KERNSWISS
PHOTOGRAMMETRIC SYSTEMS

Product Information No.4
Special issue
for the ISPRS Congress, Kyoto, Japan July 88

New Products from Kern

DSR 12 DSR 14 DSR 15
The new Kern DSR Series of First Order Analytical Plotters

KRISS
Kern Raster Image Superimposition System

The Kern Correlator System – 2nd Generation

The Kern DSP 1
Digital Stereo Photogrammetric System

INFOCAM
Kern Geo-Information System

Kern & Co. Ltd.
CH-5001 Aarau Switzerland
Optics,
Electronics, Precision Mechanics
Telephone 0041 64 26 44 44
Telefax 0041 64 24 80 22
Telex 981106

DSR 12 DSR 14 DSR 15 The new Kern DSR Series of First Order Analytical Plotters

Introduction
Technological progress led to low priced Personal Computers, powerful super-microcomputers and fast, concurrent real-time computing by transputers. Digital image processing techniques and huge RAM memory capacities made possible very advanced options enhancing the versatility and efficiency of analytical plotters.
Kern now introduces a new series of the well-known DSR Digital Stereo Restitution instrument, with different host computers. The concept of distributed processing and modular software allows the installation of computing power to meet the requirements of the user and of the options to be implemented. Improved fixed optics, a touch-sensitive operator panel, an optional dual-observation ocular and a new styling are common to all versions. Upgrading is easy and operating largely the same for all models. The photogrammetric applications software is user-friendly, with logical, menu-guided sequences. The more sophisticated options are available with the powerful top version DSR 15 only.

The Kern DSR 12
This version replaces the DSR 11. It is based on the reliable DEC PDP computers. The RT-11 single-user or TSX multi-user operating systems provide ideal environments for the modular DSR software.

The Kern DSR 14
This model uses popular IBM-AT compatible or 80386-based Personal Computers as hosts. The programming language PASCAL allowed easy transportation of the software from PDP to PC equipment by new compiling. The programs are running well in the familiar environment of the operating system MS-DOS/PC-DOS.

The Kern DSR 15
The top version's host computer is a DEC MicroVAX super-microcomputer or a VAXstation graphic workstation. The operating system VAX/VMS is ideal for running the DSR software and all the available options. Again, PASCAL compilers made software transportation straightforward. The special model DSR 15–18 features larger stage-plates for the format 25 cm x 50 cm used by certain satellite imagery.

The modular DSR software
The DSR1B Orientation packages perform instrument calibration, ground control management, camera file management and inner, relative and absolute orientations of perspective, SPOT or panoramic imagery. In DSR 15s with optional Correlator hardware, DSR1C is executing most of these orientations automatically. DSR BUNDLE permits the orientation of stereo pairs using a single model-bundle adjustment. AETRI is used for collecting, checking and adjusting aerial triangulation data, serving as input for bundle or independent model block adjustments. MAPS 200 allows manuscript prepreparation and on-line data compilation with graphic and/or digital output. PLOTR is used for off-line plotting of digital data collected with MAPS 200, on the Kern GP1 plotting table or on a drum plotter. DTMCOL and DOTXS perform data collection in Digital Terrain Models or profiles, whilst DTMCOR allows the automatic measurement of DTMs in DSR 15s with the Correlator option.

The new Kern DSR hardware and software options
KRISS, the Kern Raster Image Superimposition System provides graphic overlays in real-time motion through the viewing system of the DSR15. Depending on the memory size chosen, the option is available for monoscopic or stereoscopic viewing and with a resolution of 50 or 25 micron.
The Correlator System adds digital image processing techniques to the potential of the DSR15. The hardware comprises two CCD cameras, optics, a monitor, an image processing board and four transputers for fast, parallel processing. The system performs model orientation and automatic measurement of DTMs and profiles. With KDOS, digital orthophotos can be generated and edited from perspective imagery. Finally, it can be used as a digital scanner.
KERN SPOT is a software package available for the DSR 12 and the DSR 15 equipped with a PDP-11/73 as CPU of the plate processor. It permits orientation and stereo restitution of the

high resolution imagery transmitted by the French satellite "SPOT".
KERN INFOCAM allows the integration of photogrammetric data in a data base, providing the necessary data structure and data manipulating capability. It can be part of a network, e.g. with DEC Ethernet, or may be used as a standalone workstation.
SOFTCOPY provides an alternative to graphic on-line check plots on the GP1 or on a drum plotter. The alphanumeric screen of the host computer is replaced by a graphic screen. The digital map is sent to this device, where it can be checked and edited.

