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14 December 1965

MEMORANDUM FOR: Chairman, USIB Committee on Documentation

SUBJECT: GENERAL DYNAMICS MACHINE LANGUAGE  
TYPEWRITER - Report and Findings

## I. Background

1. In December 1960, CODIB set up the Working Group on Remote Systems Input. Its immediate purpose was to compare the requirements and specifications of USIB agencies for remote systems input devices in order to combine them into a single set covering all essential features. The Group duly formulated a statement of requirements for an Input/Output Typewriter for typing classified information at jointly used installations abroad. The statement included functional specifications common to all participating agencies, as well as those of major significance to one or more agencies. NAG-1A/TSEC (later, FS-222) was subsequently designated as the security standard for the equipment.

2. BuShips, Department of the Navy, was selected as executive agent by DOD to contract with industry for the development and production of the secure machine language typewriter. The R&D Contract was awarded to General Dynamics/Electronics. GD/E in turn chose the MITE Corporation as subcontractor for mechanical assemblies. Work on the project commenced in early 1964, and the initial briefing of the Working Group by the BuShips Project Officer in May of that year indicated a satisfactory beginning.

## II. The Problem

1. By October 1964, when the Group was again briefed on the progress of the development, some problem areas were becoming evident. It was reported, for example, that the size and weight, as well as certain of the security requirements, would be difficult to attain.

2. As additional problems were identified and corrective measures applied - and as additional requirements were levied - the equipment began to take on a character substantially

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different from the original USIB functional specifications. The complexity and projected unit cost have, at this point, reached alarming proportions. This, together with some problems (operational and security) which have not yet been resolved, leads the Working Group to conclude that there is little hope for obtaining an equipment from this effort which will meet USIB requirements and gain user acceptance. The problem, then, is whether to continue to support the effort as programmed, attempt to redirect it, or recommend cancellation of the contract now. Facts bearing on the problem and on the Working Group's recommendation are presented below.

### III. Discussion

1. During the early stages of development, it became apparent that (a) the machine would be larger and heavier than anticipated and (b) it would have to be completely enclosed - in fact, virtually sealed - in a "quiet" cover to meet the acoustic requirement of Federal Standard 222. A decision was made to go into microelectronics and provide a recessing keyboard to reduce the size and weight. Even so, it now appears that the machine will exceed the 100 pound weight limitation by 30-50% and also be two or more inches wider than the design goal. The effect of the "quiet" cover concept is that of making access to the paper and tape, for correction purposes, difficult. This factor may well affect typist's acceptance of the device.

2. In order to develop a machine with the broadest possible customer appeal, the scope of the contract was modified to provide for on-line communications capability and direct code conversion. By including a variety of optional features to increase the demand, it was felt that the unit cost would be held down. However, despite the original quotation of \$3,400 per unit in lots of 1000 machines, General Dynamics is now talking of a unit cost approaching \$10,000. Some members of the Working Group feel the on-line feature has complicated the design and will lead to increased maintenance problems. The contractor has affirmed, however, that the existing problems are not related to the on-line or code conversion capabilities.

3. Inspection of the Engineering Model at the contractor's facility by members of the Group along with engineering and security advisors, pinpointed some of the problems and objectionable features. These range from poor

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design, to the use of questionable materials, to probable operating and foreseen maintenance difficulties, to doubts about the ability of the equipment to meet the requirements of Federal Standard 222. It was determined that, if the effort is to continue, some redesign involving additional R&D funds is imperative.

4. The contractor was called to Washington 9 November 1965 to review the problems and discuss redesign recommendations. A summary of the results of this meeting is outlined below.

