NASA TECH BRIEF

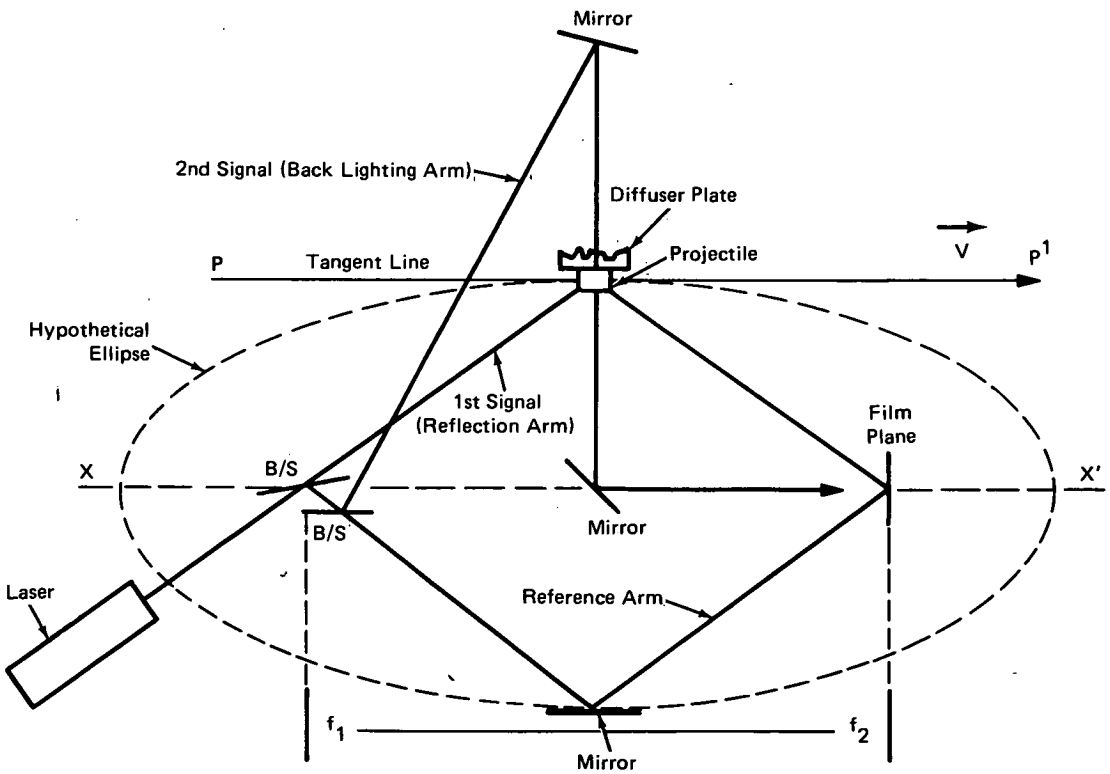
Marshall Space Flight Center

A Real Time Moving-Scene Holographic Camera

A novel technique obtains holographs of the front surfaces of objects moving at velocities of up to 9×10^5 cm/s. The method can be a useful laboratory tool for the observation of rapidly moving objects such as bullets, aerodynamic bodies, and bodies undergoing collisions or interactions. The optical components of a holographic system are positioned so that the light paths from the laser source will be equal.

The specific orientation of the holographic system is based on the use of a hypothetical ellipse, oriented with its major axis parallel to the "line of motion," defined by the moving projectile. This "line of motion" must be made tangent to the hypothetical ellipse at some point Q.

One possible configuration of a holographic system positioned in this preferred orientation, inside the hypothetical ellipse, is shown in the figure. The specific orientation is defined by the following conditions: (a) a thin-film beam splitter (B/S) centered at the focus, F, of the hypothetical ellipse; (b) a film plane centered at the other focus, f_2, of the hypothetical ellipse; (c) a film plane centered at the other focus, f_2; and (d) the major axis of this ellipse, defined by XX′ in the figure, the "line of motion" of the projectile.



Elliptical Holograph Configuration

(continued overleaf)

The exact matching of the lengths of the three arms of the beam path is of no real concern, if the source has a sufficient coherence length. The source used in this experiment has a coherence length greater than three meters, operates at 6943 Å, and has a pulse length as short as 15 ns.

Notes:

1. Similar and related systems are described in NASA Tech Briefs B73-10434 and B73-10435.
2. Requests for further information may be directed to:
   Technology Utilization Officer
   Marshall Space Flight Center
   Code A&PS-TU
   Marshall Space Flight Center, Alabama 35812
   Reference: B73-10421

Patent status:

This is the invention of a NASA employee, and a patent application has been filed. Inquiries concerning license for its commercial development may be addressed to the inventor:

Mr. R. L. Kurtz
Marshall Space Flight Center
Code A&PS-PAT
Marshall Space Flight Center, Alabama 35812

Source: R. L. Kurtz
Marshall Space Flight Center
(MFS-21087)