Conclusion
The new Kern DSR Analytical Plotters, with the comprehensive software and the sophisticated options, represent the most versatile and powerful photogrammetric tools ever produced.

KRISS
Kern Raster Image Superimposition System

Introduction

For revisioning and profiling tasks, completeness, checking etc., photogrammetrists often wish to see the digital data they are working on right in the optical stereomodel being restituted. Advanced computer- and image processing technologies brought about highly efficient analytical stereoplotters with distributed processing hardware and modular software, such as the new Kern DSR 15. The same techniques can be used to superimpose digital data on the corresponding photographic images. The digitized lines can be displayed on monitors and fed into the optical viewing system for the photographs. The orthogonal projection must be transformed to fit the perspective projection of the photographs, and the overlay must follow in real-time motion the movements of the floating mark within the stereo model. This requires very fast computation of exacting algorithms and big memory capacities. The solution offered by Kern for these problems is KRISS.

KRISS –
the Kern Raster Image Superimposition System

KRISS is an optional peripheral to the new Kern DSR 15 Analytical Stereoplotter, realised by expanding its distributed processing architecture. It is functioning as an intelligent slave of the host computer DEC MicroVAX, performing the dedicated real-time processing in its respective environment.

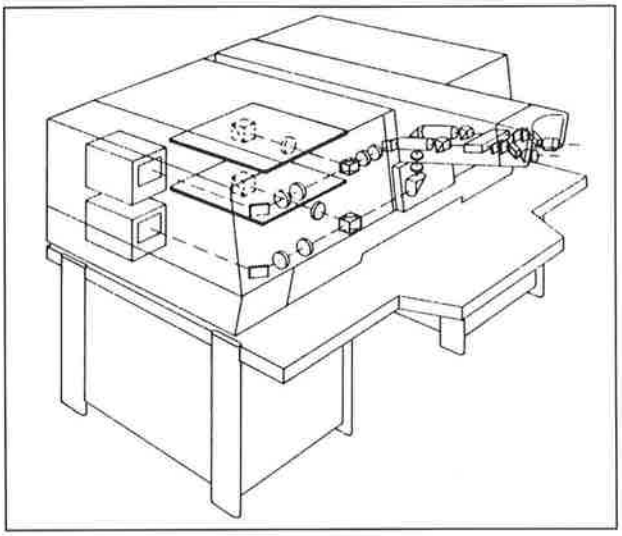
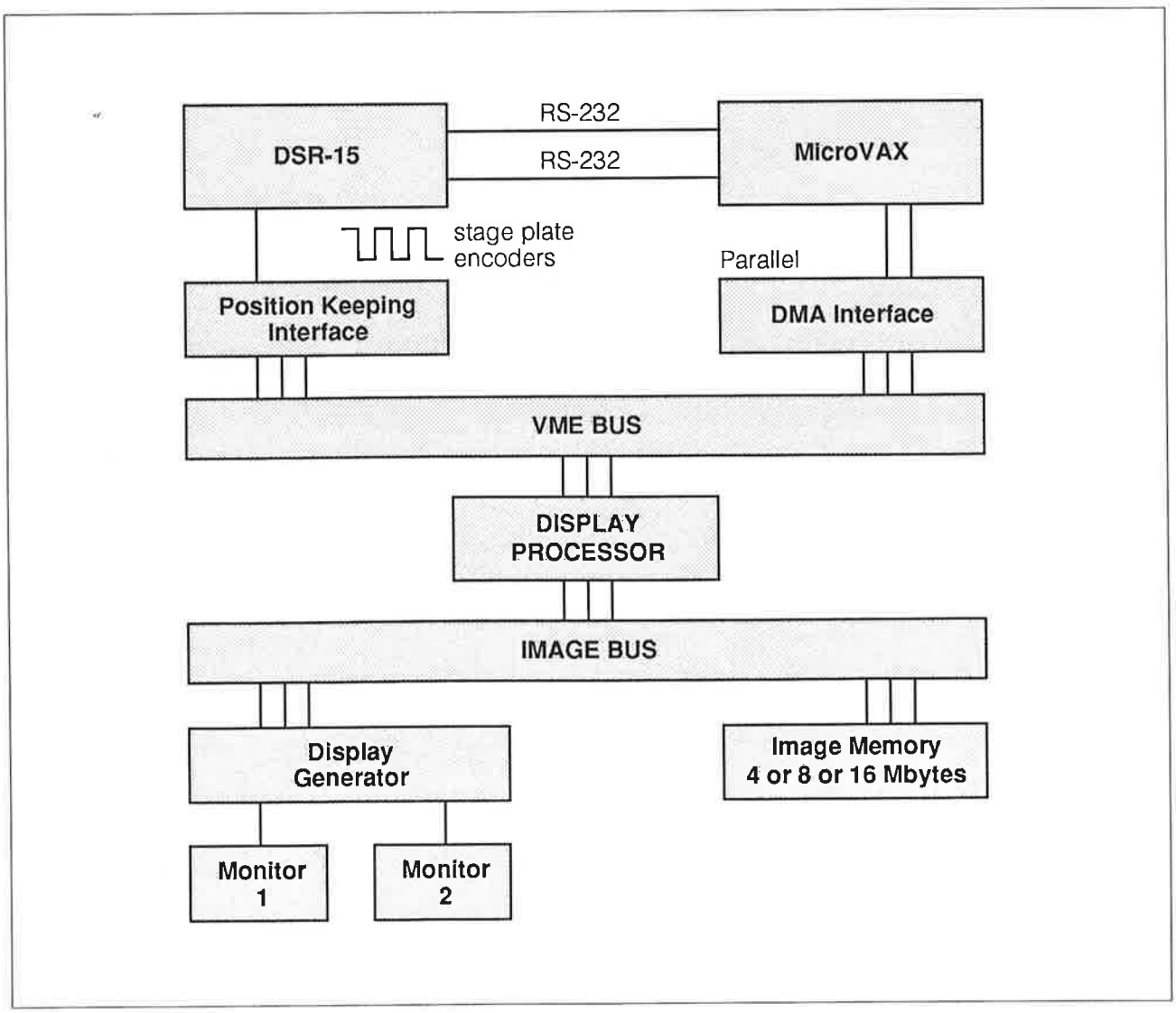


