

Portable Vibration/Balancing System Simplifies Jet Engine Testing

Overall gas turbine engine vibration may be considered the summation of vibration contributions from various moving parts within the engine. The ability to correlate vibration magnitude with specific moving parts helps engineers ascertain and correct the sources of vibration.

Problem

Commercial and military aviation rely on vibration analysis and trim balancing to establish such correlations. Vibration analysis detects discrepancies in rotational machine dynamics; trim balancing is used to reduce vibration amplitudes of gas turbine shafts.

Early analysis of turbine vibration can identify problems quickly, saving the time and cost of engine removal. Implementing such troubleshooting techniques, however, can prove difficult. Mechanical constraints under the engine cowls and the complex design of aircraft wiring harnesses can make the installation of accelerometers, charge amplifiers, and cables a time consuming and error-prone task.

Solution

MTI's portable vibration analysis and engine trim balance instrument, the PBS-4100+, connects directly to the engine's built-in sensors to read necessary signals. Coupled with aircraft-specific accessory kits (AVM Systems), the unit simplifies balancing and vibration testing on almost any jet engine.

The instrument employs a series of on-board digitizers to measure each spool's rotational speed and the magnitude of vibration. Embedded logic assesses the 12-o'clock position of each engine spool to understand where on the spool an imbalance might be located.

Configurable "tracking filters" correlate vibration to the individual spools. Essentially a series of specialized computer algorithms, the tracking filters measure rotational speed of a given spool, and then filter the vibration content outside of a narrow band of interest. The latter is defined as the characteristic frequency of vibration around each spool's rotational speed.

In testing an engine, the operator executes a vibration survey on the turbine engine. The survey is a slow cycling of engine speed from idle to maximum, then back down to idle again. As this occurs, the PBS-4100+ measures the vibration contribution from each spool and plots its findings. In addition, overall vibration is also plotted.

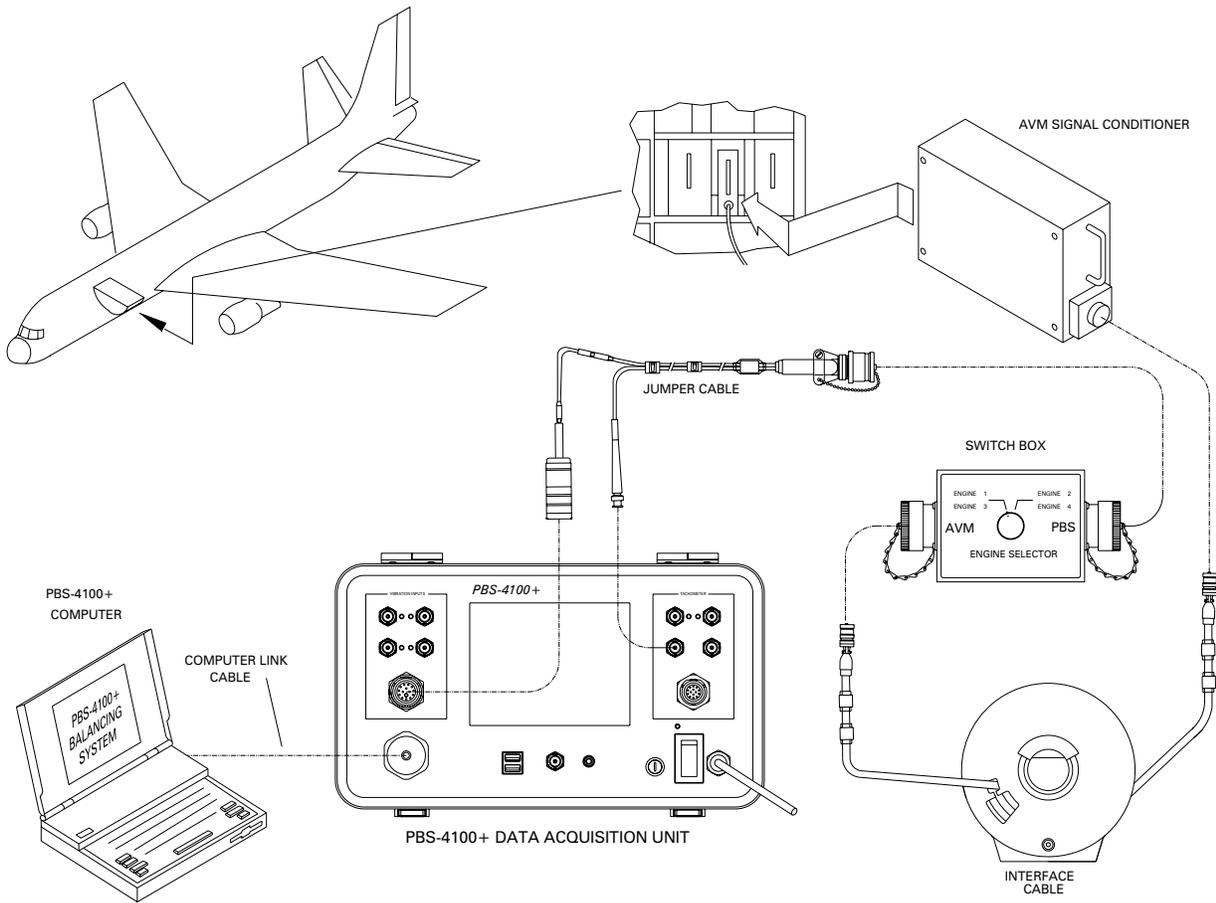
Benefits

Compared with existing testing procedures, the PBS-4100+ portable vibration analysis and engine trim balance instrument is quick to configure and easy to use. The system is compatible with engines from all major manufacturers including GE, Pratt & Whitney, Rolls-Royce, and Honeywell. Features include

- As many as four vibration channels and three speed channels
- Intuitive color graphic interface and touch screen
- Trouble-free accurate trim balancing at the touch of a button
- Built-in diagnostics and traceability reporting



MTI's PBS-4100+ portable vibration analysis and engine trim balance instrument is quick to configure and easy to use. Cable sets and connection accessories are available for all engine and aircraft types.



Engineers at MTI have studied wiring configurations of a variety of engines and airframe combinations and have designed cable sets that join directly to the equipment connections of the aircraft.

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