

CHAPTER 4**VIBRATION MONITOR UNIT**

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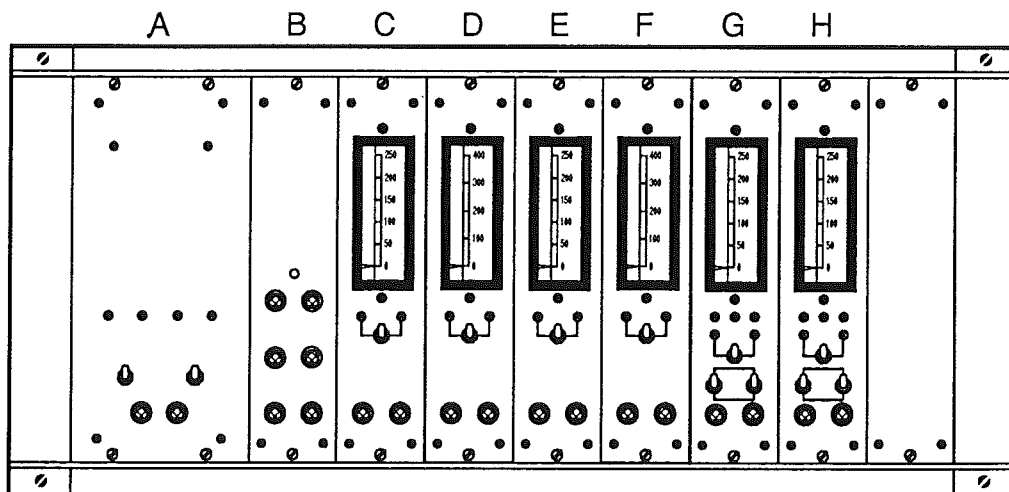


Figure 4.1 - Vibration Monitor Unit

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1 GENERAL

The Vibration Monitor Unit is of modular construction mounted within a pull-out chassis. The end panel of each unit (card) is visible to the Operator with, where provided, visual indicators to display the operational condition of the system.

The Vibration Monitor Unit responds to the input from the Turbine Control Panel and Central Processor Unit.

2 MODULES (Cards)

Each of the segments of the Vibration Monitor Unit is comprised of components mounted on a Printer Circuit Board (a Card) and an end panel in which is mounted any visual display components identified with that card. Several of the Cards contain components that may be adjusted for system calibration.

NOTE: Any adjustments to the settings of Card components may only be carried out by a representative of **Dresser-Rand Power**. No attempt should be made by the Operator to carry-out any adjustments on the Vibration Monitor Unit.

The Vibration Monitor Unit comprises the following Cards:-

POWER SUPPLY CARD (A)

DUAL TRACKING FILTER CARD (B)

GAS GENERATOR VIBRATION FROM GAS GENERATOR EXDUCER MONITOR CARD (C)

POWER TURBINE VIBRATION FROM GAS GENERATOR EXDUCER MONITOR CARD (D)

GAS GENERATOR VIBRATION FROM POWER TURBINE EXDUCER MONITOR CARD (E)

POWER TURBINE VIBRATION FROM POWER TURBINE EXDUCER MONITOR CARD (F)

GENERATOR TURBINE END TWO PLANE RADIAL MONITOR CARD (G)

GENERATOR EXCITOR END TWO PLANE RADIAL MONITOR CARD (H)

The Assembly for the above functions in this installation is comprised from four basic types of Card:

- » The Power Supply (A)
- » Dual Tracking Filter (B)
- » Vibration Monitor (C, D, E & F)
- » Two Plane Radial Vibration Monitor (G & H)

Refer to the following Paragraphs for a description of each type of Card and the operator facilities available on the end panel of each Card.

