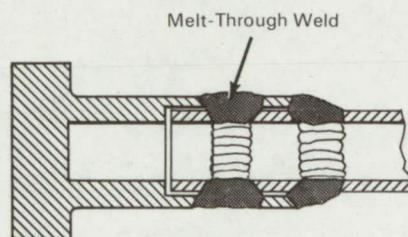
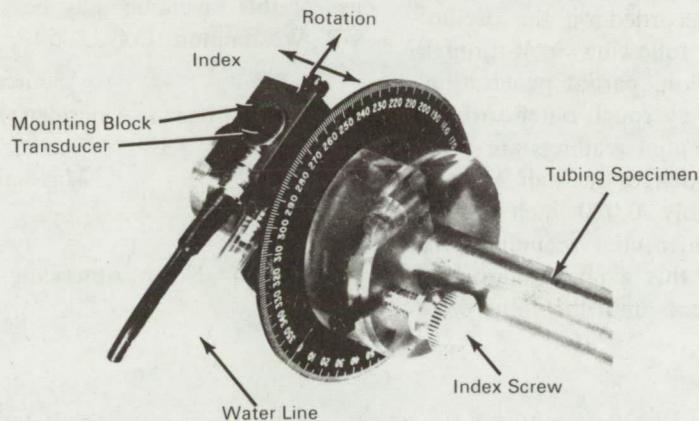


# NASA TECH BRIEF



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## Nondestructive Testing of Welds on Thin-Walled Tubing



A special ultrasonic search unit, or transducer assembly, has been developed for reliable inspection of the quality of melt-through welds on fusion-welded tubing couplers for hydraulic lines. This unit is used in conjunction with high-resolution ultrasonic equipment for the inspection of welded tubing assemblies having diameters of 0.25 to 1.0 inch and wall thicknesses of 0.028 to 0.095 inch.

The device consists of a 7/16-inch-diameter  $\times$  1/2-inch-long ultrasonic (25 MHz) transducer contained in a mounting block having a water-line connector; a nonrotatable, ("clamshell") plastic housing with index screw and pointer; and a rotatable clamshell, search unit housing with circular protractor scale.

In preparing for inspection of a tubing specimen, the search unit housing is placed in position over the

(continued overleaf)

adapter side of the weld. The nonrotatable plastic housing is firmly mounted on the outer tube wall by two setscrews, while the transducer is placed in its mounting block and secured by a setscrew. The mounting block with the transducer is then arranged in the guide of the rotatable housing. The ultrasonic medium, water, is fed into the mounting block beneath the face of the transducer. Signal traces are observed on the oscilloscope, and the mounting block is moved normal to the tubing axis until an optimum ultrasonic response is obtained. The mounting block is then secured by a setscrew in the guide of the rotatable housing.

To perform an inspection, the transducer assembly (in the rotatable housing) is rotated (circumferentially) about the weld, while ultrasonic response is observed on the oscilloscope at 10-degree intervals. Weld quality signal traces recorded on the oscilloscope indicate any of the following melt-through weld conditions: no penetration, partial penetration, full penetration, and excessively rough outer surface. After the thirty-six circumferential readings are completed, the index screw is rotated one-half turn to index the transducer assembly 0.020 inch axially along the weld. The circumferential scanning procedure is then continued at this axial position and successive 0.020-inch increments until the entire weld

is covered. The quality of the weld is evaluated from the point-by-point oscillograms.

#### Notes:

1. This instrumentation can also be used to detect (1) faulty braze bonds in thinwalled, small-diameter joints; and (2) wall thickness of thin-walled metal tubing.
2. No further documentation is available. Inquiries may be directed to:

Technology Utilization Officer  
Marshall Space Flight Center  
Huntsville, Alabama 35812  
Reference: B69-10402

#### Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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