Figure1: KRISS hardware

KRISS is linked to the DSR 15 by a position-keeping interface, whilst communication between the MicroVAX and the display processor, a Motorola 68020 with a 68881 coprocessor, goes over a fast parallel DMA interface. Rasterization, real-time loop monitoring and perspective transformation are handled locally. KRISS is available in four versions, differing mainly in the memory capacity: For monoscopic or stereoscopic viewing and with a resolution of either 25 or 50 micron.
The fixed optical system of the DSR 15 allows the image to be injected at the front end. Therefore, optical adjustments like image rotation with Dove Prisms or zooming with the Zoom system do not disturb the geometry since the injected images and the photographs are infuenced equally. Due to the modular Kern software, the implementation of KRISS with application packages such as MAPS 200 or DTMCOL is very efficient

Conclusion
The option KRISS enhances the economy of the DSR 15, being a very productive tool for many photogrammetric applications.

Figure 2: KRISS configuration block diagram



The Kern Correlator System – 2nd Generation

Introduction

The Correlator System is an option available with the new DSR 15 Digital Stereo Restitution instrument featuring a DEC MicroVAX super-microcomputer as host. Applying digital image processing techniques, it performs photogrammetric tasks, like model orientations or measuring digital terrain models, semi- or even fully automatically. It even allows the analytical stereoplotter to be used for generating digital orthophotos, or as a digital scanner, replacing the relevant special instruments.

