Technical Specifications

Accuracy
Vibration Amplitude: +/- 5%, 0 - 10 IPS
Frequency Range: 0 - 20K Hz
Tachometer Inputs: +/- .3%, 100 - 10,000 rpm

Power Supply
New battery and smart, fast charging circuit. Up to 16 hours of operation on one full charge of the NiMH (Nickel Metal Hydride) battery pack. Full charge in 2 to 4 hours. The charger can be left connected indefinite without damage to the battery.

Operation Time
Up to 16 hours

Voltage
12 V DC Battery or 14-28 V DC ships power

Charging Time
2 hours

Physical Specifications
Height: 9.3"
Width: 7.5"
Depth: 4.4"
Weight: 4.8 lbs.

AC Input
The data acquisition system is capable of measuring AC values from 0.1 volt to 2.048 volts peak.

Tachometer-Synchronized Measurements
The analyzer can use the tachometer input to synchronously sample and average data. These data contain phase information for vibration related to the tachometer. The analyzer can report phase to +/- 3 degrees for this vibration, which is reproducible to 1 degree.

Unconditioned Tachometer Input
Tachometer signal processing electronics are capable of adjusting the full-scale input range to handle any available sensor for measuring speed. Adjustment of the tachometer conditioning electronics is performed auto-matically by the microprocessor and requires no user intervention. The voltage level that is used as a reference for detection of the start of the revolution can be adjusted from 120mV to 5 volts. The tachometer circuitry can detect speeds up to 10,000 RPM.

Autoranging Input
The analyzer autoranges all signal inputs based on sensor sensitivity. That way, it can determine the optimum gain setting to achieve the maximum dynamic range. Gains are adjusted by factors of two (1 to 512) for all channels. This adjustment enables the analyzer to perform each measurement without overload and with maximum accuracy

Sensor Types
The analyzer will accept any vibration signal input (acceleration, velocity, or displacement). The input is then displayed as collected or integrated to another vibration unit. The vibration input will accept any voltage-generating sensor (must have external charge converter when in charge mode) and will supply power to the sensor when required.

Analysis Range
A high roll-off, 8-pole elliptical, anti-aliasing filter is used with a Fast Fourier Transform (FFT) to accurately transform data from the time to the frequency domain. The analyzer will perform FFT resolutions of 100, 200, 400, and 800 lines.

Complete Propeller Balance Kit

- Model 2020HR ProBalancer Analyzer
- 991D-1 Vibration Sensor
- 25' Vibration Sensor Cable
- Phototach Speed Sensor
- 25' Tachometer Sensor Cable
- Phototach Mount Assembly
- 1/4 x 28 Vibration Sensor Mount
- Eight piece case-bolt adapter set
- Prop Protractor - Full Circle

- Battery Charger
- Pocket Pro Tackle Box
- Communications / Printer Cable
- Training DVD
- Carrying Case
- User's Manual
- FAA-Approved ACES Guide to Propeller Balancing
- Digital Gram Scale

Optional interfaces are available for a wide range of vibration and speed sensors

High Quality

ACES Systems products are manufactured at the TEC facility in Knoxville, Tennessee. Our aviation products are manufactured to exceptional standards and guaranteed for five years against defects in material and workmanship. Extensive testing and quality checks are performed before any ACES Systems product is allowed to leave the factory. At ACES Systems, total Quality is not a "buzzword," it is the foundation of our business.

Exceptional Support

We know that you expect and deserve a quick response to your service or technical needs. Since all facets of our business are located in one facility, a single telephone call puts you in touch with the people who design, build and support your ACES Systems equipment. As an employee owned company, we understand the importance of customer satisfaction to our future.

Turbo Option is Standard on all 2020HR ProBalancer Analyzers

- 320x240 high resolution screen (up from 192x192)
- Full time adjustable contrast keys while analyzer is on
- True multiple-channel, simultaneous inputs
- Full graphic spectrum display with cursor and expanded-view feature
- Backlit easier to read white graphic LCD screen
- Design utilizes more surface mount technology (Fewer Components)
- Digital accuracy
- 5-year warranty
- Step-by-step propeller balance
- Programmable propeller balance influences
- Split weights to existing holes
- Helicopter magnitude and phase measurements
- Supports the use of multiple sensor types: tracker, strobe, phototach, lasetach and mag pickup
- User-defined and stored setups for repeated use
- Printouts of all jobs and setups
- Powered by internal NiMH battery pack and smart, fast charging circuit or ship's power
- Large, easy-to-read multiple-function keypad
- Compact, rugged design
- Maintains prior influences to compute one-shot balances

Model 2020HR ProBalancer Analyzer

Dynamic Balancing, Rotor Track and Balance, and Spectrum Analysis Made Fast, Simple, and Affordable

The ACES Systems Model 2020HR ProBalancer Analyzer combines the best features of previous ProBalancers with the spectrum analysis capabilities of our top-of-the-line ACES Analyzers. With its true, two-channel simultaneous inputs, the Model 2020HR makes performing twin engine propeller balancing a snap, as well as acquiring both vertical and lateral helicopter main rotor vibration measurements without switching channels.

