

Resonance Dwell Unit

type 5885

USES:

- Resonance dwell testing

FEATURES:

- Automatic sweep control using the Vibration Exciter Control Type 1050
- Automatic phase lock loop to maintain a constant phase angle between the input and the response
- LED phase sign indicators for resonance detection
- Compressor controlled input for optimum phase detector operation

Fatigue testing of test objects often provokes changes in the resonance frequencies of that object. The Brüel & Kjær Resonance Dwell Unit Type 5885 is used with the Vibration Exciter Control Type 1050 for continuous testing at a resonance.

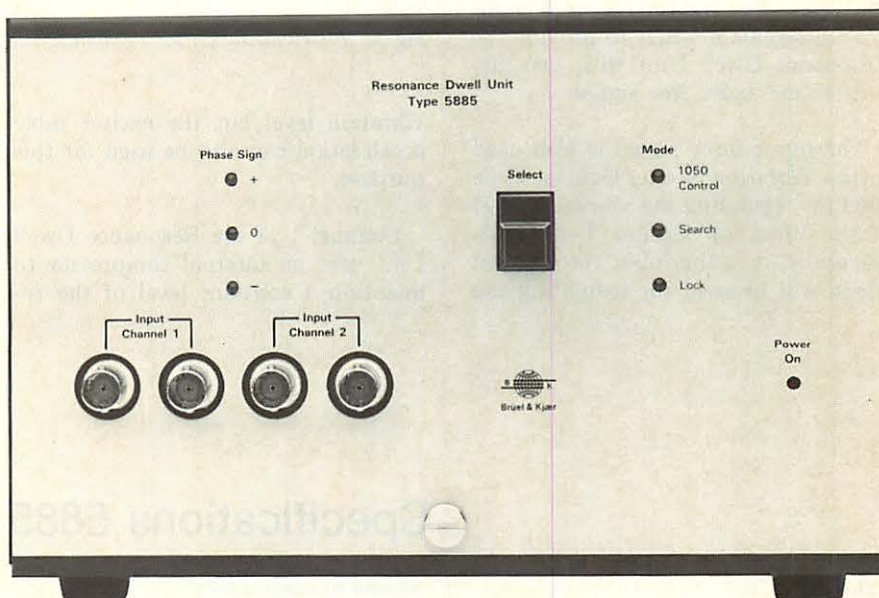
General Description

During vibration testing, objects and structures are continuously subjected to stress reversals. It is at the resonance frequencies that these stresses are likely to cause the most damage. After prolonged testing the stressing will inevitably result in fatigue failure. As damage begins to occur the resulting changes in the material of the structure will alter the resonance frequencies of the structure.

If the environment is dominated by one or a few discrete excitation frequencies, then it is realistic to perform fatigue testing at these frequencies.

Resonance dwell testing provides continuous fatigue testing of an object at a particular resonance. At resonance the phase angle between the input force and the response acceleration is 90°. For a small change in the resonance frequency there will be a large change in the phase angle. Consequently, monitoring the change in the phase angle is a more accurate method of tracking the resonance frequency than monitoring the maximum amplitude of the response.

The Brüel & Kjær Resonance Dwell Unit Type 5885 uses this technique to



enable continuous vibration testing at a resonance.

The instrument is specifically designed for use with the Vibration Exciter Control Type 1050, and for optimum operation the 2-channel Slave Filter Type 5888 can be used to filter the input force and response acceleration signals.

Principle of Operation

The two input signals used by the Resonance Dwell Unit Type 5885 are the input force to the test object and the resultant acceleration. After a resonance has been selected, the Reso-

nance Dwell Unit measures the phase angle between the two input signals and identifies any difference from 90°. If the phase deviates from 90° the Resonance Dwell Unit will activate the frequency sweep of the Vibration Exciter Control Type 1050 so that it increases or decreases the generator frequency in accordance with the detected phase change.