The Correlator Hardware

The special hardware comprises two high-resolution CCD cameras, optics, a monitor, an image processing board and (optionally) a set of four transputers for fast, parallel real-time computing of time-critical algorithms.

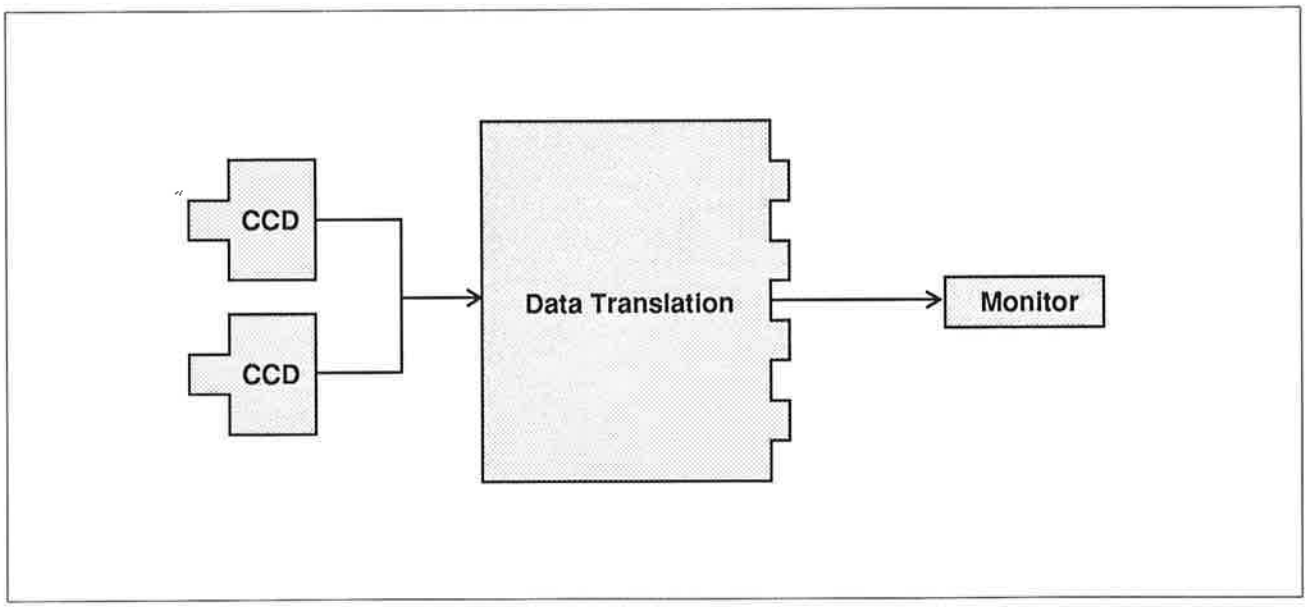


Figure 1: Kern Correlator configuration

The Correlator Software

The modular correlator software essentially comprises the following packages: The Video Installation programs check the hardware and allow the centering of the floating marks into the video coordinate system. The Video Library comprises routines for digital image processing applications. DSR1C assists in instrument calibration by means of gridplates, as well as in inner, relative and absolute orientations of stereo models, performing automatic parallax measurements in the positions selected by the operator. DTMCOR measures automatically the heights of points in digital terrain models and in close-range industrial or medical applications. Missing points are marked and can be re-measured by the operator.

The Kern Digital Orthophoto System KDOS produces digital orthophotos based on a DTM. Margins, contours and text can be added to the file by means of digital image processing techniques. A digital printer is used to generate the photographic negatives or printing foils of the complete orthophoto map. With DIGITI transparent images can be digitized. The relationship between the video- and the plate coordinate systems permits geometric correction of the recorded data. The DSR 15 can thus be used as a high precision Scanner.

