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Langley Research Center



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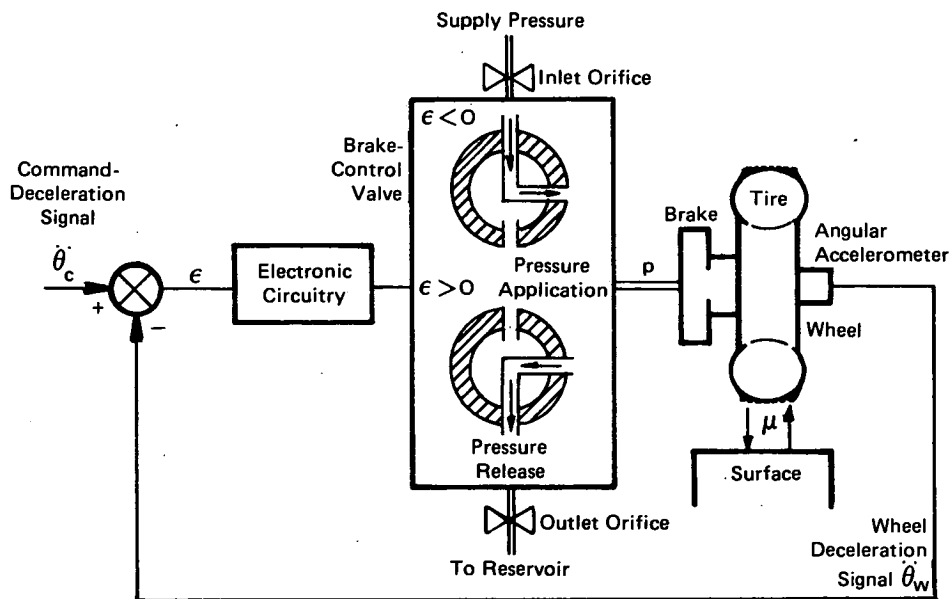
Accelerometer-Controlled Automatic Braking System

An automatic braking system, which employs an angular accelerometer to control wheel braking and results in a low level of tire slip, has been developed and tested. The tests, conducted on a rotating-drum dynamometer as well as a ground vehicle, indicate that this braking system is feasible for operations on surfaces of different slipperinesses. The system restricts tire slip and is capable of adapting to rapidly-changing surface conditions. Tests, which led ultimately to a locked-wheel skid, revealed that wheel lockup was delayed by the controlled braking action and thus provided time for possible corrective action. This system results in good steering capability, as it permits little slip in the tire-surface interface.

The basic components of the accelerometer-controlled braking system are shown schematically in the illustration. They consist of a wheel angular accelerometer, a

high-speed solenoid-operated brake-control valve with adjustable inlet and outlet orifices, a set of disk brakes installed on a wheel-and-tire assembly, and electronic circuitry to control the valve in an on-off manner.

The accelerometer monitors wheel behavior during braking; when wheel deceleration exceeds the pre-selected or threshold command-deceleration level, a signal from the electronic control circuitry commands the control valve to release the brakes, until an acceptable level of deceleration (below command-deceleration level) is once more attained. Brake pressure is applied as long as wheel deceleration remains below the command-deceleration level; it is expressed in terms of deceleration and is varied by a potentiometer in the electronic circuitry. The adjustable orifices are used to optimize the action of the brakes, by controlling the rate at which brake hydraulic pressure is allowed to rise



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(continued overleaf)

and decay. Braking action, with this circuitry, consists of the cyclic application and release of the brakes until the wheel stops rotating.

Note:

The following documentation may be obtained from:
National Technical Information Service
Springfield, Virginia 22151
Single document price \$3.00
(or microfiche \$1.45)

Reference: NASA TN D-6953 (N72-33018) Experimental Investigation of an Accelerometer-Controlled Automatic Braking System

Patent status:

NASA has decided not to apply for a patent.

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