MAPS 300 A STAND ALONE INTERACTIVE GRAPHICS STATION

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Since 1960 Kern has been working to provide tools for map makers, at first in the form of high precision analog restitution instruments for photogrammetry, and more recently in computer based numerical or digital data.

In 1976 the DC2B was introduced to capture data from a stereoplotter and to help prepare and plot a manuscript using a small computer. Many are still in use today. More recently the MAPS 200 system was introduced to better provide for the requirements of the map makers. This system records the data on a disk in an ASCII format and the feature coding is organized in 1000 different levels. This enables the user not only to prepare his manuscripts in the old manner but also to plot a map on-line or at a later date using the plot program. This being the case the map maker can decide several practical things before plotting, like: The scale to be used, which levels, which area, etc. Having the data in numerical form also gives the ability to process it for other users, in particular MAPS 200 users are currently providing data input to larger more expensive systems such as IBM and Intergraph by way of translators.

It became clear that there was a need by the users to be able to correct and complete the data they had collected. At the same time this had to be a relatively inexpensive system which would be cost effective for smaller photogrammetry companies. For final presentation it was found necessary to graphically edit the data for both corrective and cosmetic reasons. It was decided that the annotation would be best done visually on a display tube rather than at the time of data capture from a stereoplotter. Hence the birth of the MAPS 300 project.

In the search for a reasonably priced graphics tube different technologies were looked at. Firstly, storage tubes were eliminated. The advantage with these is that they can show large amounts of data at a time, the disadvantage is the amount of time taken to redisplay any changes made to the data. As the aim was to create an editing station, any changes made would not be seen until a total redisplay was carried out leading to much time wasting, not knowing which edits had been carried out, or how the results looked.

The second type of tubes looked at were those currently available using raster technology. Though it has come a long way recently, raster tubes still do not have a very high resolution, nor is the quality of the lines drawn very high. Automatic zoom on a raster tube usually means enlarging the number of pixels shaded and still does not increase the line quality.

The third type of tube currently available is the vector re-
fresh tube. This tube shows true vectors as does the storage
tube, but can show changes as they are carried out. It can also
provide useful aids for editing such as blinking, variable
intensity and point highlighting. It has the disadvantage that
the local memory in the tube does not have unlimited capacity
like the storage tube but is capable of holding all of the data
that is normally required to edit at any one time.

These tubes were carefully considered and the MAPS 300 system
has been developed around the IMLAC refresh graphics tube, it
being considered the most advantageous tool available for the
editing station, it consists of a 19 inch diagonal screen,
2048 x 2048 screen addressable points, bit-sliced display pro-
cessor, 8066 central terminal processor 64Kbytes RAM, 64Kbytes
EPROM, 92 keyboard and light pen. Optional are 192Kbytes RAM
and a menu tablet and two different hardcopy units.

        The first major aim of the MAPS 300 project was to
provide easy editing of previously captured data. Many problems
have been identified on data as input from a stereoplotter or
digitizer.

Contour lines which do not close can be identified and closed
in a few simple steps. Sections of lines can be removed by
pointing to the limits of the section to be removed. Spurs on
lines can be clipped back to give a clean join by pointing to
the line to be edited and the line to be connected to with the
light pen.

Standard editing features such as delete, move, scale, rotate
and copy can be carried out by identifying the segment to be
changed and requesting the action to be carried out on it by
one button push.

The level or layer on which a segment is stored can be changed,
as can the line type with which it is drawn. The system supports
1000 different levels which can be switched on or off by the
user, and a 1000 line definitions and symbol definitions speci-
fiable by the user using an utility program.

Buildings which were not squared on input of the data can be
corrected here, and cross hatched at any angle and spacing.

Finally among the editors are two box erasers. One which will
delete everything within its limits, and one which will delete
everything not within its limits. The view of the map being
edited can be enlarged at any time by specifying the new limits
that are to be shown on the screen, and editing can be further
simplified by turning off levels not being worked on at the
current time.

The second major aim of the MAPS 300 system was to provide comprehensive annotation functions.

Text can be inserted into the graphical data at any height selected by the user. The width of the characters can be varied independently of the height, and can be slanted either forwards or backwards as desired.

With the simplest text commands, one or more lines of text can be inserted either left justified, right justified or centered. In each case two points are used to define the orientation of the text. If more than one line of text is entered, subsequent lines will be automatically spaced down and aligned appropriately along the left margin, right margin or center line.