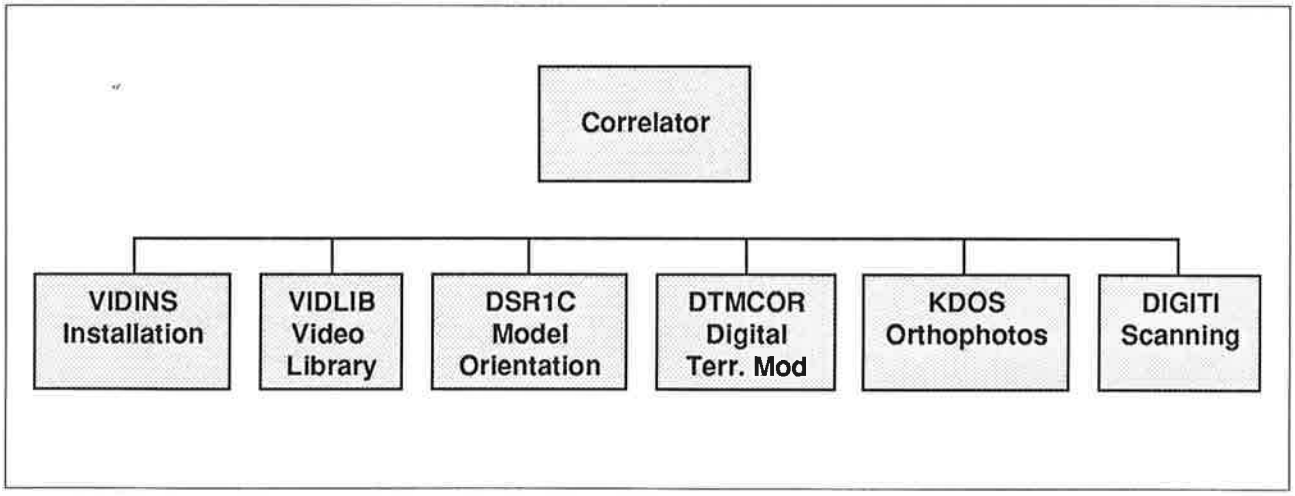


Figure 2: The modular Correlation System software

Conclusion

The Kern Correlator System (2nd generation) adds automation, orthophoto and scanning to the wide photogrammetric range of the powerful new DSR15 Analytical Stereoplotter.

The Kern DSP1 Digital Stereo Photogrammetric System

Introduction

Recent progress in computer technology and image processing techniques made possible the development of very efficient digital photogrammetric systems. The new Kern DSR15 Analytical Plotter, enhanced by such sophisticated options as correlators for automated orientations and restitution, raster image superimposition or even mapping from digital "SPOT" satellite imagery, represents such advanced technologies. The next step in this evolution will be the fully digital approach to photogrammetry, where the analogue photographs are replaced throughout by digital imagery. Kern has already realized this technique of the future and now proudly presents the Digital Stereo Photogrammetric System DSP1.

The Concept of the Kern DSP1

The new DSR15 with its distributed processing hardware and modular software is an ideal basis for an all-digital photogrammetric system. It was combined with GEMSYS 35, the proven image processing equipment by GEMS of Cambridge. The only new hardware developments were interfaces between the various existing modules.

