

# NASA TECH BRIEF

*Langley Research Center*



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## Noise Suppressor

A noise suppressor developed at Langley Research Center is a device which reduces noise propagated through ducts. It provides high attenuation in a given duct length, significantly higher than do prior devices, and also possesses broadband noise suppression ability. This device could be used for the suppression of noise from modern turbofan aircraft engines, in noise attenuation in airflow ducts, and in mufflers for internal combustion engines.

The noise suppressor consists of multiple bands of acoustically absorbent liners on the inside wall of the duct. These bands are placed in adjacent positions along the duct axis and are made from single or multiple layers of porous sheet material separated by a spacing medium such as honeycomb. The first band is a sound-reflecting element which reflects sound back toward the source and also reflects sound which is directed toward the source from another point in the duct. The second element is a band which dissipates sound energy. The physical properties of the second band are adjusted to minimize the transmission of sound from the first and third element bands. The third element is a band where sound which has passed through the first two bands is reflected back to the second band to be dissipated.

The entire device forms an acoustic trap which utilizes the reflective elements on the ends to direct the sound energy into the sound-dissipating element in the center. The noise suppressor may also be made of groups of reflective and dissipative elements placed in the duct as splitters, rather than as bands around the duct perimeter, to provide sound suppression. The device achieves large suppression by utilizing the interactive effects of these different suppression devices.

### Notes:

1. A set of acoustic equations in matrix form has been derived for the sound field in and radiated from multisection ducts and may be obtained from:

National Technical Information Service  
Springfield, Virginia 22151  
Single document price \$3.75  
(or microfiche \$2.25)

Reference: NASA TR R-419 (N74-23274),  
Acoustic Theory of Axisymmetric Multi-  
sectioned Ducts

2. Technical questions may be directed to:

Technology Utilization Officer  
Langley Research Center  
Mail Stop 139-A  
Hampton, Virginia 23665  
Reference: B74-10261

### Patent status:

This invention has been patented by NASA (U.S. Patent No. 3,830,335). Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to:

Patent Counsel  
Langley Research Center  
Mail Stop 313  
Hampton, Virginia 23665

Source: William E. Zorumski  
Langley Research Center  
(LAR-11141)

Category: 03 (Physical Sciences)

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