15 July 1993

Release of TNTmips™ V4.30

Introduction

Much of the effort on **TNTmips** for the last 3 months, since the shipment of **V4.20** has been concentrated on improvements in reliability. The important on-line help and batch features of **MIPS** have also been implemented in **V4.30**. However, some very significant new additions have been made in **V4.30** in the area of using TrueType® fonts, database forms, and additional soft photogrammetry. The advances in this version in font handling and rendering alone warrant its use over **MIPS V3.33**.

TNTmips V4.30 was duplicated and ready to begin shipping in mid-June. However, due to continued input of new problems from those using **V4.20** it was decided to test **V4.30** longer and more extensively. This was done and the floppy disks have been remade.

TNTmips V4.40 will be shipped about mid-September on the normal quarterly release schedule.

Name Changes

MicroImages is announcing some minor changes and additions to its product names to bring existing and planned product names into better agreement. The following are the revised product names.

TNTmips™ is the revised form of the name for **TNT-MIPS**. This is the abbreviated name now used for the Map and Image Processing System.

TNTview™ will be the release name for the $1000 product which has been referred to previously as **MIPSview** and will be distributed without charge to those who have previously purchased the stand-alone HyperIndex® product. **TNTview** is being rewritten now for distribution at the beginning of August and will contain most of the complex on-screen visualization and viewing tools in the **TNTmips** display subsection.

TNTatlas™ is a product which may be released by MicroImages at about $400 to allow the low cost use of HyperIndex stacks or atlases which you might want to distribute on **CD-ROM**s. If, and when released, it would contain essentially the same features as the previous stand-alone HyperIndex, but will allow the use of **CD-ROM** stack(s) on any platform supported by **TNTmips**.

TNTsdk™ will be the name for the former C tools kit which has been more recently referred to as the **SDK** (Software Development Kit).

Installation

Microsoft Windows 3.1 (**MS W3.1.**
The 5.25" version has 31 disks as follows: 25 containing processes and outline fonts; 5 containing both the **TNTmips** and **MIPS** documentation; and 1 with the installation process and the utilities.

The 3.5" version has 26 disks as follows: 21 containing processes and outline fonts; 4 containing both the **TNTmips** and **MIPS** documentation; and 1 with the installation process and the utilities.

Running **INSTALL** upgrades your key to authorize it for **V4.30**. It then decompresses and writes a copy of each process you have licensed from the disks containing **V4.30** into a **TNTMIPS** directory on your hard drive. You must use the **INSTALL** routine on the installation disk supplied with this release to decompress the files during installation. Installing this **V4.30** will completely replace **V4.20** or earlier versions of **TNTmips** if the same hard drive is selected.

TNTmips V4.30 may require as much as 58 megabytes of your hard drive depending upon the options you have purchased plus additional space for the on-line documentation. Eventually this hard drive requirement may shrink somewhat as processes are further streamlined and integrated.

Apple Macintosh.

The Mac via **AU/X** version of **TNTmips** is shipped on floppy disks with specific printed installation instructions included.

Workstation.

The **TNTmips V4.30** for workstations is being shipped on 8 mm Exabyte, 4 mm DAT, or 1/4" QIC tape according to the preference you expressed. Specific installation instructions are included with each tape.

Those receiving the 8 mm or DAT tape will find that it contains the following optional versions for installation: Sun Solaris 1.1, Sun Solaris 2.2, Silicon Graphics Indigo, Data General, and the Macintosh. These tapes also contain the illustrations for the documentation, sample data sets, and the Software Development Kit (**TNTsdk**).

Those receiving the shorter 1/4" QIC tapes will find that they do not contain the Macintosh or Data General versions as insufficient capacity was available on these tapes to include these versions. MicroImages will buy longer QIC tapes for the release of **TNTmips V4.40**.

Should you wish to try any other versions not supplied on your standard tape or disk, (e.g. **IBM**, **DEC**, **HP**, and so on) please let MicroImages know and they will be provided if your **TNTmips** product key is authorized to run them.

General Changes to Protection Keys

The black software protection key and associated use with **TNTmips V4.30** has not been altered in any way. However, with the release of **V4.30** the red protection key and associated protection scheme used on the workstation and Mac platforms has been liberalized. **TNTmips**, when purchased for a workstation, uses the red serial key which can now be attached to the serial port of any workstation supported and will run that platform's version of **TNTmips**. Thus, everyone who purchased or will purchase a workstation version of **TNTmips** obtains the license to run it on any other workstation supported. This same red key can also be added to the serial port of an Apple Macintosh running **AU/X V3.0**, to a **PC** running **MS W3.1** (and eventually **NT**)**,** to allow the installation and use of **TNTmips V4.30** as well. While the red key can be attached to only one machine at a time, this license modification provides a lot of new convenience. For example, many inexpensive input/output devices are available for the

PC. The workstation version of **TNTmips** now allows you to temporarily run on a **PC** to use these devices. Also remember that the workstation key is automatically licensed and programmed to let you load and use these peripherals on the **PC** (i.e. almost all the peripheral support features are bundled into the workstation version of **TNTmips**).

