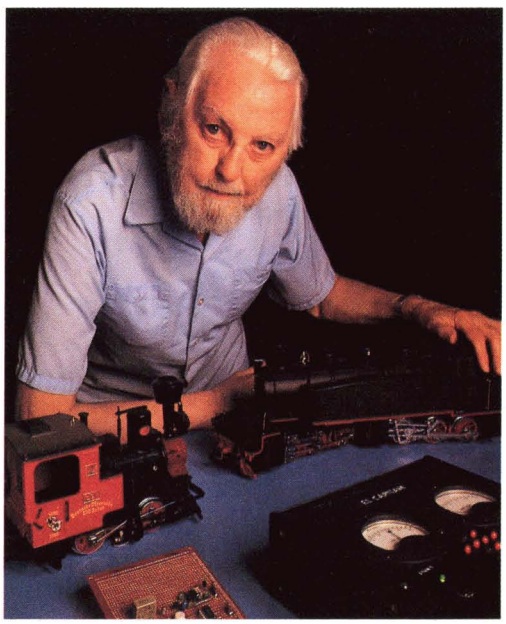
Consumer/Home/Recreation

Museum Exhibit

A NASA technical report provided a solution to a museum's problem

NASA Tech Briefs is a publication intended to tell what new technologies are available to potential users. Sometimes a *Tech Briefs* notice provides a lead that eventually produces a spinoff product or service of considerable economic value. In many other cases the publication serves as a current awareness medium or problem solving tool. Such uses may individually provide only small economic gain but they offer better ways of doing things and in the aggregate — with 120,000 follow-up requests annually — they represent a very significant benefit.

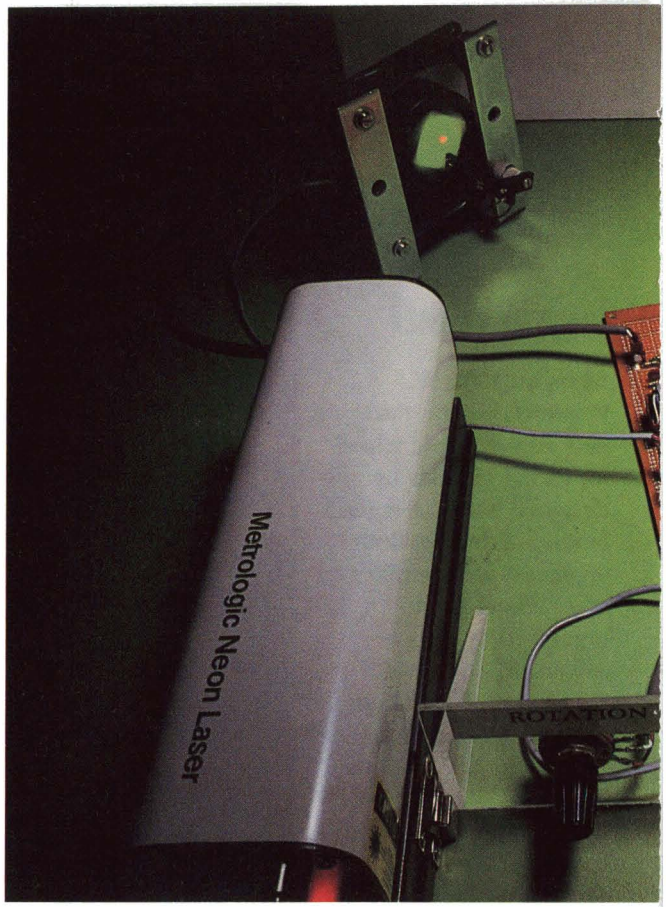
An example of a problem solved through a *Tech Briefs* lead is the experience of the Miami (Florida) Museum of Science and Space Transit Planetarium. Supported by private and corporate donations, the Museum is a private non-profit institution dedicated to promoting scientific literacy by providing an interesting, non-threatening environment for science, learning and exploration.

