Title: LOW-COST MICROCOMPUTER GENERATION OF PHYSIOLOGIC PROFILE

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Introduction. Inexpensive microcomputer systems are rapidly becoming an integral part of medical practice. At CMGH we have developed a system designed to input patient information and calculate parameters frequently utilized in the assessment of cardiopulmonary disorders. The computer programs were specifically designed to interact with the user, and thereby enable usage by personnel without specialized computer training. After initial program loading, the computer leads the user through the program, offering and explaining options. Proficiency at using the programs can be developed in minutes.

Methods. The subsystems utilized here are commercially available and were purchased for under $3000. Current cost is even less. Individual components and costs are as follows: Apple II Microcomputer with 32K bytes of memory - $1345, Disk II floppy disk data storage subsystem (with controller) - $595, Applesoft (extended precision, floating point, basic language) firmware ROM - $200, parallel printer interface card - $180, printer - $300, RF modulator + black and white TV monitor - $130 (prices quoted as of 4/25/79). The software was not developed by a programmer, but by an individual with minimal prior programming experience. Programming skills were developed using only the supplied basic manuals, occasional assistance of the vendor, and perseverance.

Results. The computer will calculate all parameters that are obtainable from the given input data. The user, with sufficient input, can obtain a complete physiologic profile including Cardiac Index, Stroke Index, Left Ventricular Stroke Work Index, Right Ventricular Stroke Work Index, Total Peripheral Resistance, Pulmonary Vascular Resistance, Deadspace, Shunt, O2 Consumption, O2 Availability, O2 Extraction Ratio etc. The output consists of both the input values and the derived parameters. Four choices of output are available: TV, hardcopy (printer), hardcopy cumulative patient summary, and bar graphs on the TV screen or in hardcopy form. The neat appearance of the printouts (9½ x 11 in. size) makes them acceptable for inclusion in patient's charts (Fig. 1). When the hardcopy cumulative summary is selected, a disk file is automatically initiated under the particular patient's name and hospital number. All of the information, both input and calculated is then stored and remains accessible for future recall. These data can later be incorporated in the patient's cumulative summary or utilized for research and statistical purposes. Bar graphs are available for quick analysis of cardiopulmonary parameters at the bedside or in the operating room (Fig. 2). The software permits use of the system as an educational tool. If the user wants to obtain a particular calculated parameter and does not know what input data are required, a separate, easily accessible program on the same disk provides this information. The equations utilized in the calculations can also be displayed with this subpro-

(Fig. 1) Portions of input and output data from cumulative patient summary—same format as used in cumulative chemistry and pathology reports at CMGH.

(Fig. 2) Representative TV monitor output of bar graphs for quick analysis of cardiopulmonary parameters.