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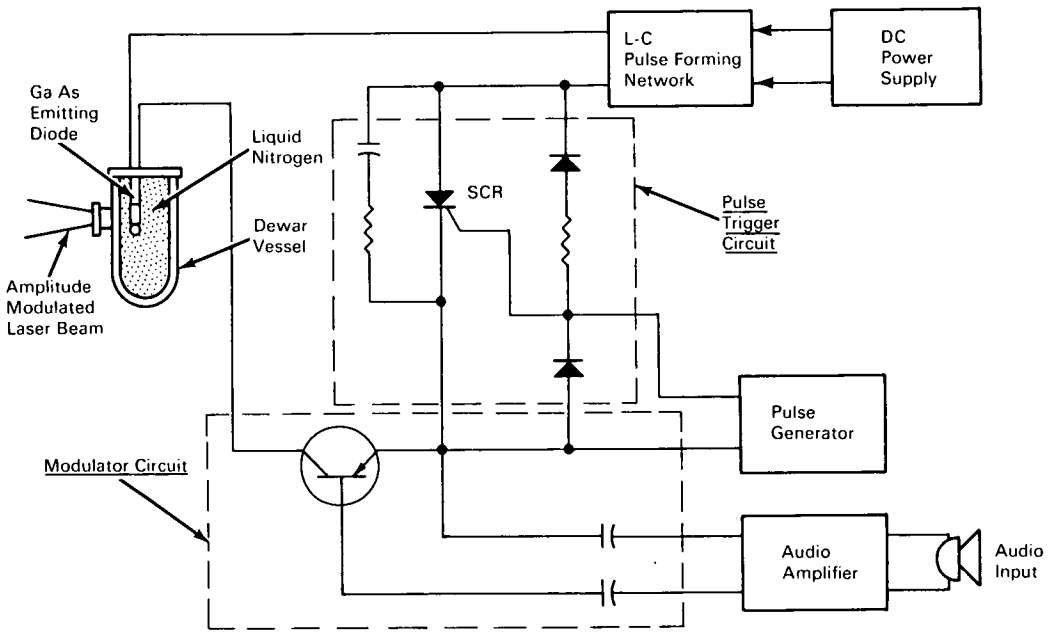
NASA TECH BRIEF

Solid-State Laser Transmitter Is Amplitude Modulated



The problem: At radio frequencies available bandwidth imposes a severe limitation upon the amount of data that can be simultaneously transmitted by a single antenna. Although electromagnetic radiation at optical frequencies affords nearly unlimited bandwidth, prior techniques of transmitting in this range have employed frequency modulated systems requiring complex circuitry and numerous components that detract from system reliability.

The solution: An amplitude modulated laser transmitter using a gallium arsenide diode that emits in the near infrared. The system is solid state and composed of a minimum number of components, thus assuring compactness and reliability.

How it's done: The system is composed of a pulse forming network, a pulsing switch in the form of a silicon controlled rectifier (SCR), a gallium arsenide emitting diode, and a transmitter modulator circuit. A pulse generator drives the SCR trigger at a frequency well above the modulation frequency. The modulator is a single transistor connected emitter-to-collector in series with the emitting diode pulse circuit. The light emitting diode is driven by pulses formed by the power supply and pulse forming network. These pulses discharge through the modulator when an applied trigger pulse causes the SCR to conduct. The modulator circuit varies the amplitude of the pulses being fed to the emitting diode in response to signals from the audio amplifier.

(continued overleaf)

Notes:

1. The high current SCR conducts only as long as the trigger pulse is applied. This characteristic eliminates the need for the "turn-off" circuitry usually required.
2. Because of the narrow transmission pattern characteristic of a laser beam, this system should be relatively safe from interception or interference.
3. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Manned Spacecraft Center
   P.O. Box 1537
   Houston, Texas, 77001
   Reference: B65-10238

Patent status: NASA encourages the immediate commercial use of this invention. Inquiries about obtaining rights for its commercial use may be made to NASA, Code AGP, Washington, D.C., 20546.

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