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**New Technology Research & Development Program  
Grant Contract 582-5-65591-0010**

**Task 2 Deliverable**

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# **Report on the Hardware Procurement, Assembly, and Test of Eaton Corporation's Hydraulic Launch Assist™ (HLA®) System**

TCEQ Contract Number: 582-5-65591-0010

Task #2 Hardware Procurement, Assembly and Testing

The preparation of this report is based on work funded in part  
by the State of Texas  
through a grant from the Texas Commission on Environmental Quality.

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## ***Introduction***

This report describes the results of a portion of the work funded in part by the State of Texas, through a grant from the Texas Commission on Environmental Quality. The activities and results discussed in the report are limited to the hardware procurement, system assembly, and test stand testing portion of the grant requirements, which is task #2 of the contract's Scope of Work.

## ***Procurement***

To build an HLA® system, more than 220 parts had to be ordered. The parts were supplied by a combination of Eaton manufacturing plans and Eaton approved vendors. The approved vendors were evaluated with respect to their manufacturing capabilities for the particular parts they were to supply in order to insure that the parts would be made properly.

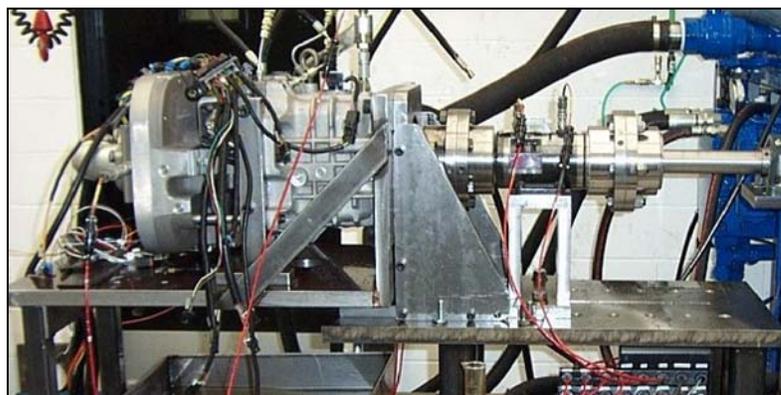
Many of the parts have parameters that are critical to the part's function. These critical parameters were inspected to verify they were correct. Most of the critical parameters were inspected by the part manufacturers prior to shipment. Those critical dimensions that were not measured by the manufacturers were measured by Eaton after receiving the parts.

## ***Assembly***

The first step of the assembly process was to assemble subcomponents. These included valves, accumulator, pumps and fluid reservoir. After testing of the subcomponents, they were assembled into the main system.

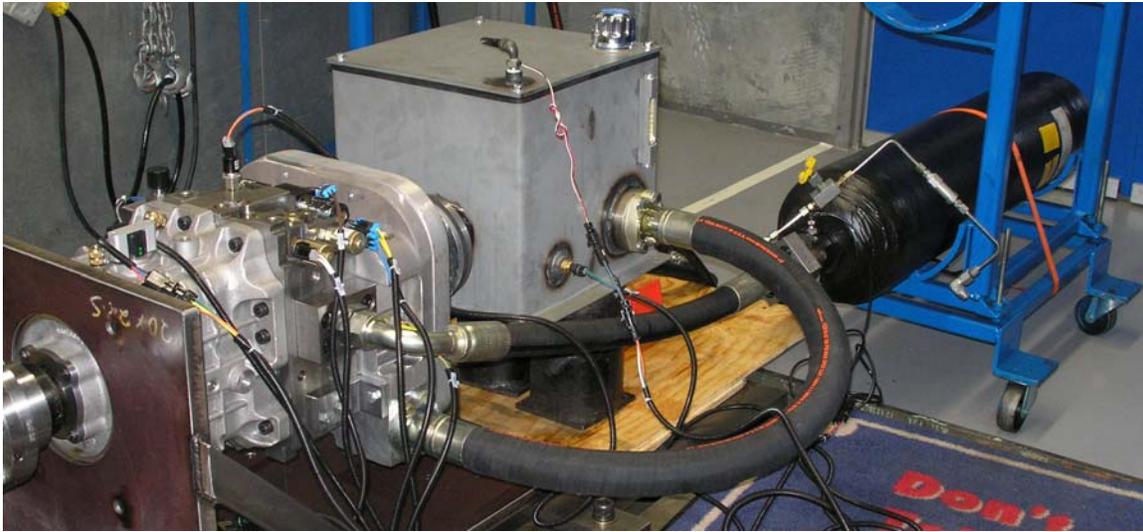
## ***Testing***

Each subcomponent was tested separately to verify proper function and performance before assembling and testing the complete system. This process enabled more accurate measurements and easy adjustments than if the whole assembly would have been tested for the first time together. The picture below shows the HLA pump/motor being tested on a pump test stand.



The tests verified that all the components functioned properly. The performance results compared favorably with analysis predictions.

The complete system was tested on a test stand that simulates many aspects of a vehicle. The HLA system was tested on this stand in all major operating modes. During the system test, the sensors were calibrated and the system software was tuned and improved. The picture below shows the HLA system being tested on the system stand.



## ***Conclusion***

All the parts necessary to build the updated HLA system were ordered and received. These parts were properly assembled and tested on test stands at both the component and system level. The testing was successful by verifying the proper function and performance of the HLA system.