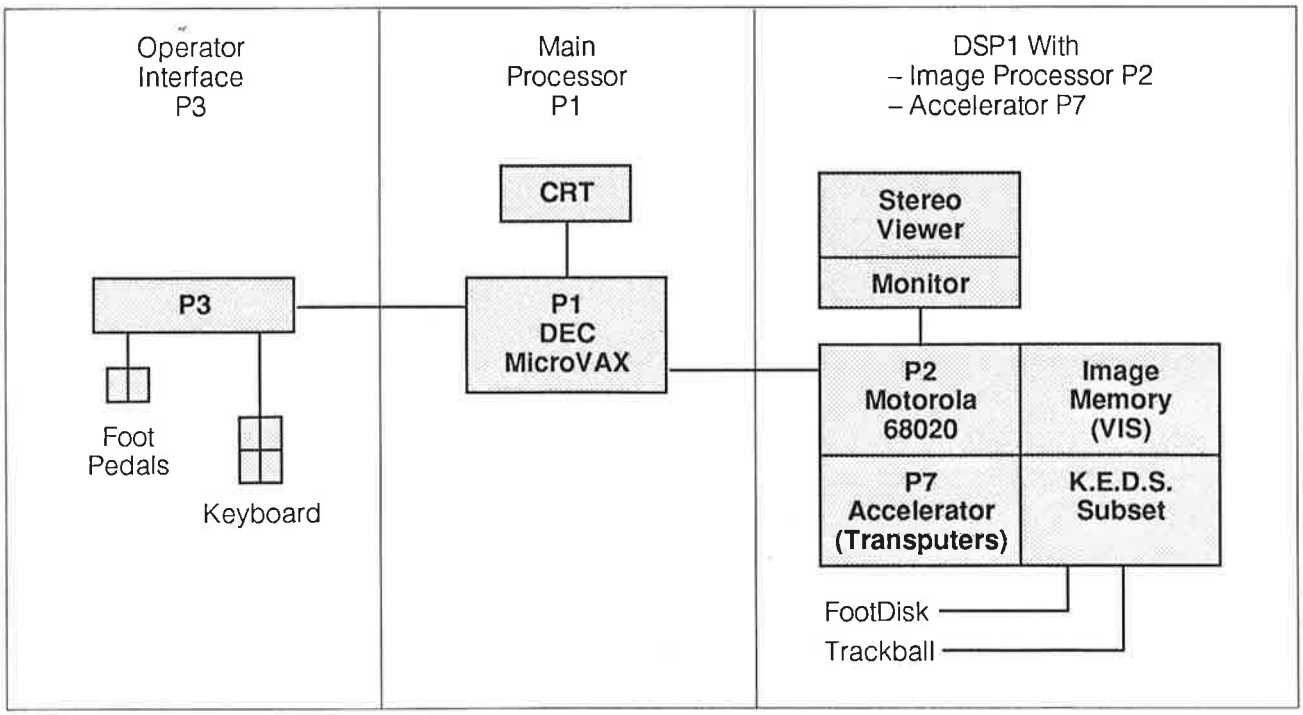


Figure 1: Kern DSP1 hardware configuration

The powerful DEC MicroVAX host computer P1, the processor P3 and the K.E.D.S. (Kern Electronic Drive System) subset were taken over from the DSR15. The plate processor P2 was replaced by the image processor P2. The Volumetric Image Store (VIS), a colour monitor to display the images and the Accelerator P7 for fast parallel processing by transputers were added.
The observation system is based on DSR optics and is designed to allow stereoscopic observation of the split screen.
The modular structure of both KERN and GEMS software facilitated the integration of many standard routines into the DSP1 software and the implementation of additional functions, such as image handling, image movement and image enhancement. A communication protocol between P1 and P2 handles the flow of data, programs and commands between the two processors.

