

MATRA TRASTER T10N
DIGITAL STEREOPLOTTER

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INTRODUCTION :

The apparition of new SPOT images makes it more interesting to use an entirely digital geographic production line. This avoids the analogic conversion and consequently a lost of image definition. The overall exploitation process time is reduced by suppression of intermediate steps.

The digital exploitation is also in the line of the general context where the geographic process tends to be more and more realized on computer and organized in new centralized data base.

The other goal of this product is to supply an increasing help to the operator by reduction of his eyestrain and by making his work easier.

PRESENTATION :

To support this increasing use of digital imagery, MATRA has undertaken as Research and Development program to analyse the requirements and study a digital system for the analysis of stereoscopic digital imagery. This effort won support from the French Government and the French Space Agency (CNES), which is currently funding the development of a prototype. The French National Geographic Institute oversees this program.

The present study is aimed to increase the production rate of data extraction from satellite and aerial photographs and oriented toward the achievement of autonomous feature extraction in the mid term.

The current phase is devoted to :

- Product a digital stereoplotter which will integrate all aspects of mapping exploitation of aerial and satellite imageries.
- Allow automatic generation of DTM data from the same sources.

The present effort is pursuing three goals :

- Analysis and application software generation.
- Development of the algorithms.
- Development of the system.

PRODUCT DESCRIPTION :

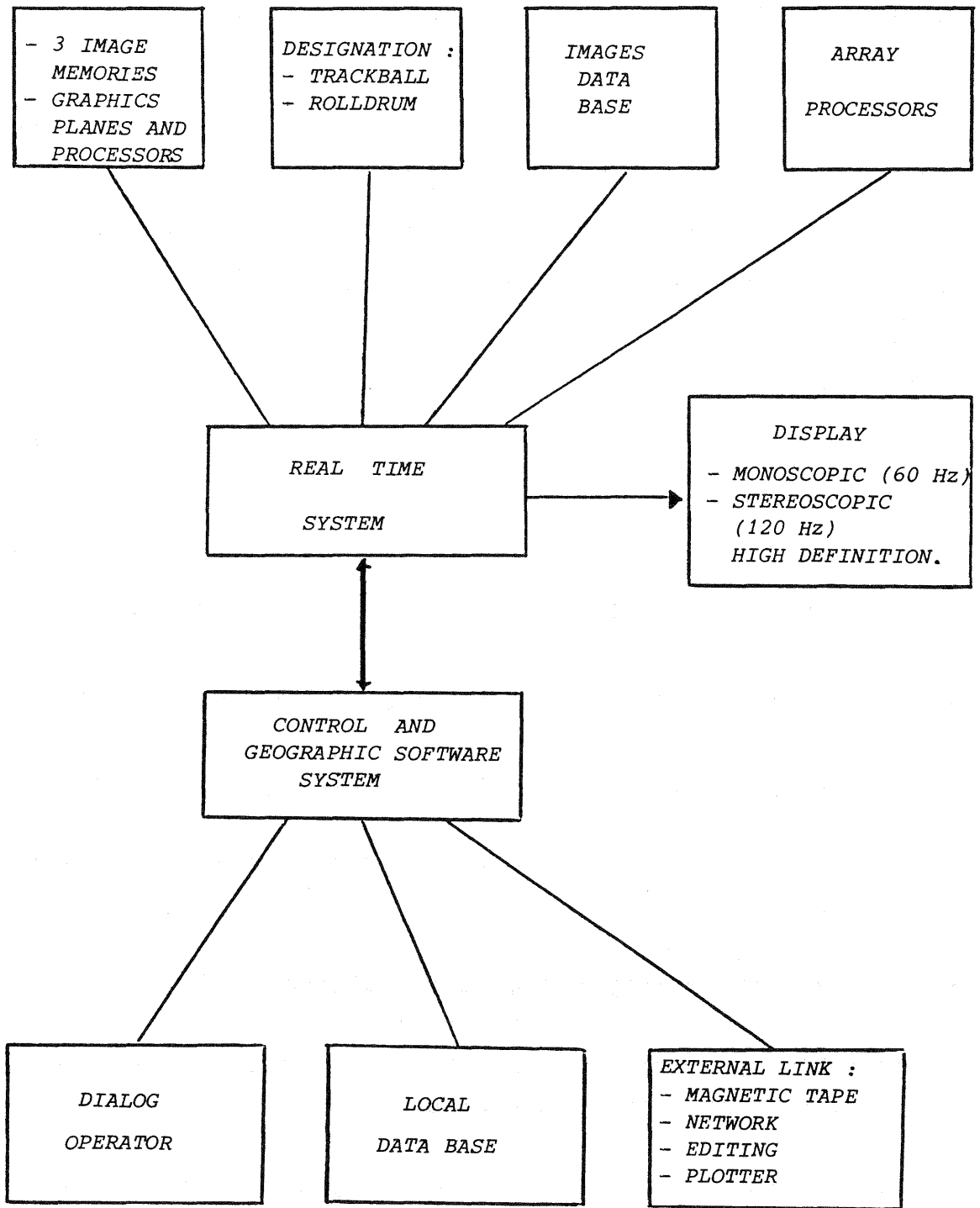
The workstation receives input data from digital sensors (satellite, digital cameras or digitalized images).

