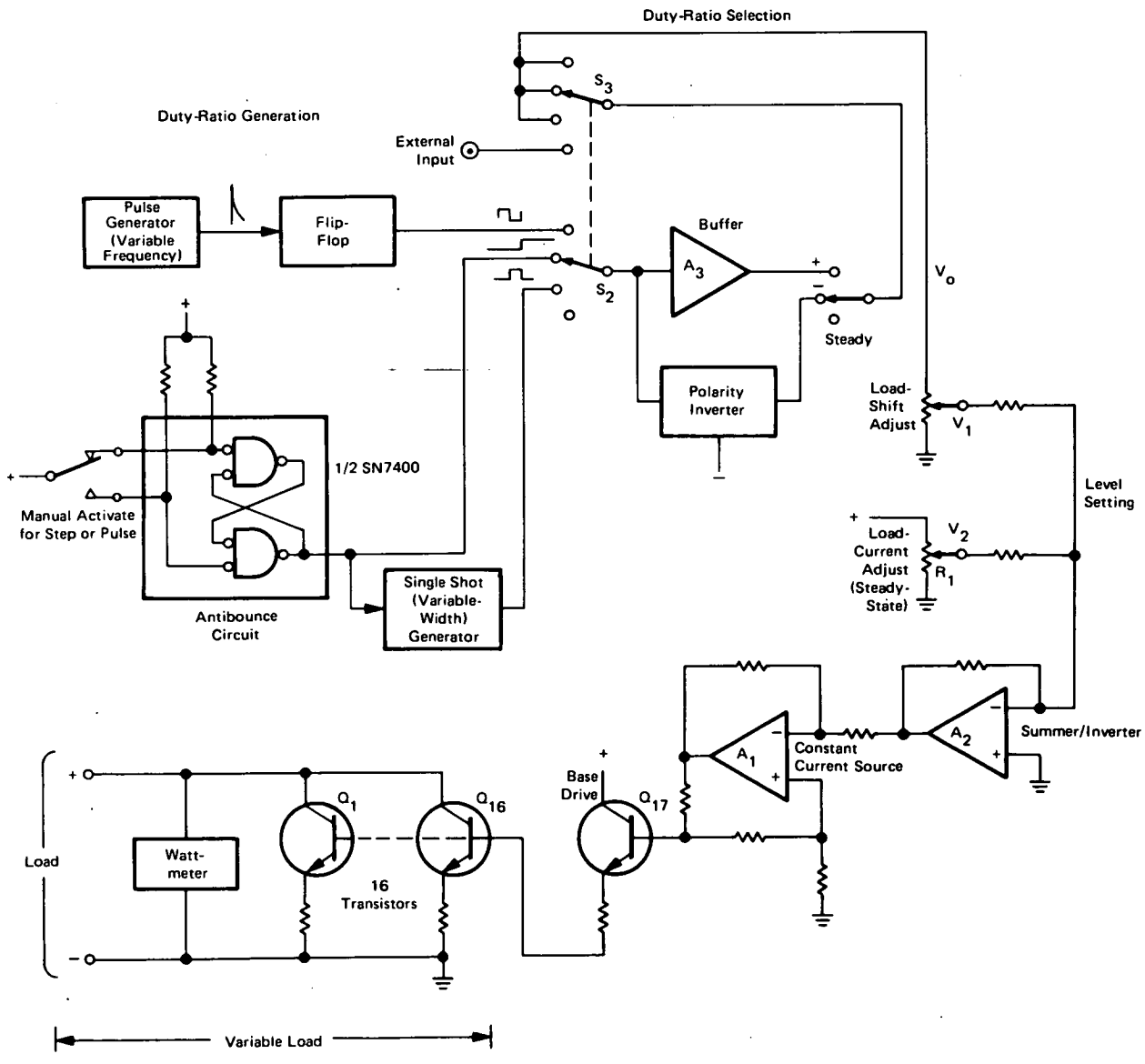
NASA TECH BRIEF

NASA Pasadena Office

Versatile Electronic Load



Load Circuit

(continued overleaf)

The problem:

Power sources (such as electronic power supplies, solar panels, power-source simulators, and solar-panel simulators) are tested frequently to determine their transient response and other operating characteristics, under dynamic conditions ranging from no load to short circuit. Such testing is performed using a variable load to simulate different operating conditions. Present electronic loads, however, do not have the fast response needed to perform the precise testing required for modern electronic power systems.

The solution:

A variable electronic load has been developed which has a very fast response (on the order of 2 to 3 μs), under a wide range of simulated dynamic operating conditions, and can accept inputs up to 1000 watts.

How it's done:

The variable load as shown in the figure is made up of 16 matched 2N3772 transistors in parallel. Type 2N6258 will be used in future versions, since it is faster and is capable of handling a higher voltage load: 80 volts instead of 60 volts.

Many types of signals may be applied to the load. A variable pulse generator and a flip-flop produce a rectangular waveform. Other signals include steady state step and single pulse. The width of the single pulse is controlled by a variable-width single-shot multivibrator. One of these three signals, or an external signal, such as a sine or ramp waveform, is selected by a two-deck multiposition switch (S_2 and S_3) either buffered or inverted and connected to a potentiometer for level adjustment. Thus, the shape, width, and frequency of the test signal may all be selected as needed for a particular simulation.

The signal (ac) is summed with an adjustable bias voltage (dc) to provide complete waveform flexibility. The summer/inverter amplifier A_2 drives a constant-current source A_1. Load conductance is varied by the base drive to the load transistors, and load power is monitored by an electronic wattmeter.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
NASA Pasadena Office
4800 Oak Grove Drive
Pasadena, California 91103
Reference: TSP73-10458

Patent status:

NASA has decided not to apply for a patent.

Source: Kenneth R. Mussen of
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under contract to
NASA Pasadena Office
(NPO-13202)