GE GE □□□ Series Service Manual

IS200VVIBH1CAB

1. Description

SPECIFICATIONS

2. Specifications

Specification	Value
Original	**Manufacturer General Electric**
Product	**Series Mark VI Speedtronic**
Functional	**Acronym VVIB**
Part	**Number IS200VVIBH1CAB**
Functional	**Description VME Vibration Board**
PCB	**Coating Conformal Coating**
Primary	**Functional Revision C**
Secondary	**Functional Revision A**
Artwork	**Revision B**

3. Product Information

SPECIFICATIONS

Part No.: IS200VVIBH1CAB

Manufacturer: General Electric

Size: 33.0 cm high x 17.8 cm wide

Number of channels: 26

Availability: In Stock

Country of Manufacture: United States (USA)

Functional Description

IS200VVIBH1CAB is a Resistance Temperature Device (RTD) terminal board developed by GE. It is a part of Mark VI control system. The Vibration Monitor (VVIB) board serves as a critical component in the turbine control system, tasked with processing vibration probe signals originating from either the TVIB or DVIB terminal boards The board is designed to accommodate up to 14 vibration probes, directly connected to the terminal board. It supports the connection of two TVIB boards to the VVIB processor board, enabling the simultaneous processing of multiple vibration signals.

Signal Processing and Transmission

Vibration signals from the multitude of probes connected to the terminal board, the VVIB board embarks on a transformative journey, meticulously processing these analog signals to unlock their full potential in the digital realm. This pivotal stage is marked by the digitization of the raw vibration data, a process vital for its subsequent transmission over the VME bus to the central controller of the Mark VI control system.

The journey begins as the VVIB board harnesses its sophisticated signal processing capabilities to convert the incoming analog signals into digital format. This transformation is achieved through a series of meticulously orchestrated steps, involving precision analog-to-digital conversion techniques. By converting the analog signals into a digital representation, the VVIB board ensures not only the preservation of signal integrity but also the elimination of potential distortions or inaccuracies inherent in analog transmission.

Once digitized, the vibration parameters encoded within the digital signals are primed for transmission across the VME bus to the central controller. The VME bus, renowned for its robustness and high-speed data transfer capabilities, serves as the conduit through which the digitized vibration data embarks on its journey towards informing critical decision-making processes within the control system.

The digital transmission of vibration data over the VME bus offers several distinct advantages. Firstly, it enables rapid and efficient communication between the VVIB board and the central controller, facilitating real-time monitoring and analysis of turbine performance. Additionally, the digital format ensures the accurate representation of vibration parameters, eliminating the potential for signal degradation or loss commonly associated with analog transmission methods.

The digital nature of the transmitted data allows for seamless integration with advanced data processing algorithms and diagnostic tools employed by the central controller. This synergy between digital signal transmission and sophisticated data analytics empowers operators with unparalleled insights into turbine health and performance, enabling proactive maintenance and optimization strategies.

Compatible Vibration Probes

The Mark VI control system utilized with the VVIB board employs Bently Nevada probes for shaft vibration monitoring. The system is compatible with various types of vibration probes, including:

Proximity Probes: Proximity probes are adept at measuring the radial displacement of shafts, providing valuable insights into shaft position and eccentricity. These probes play a crucial role in detecting potential shaft misalignment or rotor imbalance, preempting operational disruptions and prolonging equipment lifespan.

Velocity Probes: Velocity probes excel at capturing the speed and direction of shaft movement, offering valuable data on rotational dynamics and shaft behavior. By monitoring velocity fluctuations, operators can identify irregularities indicative of bearing wear, lubrication issues, or mechanical resonance, facilitating proactive maintenance interventions.

Acceleration Probes: Acceleration probes specialize in detecting sudden changes in shaft acceleration, offering real-time feedback on vibration intensity and frequency. These probes are instrumental in identifying abnormal vibration patterns associated with rotor-stator interactions, blade passing frequencies, or structural resonances, enabling prompt corrective actions to avert potential failures.

Seismic Probes: Seismic probes are engineered to capture ground vibration transmitted through the turbine foundation, providing insights into environmental conditions and structural integrity. By monitoring seismic activity, operators can assess the impact of external factors such as earthquakes or nearby construction activities on turbine performance, optimizing operational parameters accordingly.

Phase Probes: Phase probes offer precise measurements of the phase relationship between vibration signals, facilitating advanced diagnostics of rotating machinery dynamics. By analyzing phase discrepancies between multiple probes, operators can pinpoint issues such as shaft bow, rotor rubs, or coupling misalignment, enhancing predictive maintenance strategies and minimizing downtime.

For enhanced monitoring capabilities, the terminal board can be connected to a Bently Nevada 3500 monitoring system, providing additional insights into turbine vibration dynamics.

Protective Functions in Turbine Applications

Vibration probes play a crucial role in turbine applications, serving four primary protective functions:

Vibration Proximity Monitoring: Detects peak-to-peak radial displacement of the shaft, utilizing non-contacting probes and Proximitors to identify alarms, trips, and faults related to shaft motion in journal bearings.

