Frequency measurements mean a safe launch for Saturn. A pinpoint re-entry for Apollo. A man's life in Boston.

Shaking the life out of a Saturn V.

Imagine a vibrating platform like the one you stand on for a foot massage. Except this one's 50 feet by 50 feet. And on it stands a rocket over five stories tall. Yet this vibrating platform can shake the life out of a Saturn V launch vehicle. Some massage!

What the engineers would like to know are the critical vibration frequencies that could destroy a rocket at launch or in flight. Hewlett-Packard has just the instrument to make sense out of all the shakes and rattles.

With this same instrument, electronics engineers can perform more detailed circuit analyses, doctors can look closer at EKG and EEG signals, architects can probe building structures, physicists can dig deeper into nuclear magnetic resonance, and astronomers can minutely scan the noisy universe.

In the case of Saturn, the HP 5450A Fourier Analyzer can perform in seconds a complete vibration analysis, resolving all the component frequencies to display on a scope the power spectrum indicating any dangerous resonance. At the push of a button, it will convert the power spectral density function to the correlation function—using Fourier transforms.

The HP Fourier Analyzer can perform as a Power Spectrum Analyzer, a Correlator, an Averager, a Digital Filter, or you can select from a keyboard any combination of these functions. Using digital techniques and Fast Fourier Transform Algorithm you get the speed and versatility to perform Time Series Analysis up to 25 kHz. Since a straightforward keyboard is used for programming you don't have to be a digital computer expert. However, as a side benefit you do have the full computing power of a standard HP Model 2115A Computer whenever you call for it from the keyboard. System price is approximately $50,000, depending on options.

The full 5450A story, far more intriguing than just massaging Saturn V, is yours for the asking. Simply write for the 5450A Data Sheet and mention your application.

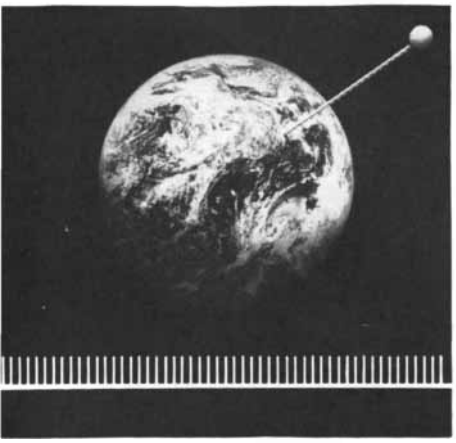
Apollo, journey into time and space—and back.

Apollo re-entry and splashdown precision is no happy accident; it stems from astronaut practice and skill—and, in part, HP dedication to microseconds of time.

Microseconds might seem irrelevant in week-long, million-mile space flights. But such precision timing is critical to mission success. It helps tracking-radars detect minute increments of Doppler shift caused by spacecraft movement—even at lunar distances—so as to determine the vehicle's speed precisely and to plot its position within feet. NASA's worldwide computer network, 15 land stations and 3 ships, depends on meticulously synchronized data exchange necessary for correlating the trajectory calculations. In the event of engine malfunction, behind the Moon or in deep space for example, such information would be vital in getting the astronauts safely back to Earth.

NASA's timing system was completely updated before Apollo 8 and played a vital role in the lunar orbit and subsequent Apollo experiments. Tracking stations in California, Spain and Australia were each equipped with a new primary frequency standard—the HP Precision Frequency Source (E02-5061A), keyed to an HP cesium clock. These primary references and their slaved rubidium and quartz standards were synchronized with a portable HP atomic clock that was flown on a pre-launch round-the-world trip.

If minute details—in time—govern your time- or frequency-dependent studies, write for HP Application Note 52, "Frequency and Time Standards," a 100-page



discussion of the practical aspects of their applications.

Hearts shouldn't lose their tempo undetected.

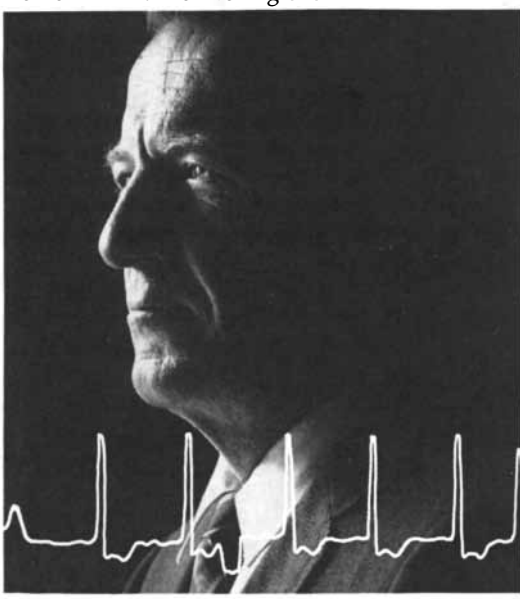
The chances of complete recovery for patients who have suffered a common type of heart attack called myocardial infarction are generally good. But complications after this trauma can greatly complicate the physician's job, to say nothing of threatening his patient's life. Some 40% of all fatalities in the hospital due to myocardial infarction are caused by arrhythmias—electrical disturbances within the heart causing irregularities in the beat such as speed-ups, pauses or double-beats.

Doctors know arrhythmias can often be successfully prevented by medication, but the usual coronary instrument alerts the doctor only when a serious arrhythmia is in process. Again, doctors know that major arrhythmias—the potentially fatal ones—are almost always preceded by less dangerous ones. The problem is to detect these small irregularities.

Since monitoring for medicine is part of Hewlett-Packard's business, we've been searching for a means to help doctors detect smaller arrhythmias, to give them a head start on treating major ones. The new 7822A Arrhythmia Monitor is such a means. When inserted into a patient monitoring system, it measures a pattern of heart signals that the physician establishes as "normal" for a particular patient. Characteristics of this "normal" pattern are stored in the instrument's memory, and each subsequent beat is compared to it instantaneously.

Beats which are abnormal as compared with this stored "normal" are classed as ectopic or out-of-place. The number of these beats occurring in a given time period is numbered and recorded so that the doctor can assess the success of drug treatment. Any excessive ectopic activity will trigger alarms to indicate a more serious condition.

This "extra ounce" of prevention can make monitoring even



more effective toward achieving a complete recovery from myocardial infarction. If you would like a definitive description of this new instrument, drop us a note asking for publication No. 7822A. We'll also send you our pamphlet, "How Patients are Helped by Intensive Care Monitoring."

If measurement of frequency isn't of personal concern to you, let us know how we can help you—in measurement, analysis or computation. Hewlett-Packard, 1505 Page Mill Road, Palo Alto, Calif. 94304; Europe: 1217 Meyrin-Geneva, Switzerland.

HEWLETT hp PACKARD

Measurement, Analysis and Computation

00904