When annotating a road name or similar it is often desirable to spread out the characters along the length of the road. This is done such that the first character of the string starts at the first point defined, and the last character ends at the second point defined, the intermediate characters being equally spaced between the ends.

To annotate a river or stream, map makers usually follow the path of the river with its name, this is not normally a straight line. On the MAPS 300 system the name of the stream is typed in first, and then the path it is to take is traced out using the light pen on the screen.

Contours can be annotated by identifying the point on the contour where the annotation is to be placed. The system retrieves the elevation of the contour from the file and inserts it in the line at the required position. The contour line is then blanked out along the section where the text has been placed.

As well as user defined symbols, the system has 30 pre-defined mapping symbols. Each of these symbols can be placed with annotation for Northing, Easting and elevation associated with them being displayed as text. There is also a text editor which can be used to change any of the attributes of text inserted on the map so that it can be adjusted to the users satisfaction.

All operations described here can be carried out by pointing to segments on the screen and then pressing a minimum of buttons to specify the operation to be carried out. Only 8 buttons are used, of which only those valid at any time have an LED light inside of them, and all of the valid options are displayed on the screen in the form of a menu. The system is also provided with an easy tutorial for the operators first hands-on experience. At the end of this paper are several pages dedicated to the 8 buttons and the different functions activated.

Since its conception as an editing system, MAPS 300 has inevitably gone through various stages of evolution.

The system as shown at this exhibition runs totally from the IMLAC tube. The system can also be run in data capture mode using either a digitizer or a stereoplotter for input. In input mode lines can be added using straight lines, arc fit, cubic spline fit and using arcs with known center, or arc fillets.

For customers who already have their own methods of data capture, translators can usually be provided to allow their data to be used with the MAPS 300 system, this being done already for several customers.

For those who are also interested in the surveying side of the industry, a second version of the program provides support for a full set of COGO commands which will generate points on the graphics tube to overlay existing maps previously created from a different source. The system can also add local survey data to an existing map using affine transformation techniques.

Finally, based on the past evolution and looking into the future there has to be as much discussion as possible with the users to best satisfy their needs. We feel that the MAPS 300 system is a cost effective tool to enable users in smaller companies to complete the maps they prepare in digital form.
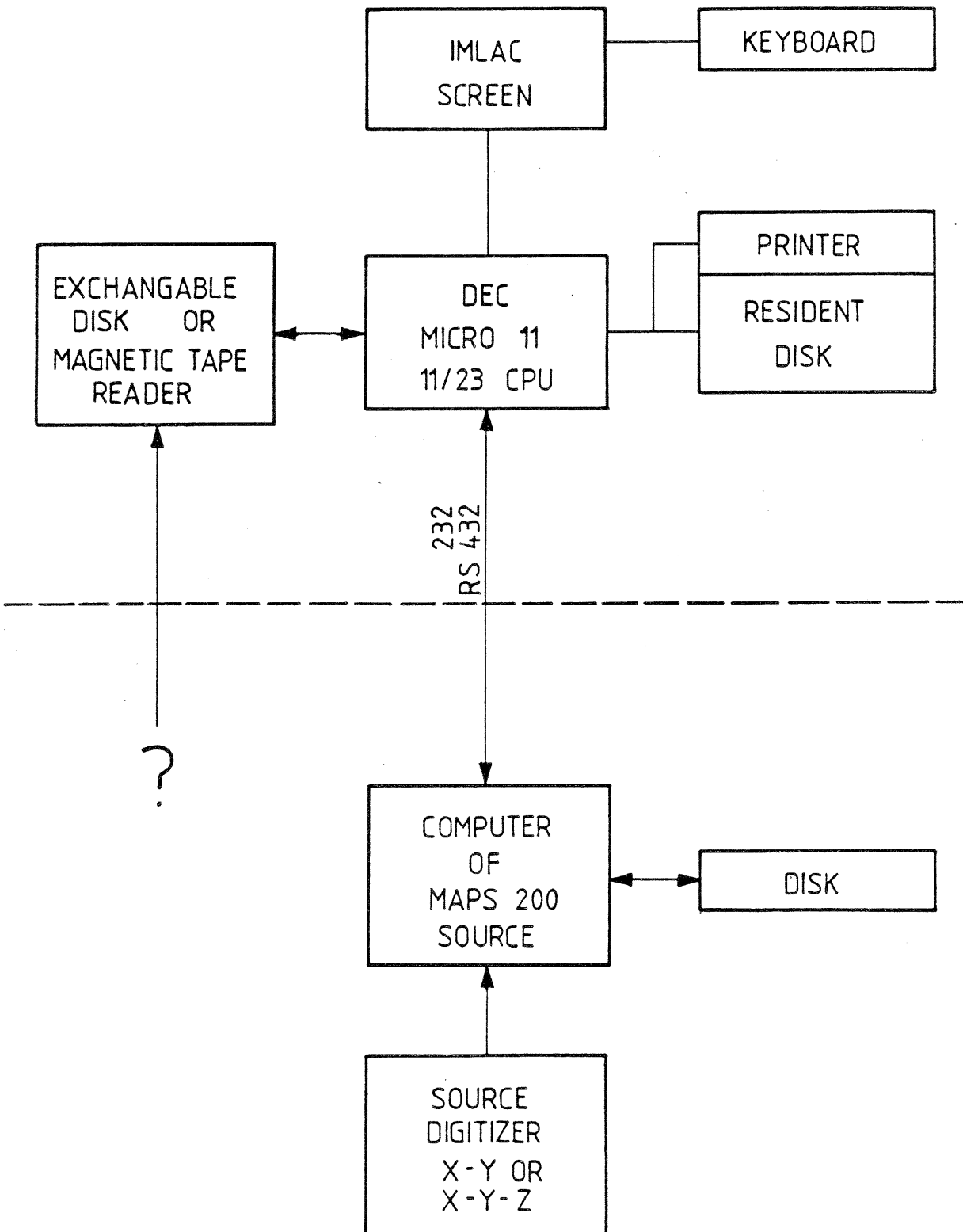
MAPS 300