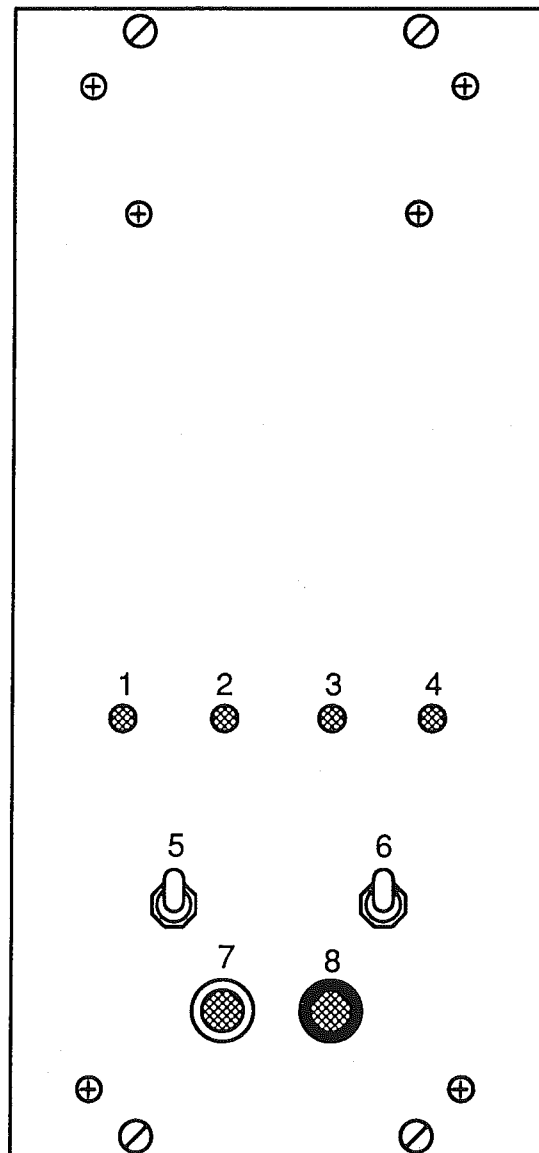


Figure 4.2 - Power Supply Module

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2.1 POWER SUPPLY

This Power Supply Module provides three unregulated direct current voltage supplies for the components of the Vibration Monitor assembly. The three outputs are in the ranges as follows:

$-V_R$	-16 to -29 volts dc, fused at 4 ampere.
$-V$	-28 to -45 volts dc, fused at 2 ampere.
$+V$	+18 to +29 volts dc, fused at 2 ampere.

NOTE: Two of the voltages, ($-V$ and $+V$), are regulated at their input to the other Cards in the Vibration Monitor assembly. The third voltage ($-V_R$) is unregulated and is used for relays and indicators.

Cartridge type melt fuses are installed within this module. It is necessary to withdraw the module and remove a side cover to gain access to the fuse holders.

An inhibit feature is provided in this Power Supply Module to prevent alarms during the initial period of system stabilisation. The monitor alarm circuits are disabled for a period of up to 45 seconds from the connection of the power supply. The inhibit period feature will also operate where the input power supply is restored after a temporary reduction or failure.

2.1.1 Indicator Lamps**+V (POSITIVE VOLTAGE) (1)**

This green light emitting diode (LED) indicator will be illuminated when this output is available to the monitors.

-V (NEGATIVE VOLTAGE) (2)

This green light emitting diode (LED) indicator will be illuminated when this output is available to the monitors.

INHIBIT (3)

This red light emitting diode (LED) indicator will be illuminated when the monitor alarm circuits are inhibited during the initial period after the establishment of power.

 $-V_R$ (RELAY NEGATIVE VOLTAGE) (4)

This green light emitting diode (LED) indicator will be illuminated when this output is available to the relay and indicator circuits.

2.1.2 Switches**COMMON RESET (5)**

This spring-loaded toggle switch, when depressed, will reset all latching alarm circuits.

LAMP TEST (6)

This spring-loaded toggle switch, when depressed, will illuminate all of the Vibration Monitor Indicator Lamps.

2.1.3 Terminals**KEY (7)**

This binding post connector provides an output point for an external instrument observation to be made of the Keyphasor Proximitors signal.