If you have purchased **TNTmips** for the Macintosh, you will find that with **V4.30** you are authorized to install and use **TNTmips** on a **PC** as well with **MS W3.1**. Since you have purchased a D45/M product it will allow you to load and use **TNTmips** on any **PC** using **MS W3.1** up to and including a display resolution level of product D45. However, the D45/M product is *a la carte* and does require the purchase of the optional peripheral support features whether used on the Mac or with **MS W3.1**.

Since the red serial workstation key can be used on several different platforms you will find that your tape for **V4.30** contains **TNTmips** for several platforms including the Apple Macintosh. Simply attach the red key and your tape reader to the particular workstation and run the install program to select and load the appropriate version. The detailed installation manual provides assistance on how to attach the serial key to each workstation, Mac, or **PC**. Those who have received only a workstation tape release can request a copy of the floppy disk sets for the Mac or **PC** if you will actually use them.

CD-ROM.

MicroImages has purchased and is working with the **JVC CD-R** (**CD** Recording) drive which can record on a blank **CD-ROM**. A small announcement on this product is enclosed with this shipment. Philips also makes a similar device. Unfortunately, with the pressure to get **V4.30** shipped, there has not been time to work out standardizing all our versions of the software on this media. It is only fair to warn all clients that MicroImages anticipates using this media extensively and that upgrades and annual subscriptions purchased after some future date will be more costly when specified to be delivered on floppy disks. Subscriptions made before that date will continue to be filled by the media of your choice without additional cost until they must be renewed. Original product purchases will continue to be available on any media specified including floppy disks, **CD-ROM**, and various tape types.

On-Line Documentation

A total of 831 pages of **TNTmips** documentation are included in the on-line form with **V4.30**. The on-line documentation printing capability is available but will not yet print the on-line illustrations. The stratification of the **V4.30** documentation is as follows: Basic System Operation at 95 pages; Display at 329 pages; Interpret at 129 pages; Prepare at 128 pages; Support at 51 pages; Appendix at 17 pages; and Glossary at 82 pages.

The first draft of the on-line documentation included with **V4.30** is now about 2/3 complete. MicroImages has recently employed two additional technical writing specialists who are introduced below. Effective with the shipping of **V4.30** we will temporarily suspend our other writing activities, such as our Application Note projects, and draft these technical writers as well to conclude the first complete draft of **TNTmips** documentation. This makes 6 full time experienced technical writing specialists available. Thus, the first complete draft of the documentation will be available about 15 August. It should be 1200 to 1400 pages but without extensive illustrations which are

being skipped temporarily in these new sections. A set of supplemental documentation disks will be available upon special request about that time.

As soon as this first draft of the total documentation is complete, two technical writers will return to their other special projects. The remaining 4 will perfect and expand the documentation with additional illustrations. However, all 6 will again spend their time just before the release of **V4.40** in mid September checking the processes for which they are responsible and making sure that the documentation is current with the additions and modifications for that release.

Subsequently, when the documentation is complete and illustrated, all 6 technical writers will be assigned special writing projects to create an increasing number of Application Notes and related materials. The initial projects will include an Application Note on the use of the soft photogrammetry in **TNTmips** and another on the use of the advanced visualization tools provided in the **TNTmips** display processes.

A longer master copy of the **V4.30** on-line documentation, including illustrations, has been deposited at Kinko's Copy Center in Lincoln as in the past for your direct ordering. Please be careful to specify the exact version number of the printed copy of the documentation you wish to order from Kinko's as they have both **V3.32** (no changes for **V3.33**) and **V4.30** on hand. Please contact George Hiatt; Kinko's Copy Center; 1201 "Q" Street; Lincoln; NE 68508 at voice (402)475-2679 or FAX (402)475-2523 for this service. The printed copy of the 1320 pages for **MIPS V3.32** (specify single or double sided) is approximately $80 plus the charge for shipping by the method specified. The printed copy of the 831 pages for **TNTmips V4.30** (specify single or double sided) is approximately $50 plus the charge for shipping by the method you specify. A credit card is the best way to pay Kinko's for both the printing and shipping.

MicroImages X Server (MI/X)

Windows **NT** for the **PC**.

MicroImages has continued to work on the **X** Server for Microsoft Windows **NT**. Basic **X** Window outlines are showing up now within **NT** and thus progress is being made and we may complete this project in 1 month. It has taken longer than originally thought because an opportunity occurred which has allowed us to code the **NT** network features into the **MI/X** server. In fact, it was found that it would have been difficult to program around the network features of **NT**.

Windows **NT** for the **DEC** Alpha **PC**.