The new high resolution screen with its easier to read, white LED backlite feature allows brighter, sharper, at-a-glance visuals. This ultra-efficient instrument, designed with direct input from customers, offers more functionality, accuracy, and speed of use than ever before.

The Model 2020HR ProBalancer Analyzer provides step-by-step on-screen instructions for performing propeller balancing, rotor track and balance measurements, and vibration surveys. Additionally, the user may extend the basic capabilities by defining and saving "setup information" for common procedures. These saved settings can be recalled later to provide on-screen setup information, consistent procedures, and one-shot balance solutions without the difficulty of configuring the unit and re-entering data each time you use it.

Complete information for balance jobs is stored in memory, eliminating the need for pen and paper. For helicopter rotors, track information may also be entered and stored with the conditions under which the data was collected. Once you complete a job, it is easy to print a summary of the job suitable for log book entry . The high capacity rechargeable battery and ship's power input permit you to operate indefinitely without downtime for changing or recharging the battery, thus increasing your productivity. The rugged construction, with its expanded ABS plastic case, continues the ACES Systems tradition of high quality, durable vibration test equipment for years of trouble-free operation.
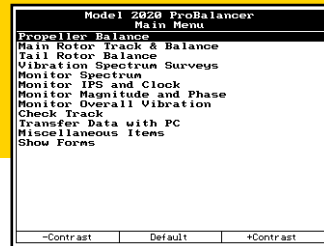
Creating better aviation maintenance solutions...

ACES SYSTEMS

The ACES Systems Model 2020HR ProBalancer Analyzer Simultaneous Data Input, Full Graphical Display, and Custom Setups for Easy, Detailed, Time-Efficient Vibration Analysis and Balancing

## Simple Menu Screens Step You Logically Through Functions

The Model 2020HR starts you off with an easy-to-understand menu. Simply pick what you want the analyzer balancer to do and press enter. Handy function keys just below the screen control common configuration changes so that you need not go into multi-layered menus to perform a minor task. The assignments of the function keys change as necessary with different screens to allow you to print, pause, continue, choose options, zoom, and do many other tasks.

## Graphically Displayed Data Aids In Quick Interpretation
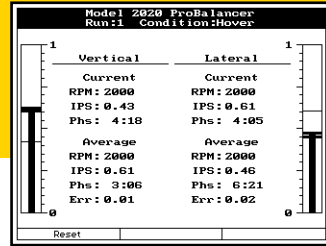
The full graphics capability of the Model 2020HR presents data in an easy-to-interpret format. As in the example screen, the IPS and clock functions appear in a "thermometer" format for easy viewing. Two channels are being acquired and displayed at the same time with independent IPS and Phase shown in both realtime and average. The analyzer even displays the percentage of error in the computation of the average. Pressing the F1 function key clears the running average and starts a new average.

Configurations Can Be Saved as Setups, Eliminating Repetitive Input
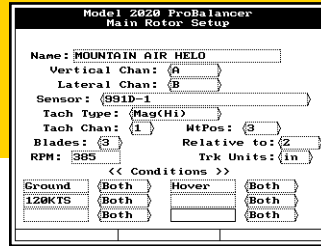
Configuration data such as the speed range, sensor requirements, and identification information can all be entered into a "Setup" and saved with a name such as "Mountain Air Helo." Later, if you need to analyze another Mountain Air Helo of the same configuration, you simply recall the saved Setup and begin the job. If a new configuration is needed, press the F1 function key and build a completely new setup. You can also make minor changes to a Setup, such as sensor type, with the edit function.

## Data Can Be Entered Manually or Automatically
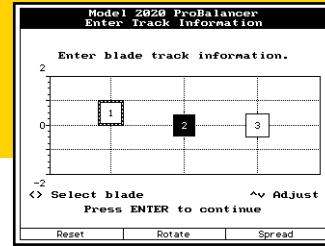
The track information screen, used in rotary wing applications, allows you to enter the blade track information manually, as shown in the example, from visual acquisition using a strobe, or it can be entered for you automatically by the optional Model 540-2 Optical Tracker System. This quick, "paperless" method of recording frees the user from data input.   The track information is recorded and can be printed or recalled for later pitch link or tab adjustments.