COMMON (8)

This binding post connector provides the return circuit for the Key Terminal output.

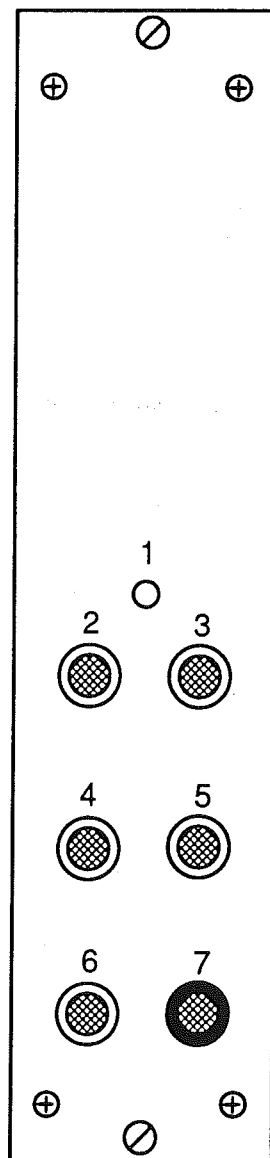


Figure 4.3 - Dual Tracking Filter

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2.2 DUAL TRACKING FILTER

The Dual Tracking Filter accepts inputs from two interface modules; that each filter the signal from sensors monitoring a common rotating member. In addition an input from the Keyphasor proximator, for that same rotating member, acts as a speed reference.

The Interface Modules each provide two outputs:

- » A Buffered Unfiltered Signal This signal is used for diagnostic readings. A terminal on the face of the Dual Tracking Filter provides a convenient point for connection of the diagnostic instrument.
- » A Filtered Signal This signal is converted to a digital signal for feeding to the Turbine and Generator Control and Monitoring Systems. A terminal on the face of the Dual Tracking Filter provides a convenient point for connection of a diagnostic instrument.

The two Interface Modules are identified as 'A' and 'B' as are the respective channels.

2.2.1 Indicator Lamp**LOCK (1)**

This green light emitting diode (LED) Indicator will illuminate to indicate that this card is active and output is available to the Turbine Control Systems.

2.2.2 Terminals**FILTERED A (2)**

This binding post connector provides an output point for an external instrument observation to be made of the Channel A Filtered Signal.

FILTERED B (3)

This binding post connector provides an output point for an external instrument observation to be made of the Channel B Signal.

BUFF A (4)

This binding post connector provides an output point for an external instrument observation to be made of the Channel A Buffered Unfiltered Signal.

BUFF B (5)

This binding post connector provides an output point for an external instrument observation to be made of the Channel B Buffered Unfiltered Signal.

SPEED (6)

This binding post connector provides an output point for an external instrument observation to be made of the Keyphasor Proximator signal.

COMMON (7)

This binding post connector provides the return circuit for the Key Terminal output.

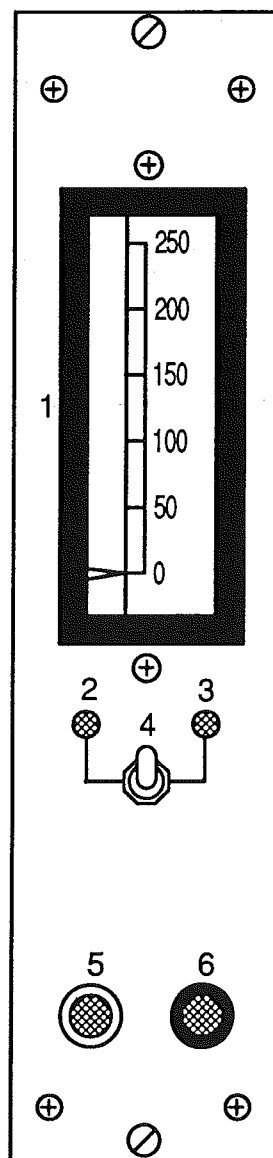


Figure 4.4 - Vibration Monitor Card

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2.3 VIBRATION MONITOR CARD

These Vibration Monitor Cards are used for the monitoring of the Gas Turbine rotors.