MicroImages has had quite a few inquiries about the possible release of **TNTmips** for the new **DEC** Alpha **APX PC** sized desktop machine. MicroImages has just taken delivery of a complete development system for this new **DEC** product. The only operating system available for this machine is the beta version of Microsoft Windows **NT**. The strategy of our original **X** user interface design becomes apparent with this second **NT** based machine where we expect that the source code of the **MI/X** server prepared for **NT** on the Intel based **PC** will be quite similar to that required for the **DEC** Alpha **PC** using **NT**. We already know from experience with other processes that the 32-bit **C** source code for the **TNTmips** application processes will compile on this new machine with relatively few problems. Pending the outcome of these tests, MicroImages may announce the delivery of **TNTmips** for this platform.

Windows for Workgroups

Neither **NT** nor Windows for Workgroups (**WfW**) is the same product as Microsoft Windows 3.1 even though they all share a common windows user interface. MicroImages is currently distributing **TNTmips** for **MS W3.1** only and it has never been stated by MicroImages that it was available for **WfW**. There are identified problems using **TNTmips** when **WfW** is set up in server mode. MicroImages has acquired WfW and will investigate the source and solution of these problems. When **TNTmips** is working with **WfW** it will be announced. In the meantime, use **TNTmips V4.30** with **WfW** at your own risk.

TNTmips Problems on Some 386/16 Computers

You may have a 386/16 based microcomputer which is equipped with a 287 math coprocessor. It has been determined that this combination will cause significant floating point computation problems with **TNTmips** via the Watcom compiler. It is important that **TNTmips** not be run on such a computer. **TNTmips V4.30** (but not earlier versions) will now run on microcomputers which do not have a math coprocessor but will detect if one is present and automatically use it. Thus, **TNTmips** will run correctly on your 386/16 if you remove the 287 coprocessor. After removing the 287 chip you must add the statement **DEVICE=WEMU387.386** into the section headed **[386Enh]** in the **SYSTEM.INI** file. Please see the new installation manual being distributed with **V4.30** for similar information. **TNTmips V4.30** will now also run on the lower cost 486SX based microcomputers which do not have a math coprocessor with a similar **MS W3.1** setup statement.

Temporary Limitation to RVC Project File Access

Warning: do not attempt to use the same **RVC** Project File in two or more **TNTmips** processes at the same time unless the file is set to read only. Simultaneously executing two or more TNTmips processes in a multiprocessing sense which attempt to write to the same **RVC** file may result in unrecoverable loss of data in the **RVC** Project File. This restriction will be removed in a future version of **TNTmips**.

Sun Modifications

TNTmips is now also available for both the Sun platforms using the Solaris 1.x series and the Solaris 2.x series. By now most of you with Sun machines know that Sun was unable or unwilling to provide you with continuity between these versions of Solaris (Unix). Thus most software purchased for the older 1.x versions will not run with the newer 2.x versions (the latest Solaris available is V2.2) and no software compiled for V2.x will run with V1.x. For example, AutoCAD release 12 is a Solaris 2.x package only while Word Perfect would run only under Solaris V1.x (current status of WordPerfect upgrade plans to V2.x is unknown).

This "brilliant" Sun move is about equivalent to Microsoft bringing out a new version of DOS which would not run any software you currently have and if you bought any new software and upgrades it would not run with the machines you still had with the earlier DOS system installed. Thus, MicroImages has to release 2 versions of **TNTmips** for

the Sun Sparc series and you must load that which is appropriate for your setup. Please also be advised that the newer Sun platforms such as the Classic and LX can not directly run Solaris 1.x except in a slower emulation mode. As we all know from past experience, emulation usually will run a few big name software packages well and generally nothing else. MicroImages is already getting feedback that this emulation approach on the new platforms is causing problems and delays in other nations with applications which they need for language conversion of the interface.

Solaris for the PC

MicroImages has acquired a copy of the development system for Sun's Solaris product for the **PC** and might make **TNTmips** available for it. At present, however, there has been little interest in this Unix product. **SCO** Unix, Solaris, and related Unix systems for the 386- and 486-based **PC** simply do not have large scale acceptance in the marketplace.

INFORMATION UPDATES

There are no new MicroImages INFORMATION UPDATES being issued with this shipment.

586s versus Workstations.

An in-depth comparison of the initial 586 **PC**s which have been shipped compared to popular workstations can be reviewed by obtaining the article: Michael J. Miller (15 June 1993); **The New PCs**; PC Magazine; pages 109 to 170. This is a very detailed discussion covering the Compaq Deskpro 5/66 Model 510 (a 586); HP Apollo 9000 Model 715/50; IBM RS/6000 PowerStation 365; Silicon Graphics Iris Indigo R4000 XZ; Sun Sparcstation LX; and Apple Macintosh Quadra 800.

