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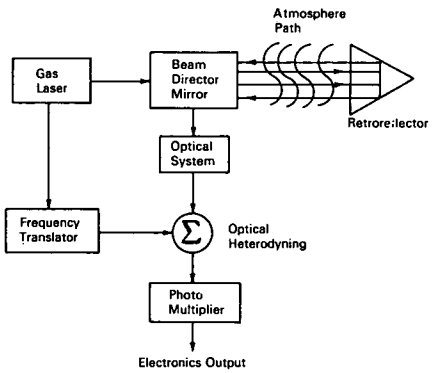
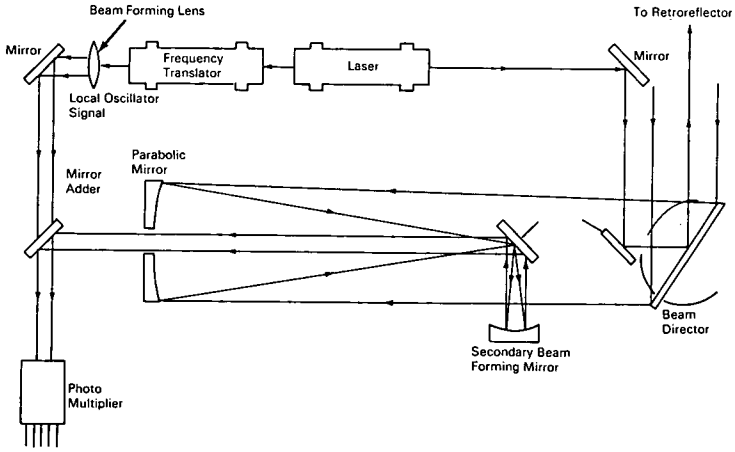
NASA TECH BRIEF

Optical Superheterodyne Receiver Uses Laser for Local Oscillator





The problem:

To develop an optical superheterodyne receiver to permit reception of amplitude modulated video bandwidth signals through the atmosphere.

The solution:

A system that uses a laser coupled to a frequency translator to supply both the incident signal and local oscillator signal in an optical superheterodyne receiver.

How it's done:

The output of the laser is reflected by mirrors to the beam director which directs it to the remotely located retroreflector. The return rays are reflected by the beam director to the parabolic mirror and then to the secondary beam forming mirror that directs the rays through the open center of the parabolic mirror to the mirror adder. Simultaneously, the local oscillator beam, originating in the laser is shifted in frequency by the frequency translator to provide a frequency offset. This offset beam is focused by a beam forming lens into a focus point corresponding to the focus point produced by the secondary mirror. The collimated return rays are now mixed with the local beam at the mirror adder and the resultant difference beat is detected by the photomultiplier and fed to the electronics output circuitry.

Notes:

1. A receiver than can cover a 1 gcs doppler range can be constructed with presently available components. Use of electro-optic frequency translators in conjunction with wideband detectors will make it possible to cover 20 gcs doppler shifts in the future.
2. This receiver should be useful in scientific propagation experiments, tracking experiments, and communication experiments.

(continued overleaf)

3. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
Marshall Space Flight Center
Huntsville, Alabama 35812
Reference: B66-10584

Patent status:

No patent action is contemplated by NASA.

Source: R. F. Lucy et al
of Sylvania Electronic Systems
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