It can be linked with a geographic Data Base. Its main activity is to update or create the geographic information tied to these images.

The system is divided in two parts : the management system controlling, all the different operations and the second system specialized in the real time operations.

The workstation is made of the following subsets :

- > Operator interfaces (dialog, designation, editing.)
- > Local data base to store and manipulate the images data.
- > High resolution display within monoscopic or stereoscopic view.
- > Large image memory and graphics planes.
- > Graphic processors allowing the exploitation of the graphic list (geographic data).
- > Array processor for all image processing (correlation, geometric rectification, ...).



PRODUCT DESCRIPTION

MAIN FUNCTIONALITIES :

The first steps before the real exploitation are :

- Initialization of the geographic job by acquisition of cartographic parameters and images.
- Model set up. After control points observation, the model of the stereopair is computed and set up in the system.

Then, the operator may use the main functionalities of the workstation :

- 3 D travel into the stereomodel.
- Viewing and updating cartographic data by stereoscopic superimposition.
- Points Measurement (driving, observation, recording, encoding).
- Computer aided Measurement (automatic correlation).

The X, Y, Z Travel is realized in the stereoscopic view by action on Trackball and roller drum. Everything is realized for the operator comfort : the choice of the stereoscopic display (high frequency, little polarized glasses), the smooth and continuous effect of the travel in the large images, computer aided measurement, display of the updated X, Y, Z.

Measurement can be done at every moment of the travelling with a subpixel accuracy (eighth of pixel).

Image processing may improve the observation and help the operator for the identification.

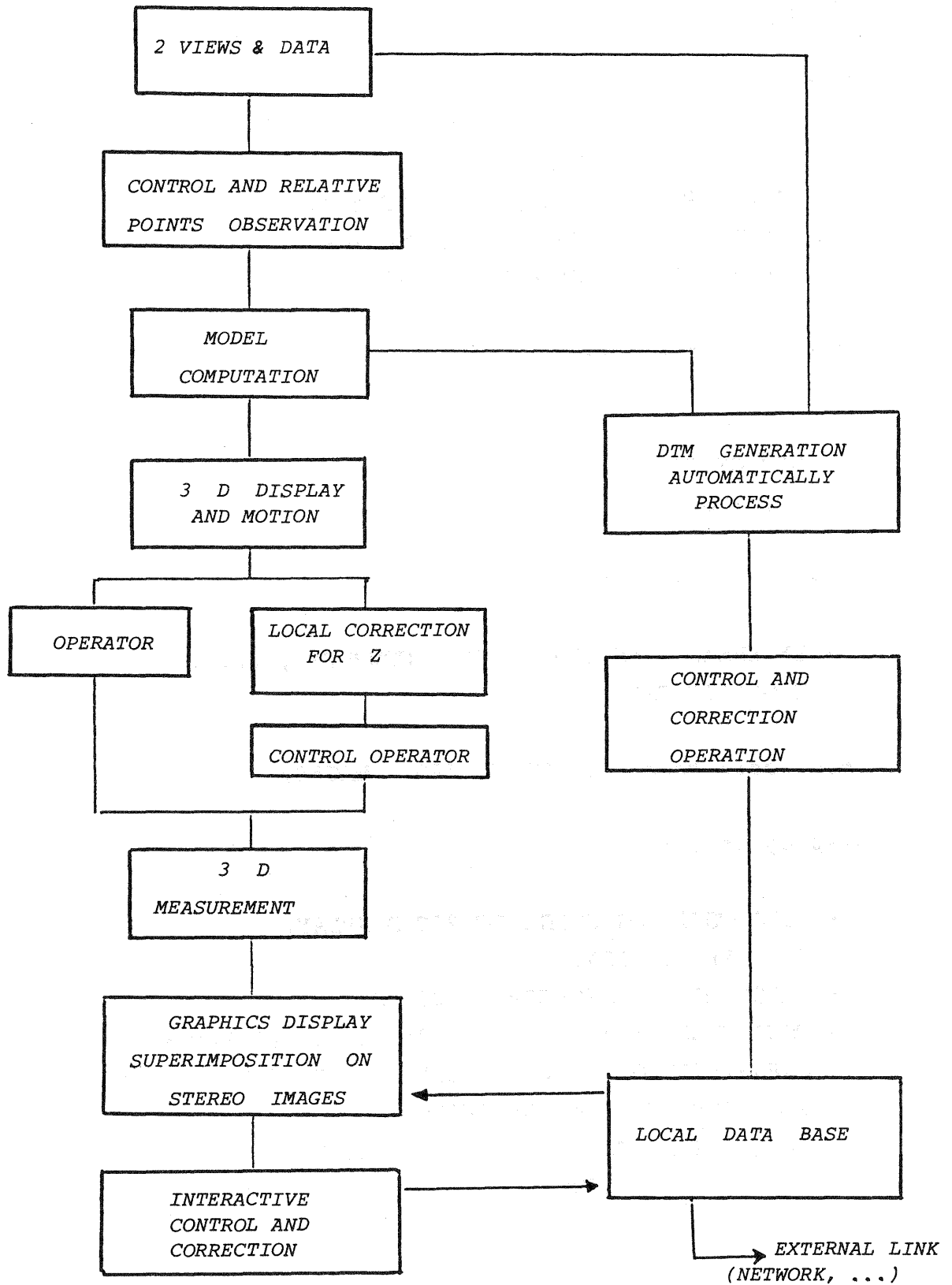
The operator is also able to update geographic informations superimposed on the images in the stereoscopic view. The graphic is overlaid and no destructive for the images.

