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Memorandum L-18

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Electronic Computer Division
Servomechanisms Laboratory
Massachusetts Institute of Technology
Cambridge, Massachusetts

TO: Jay W. Forrester
FROM: Hugh R. Boyd
DATE: February 15, 1950
SUBJECT: ESTIMATED COST OF STANDARD STORAGE TUBES - (JANUARY, 1950)
REFERENCE: Interoffice Memorandum from R. Everett to J. Forrester dated
January 9, 1950 - (Same Subject)
Notebook No. 12 - H. R. Boyd - Pages 140-142

ABSTRACT: The cost of 100-series storage tubes storing 256 points each is calculated. This cost in January is approximately \$1,500 per tube at the present construction rate of one and one-half satisfactory tubes per week.

Section 1.0 SUMMARY

At your suggestion I have prepared the following cost estimate for constructing standard storage tubes. The cost per tube in January is approximately \$1,500 each. These costs include direct manpower and materials as well as a proper allocation of building operation, administrative, and supervisory costs covering such direct contract charges as material procurement and standards group, purchasing, stock clerks, guards, telephone operators, and so forth.

The storage tube group constructs approximately three tubes per week, of which one is a research tube and two are the so-called standard tubes. Of the two standard tubes, about 75% or one and one-half tubes per week are satisfactory.

The cost per tube is computed by taking two-thirds (the ratio of standard to total tubes constructed) of the weekly cost of the storage tube construction group divided by one and one-half (standard tubes constructed per week). The cost of the standard storage tube construction per week is \$2,222. Dividing by the one and one-half satisfactory tubes constructed per week

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gives a cost of \$1,481 per tube. The cost is divided as follows:
(see sections 2, 3, and 4 for cost details and allocation method)

Direct salaries and wages	\$ 922	
Allocated salaries and wages (50.7% of \$922)	<u>467</u>	
Total salaries and wages	\$1,389	
MIT overhead at 42%	<u>583</u>	
TOTAL SALARIES AND OVERHEAD		\$1,972
Direct materials and services	\$ 190	
Allocated materials and services (6.5% of \$922)	<u>60</u>	
TOTAL MATERIALS AND SERVICES		<u>250</u>
TOTAL COST PER WEEK		<u>\$2,222</u>

Section 2.0 DIRECT PERSONNEL

The following persons were charged to tube construction in January:

STAFF

P. Youtz (full time)
T. Clough (" ")
R. Shaw (" ")
M. Florencourt (full time) for standard testing
J. Ely (1/3 time)

NON-STAFF

W. Pickett (glass blower)
J. Palermo (construction)
F. Caswell (")
G. Kaplan (")
T. Parkins (")
A. Greenlaw (processing)
J. Wilson (drafting)
A. Greaves (")
I. Paulsen (files and dies)

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NON-STAFF (continued)

H. O'Connor (secretary)
L. Prentice ($\frac{1}{2}$ time - machine shop foreman)
D. McGonigle (machinist)
R. Witthus (")
J. MacDonald (")

STUDENTS DOING PROCESSING

Angus (1/3 time)
Blank (" ")
DiPietro (1/2 time)
Lincoln (" ")
Maglio (" ")
Nelson (" ")

Two-thirds of the cost of the above group or \$922 per week is charged to standard tube construction while the remaining one-third is charged to research tube construction.

Section 3.0 DIRECT MATERIALS AND SERVICES

T. F. Clough estimated on January 9 that the average weekly expenditure was \$285.00 for materials and services. This estimate is based on the past six months' orders and is divided as follows:

Raw glass	\$ 55
Stems	35
Guns (purchased)	20
Mica	30
Silvering for signal plates	40
Chemicals	30
Liquid nitrogen, hydrogen, etc.	55
Miscellaneous	20
	<u>\$285/week</u>

As in section 2.0, two-thirds of \$285 or \$190 is charged to standard tube construction.

Section 4.0 ALLOCATED PERSONNEL AND MATERIALS AND SERVICES

According to my calculations (February 9 - Notebook 12), approximately \$212,000 per year out of a total budget of \$650,000 per year is required to cover the allocation of personnel, and materials and services charged directly to contracts but serving all groups in the Barta building. This \$212,000 covers the cost of administrative and supervisory staff and non-staff, procurement and purchasing, guards, telephone operators, stock room,

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receiving and shipping, test equipment calibration, print room operation, report editing, and other similar facilities which serve the entire building. This estimate is based on our actual current cost and is the best one available at the present time.

This \$212,000 allocation includes \$17,500 for materials and services, \$137,000 for salaries and wages, and \$57,500 for institute overhead covering building depreciation, maintenance, heat, lights, power, water, cleaning, vacations, and sick leave of non-staff, etc. The direct salaries and wages are \$270,000. Thus the proper allocation percentages are obtained by dividing the allocated items by \$270,000. These percentages are:

	Percentage of Direct Salaries and Wages
Allocated salaries and wages $\left(\frac{\$137,000}{270,000}\right)$	50.7
Allocated materials and services $\left(\frac{\$17,500}{270,000}\right)$	6.5

Hugh E. Boyd
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HRB:rbb

cc: R. Everett