Rotor Axial Position Monitoring: Observes the motion of the thrust collar on the turbine rotor through a probe mounted in a bracket assembly off the thrust bearing casing. This system detects thrust bearing wear alarms, trips, and faults.

Differential Expansion Monitoring: Utilizes non-contacting probes and Proximitors to detect alarms, trips, and faults related to excessive expansion differential between the rotor and the turbine casing.

Rotor Eccentricity Monitoring: Continuously senses the shaft surface adjacent to the probe, updating turbine control systems. It calculates eccentricity once per revolution during turning gear operation, providing alarm and fault indications.

Features

Probe Power Supply: The Vibration Monitor (VVIB) board provides power to the probes by stepping down the voltage from the -28 V DC bus to -24 V DC. Each probe supply is current-limited to ensure safe operation.

Transducer Load: Each transducer connected to the VVIB board imposes a load of 12 mA. This current requirement is factored into the overall design to ensure proper power

distribution and stability.

Signal Sampling: The VVIB board employs a 16-bit Analog-to-Digital (A/D) converter for probe signal sampling. However, the effective resolution is 14 bits, ensuring accurate representation of the vibration data.

Buffered Outputs: The board features buffered outputs to ensure signal accuracy when interfacing with the Bently Nevada 3500 vibration analysis system. The amplitude accuracy of these buffered outputs is maintained at an impressive 0.1%, providing reliable data for precise vibration analysis and diagnostics.

Sampling Rates

During operation, the VVIB board samples probe signals at a rate of 4,600 samples per second in fast scan mode, applicable when the turbine speed ranges from 4,000 to 17,500 rpm. For speeds below 4,000 rpm or when nine or more probes are in use, the sampling rate is reduced to 2,586 samples per second. All inputs are sampled simultaneously within time windows of 160 ms, ensuring synchronized data acquisition.

Rated RPM Configuration

The configuration of the VVIB board depends on the rated revolutions per minute (RPM) of the turbine:

If the rated RPM exceeds 4,000, the board supports the use of eight vibration channels, with the remaining channels allocated for proximity or position monitoring.

If the rated RPM is below 4,000, the board can accommodate up to 16 vibration channels, alongside other probe types such as proximity or position sensors.

IS200VVIBH1CAB Technical Specifications

Original Manufacturer General Electric

Product Series Mark VI Speedtronic

Functional Acronym VVIB

Part Number IS200VVIBH1CAB

Functional Description VME Vibration Board

PCB Coating Conformal Coating

Primary Functional Revision C

Secondary Functional Revision A

Artwork Revision B

About the IS200VVIBH1CAB

The IS200VVIBH1CAB is a board component made by General Electric as part of their Mark VI system. This system was released in the 1990s as a steam and gas turbine management system under the “Speedtronic” umbrella. The Mark VI is built upon TMR (triple modular redundant) architecture, which builds out the Mark VI with three separate, independent Control Modules, power supplies, and IONets. It is also possible to build the Mark VI in Simplex form for smaller, single module systems that may not benefit from the complexity of TMR architecture.

Hardware Tips and Specifications

The IS200VVIBH1CAB functions within the Mark VI system as a Vibration Monitor board. The PCB processes vibration probe signals that originate from probes that have been attached to the DVIB or TVIB terminal boards. These probes can measure rotor axial position or eccentricity, differential expansion, and vibration. Compatible probes include Seismic, Phase, Proximity, Acceleration, and Velocity probes. If desired, Bently Nevada vibration monitoring equipment can be permanently cabled to the TVIB board. The IS200VVIBH1CAB is a component dense board with an attached faceplate. The faceplate is marked with the board number and has three LED indicators. The PCB has over fifty integrated circuits, including field programmable gate arrays like the Xilinx Spartan Xcs30. The board has SRAM and RAM chips. Capacitors and resistors are placed on the back surface of the board as well as on the front. Other components include inductor coils and six connectors, including two backplanes.

Please follow all manufacturer guidelines when maintaining or installing the IS200VVIBH1CAB. Installation procedures can be found in manuals or datasheets, or in the system control guide (GEH-6421.) This IS200VVIBH1CAB VME Vibration Board printed circuit board product offering or just PCB for short from General Electric, despite being well-loved, has really only been described thus far on this IS200VVIBH1CAB VME Vibration Board personalized product page with information gleaned from a thorough technician-led visual inspection of the device itself, given a relative gulf in Mark VI Series instructional manual materials available on the internet. With this being the case, this IS200VVIBH1CAB VME Vibration Board product's IS200VVIBH1CAB VME Vibration Board functional product number itself can be highlighted as a decent functional source of IS200VVIBH1CAB VME Vibration Board device hardware component and component specification information, as it was specifically designed by GE to designate a number of important IS200VVIBH1CAB VME Vibration Board device hardware qualities through a series of consecutive functional naming elements. One such element is the initial dually-functional IS200 series tag indicating both this IS200VVIBH1CAB VME Vibration Board product's normal Mark VI Series assembly as well as its domestic original GE manufacture location. Some of the other IS200VVIBH1CAB VME Vibration Board details indicated through this medium are its:

VVIB functional product acronym

Group one Mark VI Series grouping

Conformal PCB protective coating

Three-fold revision table