Figure 2:
The Kern DSP1 Digital Stereo Photogrammetric System

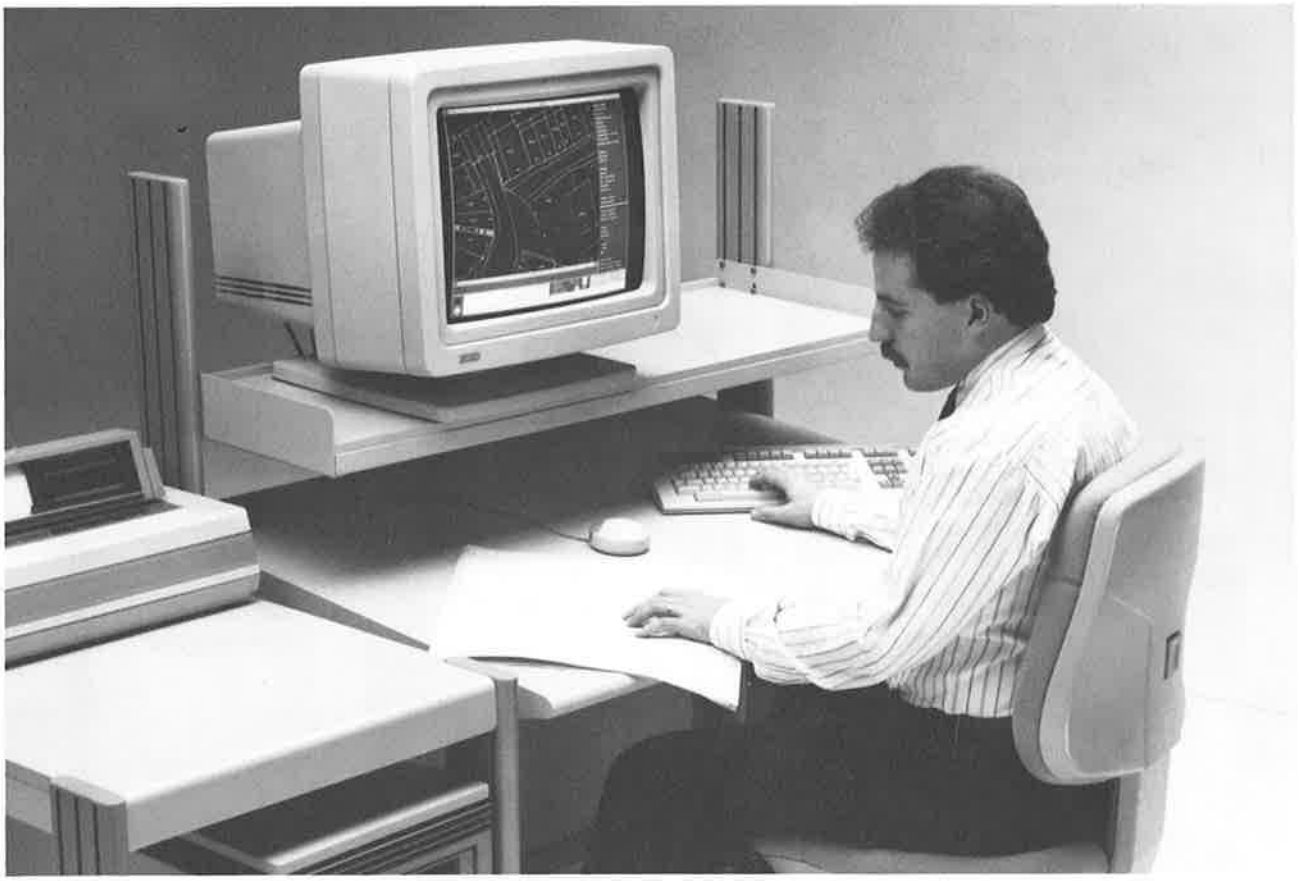
Conclusion
All-digital systems will set a new standard in photogrammetry. Again Kern is in the lead, anticipating tomorrow's technology.

INFOCAM
Kern Geo-Information System

Introduction
INFOCAM is a graphics interactive system concept for the management and administration of geographic spatially related data.

The new approach
The current object-oriented data base has been drastically re-designed into a fully TOPOLOGICAL DATA BASE with NODE/EDGE structure.
This new approach is ideal for the management of photogrammetric data, tacheometric measurements, point coordinates, geometrical structures and attached thematic attributes.
The open architecture provides maximum flexibility for the data base design as well as for the user interface.

INFOCAM / ORACLE
ORACLE is a Relational Data Base Management System (RDBMS) from ORACLE CORP., Belmont, USA.
INFOCAM can be upgraded at any time with this option (INFOCAM/ORACLE) where ORACLE is responsible for the long term storage of the geometry and thematic attributes, data consistency and multi-user environment with integrated SQL (Structured Query Language).



Conclusion
INFOCAM merges data from various sources within the world of geo-information. It provides editing functionality and lays the base for long-term data storage.

Networks
Larger organisations need several workstations for the collection, processing and management of spatial data. These stations can be connected with one another through a network.

General Conclusion.
With these new developments, based on well proven hardware and software design principles, KERN consolidates its leading position as the reliable supplier of cost effective, future oriented photogrammetric system solutions.

For more information please write or call:

Kern & Co. Ltd.
CH-5001 Aarau Switzerland
Optics,
Electronics, Precision Mechanics
Telephone 0041 64 26 44 44
Telefax 0041 64 24 80 22
Telex 981106

6.88. FA Printed in Switzerland