2.3.1 Meter**DEFLECTION METER (1)**

This continuous scale deflection meter displays the peak to peak vibration level in normal operation.

The Danger or Alert Set-points are displayed by this Meter as selected by the SET Toggle Switch (4).

NOTE: Adjustment of the Danger and Alarm Set-points requires access to the interior of the respective module for potentiometer adjustment. This adjustment may only be carried out by personnel with the authorization of **Dresser-Rand Power** to make such adjustments.

2.3.2 Indicator Lamps**ALERT (2)**

This red light emitting diode (led) indicator, when illuminated, informs that the lower vibration warning level has been exceeded.

This indicator will also illuminate when the ALERT set-point is selected for adjustment by the SET Switch (4).

DANGER (3)

This red light emitting diode (led) indicator, when illuminated, informs that the shut-down vibration warning level has been exceeded.

This indicator will also illuminate when the DANGER set-point is selected for adjustment by the SET Switch (4).

2.3.3 Switch**SET (4)**

This three position toggle switch is used to select the alarm set-point to be displayed by the METER (1). For normal operation and observation of the detected peak to peak vibration level this switch is set to the central position.

NOTE: Adjustment of the selected set-point requires access to the interior of the respective module for potentiometer adjustment. This adjustment may only be carried out by personnel with the authorization of **Dresser-Rand Power** to make such adjustments.

2.3.4 Terminals**SIGNAL (5)**

This binding post connector provides an output point for an external instrument observation to be made of the signal output.

COMMON (6)

This binding post connector provides the return circuit for the Signal Terminal output.

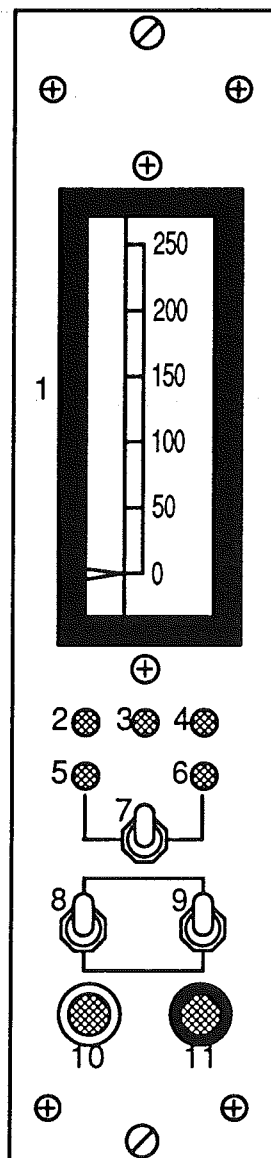


Figure 4.5 - Two Plane Radial Vibration Monitor Card

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2.4 TWO PLANE RADIAL VIBRATION MONITOR CARD

These Two Plane Radial Vibration Monitor Cards are used to monitor the vibration at the Generator Bearings. Each Card has two monitor channels with a channel sensor that is positioned 90° relative to the other radially around the bearing. These sensors and their channels provide X-Y plane monitoring at the Generator Bearings.

2.4.1 Meter**DEFLECTION METER (1)**

This continuous scale deflection meter displays the peak to peak vibration level in normal operation.

The Danger, Alert Set-point or Sensor Gap Voltage are displayed by this Meter when selected by the appropriate settings of the SET (7), VERTICAL (8) and HORIZONTAL (9) Toggle Switches.

NOTE: Adjustment of the Danger and Alarm Set-points requires access to the interior of the respective module for potentiometer adjustment. This adjustment may only be carried out by personnel with the authorization of Dresser-Rand Power to make such adjustments.

2.4.2 Indicator Lamps**VERTICAL OK (2)**

This green light emitting diode (LED) indicator will be illuminated whilst all components and measurements are correct within the Vertical plane sensor circuit.

