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SOFTWARE FOR GEOMETRICAL TRANSFORMATION OF DIGITAL DATA USED FOR REMOTE SENSING APPLICATIONS

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The Remote Sensing Research Program, University of California at Berkeley has developed a regression-based XY transform methodology and supporting computer software to accurately and cost-effectively transform one- and two-dimensional digital data from one geometrical coordinate system to another. First, control points common to both the original coordinate system and the desired output system are located with respect to each system. Second, the control points and the desired equation form are input to a statistical package program which performs a least-squares regression analysis of the points to yield transform equation coefficients. Third, the original coordinates of a one-dimensional line segment or a two-dimensional picture element (pixel) are substituted into the transform equations to yield the revised coordinates. This transformation method is computationally inexpensive, can be performed easily on small computer systems, and can be used for many types of remote sensing and ancillary data. Up to four ERTS images have been overlayed with less than one pixel error over a 1024 x 1024 pixel area. ERTS data to Universal Transverse Mercator (UTM) ground coordinate system transforms have been within 200 meter RMS error for the same size area.

A 4-CHANNEL OPTICAL FILM ANNOTATOR FOR PRODUCTION OF PLANOMETRICALLY CORRECT IMAGES

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The RSRP has designed and built an optical film annotator called EGOR. This device has the ability to produce sharp images composed of dots 2 mils in size and in 64 different grey levels from jet black to full white. It can be used in either four-or two-channel modes and can produce four images of up to 6"x9" or two images of 9"x9", respectively.

EGOR also has capabilities to eliminate or induce certain kinds of distortions, for example the "skew" and "squish" associated with ERTS tapes. The spacing between dots in the Y dimension can be varied to close up or spread out the image, and the image can be "tilted" to give a parallelogram rather than a rectangle.

To date EGOR has been used to produce planometrically rectified images of ERTS data that has been classified by CALSCAN. Three monochrome images are made with EGOR then combined using filters to produce a full color composite. EGOR has also been used in the four channel mode to produce high resolution rectified images of the four MSS bands of ERTS data tapes.