Page 133 of this article contains important tables showing a wide variety of benchmarks (Dhrystone, Graphstone, Khornerstone, SPECmark, Whetstone, X11PERF, and others) comparing these systems. A stand out result on these tables is that the Compaq 586 is similar in performance to the Sun LX and Classic workstations which are Sun's replacement for the Sparcstation 2 and IPX workstations.

Windows **NT**.

A comprehensive technical overview of **NT** can be reviewed by obtaining the article: Ben Ezzell (15 June 1993); **The Power Under the Hood**, Windows NT, the first 32-bit Windows interface with some powerful new under-the-skin architecture; PC Magazine; pages 173 to 200.

Windows Display Boards.

New graphics display boards for **MS W3.1** can be reviewed by obtaining the article: (13 April 1993); **Waking up Windows**; PC Magazine; pages 158 to 219. Additional up-to-date information on selecting a display board can be reviewed by obtaining the article: Alfred Poor (July 1993); **The Perfect Display**; PC Magazine; pages 147 to 179.

Buying a New **PC**.

Designing a state-of-the-art **PC** for use with **TNTmips** can be assisted by reviewing the following articles: 1) Winn L. Rosch (July 1993); **The Perfect System**; PC Magazine; pages 123 to 145. 2) Alfred Poor (July 1993); **The Perfect Display**; PC Magazine; pages 147 to 179. 3) John R. Quain (July 1993); **The Perfect hard Disk**; PC Magazine; pages 183 to 206. and 4) Mitt Jones (July 1993); **The Perfect Accessories**; PC Magazine; pages 218 to 223.

Service Information Updates

A brochure from Photo Science Inc. (**PSI**) is included which describes a new large format, high resolution film recorder service they provide. **TNTmips V4.30** can export raster files or create print files (via product **F20**) for transmittal to **PSI** for preparation on this new Saturn film recorder form **LTV** (a Kodak subsidiary).

Should any other organization wish MicroImages to forward similar information on their services to all **TNTmips** clients we would be happy to consider doing so. The basic requirement is that the information be provided in sufficient quantity, that it contain summary price information on the product or service, and that the providing organization be a MicroImages' customer.

Optimizing MS W 3.1

An updated **TNTmips** installation manual for all platforms is being shipped for your **TNTmips** installation notebooks.

Among the revised information it contains is a new trick on page 31 which allows setting up a larger permanent virtual memory than is directly allowed by **MS W3.1**. MicroImages has already encountered situations when a very large permanent swap space is required for efficiency in controlling hardware devices. This trick and many others can be found in the book: Brian Livingston (1992); **Windows 3.1 SECRETS**; IDG Books Worldwide, Inc.; 155 Bovet Road, Suite 610; San Mateo, CA 94402; 990 pages.

New Features

Display.

A Quick-Add (**Q-A**) display layer option has now been added to allow rapid selection and display of a single raster and multiple vector and **CAD** layers without a lot of complicated design and set up features. In **V4.30, Q-A** will display each layer selected just as if you used the general procedure to add a layer but immediately clicked the "OK" button. Thus, vector and **CAD** objects will display all their contents and only in the color of white. Modifications to **Q-A** planned for **V4.40** will automatically display each layer selected just as it was previously displayed in the general procedure. In other words, **Q-A** will default to display each layer selected with defaults of colors, line styles, database query, and so on as set in the last use of the layer in the general display process.

The inside contents of the "view window" (the window where the complex visualization is built up) can now be quick "snapshot" saved as a raster object in the **RVC** project file you select.

A completely new interface procedure has been provided for the selection of a map projection and its coordinate reference frame.

The interface procedure for color-map editing has been significantly improved and several minor new features added.

Error Messages.

While error messages are things you and MicroImages wish you never encountered, they are a fact of life. Thus, a new error message system has been integrated into all **TNTmips** processes. It displays much more verbose error messages and information which will be helpful to you and MicroImages in pinpointing a problem. Please provide this complete message in English as part of your technical support request. Unfortunately, this will not eliminate those wonderfully descriptive **MS W3.1** "Application Error" messages which are trapped and displayed by **MS W3.1** at the systems level.

Those of you using **TNTmips** who prefer reading other languages, or are servicing customers who do, may wish to immediately translate the error messages into that "local" language. This can be done by translating the error reference file **ERRMSGS.TXT** into the local language with the **TNTmips** text editor or some other editor. This translation will require the use of an **X** System font as discussed in the Application Note entitled Internationalization and Localization. Please note that in the section below on the use of TrueType fonts in **TNTmips**, it may soon be possible to translate TrueType fonts into **X** System fonts, but in the meantime you will have to find your own **X** System fonts. Please note that once translated, the **ERRMSGS.TXT** file will be immediately usable on all platforms supported by **TNTmips** (workstations, Mac, **PC**, etc.).

Instructions on the internal structure of the **ERRMSGS.TXT** file are contained as comments at the beginning of this file. You may also expand and elaborate the error messages in English or any other local language in your choose by simply adding lines into the appropriate sections in the file. Please recall however, that the **ERRMSGS.TXT** file is replaced with the installation of each new **TNTmips** version and this will overwrite your additions and translations, so save a backup copy. A means of preserving your local language translations or personal additions from **TNTmips** version to version is being investigated for future implementation.