Structural resonances can be found by manually tuning the controller to the associated frequency. These resonances are located by inspection of the phase sign indicators. A resonance frequency is indicated when the phase sign indicator passes from + through 0 to -, or vice versa. When a resonance is located, the controller frequency

should be set slightly higher than the resonance frequency. Then by pressing the *select* key the Resonance Dwell Unit will enter *search* mode which causes the Vibration Exciter Control Type 1050 to sweep downwards to the resonance frequency. The Resonance Dwell Unit then enters *lock* mode and tracks the resonance frequency by maintaining a constant phase shift between the two input signals.

System Operation

An instrumentation set-up for resonance dwell testing is illustrated in Fig. 1. The instrumentation uses the Resonance Dwell Unit Type 5885 together with the Slave Filter Type 5888. The Slave Filter is used to filter the input force and the response acceleration signals in order to provide the Resonance Dwell Unit with two distortion and noise free signals.

The input force signal is also used by the Vibration Exciter Control Type 1050 for regulating the vibration level of the Vibration Exciter Type 4805. Generally, it is the input force signal which will be used for regulating the

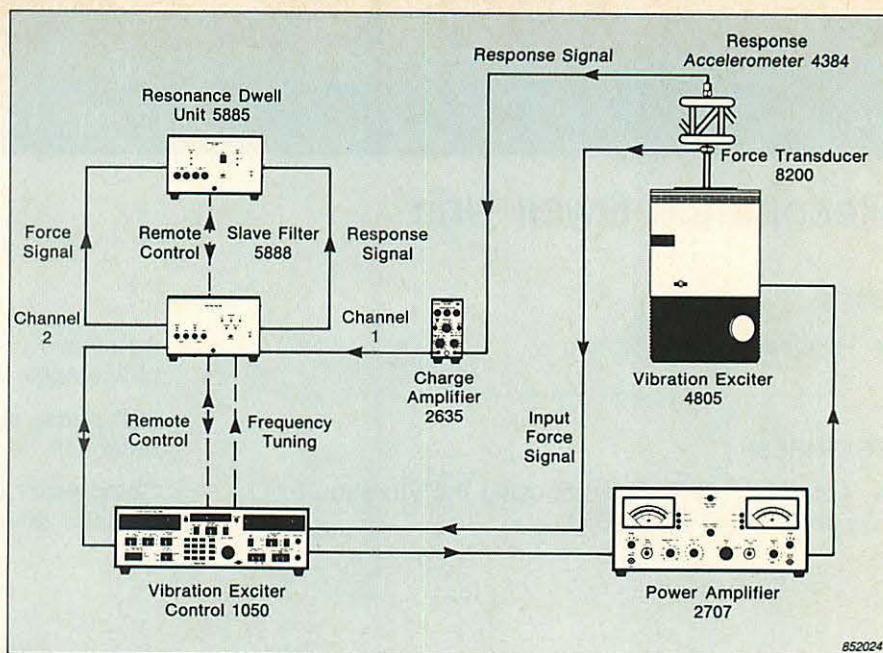


Fig. 1. Instrumentation for resonance dwell testing

vibration level but the exciter table acceleration can also be used for this purpose.

Channel 1 of the Resonance Dwell Unit uses an internal compressor to maintain a constant level of the re-

sponse acceleration signal. The input force signal is regulated by the controller compressor and is supplied to channel 2 of the Dwell Unit. Consequently, the two signals to the Resonance Dwell Unit Type 5885 are optimised for accurate phase detection.

Specifications 5885

PHASE:

Input Measurement Range: 0 to 360°

Limits: ± 10° for LED indication

± 10° for 1050 interlock activation

Resonance Detection: 90° or 270° phase shift between input force and response acceleration

MANUAL CONTROL:

Resonance search

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.

GENERAL:

Height: 133 mm (5,2 in)

Width: 210 mm (8,3 in)

Depth: 240 mm (9,4 in)

Weight: 3,2 kg approx. (7,0 lb)

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.