

### VXP - Carry-On Version

#### Product Description



The VXP represents 46 years of Chadwick-Helmuth experience and is the latest in the Chadwick-Helmuth product lines. It is the most advanced Aviation Vibration Management System available on the Market and represents a merging of On-board system and Ground-based Technologies. The VXP System consists of the VXP AU<sup>1</sup>, VXP DU<sup>2</sup> and software. The software for the VXP is divided into two major systems. The first is the VXP OP<sup>3</sup>, which resides permanently in EPROM memory of the VXP AU. The second is support software that resides on the VXP DU such as:

1. VXP DP<sup>4</sup>. This application runs on the VXP DU running Windows 95™ or higher and is used for communication, data download, software upload and to initiate

- specific vibration tests such as Smart Charts™ or Vibration Routes.
2. VibraLog™ for Windows. VibraLog runs on a PC and performs the function of data analysis and setup of the VXP AU.
3. VibReview. VibReview runs on a PC or the VXP DU

As a vibration analysis and balancing tool it rapidly and accurately acquires and analyzes aircraft vibration data. It uses that data to calculate balance solutions and to analyze aircraft vibration levels across a broad frequency range. The VXP uses the cables and sensors (FASTRAK™, Velocimeters, magnetic pickups, photocells, etc...) from previous generations of Chadwick equipment, further reducing the cost of ownership. They can be directly connected to the front panel connectors on the Carry-On VXP AU. There is also an expansion connector that provides additional interfaces. The Major Functions of the VXP are as follows:

- Rotor System Track and Balance and Propeller Balance via Smart Charts
- Vibration Route Spectrum Data Collection
- Continuous Vibration Monitoring
- Spectrum Measurements Only
- Balance Measurements Only
- Track Measurements Only

***The VXP provides a dramatic reduction in maintenance man-hours, maximum flexibility, the latest advancements in technology, system growth, low costs, proven reliability and existing Chadwick-Helmuth world-renowned customer support.***

<sup>1</sup> AU – Acquisition Unit

<sup>2</sup> DU – Display Unit

<sup>3</sup> VXP OP – VXP Operational Program

<sup>4</sup> VXP DP – VXP Display Program

## System Benefits

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The VXP when used as a Carry-On Vibration Balancer / Analyzer provides a rapid return on investment through a dramatic reduction in maintenance and flight time by:

- a. Simultaneously collecting data from 4 vibration, azimuth and track data at the same time thereby reducing flight time.
- b. Collecting Vibration and Rotor track and balance flight regime data in any order, thereby eliminating the need to restart tests and providing flexibility during Flight Tests.
- c. Implementing progressive RT&B solutions based on the data collected. This means that a solution will be given if only ground and Hover regimes are collected.
- d. Allowing solutions to be edited. The VXP will give vibration predictions for the next flight based on these adjustments. In addition, adjustment types such as weight, pitch link and tab can be turned off and solutions will be given based on the adjustment types available.
- e. Providing immediate feedback of Vibration Excedances. Excedances are displayed on the screen of the VXP DU. This eliminates the need to review the data in ground station software, thereby saving time and man-hours
- f. The Chadwick-Helmuth Vibralog software provides the ability for the user to setup the VXP data acquisition requirements without the need for Chadwick-Helmuth to modify the VXP OP. The VXP is also completely compatible with the Chadwick-Helmuth Vibralog and VibReview Ground-Based Software for trending.

The VXP AU can be used as a continuous vibration monitoring system. When used in this mode it provides the following additional functionality:

- a. The VXP AU performs continuous Vibration Monitoring (Monitor Function) during a flight and at the end of a flight will issue a report of the average component vibration levels, the peak level during the flight as well as comparison to the last flight.
- b. The VXP AU has 3 serial ports, 4 discrete in and 2 out and can be interfaced with a Flight Data Recorder. This allows the continuous vibration data to be tagged with flight regime information or the flight data recorder to trigger acquisitions.
- c. The VXP AU has a connector internally for an ARINC 429 or 1553 Industrial pack daughter card for

The VXP also provides a reduction in overall application kit costs by:

- Use of existing Chadwick-Helmuth cables and accessories previously purchased.
- Integral Chadwick-Helmuth photocell processors for use with the Chadwick-Helmuth Photo Probe
- 6 integral Chadwick-Helmuth 8225 charge converters for interface with high temperature accelerometers.

## System Functions

### Tracking and Balancing

The Smart Chart incorporates easy to understand menus allows the user to collect data for balancing. Data is collected simultaneously from up to 4 vibration one azimuth and the Chadwick-Helmuth FASTRAK™ Optical Tracker. During data collection should a vibration limit be exceeded the operator will be notified immediately. The data can also be reviewed at anytime during data collection either as a measurements list or graphical display.