On-Line Help.

Context sensitive, on-line help is now available in a scrolling window for most processes. If you want to request that this help be expanded or added in a specific process, please let us know as this is easily done. A couple of pages of instructions on using this on-line help are included in the on-line documentation and are summarized here. 1) If there is a menu bar on the window being used you can access on-line help via the help menu and then select "on context". The cursor will then change into a pointing finger. Use it to select the item for which you want help. 2) If you are using a dialog box which does not have a menu bar, it will show a help button which you can press to show the help window. 3) If an interface item such as a button has been selected and has "focus", as shown by a black box around it, you can request on-line help by pressing F1 or the help key for workstation keyboards which have one.

Those of you using **TNTmips** who prefer reading other languages, or are servicing customers who do, may wish to immediately translate the help messages into that "local" language. This can be done by translating the help reference file **TNTHELP.TXT** into the local language with the **TNTmips** editor or some other editor. This translation will require the use of an X System font as discussed in the Application Note entitled Internationalization and Localization. Please note that in the section below on the use of TrueType fonts in **TNTmips** that it may soon be possible to translate TrueType fonts into X System fonts, but in the meantime you will have to find your own X System fonts.

Please note that once translated, the **TNTHELP.TXT** file will be immediately usable on all platforms supported by **TNTmips** (workstations, Mac, **PC**, etc.).

Instructions on the internal structure of the **TNTHELP.TXT** file are contained as comments at the beginning of this file. You may also expand and elaborate the help messages in English or any other local language if you choose by simply adding lines into the appropriate sections in the file. Please recall however, that the **TNTHELP.TXT** file is replaced with the installation of each new **TNTmips** version and this will overwrite your additions and translations, so save a backup copy. A means of preserving your local language translations or personal additions from **TNTmips** version to version is being investigated for future implementation.

Importing Rasters.

Improved buffering has been added which significantly speeds up the import and export of **TIFF** files. The raster object selection in the import process has been reworked to be similar to that used in the main **TNTmips** display process for **RVC** files and now allows for the selection of multiple **RVC** files. You may now also select a contrast table from the **RVC** project file to pass the raster through, thus mapping it to new desired values as it is being converted and exported.

The raster import process is being modified to allow the selection of multiple input files of a specific type. With this modification a large number (e.g. video frames in **TIFF** format) of a specific file type can be selected and then imported without further input. The import operations which support the multiple selection features are for the **LVT**, simple array, and **TIFF** formats. Modification to the raster import process will be continued to add this feature to the import of other raster types.

Raster files of the expensive **LVT** Saturn film recorder (**LVT** is a Kodak subsidiary) can now be imported and exported. A Photo Science Inc. flier is enclosed which details the technical characteristics of this large format, high resolution film recorder as part of the PSI offering of film recording services with this device. With this export feature you can export rasters to send to **PSI** for film preparation. The **TNTmips** Map and Poster Layout process will shortly be modified to output print rasters for direct use on this same **LVT** device. Please note that using Map and Poster Layout for such activity will, as usual, require that the appropriate film recorder feature be authorized and installed on your **TNTmips**.

Landsat data obtained from the Australian and South African tracking stations on 8 mm tape can now be imported into an **RVC** file from either the band sequential or band interleaved by line tape formats.

Rasters produced by the Dianippon Screen-1000 large format color map scanner marketed by Laser-Scan can now be imported into an **RVC** file in two formats (the Laser-Scan format and that from the direct scan software provided by Dianippon).

Copying Rasters.

This process has been significantly reworked to provide a more intuitive user interface. It now automatically prevents some of the "incompatible size" errors of the previous version. Improved buffering provides significant speed improvements for large rasters.

Importing and Exporting Vectors.

The Tydac SPANS **VEH/VEC** file can be imported into a vector object. The companion ***.TBA** file containing the associated attributes can also be both imported and exported to/from a companion database table.

Copying Vectors.
This process will now allow you to manually select the coordinates of the corners of the area to be copied. The labels contained in a selected portion of the vector object will also now be copied to the new object.

Text Editor.
The text editor can now copy, cut, insert, and delete the highlighted text selected by the mouse.

Surface Fitting.
As an alternative to fitting the surface to the entire extent of the vector object you can now also directly select a subportion of the object. To use this feature simply ask for this process to display the vector object and then use the mouse to draw a single closed polygon or box enclosing a portion of the vector object. The surface fitting method you choose will then be applied only to the portion of the vector object within the new area you have outlined.

Several vector objects can now be selected for the same surface fitting run with identical parameters.

Buffer Zones.
The buffer zone process has had quite a lot of improvement in handling the complex special cases encountered by various users.