USER COMMANDS MAPS 300

BUTTON KEYS

1 LEVELS	2 FILING	3 TEXT	4 SYMBOLS

5 GROUP	6 ATTRIBUTES	7 EDITORS	8 SPECIAL FUNCTIONS

MAIN COMMANDS

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1

DEFINE LEVEL		SELECT VIEW LEVELS	RESET VIEW LEVELS

SET ONLY SELECTED LEVELS	SET ALL LEVELS	SET SELECTED LEVELS	RESET SELECTED LEVELS

SUB COMMANDS

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2

CLEAR WORKSPACE	ADD FILE TO WORKSPACE	FILTER FILE TO WORKSPACE	LOAD KOGO TABLE

	WORKSPACE TO FILE	FILTER WORKSPACE TO FILE	

SUB COMMANDS

ISP 84   KERN   MAPS 300

USER COMMANDS MAPS 300

STRETCHED TEXT	BOXED TEXT	ANGLED LEFT JUSTIFIED	CENTRED
ANNOTATE CONTOUR	ANNOTATE LINE	ANGLED RIGHT JUSTIFIED	FEATURE TEXT

3 — SUB COMMANDS

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CLOCKWISE ARC	SHORT ARC	CIRCLE	ARC FILLET
COUNTER-CLOCKWISE ARC		RECTANGLE	MAPPING SYMBOLS

4 — SUB COMMANDS

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START GROUP DEFINITION	END GROUP DEFINITION	CREATE GROUP	USE FILE AS A GROUP
		RELEASE GROUP	

5 — SUB COMMANDS

ISP 84   KERN   MAPS 300

USER COMMANDS MAPS 300

LINE TYPE	TEXT ATTRIBUTES	SCREEN DEFAULTS	MAP SCALE

6

CHANGE INPUT MODE	ANGULAR MEASURE	LINEAR MEASURE	Z COORDINATE

SUB COMMANDS

SEGMENT EDITOR	POINT EDITOR	SECTION DELETE	TEXT + SYMBOL EDITOR

7

ATTRIBUTE EDITOR	ERASE INSIDE	ERASE OUTSIDE	HANG + CLIP

SUB COMMANDS

CROSS HATCH	FIT LOCAL SURVEY	SET NEW WINDOW	MANUSCRIPT GRIDDING

8

STREAM MODE	FIT DATA	PARALLEL	RETURN TO SYSTEM

SUB COMMANDS

ISP 84   KERN   MAPS 300