## Data Can Be Transferred to a PC for Storage
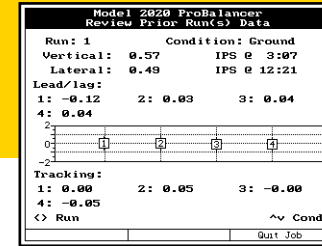
Each review screen contains all the information required to make adjustments to your job. The run number, condition, vibration amplitude/clock angle, and blade tracking information are recorded and readily available for viewing, printing, or storage with only a few keystrokes. Multiple jobs can be stored for various Setups for later review or reference. The data can also be transferred to a personal computer, enabling you to easily establish a database of the history of individual aircraft.

Stored Setups Speed You to a Solution
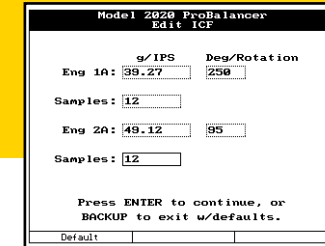
When you establish a Setup, you define the parameters of the balance job.The analyzer then "learns" about the setup and refines the information you supply. Influence coefficients are established either by manual entry or by the results of a balance job. The coefficient is stored with the Setup and is automatically recalled with the Setup the next time you choose it for a new balance job. What this means is, given the same Setup parameters on subsequent balance jobs, the 2020HR can give you a balance solution on the first run.

Data and Menu Functions Are Readily Accessible
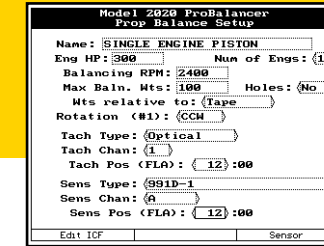
Should the information in the Setup change, for example the tachometer position, "Tach Pos (FLA)," then you can also edit the Setup to match that configuration. The ACES Systems Model 2020HR is so versatile it even remembers the frequency of use for all stored Setups and moves the Setups you use most often to the top of the selection list.   You can also edit existing setups to make an entirely new setup, for example changing a two-bladed prop to a 3-bladed prop which requires new ICFs.

## Multiple Sensors Can Be Configured and Saved
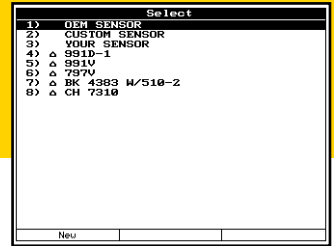
The ACES Systems Model 2020HR allows you to define a list of your sensors, which is then stored so you can change sensor types between jobs. The Model 2020HR stores all the information you need to balance, track, or perform vibration surveys on your entire fleet.

Ease of use is one of the Model 2020HR ProBalancer Analyzer's key features; operation is as simple as reading the screen and selecting what you want the 2020HR to do for you.

Multiple Channels Are Displayed at One Time, Facilitating Data Comparison

The ACES Systems Model 2020HR ProBalancer Analyzer's ability to display two channels at once allows you to perform front and rear engine vibration analysis or vertical and lateral analysis for rotary wing applications. Cursor functions allow you to examine detailed frequency data. Cursors are aligned on both spectra for direct on-screen comparison of similar operating frequencies between two engines. Options for plotting the X and Y coordinates and harmonic cursors are available for the display.
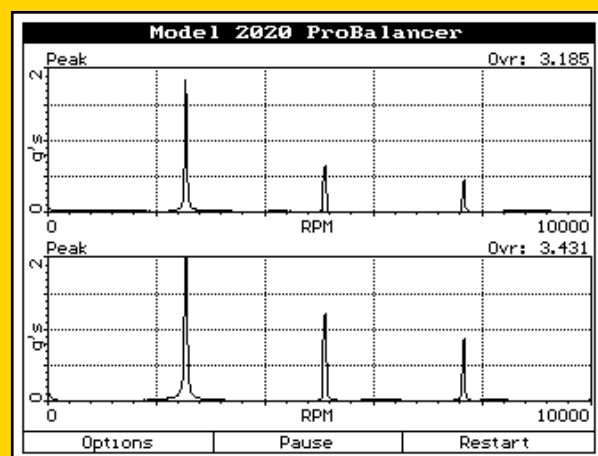
Graphical Display Shows Detail of All Frequencies in a Wide Range

The ACES Systems Model 2020HR ProBalancer Analyzer's illuminated graphical display gives you the ability to view all frequencies throughout a range, not just a few of them. You can view any frequency between 0 and 20,000 Hz by expanding the frequency axis for more detailed analysis. You can pause the display at any point for static viewing, move your view in even further, or print and save the screen for later analysis or for transfer to a PC for storage.