Classification.
The statistics text file output from the unsupervised classification or clustering processes can now be saved. It can then be used as the definition of the training sets in a supervised classification process.

Orthoimages/**DEM**s from Stereo Pairs. When using this process with a pair of color images the first two of the three major steps utilize only the one color or raster object which you select from among the 3 available to form the model, solve the general image geometry, and perform the autocorrelation to derive the elevation of the original image's cells. The first of these processes is the Prospective Projection Transformation. The second is the Stereoscopic Modeling process which autocorrelates the two stereo images to derive the elevation of the cells of one of the images. The third Restitution process has been modified so that you can select the corresponding 8-, 16-, or 24-bit color composite raster of the left or right image to be resampled into a color orthoimage. Thus, if you begin the sequence of 3 processes with 3 separate red, green, and blue color raster objects and a corresponding color composite raster object, the last process will yield a color composite orthoimage.

Using a premade color composite raster for the final resampling saves on computation time since all three colors are resampled (by the method you select) all at one time rather than repeating the same time consuming computation over for each band. However, you may want to perform this operation on stereo images with more than 3 multispectral bands (imagery of this type already exists). Thus, this last process will be modified in V4.40 so that it will allow you to select any number of coregistered raster objects (e.g. red, green, blue, photo infrared, etc.) and the final positional resampling

will automatically be performed sequentially on each raster object. The process would then yield a Project File containing a coregistered set of multispectral raster objects representing orthoimages of each spectral band selected.

Orthoimages from Single Images (Restitution).

If a geo-referenced Digital Elevation Model (**DEM**) already exists for an area, this new process will combine it with a single airphoto or **SPOT** image to produce an orthophoto or orthoimage respectively. This process corrects for the image geometry and terrain induced displacement errors within the limits of the accuracy of the geo-referencing of the **DEM** and the number, distribution, and accuracy of the ground control points you add to the image. The geo-referenced **DEM** might be available from a **USGS** for the 7.5' quadrangle of interest, a previous stereo image computation using a pair of older **SPOT** images or airphotos, or some other source. However, the new, single image selected may contain significantly altered natural resource, environmental, urban, or other surface features which did not change the areas topography. This new **TNTmips** process can be used with such new images to prepare a current orthoimage of these altered features without the requirements to repeat the more complex, complete soft photogrammetric solution.

MicroImages has developed its own technical solutions for these processes. However, general information on the concepts as applied by others can be found in recent articles. For SPOT imagery see: Liang-Chien Chen and Liang-Hwei Lee (May 1993); **Rigorous Generation of Digital Orthophotos from SPOT Images**; Photogrammetric Engineering and Remote Sensing; pages 655 to 661. For airphotos see: Gregory S. Tudor and Larry J. Sugarbaker (**GIS Orthographic Digitizing of Aerial Photographs by Terrain Modeling**; Photogrammetric Engineering and Remote Sensing; pages 655 to 661.

Producing a new orthoimage with these technique is relatively straightforward **TNTmips** process. It is nowhere near as complex a process as preparing an original **DEM** and orthoimage from a stereo pair and the necessary ground control. In summary, you simply select well defined ground control points in the image with the mouse and enter their geographic coordinates. The coordinates of the image points selected for control might be derived from a topographic map, a **GPS** survey, or other convenient methods. A minimum of 4 ground control points must be used. However, the more control points provided, the better the result. They should also be selected in a well distributed net pattern over the area especially including the high points.

A likely scenario is that in the office you print out sections of the image and mark up ground points which can be accurately identified on the image, are well distributed over the image, and can be subsequently located in the field. Then the coordinates of these objects are determined in the field with a **GPS** device. For example, a single tree in the middle of a meadow can be accurately identified on the image and found in the field to read its **GPS** coordinates. In the general photogrammetric surveys before **GPS**, it would have been necessary to select permanent features or premark surveyed image control points. This yielded expense and sparse control point information in rough terrain where the densest control point net is actually needed. Taking the printed image to the field as outlined above and reading the **GPS** coordinates of trees, bushes, rock outcrops, other distinct natural features can provide dense control points in rugged areas and yield more economical and accurate orthoimages.

The data you use in this process may have a significant resolution mismatch such as when using a **DEM** derived from **SPOT** stereo images with a high altitude airphoto or when using a **USGS** 7.5' **DEM** with a low altitude airphoto. An elevation surface fitting and resampling procedure is included within this process so that a coarse resolution elevation surface can be directly combined with a higher resolution single image to produce a high resolution orthoimage. However, it should be clear that the higher the resolution of the **DEM** the more accurate the orthoimage will be when high resolution images are available. When specifying the output raster object you will also be able to select the cell size, scale, and other parameters of the orthoimage which need not equal that of the **DEM** or original image.

Please also recall that the mosaic process in **TNTmips** can take the separate orthoimages which result from this process and put them together into a orthoimage map unit. Also recall that during the mosaic process that color tone trends within the orthoimage (e.g. vignetting in a photos) and between them (e.g. light balance differences between photos) can be greatly mitigated.

