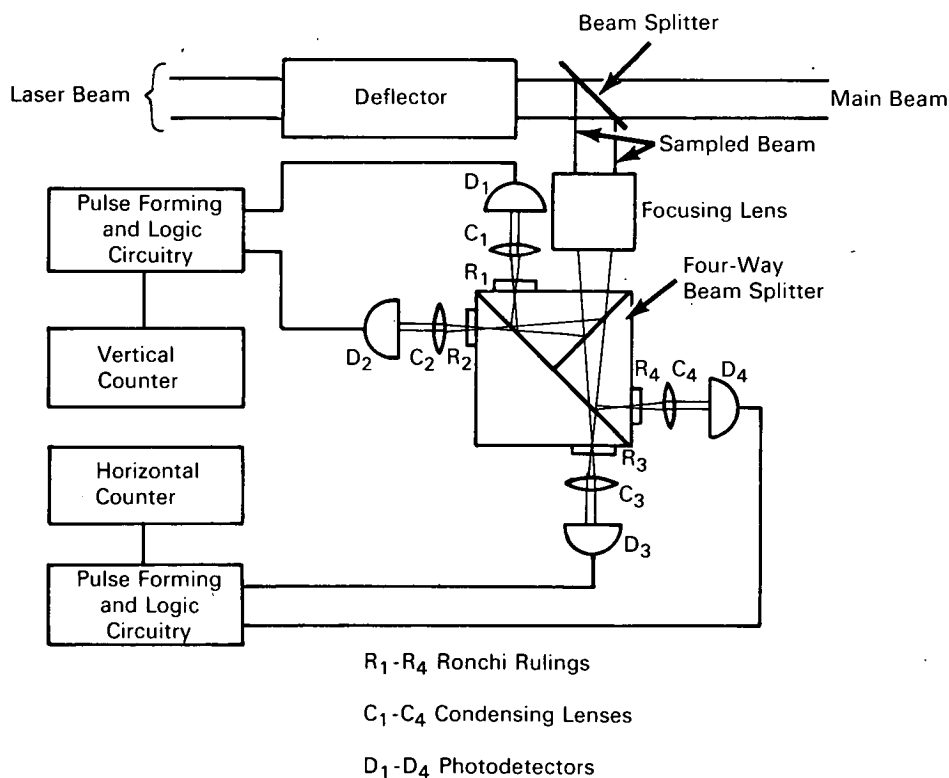


NASA TECH BRIEF



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Digital Laser-Beam Deflection Sensor



This sensor automatically and accurately measures the two-dimensional deflection angles of a laser beam to provide closed-loop servomechanism control of laser beam directivity. The sensor incorporates beam splitters, focusing and condensing lenses, Ronchi rulings, photodetectors, and pulse forming and logic circuitry. The accuracy of this sensor is reported to be approximately four times as great as that of other systems of angle sensing.

A portion of the deflected beam, sampled by the beam splitter, is passed through the focusing lens. A four-way beam splitter is employed after this lens to allow the focused beam to fall on each of four Ronchi rulings which are placed in the split focal plane. Two of the rulings, R_1 and R_2 , are set so that their lines run horizontally, and the other two, R_3 and R_4 , are set so that their lines run vertically. The two sets of rulings are perpendicular to each

(continued overleaf)

other to within ± 0.1 milliradian and detect horizontal and vertical deflection, respectively. To make this relationship permanent, the rulings are securely bonded to the fused silica block forming the four-way beam splitter. As the spot of focused light moves across the alternate opaque and transparent stripes of the rulings, pulses of light are transmitted to the photodetectors which give electrical output pulses corresponding to beam movement. Discrimination between positive-going and negative-going deflection is obtained by sensing the relative phases from each pair of photodetectors connected to the pulse forming and logic circuitry. The resultant pulses are counted as dictated by the pulse phases to establish the beam position. The maximum deflection rates to which the sensing system will respond are limited by the counter response to about 4×10^6 spots per second.

Note:

Details may be obtained from:

Clearinghouse for Federal Scientific and
Technical Information
Springfield, Virginia 22151
Price \$3.00
Reference: B68-10525

Patent status:

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

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