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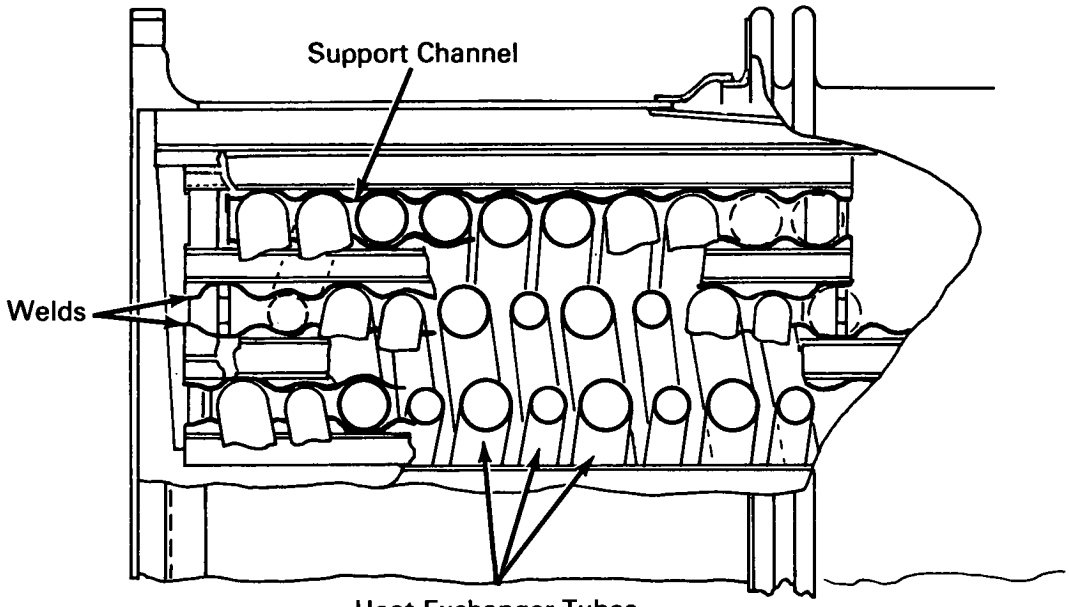
Brief 66-10567

NASA TECH BRIEF

Heat Exchanger Tubes Supported in High Vibration Environment



The problem:

Helically wound tubes, mounted inside a turbine exhaust duct, form the tank pressurization heat exchanger used on large liquid fueled space vehicles. The support structure for these coils presents a difficult design problem because of the high vibration levels and severe thermal gradients.

The solution:

A cantilevered structure that supports the coils against vibration loading while allowing freedom for differential thermal growth.

How it's done:

Support for the three rows of coil turns consists of a "curtain rod" channel arrangement in which hemispherical protrusions are spaced along the channel adjacent to the coils. The protrusions form a series of saddles on which the individual coil turns rest, giving support against vibratory loads while permitting freedom for anticipated levels of thermal growth. The channels are preloaded against the coil turns during fabrication and welded in place at their ends during assembly in the exhaust duct.

Notes:

1. The support channels will accept a variety of coil angles with the same coil pitch, thus reducing the number of parts required.
2. Applied to J-2 engine heat exchangers, this design has been subjected to 1,451 starts without structural problems.

(continued overleaf)

3. This design, with slight modification, could be used to support parallel rows of straight piping, for cable harnesses, etc.
4. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Marshall Space Flight Center
   Huntsville, Alabama 35812
   Reference: B66-10567

Patent status:

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

Source: R. Urquidi
of North American Aviation, Inc.
under contract to
Marshall Space Flight Center
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