

Spinoff

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NASA





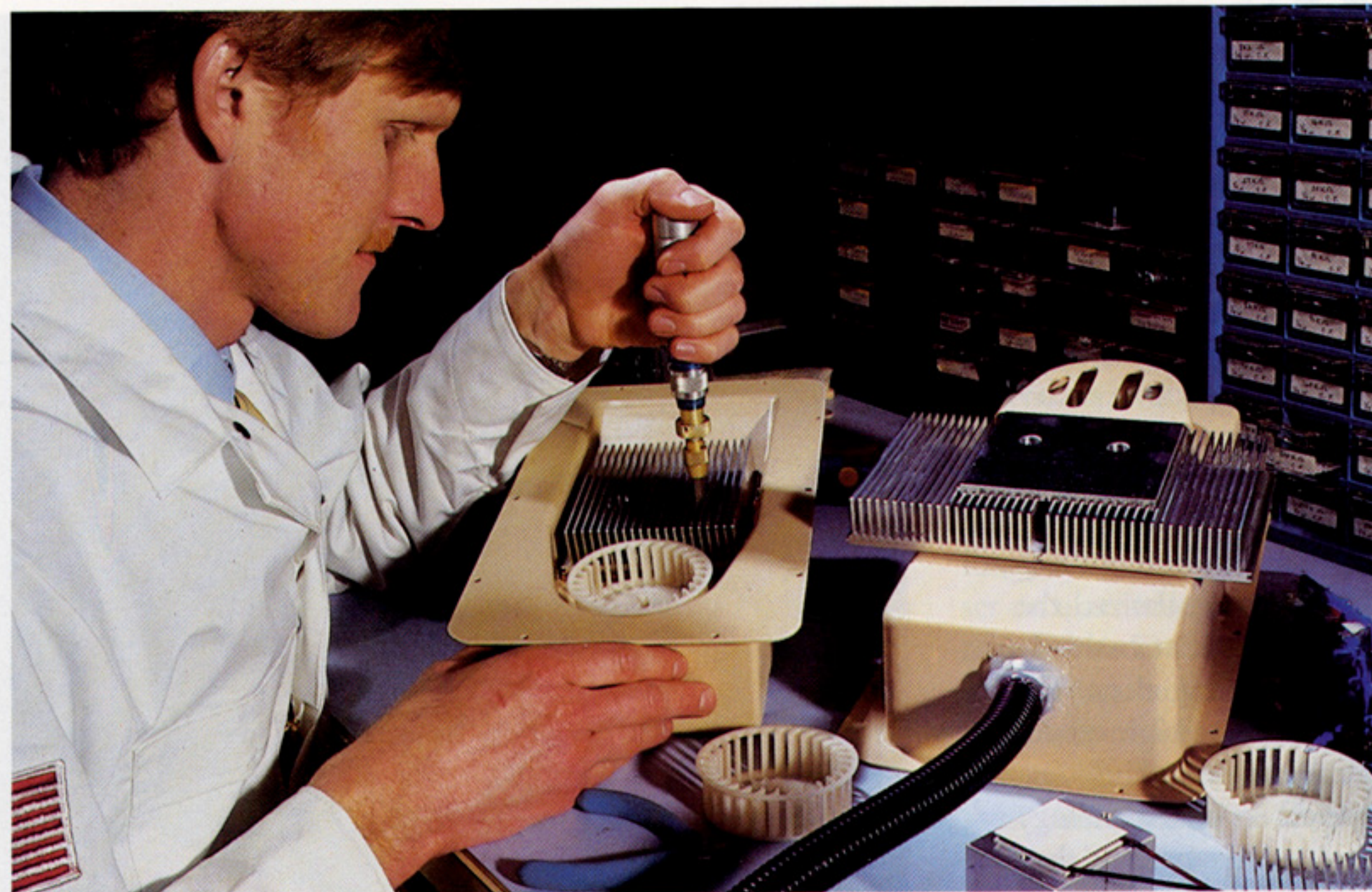
## Thermoelectric Products

**S**hown below is an office use high purity water delivery system with a two cubic foot thermoelectric refrigerator. Manufactured by United States Thermoelectric (UST), Chico, California, it is one of a line of UST products based in part on NASA thermo-



electric technology. Among the company's products are portable heating and refrigeration units called precision temperature chambers (PTC), commercial versions of systems developed for use in spacecraft under contract to Ames Research Center.

Instead of the bulky coils and compressors used in conventional refrigeration systems, UST design engineers drew on thermoelectric technology. UST's precision temperature chambers (PTCs) feature small thermoelectric modules that measure not much more than one square inch and operate on a unique phenomenon of heat exchange: when electric current flows through special-



ized metallic crystals, heat is produced, and when the current direction is reversed, cooling is produced. At right above an engineer is inspecting a thermoelectric assembly.

PTCs have been used in medical and scientific applications. Powered by the battery of an auto or airplane, they offer a typical temperature range of 35 to 150 degrees Fahrenheit; a digital keypad or a thumbwheel switch offers temperature selection in one degree increments. UST's chambers can refrigerate for up to 48 hours on a single charge powered by a 16-ounce battery pack.

As the company's name indicates, UST specializes in

R&D focused on creation of proprietary thermoelectric systems for consumer, commercial, industrial and aerospace use. Products include heating and cooling systems, power generators and thermoelectric systems operated by solar power sources. UST chief executive officer and general manager James M. Kerner states that his company has benefited from NASA technology in several areas. NASA crystal growth technology has proved valuable. In designing advanced thermoelectric power generation systems, UST employs NASA technology developed for the radioisotope thermoelectric generators aboard several long duration space-

craft. The company also benefits from NASA solar power technology.

Other UST products include thermoelectric solar driven refrigerators; a Third World refrigerator that can operate on very low power or on solar power; a Refrigeration Conversion Module that can convert any insulated container into a refrigerator; and several types of PTCs. Scheduled for release this year or early in 1989 is an Undercounter Water Delivery System for the home that delivers purified hot and cold water to the household sink at the touch of an electronic faucet. ▲