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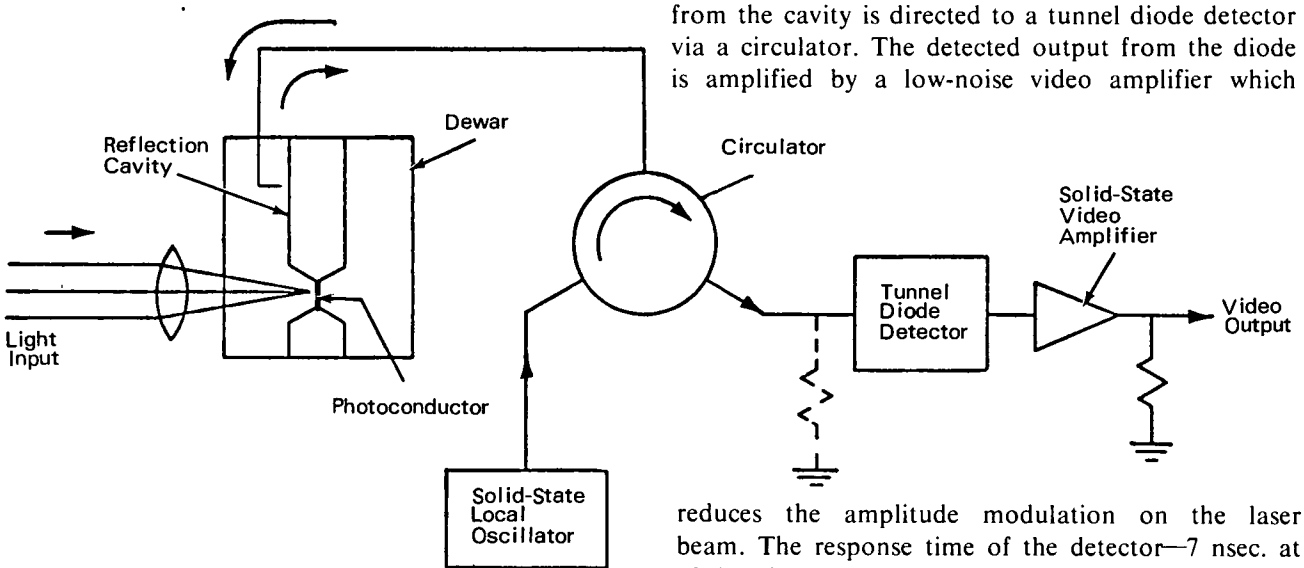
# NASA TECH BRIEF

*Goddard Space Flight Center*



## Microwave Biasing Improves Detector Response in the Infrared Region

A detection system, which incorporates the advantages of microwave biasing, measures the output of a $CO_2$ laser at 10.6 microns with a factor of $10^3$ improvement in sensitivity. Recent theoretical and experimental studies on biasing photoconductive detectors by microwave energy demonstrated the advantages of this technique over conventional dc methods.




The biasing technique consists of mounting the photoconductive sample, mercury-doped germanium, in a microwave cavity and detecting the microwave power absorption that occurs when the conductivity of the sample is increased by the laser beam. In the experimental arrangement shown in the figure, the microwave power from an X-band Gunn-effect oscillator is directed to a coaxial re-entrant cavity containing the detector. The cavity is mounted in a liquid-helium dewar which has a window transparent to laser radiation. The power reflected from the cavity is directed to a tunnel diode detector via a circulator. The detected output from the diode is amplified by a low-noise video amplifier which reduces the amplitude modulation on the laser beam. The response time of the detector—7 nsec. at 10.6 microns—is limited by the lifetime of the material rather than by the external circuitry. A direct comparison of the experimental data indicates that, with an extrinsic photoconductor, the sensitivity is improved by a factor of $10^3$ for wideband envelope detection.

### Note:

Requests for further information may be directed to:

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(continued overleaf)

**Patent status:**

No patent action is contemplated by NASA.

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