Portable Vibration Exciter

The problem:
To provide a portable source of sinusoidal vibrations for vibration integrity testing of fluid system components or connectors.

The need for this device is created by the lack of an agreed method of verifying the vibration-failure confidence level of certain fluid system mechanical connectors. The principal technique employed until now has been to subject the entire system to vibration and/or to test it under a high static pressure level. The major problems in this technique have been the magnitude of the static pressure applied and the questionable validity of applying a high static pressure test to give a high vibration-failure confidence level.

The solution:
The gas-driven vibration exciter illustrated above produces a sinusoidal excitation function controllable in frequency and in amplitude. This device allows direct vibration testing of components under normal loads, removing the possibility that high static pressure may damage other components in the system.

How it's done:
The exciter consists of an unbalanced turbine rotor straddle mounted on bearings in a stainless steel body and driven by a tangentially directed air jet. The sinusoidal vibrations produced by the spinning rotor are transmitted through the case and coupled to the (continued overleaf)
test object by a steel rod. The rod may be attached to
the object in a variety of ways. Here the apparatus is
attached by means of a pipe clamp; other types of
clamps, providing area or point contact, may be used.
In use, frequencies up to 1100 Hz have been
achieved, with a maximum amplitude of 0.015 in. at
resonance. The frequency is controlled by the delta
pressure across the turbine, and the amplitude is in-
creased by increasing the amount of turbine un-
balance. Maximum amplitude is experienced at
resonance of the test item.

Notes:
1. This device is superior to all known comparable
methods in compactness, portability, cost, and
safety. Being gas driven, it may be used in
hazardous environments where electrical equipment
is forbidden.

2. Requests for further information may be directed
to:

Technology Utilization Officer
Kennedy Space Center
Kennedy Space Center, Florida 32899
Reference: B70-10339

Patent status:
No patent action is contemplated by NASA.
Source: F.T. Williams of NASA, and
L.C. Beecher of
The Bendix Corporation
under contract to
Kennedy Space Center
(KSC-10069)