Better physician's 'black bags'

Engineers at JPL proposed a solution to the blood-celI-freezing problem, first identified by the research team during discussions with the National Cancer Institute. JPL's solution utilized a special electronic circuit developed for precise temperature control of the cells themselves. A thermocouple placed against a polyethylene container relays temperature data to an electronics system, which in turn controls small heaters located outside of the container. The heaters allow liquid nitrogen to circulate at a constant temperature, maintaining a consistent freezing rate. Freezing white blood cells is important in leukemia work. There are more than 80 types of white blood cells, making patient-matching difficult. Storing unfrozen white blood cells is only a few hours.

The Goddard freezer, which was delivered last year to the cancer institute, can freeze up to 220 ml of white blood cells in one hour. Animal bone marrow also is being frozen by the unit for transplant research. Results so far are encouraging.
Portable medical status system—a highly advanced physician's "black bag"—weighs less than 30 lbs, yet contains equipment for monitoring and recording vital signs, electrocardiograms, and electroencephalograms. "Black bag" is outgrowth of astronaut-monitoring technology.

crystal displays are used to present 15 digits of data simultaneously for long periods of time without excessive use of battery power. A single printed-circuit card contains all the circuitry required to measure and display vital signs such as heart and respiration rate, temperature, and blood pressure.

So far the unit measures 7 x 22 x 14 inches and weighs less than 30 lbs. It will be field-tested this year, even as efforts continue to reduce the size further.