DEFEAT (3)

This red light emitting diode (LED) indicator will be illuminated when either the Channel Defeat or Danger By-pass Switch is active.

NOTE: The Channel Defeat and Danger By-pass Switches are mounted in the interior of the respective module. These switches will only normally be accessed during initial installation or for special service requirements. On completion of installation or special service requirement both switches should be set by the Service Technician to the 'Normal' or 'Off' position.

In the event of a malfunction in either of the sensor circuits the Defeat Switch may be set to 'Horizontal' or 'Vertical' to inhibit that particular circuit. The corresponding 'OK' LED indicator (2 or 4) will extinguish.

NOTE: Access to the interior of the module to activate either of the switches may only be carried out by personnel with the authorization of Dresser-Rand Power.

HORIZONTAL OK (4)

This green light emitting diode (LED) indicator will be illuminated whilst all components and measurements are correct within the Horizontal plane sensor circuit.

ALERT (5)

This red light emitting diode (LED) indicator lamp, when illuminated, informs that the lower vibration warning level has been exceeded for the vertical and/or horizontal monitor.

This light emitting diode (LED) indicator will also illuminate when the ALERT set-point is selected for adjustment by the SET Switch (7).

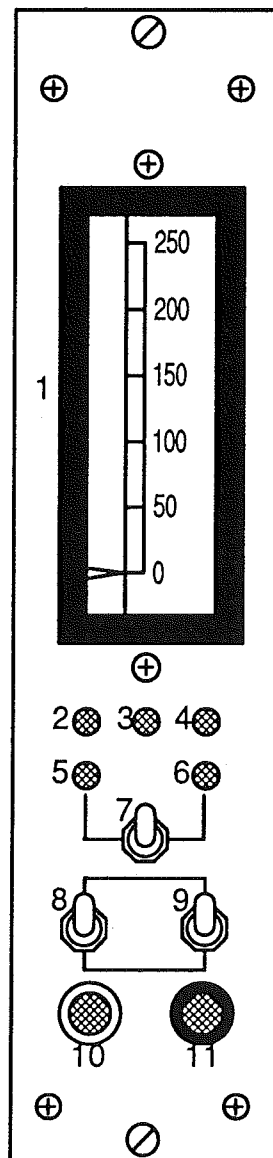


Figure 4.5 - Two Plane Radial Vibration Monitor Card

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DANGER (6)

This red light emitting diode (LED) indicator lamp, when illuminated, informs that the shut-down vibration warning level has been exceeded for the vertical and/or horizontal monitor.

This light emitting diode (LED) indicator will also illuminate when the DANGER set-point is selected for adjustment by the SET Switch (7).

2.4.3 Switches**SET (7)**

This three position toggle switch is used to select the ALERT or DANGER alarm set-point to be displayed by the METER (1). For normal operation and observation of the detected peak to peak vibration level this switch is set to the central position.

NOTE: Adjustment of the selected set-point requires access to the interior of the respective module for potentiometer adjustment. This adjustment may only be carried out by personnel with the authorization of **Dresser-Rand Power** to make such adjustments.

VERTICAL (8)

This three position toggle switch is used to select, for display on the METER (1), the detected vibration level ('VIB') or the gap voltage ('GAP') for the vertical plane sensor. The 'VIB' and 'GAP' switch positions are spring-loaded so that the switch has to be held to the desired position while observing the METER (1).

HORIZONTAL (9)

This three position toggle switch is used to select, for display on the METER (1), the detected vibration level ('VIB') or the gap voltage ('GAP') for the horizontal plane sensor. The 'VIB' and 'GAP' switch positions are spring-loaded so that the switch has to be held to the desired position while observing the METER (1).

2.4.4 Terminals**VERTICAL (10)**

This binding post connector provides an output point for an external instrument observation to be made of the signal output from the vertical plane sensor circuit.

HORIZONTAL (11)

This binding post connector provides an output point for an external instrument observation to be made of the signal output from the horizontal plane sensor circuit.