MURA # 597

ONE13

(Program 312)

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Based on a conversation with M. Storm and a write-up from F. Cole; "One13" was programmed and coded. It is a one pass per run code and evaluates and prints out the results of 13 equations. The input is also printed out. Several runs at a time may be made as the routine returns to the input after completing a run. This program stops on encountering a "Stop Series" card. Output is "off-line", in BCD, on logical tape 9. Because the range of the input values has a lower limit of zero, certain tests were required. The general rule was: any factor that had a zero term in the numerator or denominator; set that factor to zero. This pertained only to those terms where the zero was a multiplier.

The input consists of 12 values, all in floating point. Their range is as follows:

R_1 - - - - - - 0 - 5×10^3

W - - - - - - 0.001 - 0.1

$\bar{B}$ - - - - - - 0 - 2×10^4

B_F - - - - - - 0 - 3×10^4

K - - - - - - 0 - 500

α - - - - - - 0 - 2π

G_1 - - - - - - 0 - 50

G_2 - - - - - - 0 - 75

D - - - - - - 0 - 100

$\frac{ms}{2\pi R}$ - - - - - - 0 - 1

F - - - - - - 0 - 1

C - - - - - - 0 - 10

The data is punched according to the attached agendum sheet (which see).

Output: The 13 equations evaluated are as follows: First, the following values are computed.

$$C_1 = \frac{4\pi \bar{B} R_1}{K B_F}$$

$$C_2 = 4\alpha F D$$

$$C_3 = \frac{R_1}{K}$$

$$C_4 = \ell F D W$$

$$C_5 = \bar{B} C$$

Next, the values of 13 numbers are found and printed, based on the following equations:

(1) $R_2 = R_1 \left[1 - 2\pi W\right]$

(2) $V_F = C_1 R_1 \left[1.1 R_1 + \alpha W + C_1 + 0.225 G_1 + \frac{1.1 D B_F}{\bar{B}} + C_1 \frac{ms}{2\pi R_1} + D\right]$

(3) $W_F = 1.45 \times 10^{-4} V_F$

(4) $V_{c,1} = C_2 R_1 \left[2 G_1 + .3 C_3\right]$

(5) $V_{c,2} = C_2 R_2 \left[1.1 C_3\right]$

(6) $W_c = 1.62 \times 10^{-4} \left[V_{c,1} + V_{c,2}\right]$

(7) $NI_1 = C_5 G_1$

(8) $NI_2 = C_5 G_2 E^{-2\pi K W}$

(9) $J_1 = \frac{NI_1}{C_4 R_1}$

(10) $J_2 = \frac{NI_2}{C_4 R_2}$

(11) $P_1 = 6.8 \times 10^{-13} J_1^2 V_{c,1}$

(12) $P_2 = 6.8 \times 10^{-13} J_2^2 V_{c,2}$

(13) $P = P_1 + P_2$

The make-up of a deck to be run is as follows:

Binary Deck.

Header
Code
Transfer Card

Data cards
End float card
Data cards
End float card
'
'
'
'
'
'
'
Data cards
End float card
Stop series card
3 blank cards

The stop series card tells "One13" that all the runs have been completed and it "halts". "One13" prints the read in values as part of the printout for each run.

Attached is a sample agendum sheet.

PRIORITY: _____

NAME: _____

RUN NO: _____

ONE13 AGENDUM

(Program 312)

Instructions:

1. One entry per card
2. Start in column 1; column 5 blank.
3. All data floating.
4. End last run with a "Stop Series" card as well as "End Float" card.

COL. 1 5

ID	ADDRESS		NUMBER	±EXP
R_1				
W				
$\overline{B}$				
B_F				
K				
ALPHA				
G_1				
G_2				
D				
$\frac{MS}{2\pi R}$				
F				
C				

END FLOAT