makeup of the production staff itself, which counts among its ranks alumni from programs like "Nova" and "Space Age."

"We're all big space enthusiasts," says Ross. "We're not just on the show because that's what the channel happens to be doing. We're kind of nuts about the subject."

—Mark Strauss

Light Engine

Come on, we all did it—used a mirror to focus the Sun's energy into a searing pinpoint of light. Nothing could withstand that intense power—not paper, not wood, not even...bugs. Now it looks like that simple childhood experiment could provide a potent, cost-effective power source for Space Station Freedom by the turn of the century.

In NASA-speak the system is referred to as a "solar dynamic power system." Engineers estimate this power system would be four times more efficient than solar panels and could save the space agency more than $3.3 billion over the 30-year lifetime of the proposed space station. NASA has provided $18 million over a 44-month period to a team of five companies—headed by Garrett Fluid Systems of Tempe, Arizona—to design and test a scaled-down version of the power unit.

With a completion date set for the late 1990s, the system could one day replace Space Station Freedom's light-gathering solar panels. Photovoltaic cells passively collect solar energy and convert it to electricity. The solar dynamic power system, on the other hand, functions much like a steam engine or jet engine. A 60-foot-diameter concave mirror focuses the Sun's energy directly into a receiving chamber lined with 82 tubes filled with a helium-xenon gas mixture. Helium carries heat well, says Bill Harper, chief engineer of space power for Garrett, although the gas is too light to be compressed effectively. However, by combining helium with the heavier gas, xenon, the mixture becomes about as thick as the air we breathe and is easily pressurized.

With solar dynamic power, the Sun heats the gas and causes it to move through the engine and past the turbines. The turbines spin on a single axis with an alternator that produces electricity. The hot gas then moves to a recuperator, which strips excess heat from the mixture. After being repressurized, the gas begins the cycle again, while the excess heat is allowed to radiate into space. The whole system is hermetically sealed. The gas constantly circulates through the engine and does not leak into space, which adds to the system's expected lifetime.

As the space station's power requirements increase, several of the units will be placed on a boom where they will be allowed to track the Sun. One of the biggest advantages, however, is the relatively small surface area that solar dynamic power requires. "The system is much more efficient and at the same time has lower drag than photovoltaic cells," Harper says. Drag becomes an important factor in low Earth orbit, especially if the station has to be reboosted often. Although the atmosphere is nearly nonexistent at the station's altitude, the large solar panels do slow the space station and cause it to fall toward Earth. If left unchecked, the space station would re-enter and burn up, like its predecessor Skylab.

Another big difference is the solar dynamic power system's ability to operate in the Earth's shadow. With a solar cell system, astronauts would rely on heavy batteries to provide power during the eclipse phase of the orbit. Garrett's system uses a phase-change salt stored in pockets lining the main chamber. The material melts while the system is operating in sunlight. While in shadow the salt, still warm like asphalt at night, maintains the temperature needed to drive the gas through the turbine.

The whole process is still in the planning stages, Harper says. Before any part is shipped to the space station, a scaled-down version operating at only two kilowatts will be tested in an experimental tank at NASA's Lewis Research Center in Cleveland, Ohio. If the test succeeds, NASA may one day place a 25-kilowatt solar dynamic system on the space station to replace the craft's enormous solar panels.

—John R. Williams

Galactic Events

FEBRUARY 23-25—San Antonio, Texas. "First Annual Wireless Power Transmission Conference." Organized by NASA Center for Space Power, Texas A&M University System. Forum to discuss applications/markets for beamed power (terrestrial utility power to remote sites, intercontinentally; high altitude aircraft as regional communications, surveillance, remote sensing platform; laser power from Earth to illuminate satellite photovoltaics, electric propulsion), societal/business considerations, environmental issues. Targeted audience of customers, users, funding sources, investors, decision makers, business/market development, regulators, environmentalists, technologists, technology transfer. Objective to encourage "strategic partnerships" to commercialize wireless power technology. Call (409) 845-8768 for program.

APRIL 27-30—Cocoa Beach, Florida. "Thirtieth Space Congress." Sponsored by the Canaveral Council of Technical Societies, the conference will include speeches by several of the leading names in America's commercial, defense and civil space programs, paper presentations and exhibits by major aerospace contractors. For additional information, call Chuck Morley at (407) 727-5689.