



FIG. 1. The Kern PG 2-R plotter in operation.

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Kern Plotter Improvements

The basic compilation instrument is modified to accommodate various map scales as well as digital readout for aerotriangulation.

(Abstract on page 156)

CHOICE OF PANTOGRAPHS FOR THE PG 2

EASE OF OPERATION and convenient compilation are important factors for a good production in mapping.

The Kern PG 2, which is intended for all topographic mapping work up to the scale of 1:5,000, both bridging and plotting, covers a variety of work with more or less the same requirements as to photography facilities, precision, etc. However, it is acknowledged that special requirements often exist for specific jobs.

THE PG 2-R (*R* for *Reduction*)

For small-scale map production, the usual practice is that several models are compiled on each sheet. In order to be able to do this

*Presented at the Annual Convention of the American Society of Photogrammetry, Washington, D. C., March 1966, under the title "Latest Developments for the Kern PG 2."

directly in the plotter, there must be ample space to shift the sheet in all directions, without creating an obstruction for the operator. Nevertheless, the plot should be within easy reach all the time.

For this purpose, the PG 2 can be equipped with a stable, one-arm, polar-type pantograph (Figure 1) with which plots can be compiled at between 2 times through $\frac{1}{2}$ times the photo scale. A clearance of two inches accommodates large sheets which are rolled up.

For reductions, the pantograph is placed with the pole in *outside* position; for enlargements *pole inside* can be used.

The instrument is provided with remote control of the pencil lifter.

THE PG 2-L (*L* for *Large*)

For plotting at scales larger than photo scale, any PG 2 can be equipped with another

pantograph, which allows plotting at up to 4.2 times the photo scale (Figure 2). The pantograph is of the same stable construction as the standard equipment, i.e., also a two-arm type with tape and disk transmis-

sion attachment enables plotting directly at model scale (Figure 3). It consists of an arm that is rigidly connected to the base carriage. The plotting area is on the drawing table of the instrument. On request, a large drawing

ABSTRACT: The Kern PG 2 is designed as a mechanical plotting instrument for wide-angle and super-wide-angle photographs. Three versions of this instrument are now available: the PG 2-D for plotting at model scale; the PG 2-R for small-scale compilation; and the PG 2-L for plotting at scales up to four times the photo scale. Using bridging microscopes with which hairlines on the space rods can be observed, the transfer of scale in aerial triangulation can be accurately executed. A simple device which can be attached to any PG-2 enables the determination of planimetric model coordinates. This makes the instrument suitable for numerical aerial triangulation.

sion. The plotting accuracy with maximum enlargement is within 0.2 mm. The plotting area is at the righthand side of the operator and all the time within easy reach. This instrument is also provided with remote control of the pencil lifter.

Table 1 gives an idea of the possible enlargement ratios between the photo scale Mp and scale of the manuscript Mk for different types of photography.

THE PG 2-D (*D* for *Direct*)

Where no pantograph is required, e.g. where the instrument is used for training, for bridging, for production of stereotemplates, or for small-scale mapping in which the manuscript is reduced photographically, a simple

surface can be provided, which enables the user to attach either an *R* or an *L* pantograph.

TABLE 1. EXAMPLES OF ENLARGEMENT RATIOS BETWEEN PHOTO SCALES Mp AND MAP SCALES Mk

Type of photography	Principal distance (mm)	Image size (in.)	$Mp:Mk$	
			min.	max.
Superwide angle	89	9×9	0.9	4.2
Wide angle	100	5½×5½	0.9	6.0
Wide angle	115	7×7	0.9	5.0
Wide angle	152	9×9	0.9	4.2
Normal angle	172	5½×5½	0.9	3.5

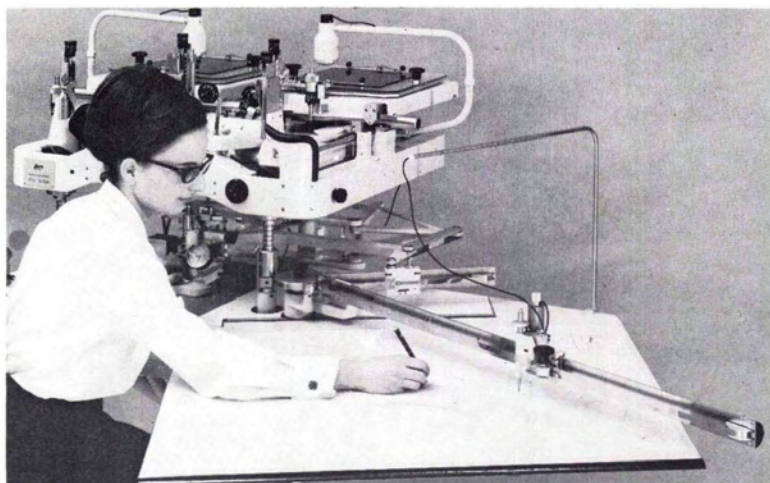


FIG. 2. The Kern PG 2-L in operation.

