Apple to Earth

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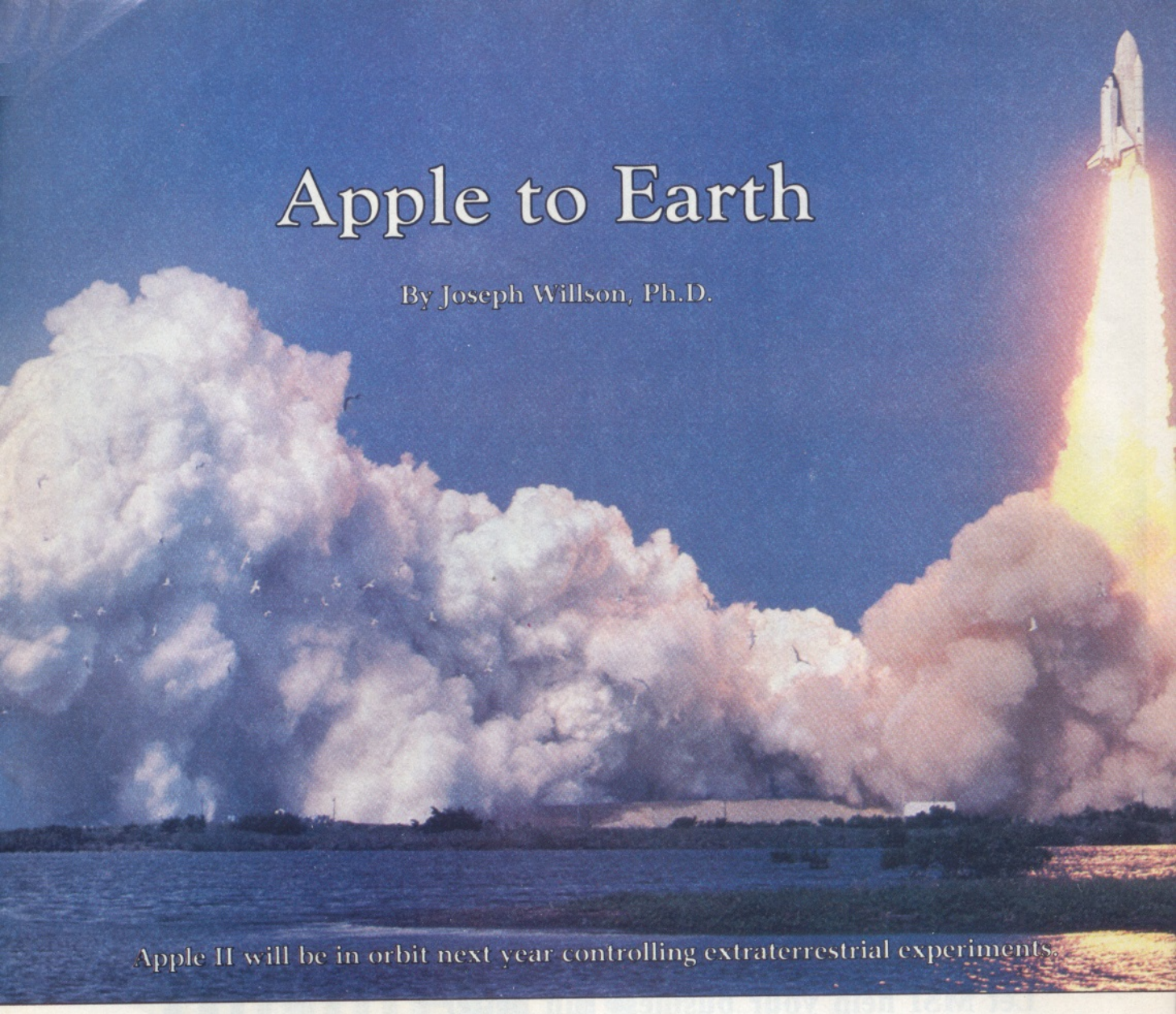

Apple II will be in orbit next year controlling extraterrestrial experiments.

When a sunflower sprouts and begins to grow, it doesn't simply push its way straight up out of the soil—it moves in a spiral.

This process, called circumnutation, is common to many plants, and nobody is quite certain why. But researchers hope to get a better idea next year with Spacelab, a joint project of NASA and the European Space Agency. This compact laboratory will be carried into space by NASA's Space Shuttle. And on board, helping to control the experiment, will be an Apple II.

The story began in 1977 in the laboratory of University of Pennsylvania biologist Dr. Allan Brown. Brown is one of many scientists studying what factors affect plant growth. In particular, why do so many plants follow a helical path? Is it just an extraneous bit of behavior which entered by accident into the evolutionary process, or does it serve a purpose? How much do the forces of gravity come into play?

Brown focused his attention on the effects of gravity. But the study of gravity presents a problem in the lab. While a scientist can change the direction of the g-force by rotating the plant, he can never completely eliminate gravity itself.

It became clear that experiments had to be done somewhere other than in an Earthbound laboratory. NASA looked at the problem and agreed that this was, indeed, a prime example of an experiment which needed to be done in space. But one problem presented itself. Brown's experiment would require a precision centrifuge, video cameras and recorders, lighting, temperature regulation, and controlling electronics and instruments, and it would have to be condensed into a miniature self-sufficient package about 2×2×6 feet.

So the University asked Interactive Structures, Inc. of Bala Cynwyd, PA, to design, develop and build an experiment controller which would manage every aspect of a seven-day experiment aboard the shuttle.

Old Tech, New Tech

The conservative approach to development of experiment controllers and instrumentation in 1977 was to design custom circuit boards for the timing, control and measurement circuits, and to provide a generous helping of trimming adjustments and

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