Narrow Band Random Noise Unit

type 5887

USES:

- Narrow band random noise testing
- Swept narrow band random noise testing
- Simulation of specific vibration environments

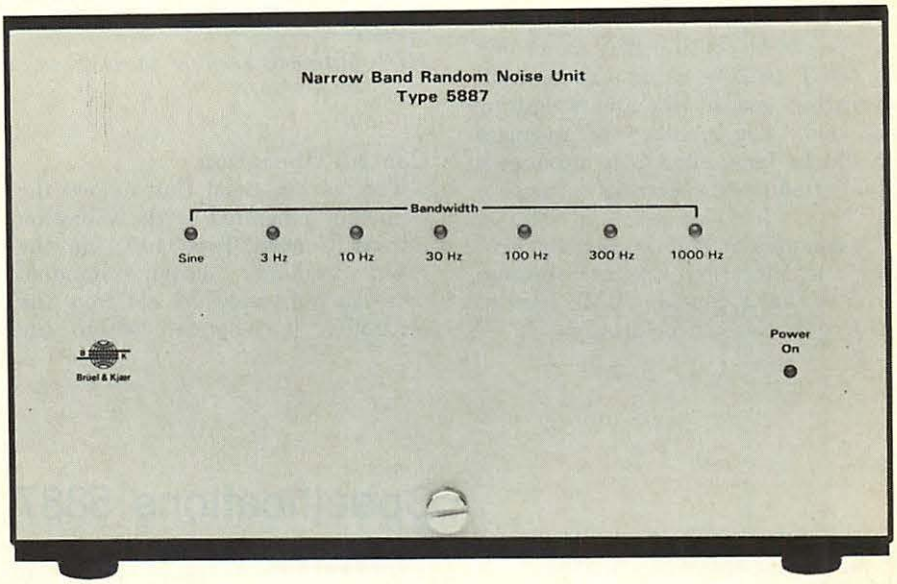
FEATURES:

- Frequency bandwidths from 3 Hz to 1 kHz
- Remote control by Vibration Exciter Control Type 1050
- Symmetrical Gaussian distribution of vibration amplitudes

The Narrow Band Random Noise Unit Type 5887 is specifically designed for use with the Vibration Exciter Control Type 1050.

Together the two instruments produce narrow band random noise for testing objects and structures which are randomly excited over a narrow frequency range.

The statistical proporties of the noise produced by the Narrow Band Unit accurately simulate those in the real environment. Consequently, a swept narrow band noise test allows realistic investigation into fatigue failure.



General Description

Narrow Band Random Noise Excitation

Narrow band random noise testing is used to simulate an environment in which the excitation consists of random vibration confined to a narrow frequency band.

Narrow band testing is, for example, used for testing motor vehicle components. Due to the nature of the vehicle construction these components are predominantly randomly excited over a narrow frequency band. More specifically, vibration from the floor of a tracked vehicle might consist of a background of broadband random vibration and a number of narrow banded frequency peaks corresponding to the resonances in the vehicle body.

Rotating and reciprocating machinery generate vibrations having frequency spectra containing one or many dominant frequency bands. If other equipment is mechanically linked to this machinery then that equipment may be excited by narrow band random noise excitation.

By using the Narrow Band Unit with the Vibration Exciter Control Type 1050 the types of environment described above can be simulated. Selectable noise bandwidths from 3 Hz to 1 kHz enables simulation of specific types of vehicle body excitation. The bandwidth is set by remote control from the controller or, when using the front panel set-up memory to set the test parameters, the noise bandwidth will automatically be set to that value in the memory.

Swept Narrow Band Random Noise Excitation

Damage through structural fatigue is caused by the accumulated number of stress reversals in the structure. The factors that affect how quickly the fatigue leads to failure are the instantaneous amplitude distribution of the random motion as well as the excitation frequency and excitation level.

The Narrow Band Random Noise Unit Type 5887 produces narrow band random noise having a Gaussian distribution of the instantaneous amplitudes. By using this instrument together with the controller a swept nar-

row band random noise test can be performed. This type of test will simulate the statistical properties of random vibration experienced in the real environment. Hence, investigation into fatigue failure can be performed using random vibration while maintaining the economic benefit of sinusoidal excitation.

System Operation

The instrumentation in Fig. 1 illustrates an example of how the Narrow Band Unit and the controller can be used for either narrow band or swept narrow band random noise testing. The test object response is measured using an Accelerometer Type 4384 and the response signal is conditioned by the Line-Drive Amplifier Type 2644. This is connected directly to the Dual Channel Frequency Analyzer Type 2032 using the accelerometer line-drive input. The frequency response can be continuously monitored by the Type 2032 using (exponential) averaging and a Hanning weighting function. The number of averages should be large enough to produce a stable frequency spectrum.

