HYDRAULIC ACTUATORS CONTROL MANIPULATOR ARMS ON DEEP SEA DIVING BELL

The Application

A seven-function manipulator arm, designed by Perry Oceano-graphics, performs various external functions aboard deep sea submersible crafts. Each manipulator is controlled by four Moog Flo-Tork hydraulic rotary actuators, two cylinder actuators, and a hydraulic motor. The actuators are operated by a proportional servo valve in combination with a multi-function, single joystick which controls shoulder, elbow, and wrist joints located on the manipulator arm. The operator, working inside the diving bell, or by remote control, can position and control the manipulator arm to perform a wide range of jobs.

A special wrist extension feature, incorporated in this design, allows increased utilization of tools. From the wrist, a tool can be inserted in a hole, or driven in a straight line without actuating any joints other than the extension feature.

A submersible craft equipped with two seven-function manipulators allows the operator to dive with each manipulator preset in different operational configurations. This allows the operator to handle almost any situation he may encounter.

Advantages

The Moog Flo-Tork rotary actuators supply the manipulator with smooth, responsive, zero-leakage operation. The sealed design of the actuator allows for deep submersion without fear of internal contamination by sea water through the use of pressure compensation in the housing/gear case. These custom-made actuators are provided with stainless steel shafts to protect against corrosion, and anodized aluminum housings to eliminate over 1/3 of the standard actuator’s weight. The design of the Moog Flo-Tork actuators allow the manipulator to have more flexibility than would be possible with conventional hydraulic cylinders.