

1976.08.16

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Dr. J. H. Laning  
Charles Stark Draper Lab., Inc.  
68 Albany St.  
Cambridge, Mass. 02139

Dear Dr. Laning:

Last weekend I amused myself by studying the vintage 1953 compiler listing you sent. It was a nice puzzle, especially because I only knew the definition of one Whirlwind opcode to start with (namely `sp --` I guess "`sp x`" means "split to location `x`"). Even `sp` did something unexpected when I learned about the "`ta`" order.

I can now certify that the program has only one bug, namely the problem you mentioned about unary minus: `-x` gets treated as `1-x`. It was remarkable how much logic you squeezed into 430 instructions, but I guess one could save another 20 or so if it were really necessary to do so!

The form of the object code was filled with surprises for me; thank you again for letting me have a look at this most innovative approach to formula translation.

Cordially,

Donald E. Knuth  
Professor

DEK/pw