The Solar Tracker
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Overview

The solar tracker is a device which points a solar panel at the brightest part of the sky in order to achieve maximum power output from the solar panel. The solar tracker is pointed in a southern direction (for use in the Northern Hemisphere) and tracks the sun from East to West. At sunrise it returns to the East position.

The solar tracker utilizes two sets of photo detectors and a comparator to determine if the light coming from the West is greater than the light from the East. There are also two limit sensors, one on the East and one on the West to limit the movement of the solar tracker to 180 degrees.

There are two modes of operation. The first mode is when the solar tracker is tracking the sun from East to West. In this mode the unit can only move towards the West until the West limit sensor is reached. After the West limit sensor is reached, it enters the second mode. In this mode the unit can only move toward the East until the East limit sensor is reached.

Circuit Description

As you can see from the system block diagram (BlockDiagram.pdf) there are four east light sensors and four west light sensors. In order for the solar tracker to move, all of the sensors on one side must receive more light than the sensors on the other side. To reduce the jitter of the motor when the sun is directly over the sensors, I added an astable timer and a synchronous latch. The limit sensors are hall-effect sensors which detect the presence of the magnet located between the east and west photo detectors.

The output of the synchronous latch, the S-R flip-flop and the X-OR gate form the logic for the H-bridge controller. The H-bridge drives a 12DC motor geared down to 3RPM.