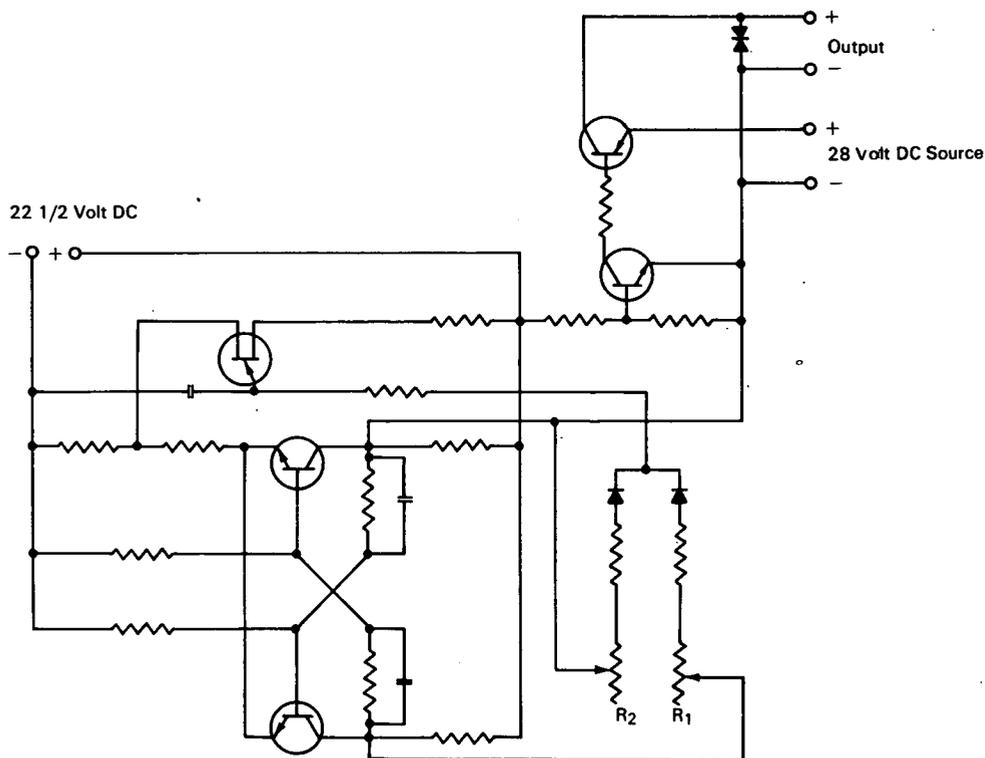


# NASA TECH BRIEF



NASA Tech Briefs are issued to summarize specific innovations derived from the U.S. space program, to encourage their commercial application. Copies are available to the public at 15 cents each from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151.

## Variable-Pulse Switching Circuit Accurately Controls Solenoid-Valve Actuations



### The problem:

To devise an adjustable switching circuit that will operate a 28 volt dc solenoid valve at precise time intervals.

### The solution:

A solid state circuit that generates adjustable square wave pulses of sufficient power to operate a 28 volt dc solenoid valve.

### How it's done:

The circuit includes a pulse-forming branch (flip-flop) and sufficient amplification to power the operation of the solenoid valve from a 28 volt dc source. The flip-flop is powered by an independent 22 1/2 volt battery. Pulse width (on time) can be varied over a range of 10 to 40 milliseconds by adjusting potentiometer  $R_1$ . Similarly, the interval between pulses (off time) can be varied over a range of 8 to 350 milliseconds by means of  $R_2$ .

(continued overleaf)

**Notes:**

1. This type of circuit has been used in conjunction with a solenoid valve for precise time control of fluid flow in combustion experiments. With a suitable arrangement of relays, the circuit can be used for sequencing of multiple flows in various processes requiring precise timing.
2. Inquiries concerning this invention may be directed to:

Technology Utilization Officer  
Marshall Space Flight Center  
Huntsville, Alabama 35812  
Reference: B67-10022

**Patent status:**

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D. C. 20546.

Source: J. D. Gillett,  
of North American Aviation, Inc.  
under contract to  
Marshall Space Flight Center  
(M-FS-1895)

DD  
RM. 3123  
KSC HQS.  
1