

October 1964

Brief 64-10150

NASA TECH BRIEF



This NASA Tech Brief is issued by the Technology Utilization Division to acquaint industry with the technical content of an innovation derived from the space program.

Novel Circuit Combines Pulse Stretcher With NOR Gate

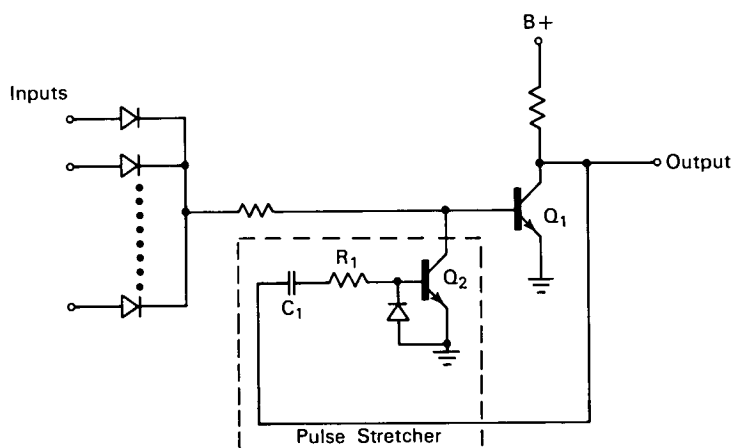


FIGURE 1

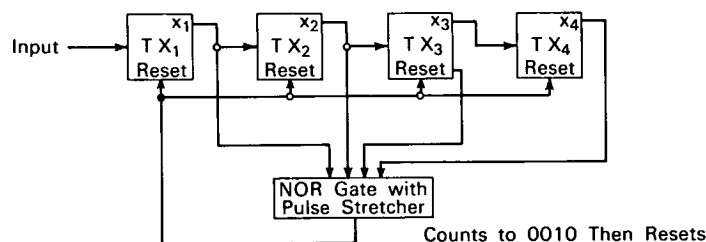


FIGURE 2

The problem: To provide a NOR gate with an output pulse of some predetermined minimum duration. Conventional circuitry has employed an additional NOR gate used with a triggered monostable multivibrator.

The solution: A pulse-stretching circuit combined with a conventional NOR gate.

How it's done: Figure 1 shows a pulse-stretcher circuit added to a conventional NOR gate circuit. With all the inputs at ground potential, the output is positive, current flows through C_1 and R_1 into the base of Q_2 turning it on. Current flows into the base of Q_2 until C_1 is charged (approximately 3 times the $R_1 C_1$ time constant). If the inputs become positive

(continued overleaf)

while Q_2 is still conducting, Q_1 will not be affected since its base is being held at ground potential by Q_2 . When Q_2 stops conducting, the inputs regain control of the output. A diode in series with R_1 provides C_1 with a discharge path to ground. Figure 2 depicts a binary counter using this pulse stretcher-NOR gate for reset. The binary counter must be reset to zero when a certain preselected count has been reached. The NOR gate detects the preselected state and produces a pulse that the pulse stretcher maintains for a period long enough to reset all counter stages.

Notes:

1. The circuit works equally well with PNP transistors, all polarities being reversed.

2. This circuitry has been used successfully in a square-root computer and with digital oscillators.
3. Inquiries concerning this innovation may be directed to:

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Reference: B64-10150

Patent status: NASA encourages commercial use of this innovation. No patent action is contemplated.

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(GSFC-187)