After measurement data encoding is compatible with Demeter data base and all the main functions of the Demeter Software package (data management and utilisation) is available.

To help this different functionalities, an effort was done to elaborate an algorithm of DTM generation.

The aim is to automatically generate a regular DTM from two stereoscopic images and associated model. This combines the correlation technics (images and edges) and the dynamic programming technics to have a result for every kind of images.

Operator control aid is provided for possible erratic points detection and associated correction.



MAIN FUNCTIONS OF THE DIGITAL TRASTER.

MAIN CHARACTERISTICS :

Processors :

- BI-PROCESSOR ARCHITECTURE.
- DIALOG PROCESSOR AND DEVELOPMENT.
- PROCESSOR WITH REAL-TIME MONITOR.
- ARCHITECTURE COMPATIBLE WITH ANALYTIC TRASTER (T5S).

Operators interfaces :

- DIALOG.
- DESIGNATION.
- EDITING.

External interfaces :

- EXTERNAL LINK (DATA BASE, COMPUTER, ...).
- MAGNETIC TAPE.

Local data base (15 STEREO SPOT IMAGES).

Display unit :

- MONOSCOPIC OR STEREOSCOPIC DISPLAY.
- HIGH RESOLUTION.
- ERGONOMIC STEREOSCOPY (120 HZ).
- CONTINUOUS TRAVEL ON THE STEREOSCOPIC IMAGE.
- CAPABILITY OF A STEREOSCOPIC DISPLAY OF 3 CHANNELS.
- GRAPHICS' OVERLAY ON IMAGES.
- OPERATOR SELECTABLE GRAPHIC PLANES.
- GRAPHIC PROCESSORS.

Array processor :

- GEOMETRIC RECTIFICATION.
- CORRELATION.
- VARIOUS FILTERING.
- IMAGE PROCESSING ...

CONCLUSION :

The goal of this project is not only to resolve the problems of the digital geographic production but also to define a real industrial product.

It must keep the ergonomy, accuracy, fiability characteristics of the product "TRASTER".

For that, the realization of new workstation like T10N needs a wide knowledge in different development and high technology products manufacturing.

MATRA COMMAND AND CONTROL SYSTEM DIVISION designs and produces systems for mapping, remote sensing, aerial reconnaissance, intelligence data processing.

The development of TRASTER T10N is in fact the fusion of the Division works in :

- Analytical photogrammetry (TRASTER T2).
- Geographic exploitation of SPOT images on analytic stereoplotter (TRASTER T5S).
- Image processing products (display processors, array processors).
- Specialized software to move a display area in large images sources.
- Activities in Data Base.
- Algorithm work (DTM generation, ...).