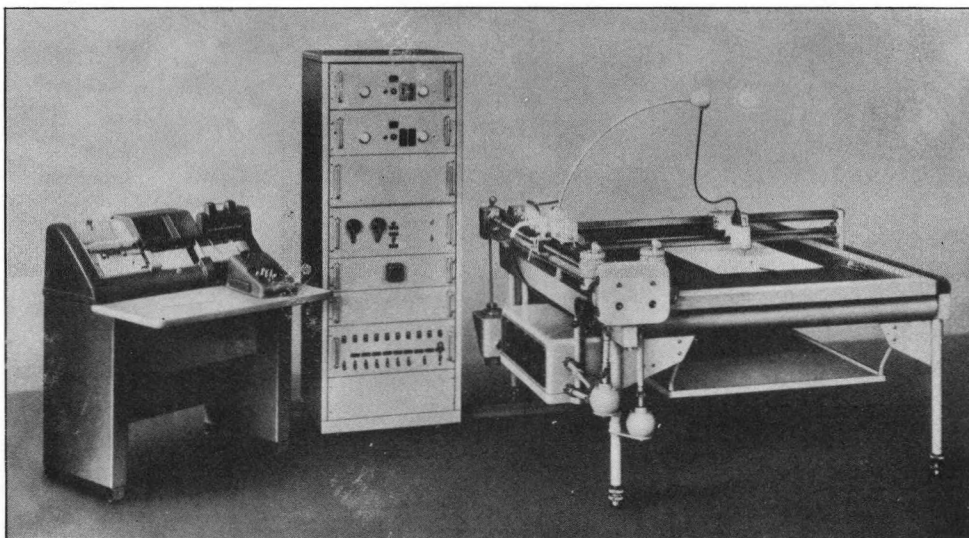


THE COORDIMAT

by Dipl.-Ing. Herbert TRÄGER

IHB Note. — We have received from Zeiss-Aerotopograph G.M.B.H., Munich, the following article about an automatic plotter which we thought would be of interest to States Members.

In all those branches of scientific activity, in which extensive series of measurements have to be processed, the graphical representation of the results will mostly be given the form of a map or a diagram. The reason for such a procedure is obvious, because a tabular list of a large number of measuring results is offset by the small drawback of relatively more



of diagrams. It is much easier to memorize a graphical representation which, on the other hand, permits comparisons which are entirely impossible in the case of tabulated values. Geographers, topographers, hydrographers, geologists and meteorologists will be those scientists most frequently to choose a graphical representation of their measuring results, because these measurements will mostly refer to our planet Earth.

The tremendous advantage of graphical and map-like representation of measuring results is offset by the small drawback of relatively more work required for the plotting process. However, in the present age of

automation this additional work can be easily taken over by an instrument which will be explained in the following pages.

On the occasion of the 9th International Congress of Photogrammetry in London from 5 to 19 September 1960, Messrs. Zeiss-Aerotopograph GMBH of Munich, Germany, introduced their new automatic plotter, the *Coordimat*, to interested scientific circles.

This instrument will accomplish the error-free, automatic plotting and — if desired — also the identification of the large number of measuring points involved in hydrological work, such as soundings, temperature measurements, measurements of salt content, currents, etc.

The *Coordimat* consists of three principal components, viz. the IBM card punch, the coordinatograph proper with the coincidence unit, and the control cabinet. The IBM card punch is a standard instrument of the IBM 024 type equipped with read-in/read-out device. It is used for reading the punched cards. This statement already indicates that the points to be plotted must exist in the form of punch-card information. Punched cards were selected on purpose, because they can be sorted much easier than information contained on punched tape. Coordinates of any rectangular, plane coordinate system can be plotted. Since the coordinates encountered in connection with soundings and measurements of currents are frequently geographic coordinates, they have to be transformed into a plane, rectangular system. This can be achieved with the aid of electronic computers which will produce the punched cards either directly or by means of a converter. Apart from the two coordinate components, the punched cards will contain a point number, the depth of sounding or similar information. With the aid of one of the two master cards of the IBM card punch the user may determine the five decimal places to be read from each of the two coordinate components. The selection of these five decimal places will depend exclusively on the desired map scale and will also be influenced by the accuracy of the *Coordimat*. If the largest values of one or both components to be plotted exceed the fifth decimal, there is a possibility again to reduce the number of places to five by adding one constant to each of the components. The process of plotting a point will then be the following :

The selected five decimals are read in the IBM card punch and transferred to a store in the control cabinet including the point number or any other desired information, such as a depth figure, etc. As soon as the storing process has been completed, the two electric motors on the coordinatograph are actuated by means of amplifiers. These motors will set the cross slide system to the desired x and y position. During this operation all revolutions of the spindle are transmitted to a so-called coincidence unit which will compare them with the value contained in the store. The instrument thus guarantees that the point is actually plotted in the position indicated on the punched card.

This safety factor cannot be over-estimated. Once the so-called comparison of coincidence has been completed, the tracing pencil will be lowered and simultaneously rotated for marking the respective point. The accuracy of the so-called coincidence comparison is 0.05 mm. This value is, by far, inferior to the manual graphical plotting accuracy attainable.

It goes without saying that the tracing pencil can be replaced by a

steel needle, so that a clear, unambiguous point will be pricked. Since such a pricked point is difficult to find, it is possible to surround the pricked point with a pencilled circle of a desired radius. For this purpose, an additional device can be screwed to the so-called pencil-lead holder which will be made to rotate when the pricking needle is lowered, so as to trace concentric circles around the pricked point. Also a printing head may be attached in the place of the pencil-lead holder. This attachment will print the desired information, such as a four-digit depth figure, beside the pricked point. As well as this information, the attachment will also print a point number, etc. In addition, it permits symbols to be printed on or around the pricked point, such as a triangle or a square. If the printing head is to be dispensed with, the desired information can be made visible to the operator in a special window. When the plotting process for a certain point has been brought to an end, the IBM card punch will automatically read the next card, transmit the desired values to the store, and the entire process is repeated. The plotting speed of the instrument is about six points per minute, provided that the average point separation is not too large. The travelling speed of the instrument is approx. 30 mm per second. Since the time-tryed coordinatograph of the Stereoplanigraph is used as a plotting instrument, the advantages of this instrument are essentially preserved. The coordinatograph permits the inversion of the sense of rotation of each component as well as a variation of scales. As a consequence, the plotting can be made in 14 different scales. For changing the scale, only two pairs of gears have to be exchanged in the gear box of the instrument. Continuously operating revolution counters also permit a visual control of the instrument.

A very robust and reliable aid for the graphical plotting of measuring results has thus been turned over to the experts of the respective fields of endeavor.