Another interesting learning and validation approach is available with this new process. Generally, with high and low altitude airphotos you will have access to stereo pairs. Should you choose to use an existing **DEM** to correct one of the pair you can just as easily processes them both and compare the orthoimages which result to determine the amount of error in the **DEM**, your ground control points, and the process. Overlaying the orthoimages obtained from the left and right images in a different colors in the display would be the easiest visual method of comparison.

Next you might think about using the mismatch as a means of improving the accuracy of the desired orthoimages. However, by the time you get to this level of complication you should think about using the complete stereo solution which uses this type of information to yield both the **DEM** and the orthoimage. However, even with the complete solution it is very instructive to use the **DEM** you compute derive both the left and right orthoimages and compare them. Furthermore, when using a complex soft photogrametric solution the recent technical literature proposes combining the left and right orthoimages to feed back into an iterative solution to improve the final **DEM** and orthoimage positional accuracy. Needless to say, this interactive process begins to take a lot of computer time. However, while this step is not yet employed in **TNTmips** it will be investigated for possible use as more powerful desktop computers will soon become the norm for use with **TNTmips**.

Many MicroImages clients have become very interested in the inexpensive and casual-use photogrammetric processes creeping into **TNTmips**. Their gradual incorporation into the product you already have on your desktop has required the use of 32-bit **C**, a windows user interface, a gradual move into the higher speed processors (386 and 486), and especially the new robust **RVC** Project File data structure. Thus, this 2 year effort and investment by MicroImages is only becoming available and useful to you with via **TNTmips**.

The use of these soft photogrammetric techniques can be a complicated idea for those without photogrammetry backgrounds or the will and determination to self-teach themselves the topic. While MicroImages intends to continue to improve these processes (we have many good mathematical and computational ideas left), the current

important task is to provide material to enable you to become a "casual photogrammetrist" to apply these methods as you need to your projects.

Some users are already experimenting with the use of this suite of processes with the help of our technical support and the software engineer who created them. **TNTmips V4.30** contains on-line help for these processes which provide good starting point for those who wish to push ahead immediately.

The very experienced technical writing specialist who brought you such complex written favorites as the **SML**, **SDK**, and Internationalization and Localization Application Notes is now going to clarify the use of these photogrammetric processes as follows. Beginning immediately the draft of the on-line documentation will be created over the next 4 to 6 weeks as part of the push to provide the first complete draft documentation for all **TNTmips** processes. Next this draft documentation will be illustrated. Finally, an Application Note on the topic will be undertaken. This step-by-step documentation process will stretch over many months but each draft section will be provided to you as soon as available in printed or disk format.

It is also anticipated that a **CD-ROM** with sample **SPOT** stereo pairs, scans of high altitude airphoto models, existing 7.5' **USGS**, **DLG** coverage, and related materials will be provided early in this process in **RVC** Project Files, probably first as a rough draft sample **CD-ROM**.

Viewshed finding.
You can now interactively select the viewing reference point using the mouse.

SML.
A very important feature added is that you can now add your functions to **SML** using the **TNTsdk** (the **TNTmips** software development kit). After you compiled these new functions, **SML** will allow you to select and use them in your scripts. Printed items amending the respective Application Notes are enclosed with this shipment, describing this advancement in more detail.

Importing TrueType Fonts into MicroImages Fonts.
First let us start with the United States legal aspects of this important advance in **TNTmips**. Those MicroImages clients in other nations have more knowledge than MicroImages regarding the copyright laws of that nation and the protection of U.S. copyrights by that nation's laws. The things which may be copyrighted under U.S. law about any font are twofold.

1) The name of a font can, and often, is copyrighted and protected by United States law. This memo has been printed using the Helvetica® font. The name Helvetica which mentally creates an outline of the letter "**A**" in your mind is the property of a U.S. company and may not be used by anyone else within the U.S. without a license to describe any other font with an "**A**" of some other shape. Since you may rename your TrueType fonts as you import them into **TNTmips** via **MS W3.1** you need not use these original names to describe your MicroImages fonts.

2) The written or computer methodology or language for the expression of the outline of the font may also be copyrighted under United States law and thus may not be used by anyone else without a license. The best example of this is the use of the Postscript language to describe and store the outline of a font. Thus the Postscript description of

the letter "**A**" in a Helvetica font is copyrighted and you can not use Postscript to describe or render a font without a license. This memo has been printed using a Helvetica font stored in a Postscript description of its shape. When you import a TrueType font into **TNTmips** via **MS W3.1** it will be translated into a new descriptive outline for each character which will be stored in the MicroImages font.

