

# NASA TECH BRIEF

## Marshall Space Flight Center



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### An Approach to Real-Time Process Control of Semiconductor Wire-Bonding

Reliability of large scale integrated circuitry is increased by performing wire bonding on semiconductors at the optimum temperature of the wire and semiconductor pad. To accomplish this, it is necessary to develop the means for accurate temperature measurement of the process. These temperatures are reflected in the thermal pattern of the tip of the collet which holds the wire during the bonding operation. Temperature of the collet tip is monitored through use of a thermal probe developed for this function. The thermal probe uses an infrared-transparent optical fiber attached to the tip of the collet with a resin (see figure) to prevent movement during bonding. Radiation emissivity is conveyed by the fiber to a detector, whose output contains the desired thermal information. The thermal probe monitors in real-time and has a temperature range of 200° to 1000°C at blackbody emissivity, is accurate to within  $\pm 1\%$  of reading, and provides a 1-millisecond detector response.

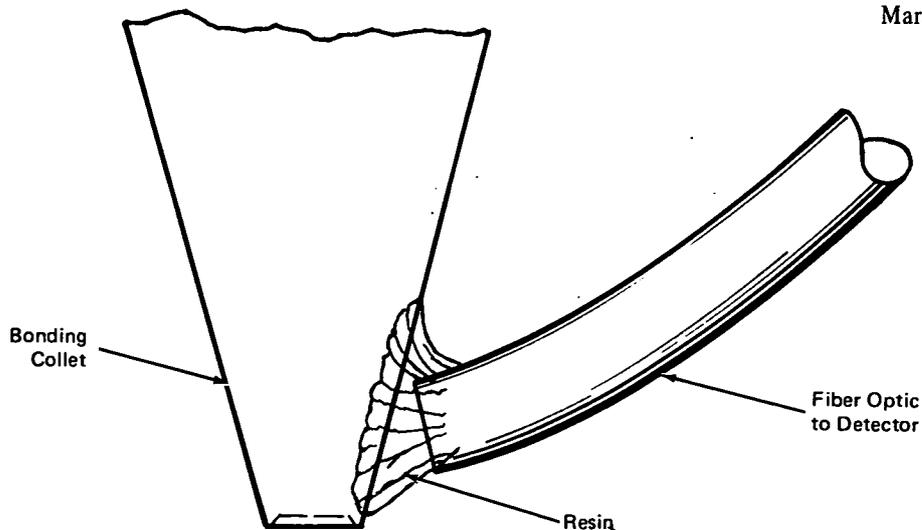
#### Notes:

1. It is anticipated that eventually a feedback loop system providing a capability of holding the optimum temperature level of the collet tip will consistently allow good quality wire bonding.
2. Information concerning this innovation may be of interest to manufacturers of semiconductors and to other industries engaged in large scale integrated circuitry.
3. 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: B72-10644

#### Patent status:

NASA has decided not to apply for a patent.

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