RELIABILITY OF "INHIBIT" IN THE TIMING SYSTEM

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The timing system must produce the preselected pulses in accordance with a chosen ejection program, on one hand, and the information received from the interlock system, on the other hand. For this purpose, the "PROGRAM" and "INHIBIT" inputs of the output coincidence gate are foreseen in every PRE/POST scaler.

Since the functions of these gates are executed by the SN7430N and SN74H11N integrated circuits, the signals applied to each of the mentioned inputs must be as follows :

"permission" signal - from +2V to +5V;
"inhibit" signal - from 0 to +0.8 V.

In order to provide the required voltage, the source of the inhibit signal must have a rather low resistance. The latter can easily be estimated from fig. 1

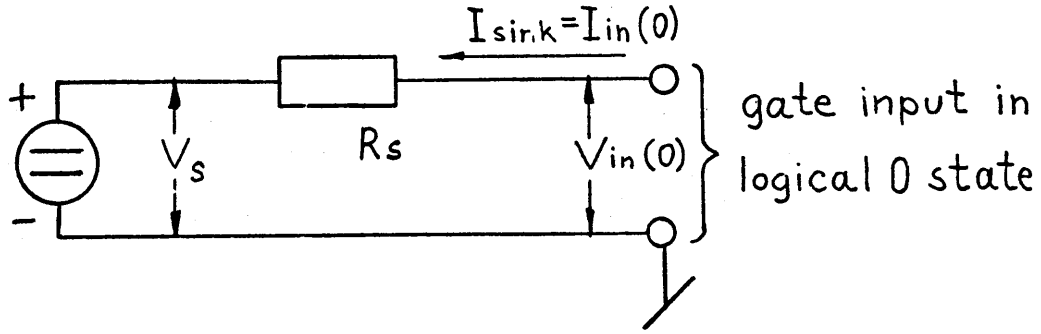


Fig. 1 : Simplified inhibit circuit

as $R_s \leq \frac{V_{in}(0) - V_s}{I_{in}(0)}$

where :

R_s - inhibit source resistance comprising the total resistance of the source itself, the cable core and the connector contacts;

V_s - inhibit source voltage ;

$V_{in}(0)$- logical 0 input voltage ensuring the proper gate performance;

$I_{in}(0)$- logical 0 level input current.

Assuming that the $V_s = 0$ and substituting the maximum values of the input parameters, we obtain :

$$R_{s\ max} = \begin{cases} 500\,\Omega & \text{for SN7430N} \\ 400\,\Omega & \text{for SN74H11N.} \end{cases}$$

Due to these circumstances, the present "PROGRAM" and "INHIBIT" input circuits (fig. 2) cannot guarantee the reliable inhibit. For instance, the bad connection contact would increase the inhibit source resistance and would consequently cause the false "permission" state. One of the possible solutions of the reliability problem is to change the input circuits so that the inhibit source resistance would always be low enough (fig. 3a).

However, one ought to take into account that under the new configuration each input will consume ~ 15 mA from the "permission" signal source. In this case the voltage losses at the cable communications are unavoidable. But their influence can be reduced by the application of the +24 V original "permission" signal with the subsequent division (fig. 3 b).

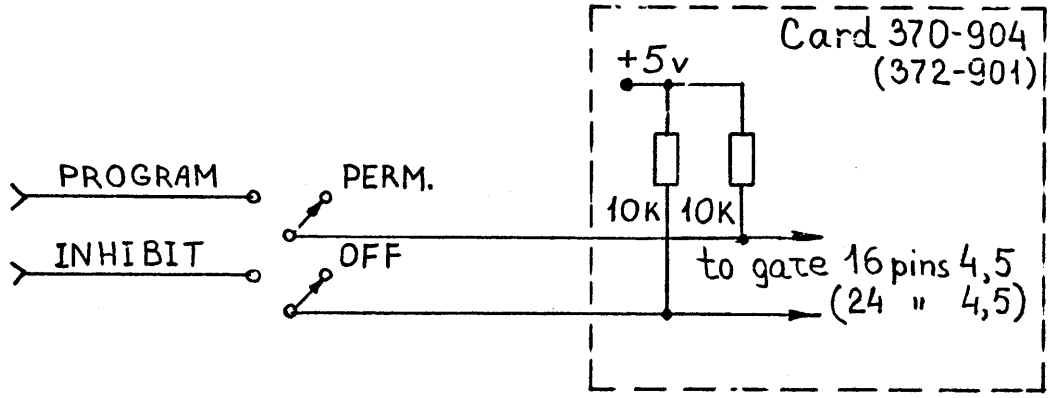
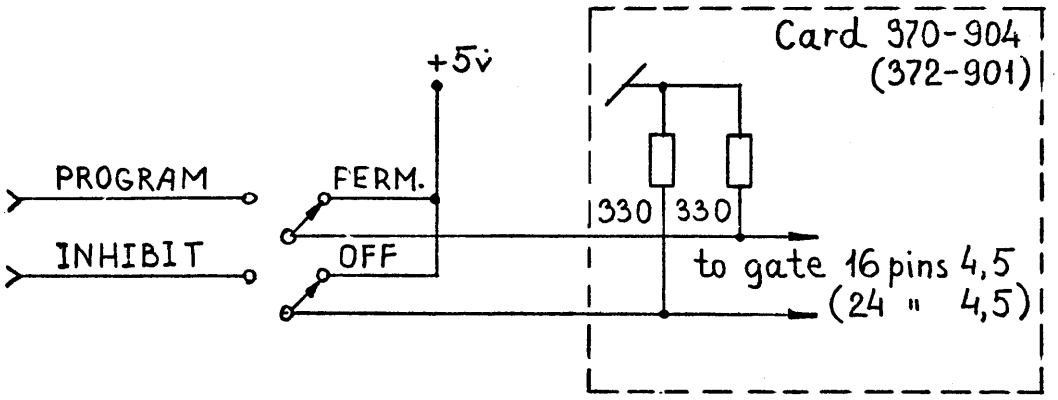
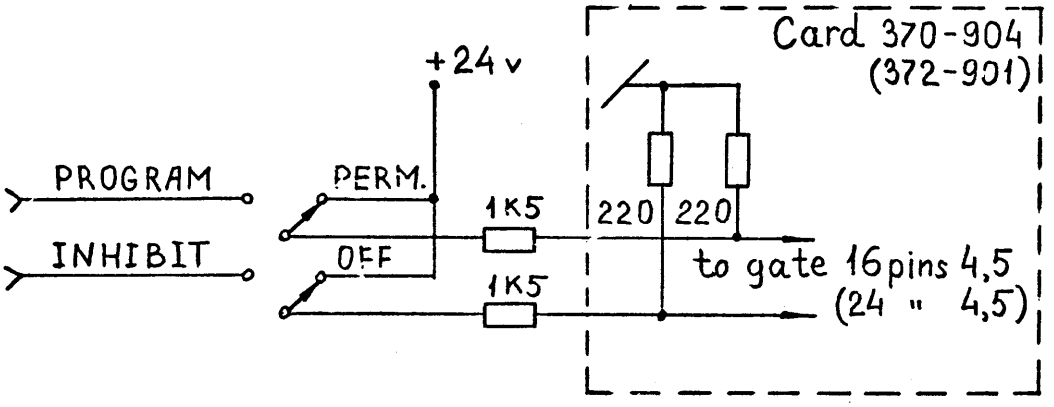


Fig. 2 : Present inhibit input



a) 1st proposal



b) 2nd proposal

Fig. 3 : Inhibit input modifications