Vibration and Rotor track and balance flight regime data can be collected in any order, thereby eliminating the need to restart tests. In addition, no data collected will be lost due to power interrupts or flight test delays because the VXP AU maintains an internal database in battery backed memory. Solutions are progressive based on the data collected. This means that a solution will be given if only a portion of the required data is collected (ie.. only ground and Hover).

Solutions can also be edited and VXP will give vibration predictions for the next flight based on these adjustments. In addition, adjustment types such as weight, pitch link and tab can be turned off and solutions will be given based on the adjustment types available as well as predictions.

### Trend Spectrum

Trend spectrums are a series of vibration spectra at specific operating conditions. Vibration spectrum routes are uploaded via the VXP DP running on the VXP DU. The Chadwick-Helmuth Vibralog Predictive maintenance software creates the spectrum routes. Once the routes are loaded, data collection is initiated through the menu on the VXP DU. During the data collection on the aircraft any vibration level that exceeds the defined limits will generate an immediate advisory report to the screen of the VXP DU. Spectrum may be displayed after collection on the VXP DU.

### Monitor

The VXP can perform continuous vibration monitoring of defined frequency bands of components of the drive train and return the RMS and Peak vibration levels for the band. The VLFW software or Chadwick-Helmuth Product Support services can define the bands that are to be monitored. The spectral data collected is compared to alarm levels using an advanced hysteresis alarming technique that eliminates false alarms caused by temporary high level excursions. If an exceedance occurs, all data is stored, and an entry is made in the VXP advisory log.

The monitor data can be downloaded to the VLFW software for trending and storage purposes. In addition, a report is available at the aircraft that provides a vibration level comparison between flights for each of the defined bands.

### Measurements Only

The measurements only menu allows three functions for the manual collection of data. These functions are as follows:

#### Strobe Track

This function allows for control of the Chadwick-Helmuth 135M-12 strobe. From this menu the user can control the flash rate, blade spread and target position.

## Spectrum

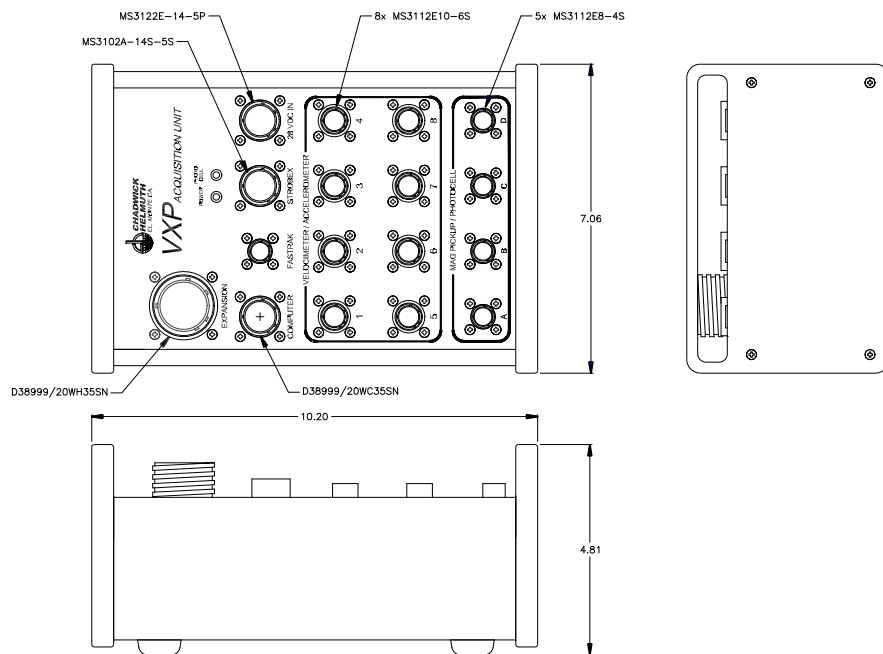
From this menu the VXP can be used as an advanced vibration spectrum analyzer. Functions include the ability to change frequency ranges, vibration sensors, azimuth channels, FFT window types, lines of resolution, ZOOM, measurement units and much more. These spectra can be saved and even continuously recorded during spectrum collection or run-up.

## Balance

Balance measurements only allows continuous display of balance data during operation of the aircraft.

