X12.03  Exploration Medical Capability

On-board clinical diagnostics to monitor crew member physiology must be available for both mid-term lunar and long-term Mars exploration missions. As in terrestrial medicine, devices with which to measure multiple constituents of small volume samples of bodily fluids are crucial components in assessing astronaut health. Nevertheless, mass, space, and power requirements of such devices are an obvious concern in an environment with scarce resources. Miniaturized laboratory analysis sensors represent a potential solution, given that these devices and supporting hardware are designed to be small, lightweight, and require little power. However, current sensor cartridges are typically single-use with limited shelf life. In order to satisfy the needs of longer duration exploration missions, reusable laboratory analysis sensors with increased shelf life must be designed without compromising accuracy or sensitivity. NASA seeks proposals for developing such reusable laboratory analysis sensors for measuring complete blood count with differential. Both the actual chips and associated electronics should minimize the use of electrical power and be as small as possible. Research should be conducted to demonstrate technical feasibility during Phase 1 and show a path toward a Phase 2 breadboard demonstration.