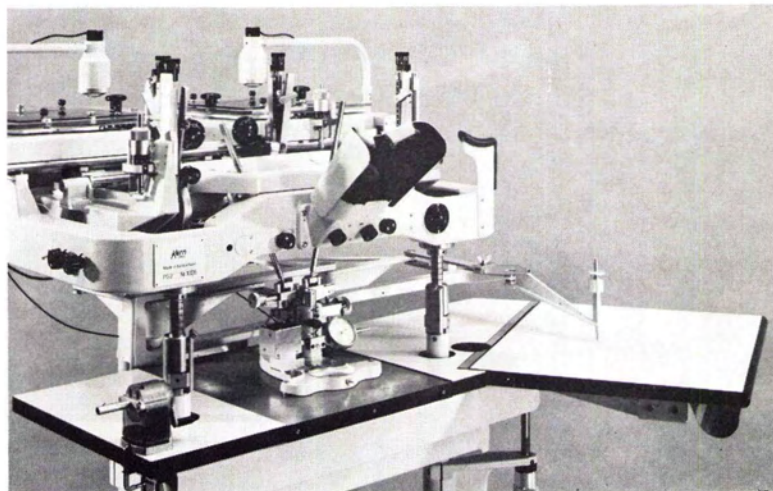


FIG. 3. The Kern PG 2-D plotter.

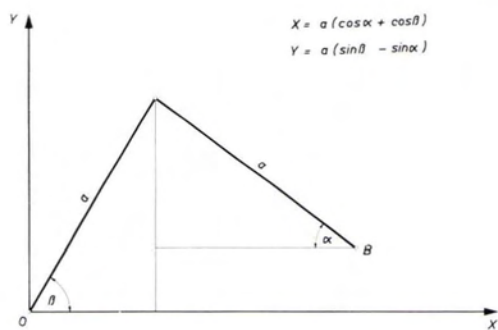


FIG. 4. Design principle of the coordinate readout system for the several models of the Kern PG 2 plotter.

PG 2 APPLIED TO AEROTRIANGULATION

Each version of the PG 2 can be equipped with special *bridging microscopes* for convenient extension of height control. The procedure for this facility is explained in detail in

the brochure "Instruction for Bridging with the PG 2", which is available on request. Usually for the smaller scales where this method is applied, adequate planimetric control is obtained by means of stereotemplates produced on the instrument during bridging. If, however, higher accuracy in planimetry is required, the PG 2 can be provided with a device for optical readout of horizontal coordinates. In order to attain a device with reliable high precision which does not interfere with the freehand operation, a system has been chosen in which the coordinates are expressed in two angles α and β .

Figure 4 illustrates the design principle of the system. Point *B*, representing the model point whose coordinates are to be expressed, is mechanically related with the origin *O* of the system by means of two hinging arms of constant length *a*. The angles α and β of each arm with the horizontal *x* direction are read from graduated circles. From the dia-

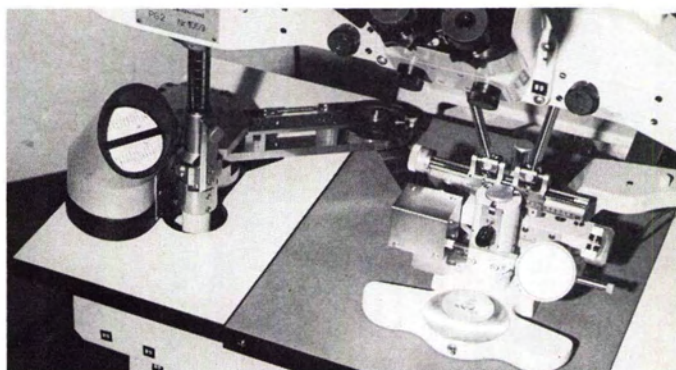


FIG. 5. Optical readout device for horizontal coordinates on the Kern PG 2 plotters.

gram it will be clear that the mathematical relation with the normal cartesian coordinate system is

$$X = a (\cos \alpha + \cos \beta)$$

$$Y = a (\sin \beta - \sin \alpha)$$

The angles are conveniently displayed on a screen which has a fixed position directly at the operator's left hand, as can be seen in Figure 5. Provisions for output on punched tape or cards are under consideration.

XI CONGRESS ISP, LAUSANNE, SWITZERLAND

Here are brief samples of the package tours that are completely described in a brochure available on request from the American Society of Photogrammetry, 105 N. Virginia Ave., Falls Church, Va. 22046.

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