To: file
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Date: 12-22-00
Subject: Azimuth (or other axis) Encoder calibration

When an encoder assembly (pinion gear, arbor, flex coupling, and encoder) has been removed and repaired, the encoder position must be recalibrated (reset to its standard position).

The most obvious procedure is as follows:

Procedure I
Move the azimuth arm to a known "cal" position, identified by a pair of scribe marks or other prearranged hardware pointers. Suppose the cal position is 360.000 degrees. Install the encoder, mesh its pinion with the rack, and make it read 360.000 degrees by either:

> Ia. loosening the flex coupling between the encoder and arbor and turning the encoder shaft to obtain the correct reading.
> I. loosening the clamps that hold the encoder body and turning the encoder body to obtain the correct reading (this technique provides a limited adjustment before the encoder cable winds up).
> Ic. using the "set encoder" routine provided by Vertex to write an offset into the non-volatile memory of the encoder. (The encoders have been factory programmed to take on the value 360.000 when commanded through the "set encoder" routine).

Procedure I has at least two disadvantages: The first disadvantage is that the azimuth must be moved to the cal position, which may be inconvenient. The second and more serious disadvantage is that it is not easy to install sufficiently precise scribe marks or mechanical pointers to find the cal position. (If the position is to be set to within one arc minute, the position of the azimuth arm along the encoder rack must be set correctly to within about 003", three mils).

Procedure II
The idea here is to set the pinion gear to encoder shaft coupling in the lab so that, when the encoder is reinstalled, it is only necessary to engage the proper pinion tooth in the rack. This requires a precision of about 1/8 inch along the rack, so the azimuth arm doesn't need to be fitted with a precise alignment pointer.

This procedure requires that the encoder arbor housing be fitted with a removable clamp that can fix the pinion gear to an accurately repeatable position. Of course the clamp position must be known or determined. The clamp could be mounted to an adjustable fixture in order to obtain a convenient value, say, 360.000. In the course of repairing the encoder, the final step would be to use the clamp to position the pinion gear with respect to the encoder mount and then make the encoder read 360.000 by any of methods Ia, Ib, or Ic. as described in Procedure I. To read the position when the encoder is in the lab, we could connect it to the spare encoder card in the spare PLC unit or we could buy a simple SSI (synchronous serial interface) display unit. Note that this method also requires that the encoder body be precisely located by one or more dowel pins.