Dr. CACERES. This device samples the continuous EKG waveform 500 times per second. Each sample is thus tagged so that a computer program can identify the peaks and valleys of the wave complex. A method to determine the amplitudes and durations of the P, Q, R, S, and T waves, as used in present-day electrocardiography, has been programed into many thousand individual instructions.

Each lead is monitored for several seconds. Within 15 seconds after the computer has recognized the waveforms of all the leads, it associates the values and can print out an interpretation, such as the physician would receive from an electrocardiographer.

Storage of the processed data for later retrieval for comparison, followup, or statistical analysis can also be made from the processed data stored on digital magnetic tape. Within a few seconds, results can be fully processed and returned to the physician or to the hospital.

High-speed teletype machines and printers, which make out reports for delivery by wire, can also serve in situations where rapid screening of large numbers of people is necessary.

With this routine processing system, the Public Health Service has established less than 1 percent error in the computer system. This is far less than any human system can possibly produce. There is a high agreement between cardiologists and computer interpretations. Moreover the computer helps the physician avoid missing any significant data.

The field trials conducted by the heart disease control program have been highly successful. Forty thousand electrocardiograms were processed in the first year of routine operation, using only one-third of the system's capability. For example, computer-analyzed electrocardiograms have been routinely employed for the past 2 years at the Hartford Hospital.

Records are processed in the evening and are available routinely at the hospital the following morning.

Two-step exercise tests and continuous recordings will be analyzed, as well. Our computer system is being programed for these, to take advantage of the information obtained through post-exercise electrocardiography.

In the future computer analysis programs will also utilize other physiological data, such as the respiratory test, blood vessel volume changes, brain waves, and heart sounds.

The computer system of the future can make complete electrocardiography service available full time in nursing homes, where the EKG can be recorded on tape for transmission to a computer center or in a patient's home while he is on home care.

With the increasing sophistication of telephone technology, signals can be transmitted through specialized analog data-telephone transmitters. A small, portable electrocardiograph machine used with a telephone interface developed by Bell Telephone employs any conventional telephone in transmitting the cardiographic signal. By simply dialing a special number, the sender can transmit the signal to a predetermined computer center for recording and analysis.

We have successfully transmitted electrocardiograms from France to Washington, D.C., for computer analysis and immediate return, using telephone, RCA communications, and satellite transmission.