

May 21, 1962

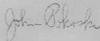
MEMO TO: File

SUBJECT: 1401 Stage II Clock and I/O Delays

Attached is a description of the 1401 Stage II circuit and logic delays encountered in the service request - service response loop.

Logic flow of the Stage II Serial I/O Service Request - Service Response section is shown, along with the maximum and minimum calculated delays through each block, and the measured delay through each block. The calculated values were obtained from the IBM Standards Book in conjunction with Mr. Leo Radzik of Department 296 (Circuits Standards). The measured values were found on 1401 #26575 on April 24, 1962, on the Endicott final test line.

Also included is a timing chart of the clock start circuitry, and cumulative figures for service response delays.

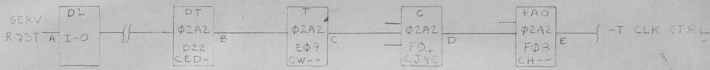


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	<u>MAX</u> <u>uSEC</u>	<u>MIN</u> <u>uSEC</u>	<u>MEAS</u> <u>u SEC</u>
1. Delay from output of Service Request terminator on O2A2 to clock control line on O2A2 Fig 1 - BE	1.409	.391	.400
2. Delay from clock control line on O1B3 to powered clock pulse on O1B3 Fig 1 - EN	1.988	.322	.500
3. Delay through Service Response trigger Fig 1 - NO	.310	.112	.100
4. Time from clock stop set to next oscillator pulse Fig 2 - H	.842	.842	.842
5. One oscillator cycle delay (just miss turn off of clock stop trigger) Fig 2 - A	2.885	.000	2.885 and .000
6. O75 time (service response for write) related to 11.54 ms clock cycle	7.212	7.212	7.212
7. O30 time (service response for read) related to 11.54 ms clock cycle	2.885	2.885	2.885
8. Clock turn on delay (2) + (4) + (5)	5.715	1.164	4.227 and 1.342
9. Service Request terminator to Service Response driver for a write operation (1) + (2) + (3) + (4) + (5) + (6)	14.706	8.879	11.939 and 9.054
10. Service Request terminator to Service Response driver for a read operation (1) + (2) + (3) + (4) + (5) + (7)	10.379	4.552	7.612 and 4.727



DELAY AB FOR IO USING

- CTDL = 1.460 μs
- CTRL = .870 μs
- SDTRL = .870 μs
- SDTDL = .760 μs
- DDTL = .290 μs

DELAY BC

- MAX. = .240 μs
- MIN = .032 μs
- MEAS = .000 μs

DELAY CD

- MAX. = .700 μs
- MIN = .200 μs
- MEAS = .300 μs

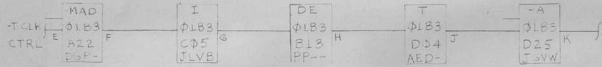
DELAY DE

- MAX. = .527 μs
- MIN = .157 μs
- MEAS = .300 μs

PLUS .0016 μs PER

FOOT OF CABLE

MEAS FOR DDTL = .190 μs



DELAY EF

- MAX ≈ .330 μs
- MIN = *
- MEAS = .180 μs

DELAY FG

- MAX = .550 μs
- MIN = .060 μs
- MEAS = .080 μs

DELAY GH

- MAX ≈ .100 μs
- MIN = *
- MEAS = 0.000 μs

DELAY HJ

- MAX = .114 μs
- MIN = .076 μs
- MEAS = .060 μs

DELAY JK

- MAX = .150 μs
- MIN = .070 μs
- MEAS = .000 μs



DELAY KL

- MAX ≈ .100 μs
- MIN = *
- MEAS = .000 μs

DELAY LM

- MAX = .267 μs
- MIN = .116 μs
- MEAS = .080 μs

DELAY MN

- MAX ≈ .380 μs
- MIN = *
- MEAS = .100 μs

DELAY NO

- MAX = .310 μs
- MIN = .112 μs
- MEAS = .100 μs

DELAY OP IS

5ANL AS AB