A compressor loop is used to regulate the Vibration Exciter vibration level so that a constant RMS level at all frequencies can be attained.

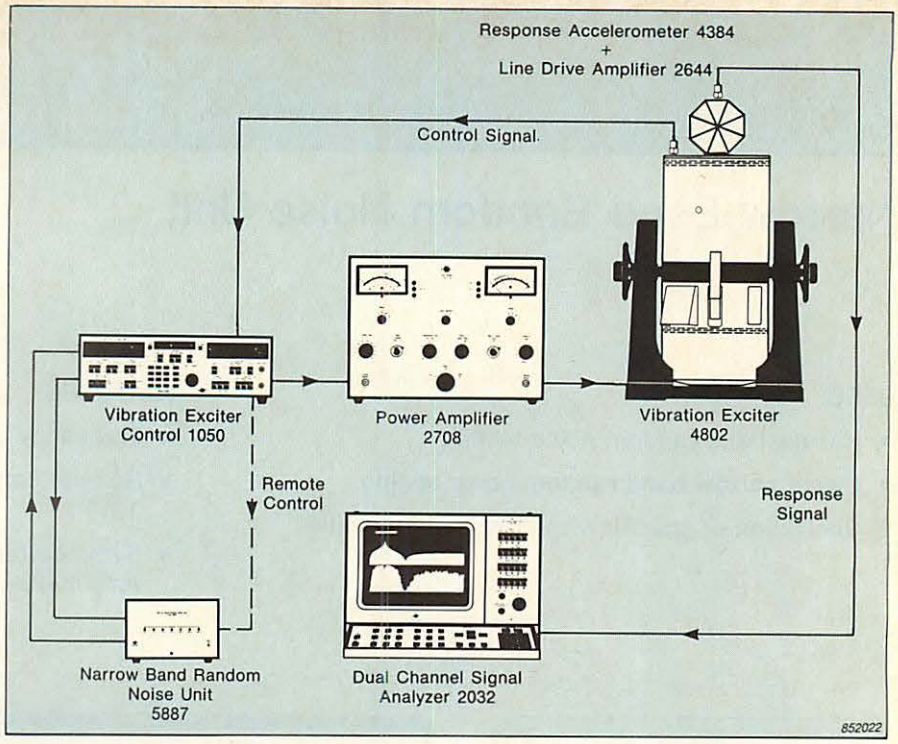


Fig. 1. Instrumentation for narrow band random noise testing

Control Operation

The Narrow Band Unit follows the frequency generated by the Vibration Exciter Control Type 1050 via the *Fixed Oscillator* output. Random noise, in the bandwidth set from the controller, is generated within the Narrow Band Unit and returned to the *External Input* of the controller. The noise bandwidth is selected using the controller via the *Auxiliary Output* and can also be selected from an external controller, for example a desk-top calculator.

Specifications 5887

SELECTABLE NOISE BANDWIDTHS:
3, 10, 30, 100, 300, 1000 Hz

MAXIMUM NOISE LEVEL:
Maximum RMS level is 10 dB below Type 1050 maximum sine generator level

AMPLITUDE DISTRIBUTION:
Symmetrical Gaussian with limits up to 4 σ

POWER REQUIREMENTS:
Power Supply: 100, 115, 127, 200, 220 or 240 V AC ± 20%, 50/60 Hz
Consumption: 10 VA approx.
Fuse Requirements: 80 mA (200 to 240 V), 160 mA (100 to 127 V)

ENVIRONMENTAL:
Safety: Complies with IEC 348 Safety Class II
Operating Temperature: +5 °C to +40 °C (+41 °F to 104 °F)
Storage Temperature: −25 °C to +70 °C (−13 °F to 158 °F)
Humidity Range: 90% RH (non-condensing at 30 °C)
Electromagnetic Compatibility: Complies with requirements for Class B computing device of American FCC (Federal Communication Commission) Rules.
Warm-up Time: 20 s

GENERAL:
Height: 133 mm (5,2 in)
Width: 210 mm (8,3 in)
Depth: 240 mm (9,4 in)
Weight: 3,2 kg (7,0 lb)

ACCESSORIES INCLUDED:

1 mains cable	AN 0020
2 BNC cables	AO 0087
1 6-pin DIN cable	WL 0658
1 80 mA fuse	VF 0046
1 160 mA fuse	VF 0051

This system is a development of the Brüel & Kjær Systems Engineering Group and is not a standard production instrument. Specifications can be modified, on a contract basis, to meet individual requirements.
For prices and delivery time, please contact your local representative.