

# **The Role of Microprocessor-based Terminals in Computer Interpretation of ECG's: The View of Management**



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## **ABSTRACT**

This paper discusses management considerations in the utilization of microcomputers in a new product design. Topics to be discussed include cost considerations in applying a new technology; dealing with development costs; and cost effectiveness of microprocessor utilization.

## **SUMMARY**

In this case study, the solution to the management defined problem of a “designed-to-cost” project was the application of a microprocessor. The solution was so effective that we were able to build a company upon it, which it appears will be an outstanding success story.

The product is an Electrocardiograph (ECG) Terminal for telephone transmission and computer interpretation. This terminal is similar to those built by several other manufacturers for hospital use but is tailored to the low volume user instead; e.g. a doctor in his office.

From a management standpoint, to understand why this terminal-and why we built the company around it, you need a little background on the market. The market for computer interpreted electrocardiograms is large and growing because of critical medical needs, A recent government study indicates that by 1980 there will be over 180 million electrocardiograms taken annually in this country, and there are enough cardiologists to read only 50 million of these. Computer interpretation of electrocardiograms is already a big business. Of last year's slightly over 100 million electrocardiograms, about 10% were computer interpreted. These were, however, predominantly hospital ECG's which were overread by cardiologists or internists.

Two major impediments have existed for some time to expansion of computer interpreted electrocardiograms to primary care physicians, clinics and small users; as opposed to large hospitals, These are:

- a.) the high cost of the terminal equipment which limits the cost effectiveness of the system to small user, and
- b.) existing computer interpretive programs are aimed primarily at large hospitals with a high percentage of patients with cardiac problems.

Comp-U-Med's approach to satisfy this developing medical need, and build a major new company, was to develop a low cost terminal for primary care physicians, clinics, and other small end users; and to establish a system oriented for this segment of the medical community by using existing computer systems and software. The result, thanks to microprocessor application, is a low-cost line of computer coupled ECG terminals ranging in price from as low as \$1,750 to \$4,000.

The major requirements imposed upon the terminal design are in the following areas;

- a. Safety Requirements - Underwriters Laboratory Specification #544
- b. ECG Performance Requirements-American Hospital Association Specifications.
- c. Telephone Line Transmission Standards
- d. Computer Compatibility-interface and communications protocol
- e. Human Factors for the intended environment-interactive system with the ECG technician.
- f. Low Non-recurring Costs-very limited funds available to a new start-up company
- g. Low Recurring Costs-to meet cost objectives of a terminal affordable by low volume users.

The end result was a very successful development program which resulted in the microprocessor driven Comp-U-Med Computer ECG Terminal which is discussed in paper number 2.