

December 1966

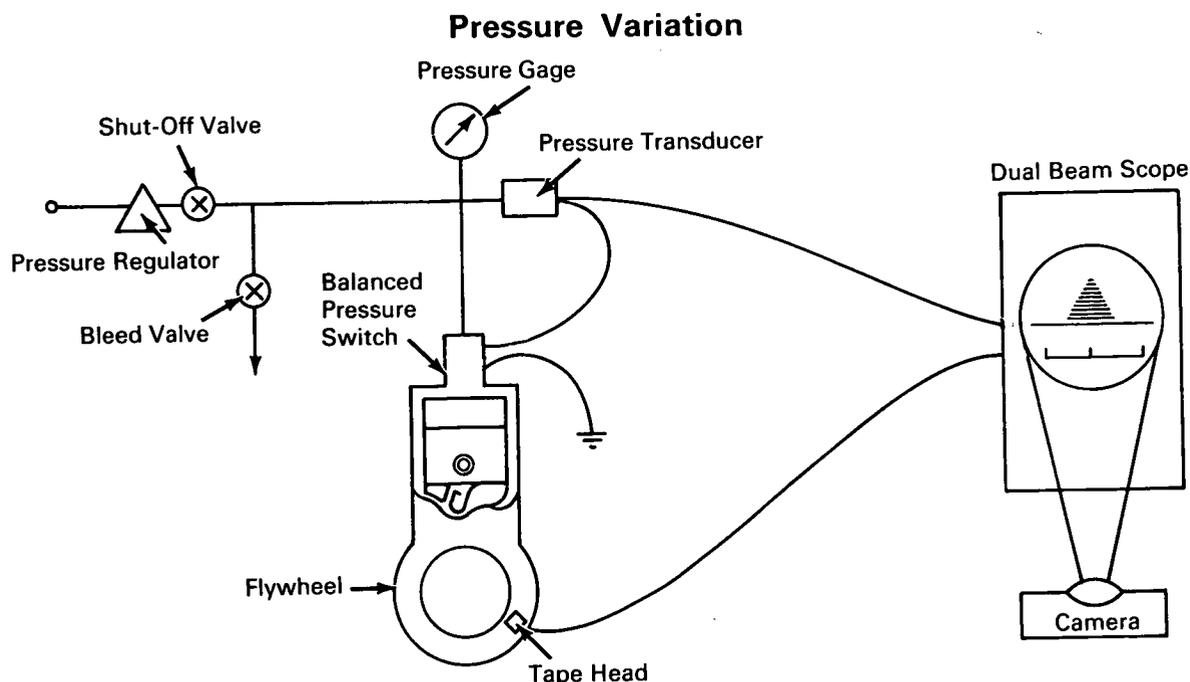
Brief 66-10470

# 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.

## Indicator System Provides Complete Data of Engine Cylinder



### The problem:

To rapidly obtain precise engine cylinder pressure data from a high speed internal combustion engine. The technique generally used in internal combustion engine research employs a balanced pressure diaphragm pickup with a controlled reference pressure on one side and a cylinder pressure on the other. A history of cylinder pressure over a large number of cycles can be obtained by plotting many individual data points to obtain a complete picture of the cyclic cylinder pressure variation.

### The solution:

Use a varying reference pressure together with a balanced pressure pickup (a diaphragm switch) to

switch the electric output of the pressure transducer in the reference pressure line. The magnitude of the cylinder pressure as well as a crank angle at which the switch opened and closed is displayed on a dual beam scope and photographed. The other beam of the scope displays crank angle position blips picked up by a tape recorder head from a magnetic tape mounted on the engine flywheel.

### How it's done:

The reference pressure side of the balanced pressure switch is initially pressurized to a level above peak cylinder pressure. The pressure is then allowed to decay at a controlled rate (with the engine running) while a time exposure photograph of the oscillograph

(continued overleaf)

display is taken. The decaying reference pressure sequentially changes the crank angle position at which the switch is activated and each succeeding data point is recorded. The resulting photograph consists of a series of horizontal lines whose extremities represent points of cylinder pressure equal to reference pressure. The envelope of this series of lines provides a pressure-time history of cylinder pressure over the number of cycles which occur while the camera shutter is open (usually about 2 seconds).

**Note:**

Inquiries concerning this innovation may be directed to:

Technology Utilization Officer  
Lewis Research Center  
21000 Brookpark Road  
Cleveland, Ohio 44135  
Reference: B66-10470

**Patent status:**

No patent action is contemplated by NASA.

Source: R.W. McJones and N. E. Morgan  
of Vickers Incorporated  
under contract to  
Lewis Research Center  
(Lewis-291)