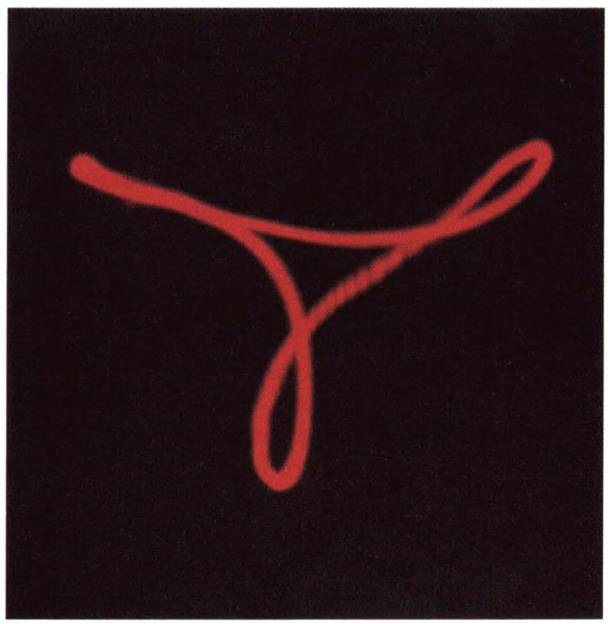


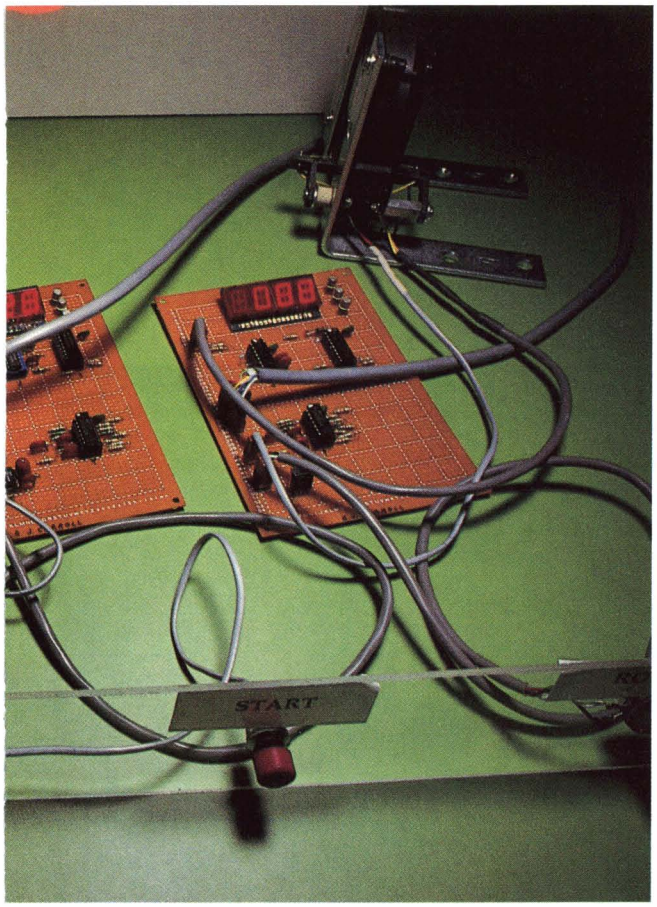
Most Christmas seasons since 1985, the Museum has set up an exhibition of model trains "for youngsters from four to fourscore," to quote Edward J. Carroll, M.D., Head of the Electronics Lab, and Victor J. Vincent, Director of Exhibits, who jointly reported the successful problem solution. The exhibition consists of three large scale trains, each with its own hands-on, child operated control panel. Each panel contains stop and start buttons, a speed control knob and meters to show the volts and amperes used.

