

Digital Computer Laboratory  
Massachusetts Institute of Technology  
Cambridge, Massachusetts

SUBJECT: MEETING ON PACKAGING OF WHIRLWIND II, HARTFORD, CONNECTICUT,  
MAY 21, 1953

To: N. H. Taylor

From: William H. Ayer

Date: May 27, 1953

IBM

M. M. Astrahan  
P. A. Beeby  
J. M. Coombs  
D. J. Crawford  
N. P. Edwards  
R. Hughes  
J. Montgomery  
H. D. Ross  
B. L. Sarahan  
D. Thompson

MIT

I. Aronson  
W. H. Ayer  
J. D. Bassett  
R. L. Best  
R. R. Everett  
R. S. Fallows  
J. F. Jacobs  
A. P. Kromer  
K. H. Olsen  
R. J. Pfaff  
N. H. Taylor  
C. W. Watt

Morning Session

The joint IBM-MIT Committee on Packaging of Whirlwind II presented a review of their work and the recommendations they had agreed on. The report was broken down into separate units as follows:

1. Review of Planning Considerations -- R. Fallows
2. Logical Break-down Into Pluggable Units -- I. Aronson
3. Logical Break-Down Into Frames -- P. Beeby
4. Proposed Floor Plans -- W. Ayer

One-half hour was spent for each report and no discussion took place during the morning session. Copies of these reports are available from the various speakers.

Afternoon Session

The afternoon discussion began with the machine layout and circuit problems affecting it. D. Crawford of IBM discussed the problem of operating gate tubes with 5 to 10 volts positive bias on the suppressor grid rather than 0 volts as used in WWI. It was agreed that more information is needed

on secondary emission effects, difficulty of driving flip-flops and gate tubes, and the type of wire to be used for point transfer connections between gate tubes and flip-flops. Several people are working on this problem at the present time, so no further assignments were felt to be necessary. N. Taylor proposed that the circuit people investigate the desired transmissions line impedance for information lines driving a flip-flop from a gate tube. He felt that twist pair might be more desirable than coax or open wire, and would not require that the gate tube be driven as hard. It was assumed for the purposes of further discussion that these problems would be solved without the addition of so many components that the proposed layouts would become invalid.

It was voted at this point to accept the machine layout #3 as proposed by the committee. This layout recommended that each register be vertical and that horizontal pluggable units be used. These pluggable units would be one tube high to correspond to the height of a given digit. Power distribution and decoupling circuits would be placed on panels directly below each register in a manner similar to the MTC arrangement.

Pat Beeby discussed the advantages and disadvantages of read-in and read-out gates. N. Taylor felt that both read-in and read-out would have to be used in the final design, even though the use of read-in gates will definitely require additional tubes due to its use of d.c. levels. H. Ross, D. Crawford, and R. Best will be the final judges as to which method will be used with a given circuit.

A general discussion of pluggable units took up the remaining time of the meeting. A tabulation was made of the pros and cons of using a small number of tubes in a pluggable unit vs. a large number of tubes.

Few Tubes

1. Fewer types of pluggable units.
2. Less redundancy.
3. Easier to change the logic.
4. Lots of diodes.

Many Tubes

1. Less rack wiring.
2. Service replacement in large logical blocks.
3. Fewer working tubes
4. Fewer plug contacts

I. Aronson reviewed his proposal that had been presented during the morning session. He recommended the use of 6-tube units for all registers in the machine. As an alternative, he suggested that 5 and 10 tube units could be used.

L. Sarahan drew a chart showing the minimum number of empty sockets per digit column that could be expected when one pluggable unit with a standard number of tubes was used for all registers. (Standardization of the electronic circuitry on the pluggable units is completely disregarded in these figures.)

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<u>Tubes in a Standard Pluggable Unit</u>	<u>Min. No. of Empty Sockets/Digit Col.</u>
2	5
3	7
4	23
5	38
6	25
7	45
8	31
9	52

The meeting decided that the mechanical design group should proceed with design of a 6-tube pluggable unit, and at the same time, develop both a 4 and a 9 tube unit in case they are needed.

There will be another packaging meeting on June 12, 1953, to review the decisions in the light of more complete information.

Signed: William H. Ayer  
W. H. Ayer

Approved: A. P. Kromer  
A. P. Kromer

CC: All IBM and MIT Personnel  
listed on Page 1

J. W. Forrester  
W. N. Papian