

ficult. This innovation has the following advantages. It minimizes the length/mass of the heater harness between the heater controllers and heater circuits. It reduces the problem of routing and accommodating the harness on the FMA.

It reduces the risk of X-ray attenuation caused by the heater harness. Its adjustable set point capability eliminates the need for survival heater circuits. The operating mode heater circuits can also be used as survival heater circuits.

In the non-operating mode, a lower set point is used.

*This work was done by Michael Choi of Goddard Space Flight Center. Further information is contained in a TSP (see page 1). GSC-16380-1*

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## Waterless Clothes-Cleaning Machine

**This machine can be used wherever water is at a premium, or to minimize washing with water.**

*Lyndon B. Johnson Space Center, Houston, Texas*

A waterless clothes-cleaning machine has been developed that removes loose particulates and deodorizes dirty laundry with regenerative chemical processes to make the clothes more comfortable to wear and have a fresher smell. This system was initially developed for use in zero-g, but could be altered for 1-g environments where water or other resources are scarce. Some of these processes include, but are not limited to, airflow, filtration, ozone generation, heat, ultraviolet light, and photocatalytic titanium oxide.

The machine has a chamber large enough to contain and agitate several articles of clothing, as well as a self-sealing door for insertion and removal of the clothing. The agitation and removal of particulate and volatiles in the clothes is done by airflow and some kind of agitation mechanism, possibly by rotating the chamber and/or alter-

nating airflow and/or heater panels for the zero-g environment. Agitation in 1-g could be done with tumbling. One of the main purposes of the airflow is to remove particulate from the clothing and to deposit it into a filter where the particulate can be removed from the filter at the end of the cycle. This airflow can also carry ozone into the chamber to penetrate into the clothing to kill off bacteria and break down odorizing proteins or other organics. The chamber can also contain an ultraviolet light source to expose the agitating clothes to bacteria-killing wavelengths of light. This light source could also expose a photocatalytic material such as titanium oxide, embedded coated on the interior of the chamber walls or on agitation mechanisms, to energies that would produce hydroxyl ions from the chamber humidity to aid in the removal of organic compounds from the cloth.

Heat could be introduced into the clothing chamber either by heating the airflow or by heating the clothing chamber directly using electrical heater strips on the chamber walls. The heat would aid in the killing of bacteria, breaking down proteins, and evaporating volatiles from the clothes. The airflow for this system could either be completely recycled back through the system or vented out, depending on the needs of the clothes cleaner's surrounding environment. Airflow, ozone, UV light, and the heat can be controlled independently so each can be turned on or off without affecting the others to allow for the needs of the specific type of clothing or different types of soiling on the clothes.

*This work was done by Glenn Johnson and Shane Ganske of United Space Alliance for Johnson Space Center. Further information is contained in a TSP (see page 1). MSC-25280-1*

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## Integrated Electrical Wire Insulation Repair System

*John F. Kennedy Space Center, Florida*

An integrated system tool will allow a technician to easily and quickly repair damaged high-performance electrical wire insulation in the field. Low-melt polyimides have been developed that can be processed into thin films that work well in the repair of damaged polyimide or fluoropolymer insulated electrical wiring. Such thin films can be used in wire insulation repairs by affixing a film of this low-melt polyimide to the damaged wire, and heating the film to

effect melting, flow, and cure of the film. The resulting repair is robust, lightweight, and small in volume. The heating of this repair film is accomplished with the use of a common electrical soldering tool that has been modified with a special head or tip that can accommodate the size of wire being repaired.

This repair method can furthermore be simplified for the repair technician by providing replaceable or disposable soldering tool heads that have repair

film already "loaded" and ready for use. The soldering tool heating device can also be equipped with a battery power supply that will allow its use in areas where plug-in current is not available.

*This work was done by Martha Williams of Kennedy Space Center and Scott Jolley, Tracy Gibson, and Steven Parks of ASRC Aerospace Corporation. For more information, contact the Kennedy Space Center Innovative Partnerships Office at 321-867-5033. KSC-13193*