LEC SYSTEM DEVELOPMENT

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LaJet Energy Company ("LEC") entered the solar energy business in early 1978 funded by its then parent company, LaJet, Inc. The first goal of LEC was to identify a viable solar product that had long-term commercial application. After making an economic analysis of solar energy, LEC defined the necessary conditions for developing a cost-effective solar product. With its goal defined, LaJet, Inc. funded a research and development program to create such a product. The result is the LEC System. The latest model of the LEC System is designated the LEC 460.

Description of the LEC System

The LEC 460 is a parabolic "dish" which incorporates a microprocessor to automatically point it toward the sun from sunrise to sunset. The "dish" is composed of a set of mirrors (made of reflective polymeric film) which focus and concentrate the sun's energy on a receiver, producing intense but controlled amounts of heat. The LEC 460 employs a design concept that permits the use of common and low-cost materials. All major structural components are fabricated from low-carbon, low-alloy steel using methods adaptable to mass production. The mirrors are supported on a steel tubing frame. This frame is attached near its center of gravity to a cantilevered support structure. The mirrors and frame are counterbalanced by the weight of the receiver, thus reducing the energy needed to move the collector (parasitic load) and allowing movement on two axes.

The Reflective Array. Each LEC 460 solar concentrator contains a reflective array consisting of twenty-four 60-inch diameter mirrors. The total reflective surface of each LEC 460 is approximately 460 square feet. Each mirror surface consists of weatherized disposable reflective polymeric film that is drawn to an approximate parabolic shape on a permanently fixed aluminum frame by a continuously applied vacuum (supplied by a small vacuum pump). The depth of the parabolic shape is controlled by an adjustable focusing valve mounted behind the film's surface at the center of the mirror's interior. The solar concentrator flux intensity at the LEC 460's focal point can be varied by adjusting the position of each mirror or by altering the adjustable focal length of the individual mirrors.

The Space Truss Structure and Space Frame. The space truss structure and space frame are designed to support the mirrors and to track the sun from sunrise to sunset. Designed by LEC to overcome the primary obstacles and problems LEC believes are encountered in the design of other solar collectors, they have low-cost, light-weight components and small, low-powered motors to track the sun.

The primary components of the space truss structure and space frame are low-cost, low-carbon steel angle and tubing. When assembled, the space frame is a lightweight, rigid, parabolic-shaped structure. The space frame is mounted on the cantilevered space truss structure, very near its center of gravity, thus minimizing the need for counter-weighting. Because of this design and the low weight, the entire space frame can be driven by a small 1/8 hp motor, thus minimizing the power that must be used to operate the system. The space truss structure is affixed to a concrete foundation.

The Controller. Each LEC 460 is equipped with its own microcomputer-based controller specially designed to operate with the LEC 460. This controller determines the system start-up and shutdown procedures including controlling auxiliary motors, valves, and other support devices, and determines the time of day to perform start-up and shutdown functions. The controller also tracks the sun and automatically adjusts for any errors in positioning or placement to ensure optimum performance. The controller provides for emergency shutdown of the concentrator in case of high wind, fluid flow losses, excessive fluid operating temperatures or other potential operating problems.

The LEC System features advanced engineering focused on reliability, performance, and low cost to produce a sophisticated yet relatively simple product.

Development of the LEC System

The development and testing of the LEC System has spanned three years. Six models of the concentrator were designed, built and tested during this period:

Model	Reflective Surface (square feet)
M-1	85
M-2	190
LEC-200 EM-1	210
LEC-300 EM-1	330
LEC-400 EM-1	410
LEC-460 EM-1	460

The LEC 460 incorporates a number of refinements and improvements developed through the testing and operation of the previous models, including a reflective surface over 5 times larger than the original model, a substantially stronger space truss structure and space frame, improved mirror design permitting greater efficiencies and durability and a microprocessor control system that governs almost all aspects of concentrator operation.

Patents

The LEC System is a unique and innovative technology. To protect the uniqueness and proprietary nature of this technology, LEC has received domestic and foreign patents on the overall conceptual design of the LEC System. Other subassembly patents have been received or have been filed for and are pending.