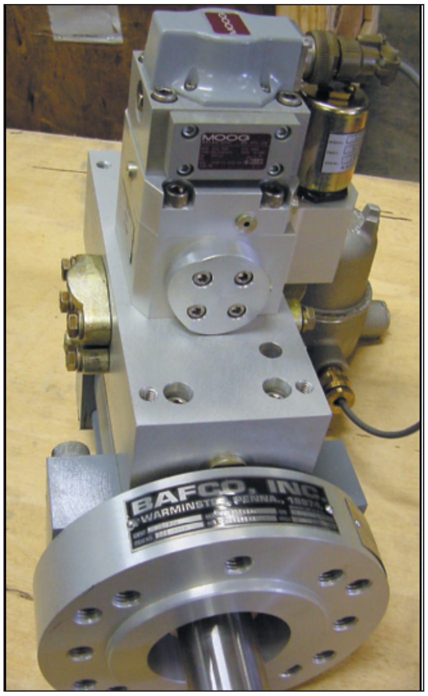

This **Electrohydraulic Linear Actuator** incorporates several improvements over prior commercially available devices of a similar nature.

position-feedback signal, which is compared with the position-command signal in the servo amplifier. When the position-feedback and position-command signals match, the servo valve moves to its null position, in which it holds the actuator piston at a steady position.

The actuator includes a deceleration feature for both extremes of the piston stroke. When the actuator is used to open and close a valve, the deceleration feature prevents damage to valve seats and other components during cycles of rapid stroking. Because the resolution of the LVDT is, for practical purposes, unlimited, the position feedback from the LVDT acts, in conjunction with the deceleration feature, to afford maximum protection against damage in those ranges of position in which protection is most needed. Other advantageous features of the improved actuators are the following:

- To eliminate leaks associated with common tubing connections, the components within the actuator that must be connected to high-pressure hydraulic fluid are connected via a manifold.
- The time and cost of manufacturing are less than those of the prior actuators.
- Optionally, fail-safe valves of a type used widely in the petrochemical industry can be incorporated into the actuators.

This work was done by James Hamtil of BAFCO, Inc., for **Stennis Space Center**.

In accordance with Public Law 96-517, the contractor has elected to retain title to this invention. Inquiries concerning rights for its commercial use should be addressed to

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Refer to SSC-00165, volume and number of this NASA Tech Briefs *issue, and the page number.*

A Software Architecture for Semiautonomous Robot Control

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A software architecture has been developed to increase the safety and effectiveness with which tasks are performed by robots that are capable of functioning autonomously but sometimes are operated under control by humans. The control system of such a robot designed according to a prior software architecture has no way of taking account of how the environment has changed or what parts of a task were performed during an interval of control by a human, so that errors can occur (and, hence, safety and effectiveness jeopardized) when the human relinquishes control. The present architecture incorporates the control, task-planning, and sensor-based-monitoring features of typical prior autonomous-robot software architectures, plus features for updating information on the environment and planning of tasks during control by a human operator in order to enable the robot to track the actions taken by the operator and to be ready to resume autonomous operation with minimal error. The present architecture also provides a user interface that presents, to the operator, a variety of information on the internal state of the robot and the status of the task.

This work was done by David Kortenkamp of Metrica, Inc., for **Johnson Space Center**. *Further information is contained in a TSP (see page 1).*
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