

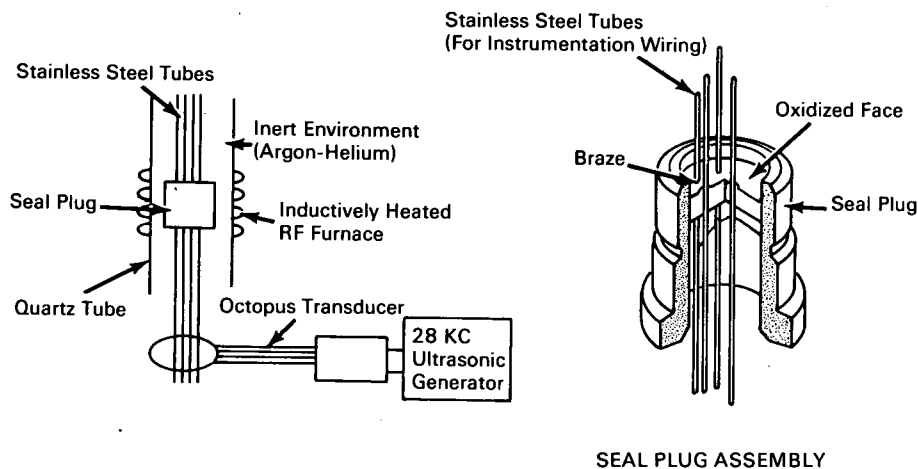


# AEC-NASA TECH BRIEF



AEC-NASA Tech Briefs describe innovations resulting from the research and development program of the U.S. AEC or from AEC-NASA interagency efforts. They are issued to encourage commercial application. Tech Briefs are published by NASA and may be purchased, at 15 cents each, from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151.

## Ultrasonics Permits Brazing Complex Stainless Steel Assembly Without Flux



### The problem:

To braze a large number of stainless steel instrumentation tubes 90 mils in diameter into a stainless steel seal plug installed in the wall of a pressure vessel. The brazed assembly must withstand a pressure of 600 psi of hydrogen. Brazing must be without flux since residual flux cannot be removed from this type of assembly after brazing is completed.

### The solution:

Ultrasonic vibration of the assembly with an ultrasonic transducer during the brazing operation. This ensures that the brazing material will flow down the length of each stainless steel tube in contact with the seal plug.

### How it's done:

The brazing operation utilizes an RF inductively heated furnace with an inert environment. Prior to brazing, the seal plugs and tubes are thoroughly

cleaned, and the face of the seal plug is oxidized (blued) before machining the tube holes through the plug. The oxidized surface acts as a dam to prevent the flow of the brazing material onto the seal plug face rather than into the holes. The brazing alloy for this application is ASTM B-260B AG-1 with 0.5% lithium. The transducer (octopus type—special design) is attached to the stainless steel tube assembly at a distance of 7 inches below the oxidized face of the seal block. (Seven inches is a multiple of  $3\frac{1}{2}$  inches which is the wavelength of the 28 kc ultrasonic energy for stainless steel.) The brazing temperature is 1375°F. Clearance between the stainless steel tubes and the holes in the seal plug is approximately 5 mils. No flux is used.

### Notes:

1. This technique can be used in applications requiring the brazing of complex miniature assemblies.

(continued overleaf)

2. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer  
AEC-NASA Space Nuclear Propulsion  
Office  
U.S. Atomic Energy Commission  
Washington, D.C. 20545  
Reference: B67-10094

**Patent status:**

No patent action is contemplated by AEC or NASA.

Source: W. H. Baker  
of Westinghouse Astronuclear Laboratory  
under contract to  
Space Nuclear Propulsion Office  
(NU-0115)