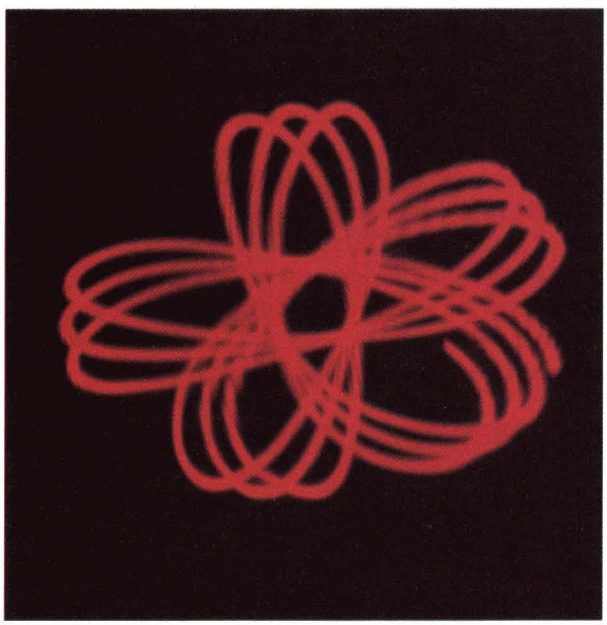
The Museum's problem stemmed from the fact that the original system employed a straight direct current voltage control, zero to 20 volts. With that type of control, the motor had little torque at low voltage; when the operator tried to start it, the train would not move until the voltage was raised high enough, then it would start with a jerk.

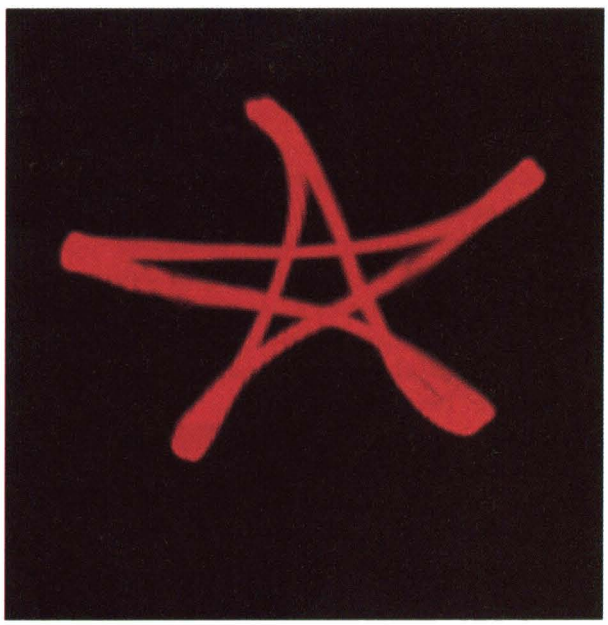
Seeking a solution, Dr. Carroll read a *Tech Briefs* article describing a development at Marshall Space Flight Center called a Pulse Width Control (PWC) that seemed to be the answer to the train problem. He borrowed the circuit blueprinted in *Tech Briefs* and duplicated it for the train exhibition; Dr. Carroll is shown **at left** with the PWC board (foreground) and the train control unit (black). The Museum's control box now uses a full 20 volts at all times, divided into about 1000 pulses a second. The pulses can vary from zero width (no power) to full width (full power). That makes it possible to start a train slowly and smoothly and to run it at low speed. The NASA technology provided two other advantages:











NASA technology offered advantages in lower exhibit construction cost and reduced maintenance

the PWC is less expensive to construct and is easier on train motors, reducing maintenance costs.

Another hands-on exhibit uses the NASA Pulse Width Control technology. A touch of a button starts a laser beam, which reflects from one rotating mirror to another, then to a screen. The operator can produce an assortment of geometric and Lissajous figures, determined by the offset of each mirror and by the relative speed of the mirrors. Each mirror has its own control knob and a three-digit speed indicator; a PWC circuit provides low speed control of the mirrors. In **the upper photo** are the PWC controls; **the lower photos** show examples of the infinite number of shapes that can be created by changing the speed of one rotating mirror, then the other.

Dr. Carroll and Vincent reported that the Museum will be using a great deal more NASA technology: "Our files now hold 11 Technical Support Packages (detailed amplifications of *Tech Briefs* reports) waiting to be used in future exhibits. The information we obtain from NASA helps us create effective, reliable teaching tools for science."