

# Developments in Business Simulation & Experiential Exercises, Volume 8, 1981

## MICROCOMPUTERS AND RELATED TECHNOLOGY FOR SIMULATION GAMING

J. Ronald Frazer, Clarkson College

The increasing power of micro computers, coupled with their steadily decreasing cost in a period of serious inflation, has meant that many things that could not be considered only a few years ago are now quite realistic options for simulation gaming activities. However, quoting the latest developments and the latest prices is almost impossible, both because the field is so dynamic and because it is very difficult to compare what various manufacturers are offering. The more limited goal of this paper is to give the results of investigations in recent years, what equipment we have acquired, some feeling for approximate costs and something of the advantages and problems that go along with it.

First, some idea of what Clarkson is doing in simulation gaming and how we use the equipment would help to give the setting for the decisions we have made. Clarkson has been active in simulation gaming for over 20 years with a laboratory for simulation gaming constructed in 1960. Our first simulation gaming experiences were simple hand-umpired games and the success with them was particularly gratifying, although the time required for hand umpiring and the inevitable calculation errors did tend to detract. As we acquired computer facilities we converted to more complex games with batch-umpiring on a computer, with students spending a full fifty minutes to make a set of decisions for which they received the results a day or two later. The delay in securing results did take away from the excitement and involvement we had experienced in the simpler hand-umpired games. Thus with the availability of online computing through time-sharing we began experimenting with games of medium complexity and returning results only short minutes after decisions were in. Success with this led us to convert to all on-line games and we have been operating our simulation gaming courses in this mode for nearly ten years.

For most of this time we used a variety of time sharing computers accessed via telephone connections through a modem to a terminal in our laboratory, with the terminal for many of the early years being a teletype printing at a rate of about 10 characters a second. The computers used included an IBM 360 using ROSCUE as the monitor, a PDP8E, and General Electric's time-sharing service Out of Cleveland. To one degree or another, all of the systems, while giving what in our opinion was a vastly superior product to our old batch-style operation, suffered from the same problems. These included

1. Computer unavailability due to crashes.
2. Computer unavailability due to no lines available.
3. Computer unavailability due to administratively ordained down-time for maintenance or other activities
4. Unexplained blips due to communicator, line noise.
5. Slow response in periods of peak activity.

These problems meant that, for the sort of class use we were making, it was imperative that we have a backup system to avoid drastically short-changing the students enrolled in the course. Even with a back-up system, keeping the rate of failure to complete a simulation in the prescribed period down to 2 or 3% was the most we could reasonably expect. In addition to this, the relatively slow response rate in periods of peak use coupled with the relatively slow terminal speed and our own self-imposed standards of an approximate two-minute period from all decisions in until all results delivered meant that our results sheets had to be fairly drastically curtailed. Some four years ago we acquired a DECWRITER-11 at a cost of approximately \$1400 that

had three times the speed of the teletype, and this gave the sort of flexibility we felt we needed while maintaining our standard of quick response. Very recently we acquired a DECWRITER-III at a cost of some \$2300 that operates at six times the speed of the DECWRITER-I I, making possible quite elaborate results sheets, but we have not as yet felt the need for this speed in our activities and the DECWRITER-III is being used exclusively for MIS-related activities rather than simulation gaming.

About a year ago we purchased a NORTH STAR HORIZON II micro computer with 32K of memory, double density, and two disk drives at a cost of \$2400 complete with a supply of floppy disks. This has been an unqualified success, with effectively more power than the other systems simply because we no longer have to time share, and virtually eliminating all of the problems with time sharing previously enumerated. In a year of operation, we have never failed to complete a simulation due to computer failure and we no longer feel the need for a back-up computer. The computer is completely portable and eliminates all telephone communication problems, there is never any question about computer availability, and we can go from power on to program running in less than a minute.

The BASIC language supplied with the computer is also a pleasure to work with because of the availability of FORMATTED output that eliminates the biggest problem we experienced in converting from FORTRAN to BASIC. All in all, the system of a micro computer and terminal at a cost of less than \$4000 provides a most satisfactory computer setup for on-line umpiring of simulation gaming.

We also use a number of games that call for TV output of results so that all students can see one set of data immediately and permits games such as our inventory simulation to be run for some 50 decision-making opportunities in just a little over an hour. Games like this provide a different experience with simulation gaming and are well worth while as a supplement to the more traditional environment of segregated teams. We use a DIGILOG TELECOMPUTER terminal for this purpose-- as well as for teaching programming--and purchased a second one in 1979 complete with small monitor and traveling case for \$1600. Add to this two large TV monitors for \$900 and you have a \$2500 additional investment to provide a TV option.

One word of warning concerns the desirability of having someone with some electronic technician capability available. Our micro was delivered set at 9600 baud and our technician easily converted it to both the 300 and 110 that we needed, but I would not have been able to do this myself. Similarly, our TV setup required the appropriate connectors to get it running as desired and this would have been a challenge without the technician available.