A. Prototypes

(1) Additional R&D Costs Related to Recommended Redesign

a. Solenoid Power to Assist for Keyboard	\$ 24,500
b. Reduce Speed to 120 WPM to Minimize RFI Problem	58,600
c. Redesign Case for easier access to tape	19,100
d. Provide Gear Reduction System for Motor Drive	11,800
Total	<u>\$ 114,000</u>

(2) Extension of R&D Contract

Estimated at Six Months - to August 1966

B. Production Models

(1) Tooling and Start-up Costs

a. Preproduction Engineering	\$ 303,000
b. Mechanical Subsystem Processing	115,000
c. Tooling	<u>1,030,500</u>
Total	\$1,448,500

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(2) Unit Cost for First Lot of 1000 Machines

- |                                       |          |
|---------------------------------------|----------|
| a. Typewriter Only                    | \$ 8,500 |
| b. Teletypewriter                     | 9,000    |
| c. Teletypewriter with Code Converter | 9,300    |

Start-up Costs Amortized Over  
1000 Units - Additional \$1,448  
per unit.

(3) Delivery of First Production Machines

- |   |                      |
|---|----------------------|
| a. 27 Months After Approval of Prototypes   | - About Nov-Dec 1968 |
| b. Accelerated Program - 17 mos. after Approval of Prototypes, achieved by Starting Preproduction Engineering during Prototype Evaluation | - About Jan 1968     |

C. Other Factors

- |   |                         |
|---|-------------------------|
| (1) Estimated Production Rate (Beginning in 1968)                     | - 50 Units per Mo.      |
| (2) Delivery of First Thousand Units (20 Months @ 50 Units per Month) | - Late 1969 or Mid 1970 |

D. Some Unanswered Questions

- (1) Required Length of Maintenance Training? Electronic/Mech. Engineer?
- (2) Security Standards in 1969 - 1970?
- (3) Operator Acceptance?

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#### IV. Findings

1. The Working Group has agreed unanimously that production of the General Dynamics typewriter under contract by any USIB Agency is highly unlikely in view of the projected unit cost, production schedule, and other problems cited above. The Group has considered alternatives to recommend to CODIB in the framework of the Group's interest as potential users of the equipment. Thus the questions of operator acceptance, maintainability overseas, and cost of the end product were primary considerations; security specifications (Federal Standard 222) were formally ruled beyond the competence of the Working Group in discussing alternatives, though the security aspect could not be discounted as a practical matter as each member decided upon his position.

2. The Group felt that there were one of two alternatives it could recommend to CODIB:

a. outright cancellation of the project, or at least withdrawal of CODIB's endorsement of continuance, on the grounds that further expenditures in redesign and prototype delivery and testing are not justified. Each agency would then re-examine its own resources, and developments in industry, in hopes of finding a substitute which would meet the original specifications. Any breakthroughs would, of course, be shared with the community.

b. continue the contract, with redesign estimated at \$114,000 and 6 months delay to meet the most basic criticisms of all parties concerned, in order to provide prototypes for testing. Given the investment to date, the experience to be gained from prototype testing would be worth the additional cost. Should this alternative be adopted by CODIB, BuShips should be responsible for scheduling testing of the prototypes by those agencies concerned, and prepare a final report on test results for CODIB.

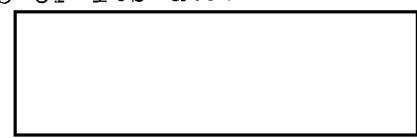
3. The Working Group is deadlocked in recommending either alternative. Each of the 7 members has registered a formal vote in light of his own convictions and the technical advice available through his own agency. The Air, Army, and Navy members vote for continuing the project through prototype delivery and testing. The CIA, DIA, and NSA members vote for cancellation of the contract forthwith. The State member abstains.

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4. It is recommended that CODIB consider this problem at the earliest opportunity, since the contractor is effectively stalled until further direction from the government is received. It is also recommended that CODIB solicit the opinions of the technical security experts most familiar with this development in weighing the problems discussed herein.

5. The undersigned and other Team members will be available should CODIB wish further oral elaboration of this report in the course of its deliberations.



Chairman, CODIB  
Working Group on  
Remote Systems Input

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