and other divisions of ITT.

We reviewed the supporting cost or pricing data submitted by ITT for proposals relative to production contracts -0065, -0268, and -0782. The proposals did not include information concerning a commercial market for rejected tubes and adequate data was not furnished in support of yield rates (percentage of acceptable tubes under the contract in comparison with the number of starts).

At the time the proposals were submitted, ITT was aware that it had sold rejected tubes commercially and the revenue from these sales was significant. Additionally, when contract -0782 was negotiated, sufficient production experience was available to show that the proposed yield rate was low.

The Armed Services Procurement Regulations (ASPR) provide that applicable portions of income received by the contractor as a result of Government contracts shall be credited to the Government either as a cost reduction or by cash refund. Under this provision, the Government should have received reasonable consideration for the sale of tubes rejected under the contract.

Although circumstances differed at the various times of negotiations, we believe that for the three contract proposals reviewed sufficient information was available relative to commercial sales of rejected tubes and realized yield rates that would have permitted a reduction in the negotiated costs of the contracts approximating \$3.3 million.

ITT officials believe that the ECOM contracting officer for the contracts was fully aware of the potential commercial market for rejected

tubes and gave adequate consideration to it during negotiations. They also believe sufficient support for yield rates was supplied to the contracting officer during contract negotiations.

Specific information regarding the rationale for our computation of an overstated price of approximately \$3.3 million for the contracts reviewed is presented in the following sections of our report.

PRICE OF CONTRACTS -0065 AND  
-0268 OVERSTATED BECAUSE PROPER CREDIT WAS  
NOT GIVEN FOR COMMERCIAL SALES

Throughout the negotiation periods for contracts -0065 and -0268 the contractor knew that there was a significant market for the sale of rejected tubes. From rejected tubes manufactured under these two contracts, ITT realized about \$620,000 above cost.

During negotiation of contract -0268 the contracting officer asked if ITT could sell the rejects. He was told that only a few commercial sales were expected. At that time, ITT had sold 88 tubes commercially that were produced under prior contracts. Additionally, the contracting officer was not told the unit price received by ITT on the sales.

Since contract -0268 was a fixed-price-incentive contract, a clause was included in the contract to give the Government some credit for the sale of rejected tubes, as follows:

"The transfer of non-deliverable tubes, at ITT's discretion, from Work In Process To Non-Government Furnished (sic) Goods Inventory, will be through ITT's normal transfer ticket, which will be costed at 85% of the price paid the vendors for the inverters, wedges and MCP's."<sup>1/</sup>

Contract -0065, a fixed-priced contract, did not include a provision for credit of rejected tubes. Notwithstanding, ITT's cost accounting system did not segregate costs by contract. Since production under both contracts was accomplished simultaneously, the Government did receive some credit for rejected tubes under both contracts.

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<sup>1/</sup>An MCP is a microchannel plate.

Production under the two contracts was accomplished under two job orders for work-in-process, one for the night vision tubes and the other for the goggles without tubes. In addition, a cost of goods sold account was maintained for each contract as well as for commercial sales.

During the manufacturing period, as units were completed, the contractor periodically transferred costs from the job order to the respective cost of goods sold accounts. Transfers to the cost of goods sold account for contract -0268 averaged \$3,260.99 for each tube; whereas, transfers to the cost of goods sold account for contract -0065 averaged \$3,283.94 for each tube. Transfers were made to the commercial cost of goods sold account at an average of \$423.47.

Near the end of production, residual amounts remaining in the job order accounts were transferred to the commercial cost of goods sold account to close out the job orders. This, in effect, increased the average unit cost transferred to the commercial account by \$1,423.68.

Cost accumulated in the job order for the goggle assembly were similarly transferred to the cost of goods sold accounts at an average unit price of \$2,850.00.

The costs accumulated in the cost of goods sold account for contract -0268 became the basis for a final proposal submitted for determination of the final price under the contract. When the General and Administrative rate (17.88 percent) was applied the target cost was exceeded by \$20,000. The amount accumulated in the cost of goods sold account for contract -0065 with General and Administrative cost and profit was less than the contract amount.

ITT classified its tubes manufactured for the two contracts by series 10,000 and 20,000. There were 360 tubes delivered to the Government under the 10,000 series and 115 tubes in this series were sold commercially. None of the 20,000 series tubes were delivered to the Government while 80 were sold commercially. The 20,000 series tubes included a microchannel plate manufactured by ITT. The ECOM specifications require the use of only MCP's manufactured by Varian Associates. ITT was aware that the 20,000 series tubes would not meet ECOM specifications, and could only be used for commercial sales.

The 195 rejects were sold for \$1,249,722. Cost for the 195 rejected tubes was \$512,503. With the application of General and Administrative costs, ITT net revenue for the rejects was \$619,856.