# System Specifications

## VXP Acquisition Unit Specifications



VXP AU Outline Drawing

<b>VXP AU Specifications</b>	
<b>Performance Measure</b>	<b>Specification</b>
Dimensions	Carry-On :4.63" H X 7.06" W X 10.2"
Weight:	Approximately 6.5 lbs or 2.43Kgm
Power Requirements:	18 – 28 VDC
Analysis Ranges (Fmax, Hz)	5,10,20, 50,100, 200, 500, 1000, 2000, 5000, 10000, 20000, 50000, 75000
Max Sampling Rate	197 KHz
Window Type	Flat Top, Hanning, Keiser Bessel, Uniform
FFT Resolution	400 / 800 Lines Spectrum,
ZOOM	upto 51200 lines Zoom
Simultaneous Acquisition Capability	4 Vibration + 1 Azimuth + 1 FASTRAK

**VXP Signal Conversion Vibration Inputs Specifications**

<b>Performance Measure</b>	<b>Specification</b>
Channel configuration options -	Sensor Type: ICP Accelerometer, Velocimeter, High Temp Accelerometers (Charge Type)
Coupling	DC, AC (High-Pass Filter In)
High Pass Filter	4 Pole Butterworth, -3 dB @ 1.5 Hz, software selected
A/D <sup>5</sup> Converter Type	16 Bit Linear, Over-sampling type
Maximum A/D Sampling Rate	197,000 Samples/second x 4 Channels

**VXP Interfaces Specifications**

<b>Performance Measure</b>	<b>Specification</b>
Power Input	18 – 36 VDC, 2500 mA Max
Accessory Power Outputs	VXP DU, +15V +/- 0.15 V, 1670 mA Max Printer, +12V +/- 0.12V, 2000 mA Max
Vibration Sensors	<u>Carry-On:</u> 48 total Single Connectors: 8 each Velocimeter (19 mV/IPS sensitivity) 8 each ICP Accelerometer Expansion Connector: 8 each Velocimeter (19 mV/IPS sensitivity) 18 each ICP Accelerometer 6 High Temp Accel
Magnetic Pickup/Photocell	4 each Pulse input, magnetic pickup or logic type 2 each Photocell with Processor. Voltage Range: +/- 12 V peak Input Frequency Range: DC – 25 kHz
Optical Rotor Blade Tracker	2 each FASTRAK™ compatible with software Day/Night control
Strobex	1 each, Chadwick-Helmuth Model 135M-12
High Speed Azimuth	4 each Fully Isolated High Voltage, High Freq Voltage Range: +25V to +250 V Input Frequency Range: DC – 25 kHz
Portable Computer	1 each Serial, RS-232, 115 Kbaud Max. <u>Optional Configuration -</u> <i>1 each Serial RS-422</i>
Printer	1 each Serial, RS-232, 9600 Baud
Discrete Input	4 each Opto- Isolated, 28 VDC Max
Discrete Output	2 each Opto- Isolated, 28 VDC Max
Accessory Power	1 each Regulated 12 VDC @ 0.3 A maximum, Short circuit protected.

<sup>5</sup> analog to digital

# VXP Display Unit Specifications



<b>Performance Measure</b>	<b>Specification</b>
Weight	4.0 lbs.
Power Requirement	16VDC (Supplied by VXP AU)
Processor	Intel Pentium, 400 MHz
Display	Color Active Matrix Sunlight Readable
Pointing Devices	Touch pad and Rotating Touch Screen
Disk Drive	80 GB
Memory	512 MB
Interfaces	RS-232, 2 USB, 2 PCMCIA Type 1,2, 1 Ethernet

## SYSTEM INTERFACES

### Ground Software

#### Vibralog for Windows

VibraLog for Windows (VLFW) is the heart of the VXP Vibration Analysis System and is a complete Predictive Maintenance productivity tool. Its features allow for configuring the VXP data acquisition functions and downloading and analyzing the data on the ground -- all without writing a single line of code.

VLFW also passes alarms to the VXP for use comparison during data collection. Any number of different types and up to 10 severity levels of alarms can be attached to a measurement.

## VibReview

The VibReview software provides a simplified data review, reporting and trending where the power of the Vibralog software is not necessary. Limits and data collection requirements can be uploaded by configuration files generated by the Vibralog software.

## Vibration Sensors

The system interfaces directly to Chadwick-Helmuth model 7310 and 8866-1 Velocimeters as well as ICP type accelerometers from 10 to 100 mv/g. Charge type sensors used in high-temperature applications may be interfaced with the C-H Model 8225-X integrating charge converter or directly to the VXP AU expansion connector.

## Rotor Speed and Phase Angle Sensors

The VXP connects directly to standard magnetic pickups, optical azimuths, and the Chadwick-Helmuth photo probe.

## Printers

The VXP uses any PC compatible printer supported by Windows Operating System for printing of graphic displays of the VXP DP. It also can use a small serial printer on the aircraft for printing balance solutions and other data.