

Application Information

Using a PLS for Positioning a Large Cable Drum

The Application

In this application a shaft extends from a gearbox that is attached to the cable drum drive mechanism. The drum spools large diameter cables that pull gondola-type train cars up an incline to a device that clamps the car in position, then rotates the entire car upside down, dumping the load. After the car is emptied, it is lowered back down the incline. Two DC motors connected to a large bull gear turn the drum. The motors are powered and controlled by motor-generators in an adjacent control room. The entire system was designed and built in the 50's, with occasional limit switch and other mechanical upgrades.



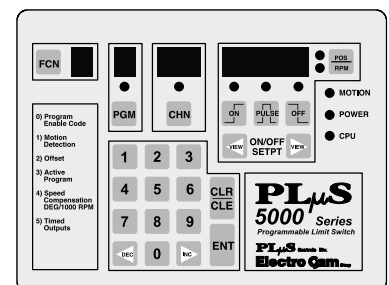
The Current Problem

The system uses a shaft with an Acme thread that moves travelling blocks. These blocks have targets that depress limit switches as they move along the shaft. There are two switch assemblies, one for each drive motor. These limit switches turn on pilot lights on a control board that tells the operator where the "Pig" (the device that actually pushes the train car) is located. Because this type system uses multiple mechanical switches and actuation devices, there is an ongoing problem with adjustment, and at times mechanical or electrical failure. The cost of downtime, replacement parts, and labor more than justify the cost of upgrading the control system.



The Cure

This application requires the replacement of the limit switch assemblies with a plain shaft that has a timing belt pulley to connect to a geared resolver (foot mount). If the shaft turns more times than a standard geared resolver, an additional ratio can be created in the sizing of the timing belt pulleys between the shaft and the resolver. Because this is an out-and-back type motion, if the ratio is slightly larger than the actual drum travel, it is not a problem. The usual need to enable or disable outputs (depending on direction) is not a factor in this application, because the output needs to be enabled in both directions.



Because the PLS has multiple programmable outputs, there is no need for two separate switch assemblies. With the resolver connected to the shaft, the PLS can be installed directly in the operator panel, with the controller's position readout used to show where the "Pig" is located. If the customer wants to continue to use their existing pilot lights, or any similar devices, the controller can be mounted in the control panel. With the PLS mounted inside the control panel, outputs can be programmed to turn ON at specific points in the drum rotation. With the ability to program outputs anywhere in the rotation, new position output can easily be created.

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