ITT officials stated that the Government was aware of the extent of commercial sales prior to negotiations since the Night Vision Laboratory (contracting agency for contracts -0009 and -0058) personnel knew of these sales. Also, they said that ECOM technical personnel who reviewed the proposals had been notified that at least 34 commercial sales had been made and believes adequate recognition was given to such sales through the inclusion of the clause which provided for the transfer of costs to a non-Government account.

#### CONCLUSION

At the time that contracts -0065 and -0268 were negotiated, ITT had sold a significant number of night vision tubes rejected under other contracts to commercial sources. The contracting officer for the two

contracts was not made aware sufficiently of the impact of these sales. As a result the Government's interest was not adequately protected. Adequate consideration of commercial sales of rejected tubes would have enabled the Government to obtain a better price on the goggles and tubes produced under the two contracts. The extent of the reduction in price may have approximated the revenue earned by ITT on commercial sales, \$620,000.

#### RECOMMENDATION

We recommend that the U. S. Army Electronics Command reconstruct the data received during negotiation and consider it in line with data contained in this report to determine the extent of the Government's legal entitlement to a price adjustment under these contracts.



PRICE OF CONTRACT -0782 OVERSTATED BECAUSE THE  
YIELD RATE WAS UNDERSTATED AND CREDIT WAS NOT  
GIVEN FOR COMMERCIAL SALE

The yield rate included in the proposal for contract -0782 was understated. As a result, the negotiated price for the contract was about \$1,693,000 more than probably would have been negotiated if realized yield rates had been used. In addition, based on prior experience, the contractor should have about 304 rejected tubes available for commercial sales. Based on the past sales prices this could result in a net revenue of about \$996,000.

In the proposal for contract -0782, ITT arrived at a contract price through the use of yield rates, the percentage of a given item or part that will end up in a completed acceptable product. Yield rates were applied to 57 parts making up the night vision tube, labor, and overhead. A Should Cost Analysis Team requested supporting information for the yield rates prior to contract negotiations. ITT did not provide sufficient data for the team to effectively evaluate the propriety of the yield rates. Using data and information available, the contracting officer negotiated the following yield rates:

	<u>Cost of units needed</u>	<u>Yield cost</u>	<u>Total cost</u>	<u>Yield percent</u>
Material	\$3,426,127	\$ 903,818	\$4,329,945	79.1
Labor	341,585	512,380	853,965	40.0
Overhead	<u>1,202,386</u>	<u>1,803,582</u>	<u>3,005,968</u>	<u>40.0</u>
Total	<u>\$4,970,098</u>	<u>\$3,219,780</u>	<u>\$8,189,878</u>	<u>60.7</u>

Although not presented to the Should Cost Analysis Team, overall yield data by tube was available. ITT records the disposition of tubes by tube serial number. Considering this information, yield rates can be determined and anticipated yield rates can be projected. Eliminating 20,000 series tubes since they were never really intended for release to the Government, we computed overall yield rates for Government sales and commercial sales. The method used for our computation is shown in the appendix to this report. Our computed yield rates are 71.6 percent for Government sales and 5.9 percent for commercial sales with a total yield rate for sales of 77.5 percent.

A comparison of the negotiated cost with cost using the 71.6 percent yield rates follows.

<u>Yield rate</u>	<u>Cost of units needed</u>	<u>Yield cost</u>	<u>Total cost</u>
60.7	\$4,970,098	\$3,219,780	\$8,189,878
71.6	<u>4,970,098</u>	<u>1,974,423</u>	<u>6,944,521</u>
Difference	<u>-0-</u>	<u>\$1,245,357</u>	<u>\$1,245,357</u>

Application of the General and Administrative (18.08 percent) and profit (15.14 percent) rates used in the original negotiation raises the yield cost difference, or overpricing, to \$1,693,039. This is \$927.69 for each of the 1,825 goggles.

A projection using our yield rates shows that to manufacture 3,650 tubes (1,825 goggles) for the Government the contractor would have to start 5,100 tubes. However, of the 5,100 tubes, 5.9 percent, or 304 would

be rejects which will be available for sale commercially. Based on the past sale prices of pocketscopes and goggles and recorded expenses for commercial sales from contracts -0068 and -0268 the contractor will realize a net revenue of about \$3,277 each or \$996,059 for the 304 tubes.

The commercial market for goggles decreased during the production of contract -0782. Through November 1975 only five had been sold. ITT officials said this decline resulted from their inability to get an export license for foreign sales. ITT is attempting to develop another market through the sale of tubes in pocketscopes which will require approval of the U. S. Department of Health, Education, and Welfare's Food and Drug Administration. As of February 1976, when contract -0782 was about one-half complete, about 100 rejects were in stock awaiting sale.

ITT officials said that they had furnished a considerable amount of data regarding yield on contracts -0065 and -0268 to the Should Cost Analysis Team. In their opinion, the data furnished should have permitted the team to make some of the same projections that we made during our review. Notwithstanding, the officials believe the use of historical data from the two prior contracts is invalid because the specifications under contract -0782 are much more stringent than under prior contracts. ECOM engineers did not agree that the specifications were more stringent under contract -0782.

#### CONCLUSION

At the time of negotiation, the contractor had data available which would have shown that the yield rate in the contract proposal was under-

stated. This same data showed that additional tubes would be available for sale as rejects from which a significant revenue could be received. We found no evidence that the contractor furnished complete information to the contracting officer relative to yield rates during negotiation. Had available data been considered a reduction in price of about \$2,689,000 might have been obtained.

The contractor claimed the specifications were tighter and, therefore, the yield rate for Government sales would not increase. We do not know if the specifications were tighter. If so, we accept that the Government yield might be lower, but the total yield would not change. Although a reduction in Government yield rate might reduce the overpricing, the matching increase in commercial yield rate correspondingly would increase the potential net revenue from commercial sales. The potential reduction in total price would increase.

The contractor claims the commercial market has decreased and that part of the decrease was due to Government action. We believe the Government should take positive action to assist the contractor in making such sales.

#### RECOMMENDATIONS

We recommend that the U. S. Army Electronics Command consider the data we obtained from ITT's records and our computation of projected yield and determine the extent of the Government's legal entitlement to a price adjustment under this contract.

As a part of this entitlement may depend on the contractor's ability to sell rejects, we recommend also that the U. S. Army Electronics Command assist the contractor, in whatever manner possible, in the establishment of a market for rejected tubes.

METHOD OF PROJECTION OF YIELD RATES  
FOR CONTRACT -0782

In order to determine the anticipated yield rate for contract -0782, we analyzed December 1973 through November 1974 data obtained from the contractor using three methods of projection. These methods: trend analysis, weighted average, and regression analysis were then analyzed using the concept of mean absolute deviation to determine which method produced an estimated yield rate closest to the actual yield rate experienced. The method with the lowest mean absolute deviation is the method which produces the best predictive model. The results of this analysis is depicted in the following table.

	<u>MEAN ABSOLUTE DEVIATION</u>	
	<u>Total yield</u>	<u>Government yield</u>
Regression analysis	5.1930	5.0206
Trend analysis	9.9090	12.3723
Weighted average	9.9583	13.3083

Based on the results of this analysis, we chose the model produced through regression analysis as our predictive model.

MAJOR GOVERNMENT CONTRACTS FOR NIGHT VISION GOGGLES AND TUBES (Note a)

Contract number (note b)	Goggle			Tubes			Other items price (note c)	Total price	Date of contract	Date of certification	Commercial sale of tubes (note d)
	Quantity	Unit price	Total price	Quantity	Unit price	Total price					
DAAKO2-69-C -0009	274	(Note e)	(Note e)	332	(Note e)	(Note e)	(Note e)	\$ 5,378,605	7-30-68	None	54
DAAKO2-73-C -0058	30 3	\$15,260.00 15,000.00	\$ 457,800 45,000	46 10 1 3	\$4,050.00 5,323.20 5,323.00 3,875.00	\$186,300 53,232 5,323 11,625	\$ 125,605	884,885	12- 1-72	Unknown	34
DAABO7-74-C -0065	None	None	None	80 25	4,552.00 4,652.00	364,160 116,300	19,540	500,000	11-30-73	10-23-73	195
DAABO7-74-C -0268	98 22	11,735.00 12,651.00	1,150,030 278,322	20	(Note f)	(Note f)	267,091	<u>g &amp; h/</u> 1,695,443	3-22-74	3-13-74	
DAABO7-75-C -0782	1,825 5	8,269.11 (Note k)	15,091,126 (Note k)	20	3,069.00	61,380	1,591,869	<u>i/</u> 16,744,375	2-25-75	2-15-75	10
	<u>i/2,257</u>			<u>i/537</u>				<u>\$25,203,308</u>			<u>293</u>

a/ We also identified 19 other small contracts for a total of 21 goggles and 132 tubes.

b/ Contracts -0009 and -0058 were awarded by U. S. Army Mobility Equipment Research and Development Center, Fort Belvoir, Virginia. The other three were awarded by ECOM. Contract -0268 was a fixed-price-incentive contract type, the others were firm-fixed-price.

c/ Includes parts, contract text reports, technical data, midpoint reliability test, first articles, and equipment.

d/ Sales under -0065, -0268, and -0782 were identified as rejects in contractor's records. During production of earlier contracts there were 88 commercial sales, 12 can be identified as rejects.

e/ Data not available at locations visited.

f/ Tubes used in first article and midpoint test. Price included as part of other items.

g/ Target cost \$1,513,832; incentive sharing 25 percent contractor--75 percent Government.

h/ Does not include modification A00002 dated August 22, 1975, which added 120 tubes at \$3,611.88 each and other parts on a Fixed-Price basis at a total price of \$449,999.94.

i/ Does not include a modification for three additional goggles at \$8,269.11 each or a provisional order for 1,825 tubes at \$3,142 each.

j/ With two tubes per goggle, total tubes is 5,051.

k/ Goggles used for initial reliability test. Price included as part of other items.