The actual appearance of a font is not copyrighted. This is the important salient point of this discussion! Thus the appearance of the letter "**A**" in a Helvetica font as stored in Postscript and rendered on a screen or printer is not protected. Thus you or MicroImages can draw by hand, print, or otherwise create the letter "**A**" to look like a Helvetica "**A**" without violating the United States copyright protections extended to fonts as outlined above. Thus, if you have a means of storing the outline of characters which is different from Postscript® and you do not name the font Helvetica, you may render and use characters which appear to be the identical letter "**A**". MicroImages has provided you that opportunity in **MIPS V3.33** and **TNTmips V4.20** processes using the MicroImages or "bird" fonts. **TNTmips V4.30** now significantly improves the use and appearance of the MicroImages bird fonts by reissuing them and rendering them as outline fonts only. Furthermore you may now import, rename, and use any TrueType font as a MicroImages font in any process. This vastly expands the number of fonts available to you.

Any TrueType font can be converted to a MicroImages font by using the Outline Font Editor in **TNTmips** to use a font access function built into **MS W3.1** which reads and provides the TrueType outline for each letter. Most commercial software products "ask" **MS W3.1** via this same function for each character outline when they want to display or print using TrueType fonts. Importing TrueType using the **TNTmips** Outline Font Editor simply uses this same function to obtain the outline description of each character. The Outline Font Editor then translates the TrueType character description into a new vector description and stores it in a MicroImages font object. Each MicroImages font you create in this fashion is stored in a separate file with the extension of ***.OF** standing for Outline Font.

All shape features of the imported TrueType font, except "hinting", are preserved in the MicroImages font including its full cubic spline description. Hinting is a special, font specific characteristic which adjusts line widths during the rendering of the font on a low resolution devices. Hinting has not been provided in **TNTmips**, but its absence will have little or no impact on products created on high resolution screens and high resolution printers which you generally use.

The font you are importing can be renamed so that Helvetica® becomes **HELVET.OF**. The name you select must be 8 characters or less and becomes the ***.OF** file's name. A brief description can also be added and stored in the MicroImages font where you can keep additional information about the font to be viewed later during any font selection process.

You will find that 5 standard MicroImages fonts named for birds (so called bird fonts) are automatically installed by **TNTmips V4.30** and available for your use. The contents and appearance of these bird fonts are listed on the attached sample page. If you rename the TrueType fonts as you import them MicroImages suggests you choose anything else except bird names to avoid confusion. MicroImages may choose to provide

additional bird fonts in the future which might overwrite the fonts you import if you use other bird names.

Everything printed on the sample font page was laid out and rendered in **TNTmips** by Map and Poster Layout, output to a print file, and printed on the new **HP** Laserjet 4 printer at 600 dpi. You will also find that all the text rendered on the SPOT graymap print attached to illustrate the quality of this **HP** Laserjet 4 has also been rendered in Map and Poster layout in a very high quality fashion using the standard 5 MicroImages bird fonts.

TNTmips draws a character obtained from a MicroImages font in each process with exactly the same logic as **MS W3.1** draws the character from the TrueType fonts. The character rendering used by all **TNTmips** processes uses the exact, same full cubic spline rendering as **MS W3.1**. Thus, with the exception of "hinting", you will find that the characters rendered by **TNTmips** produce the same character outline as other commercial programs which use the built-in process provided by **MS W3.1**.

Suddenly, with rapid advancement of **MS W3.1** into the world-wide market, there are thousands of font types available to you in TrueType format in many local languages at very low costs. More fonts are available as TrueType than any other form. All, and any, of these fonts are now available for your use in **TNTmips V4.30** processes which now use these fonts for text in making maps, on screen display, and anywhere else that a process generates text. As outlined below, these fonts may even subsequently become available for use in customizing the **X** Windows user interface of **TNTmips**.

Those of you using **TNTmips V4.30** on any other platform such a workstation or a Mac have the same 5 standard MicroImages bird fonts. You may also now convert **X** System bit-mapped fonts into MicroImages outline fonts as described below. For the time being, to import additional TrueType fonts into MicroImages fonts for use with **V4.30** you will have to improvise as follows. You can simply import the TrueType font on a **PC** which is already set up to run **TNTmips** under **MS W3.1**. Then move the MicroImages font file over to the workstation or Mac platform for use. As long as the font file and name are not altered in any way, the MicroImages font you create in this fashion will be immediately usable on any platform. The byte order used on the platform need be of no concern. Please watch out however, that the transfer method you use does not change the file name or add some hidden bytes to the beginning or end of the ***.OF** (or ***.RVC**) file. File transfer via a network is usually safe, however, transfer via a physical media such as a floppy may not be. For example, moving a file from a **PC** to a Mac using the built in Apple **PC** File Access procedure will add hidden bytes to the file. Subsequent attempts to use this file via **TNTmips** and **AU/X 3.0** will not work as the file has been altered by the addition of these hidden bytes. Alternatively, **DOS** file name conventions are different from Unix conventions. Use the common subset of legitimate characters when physically moving ***.OF** (or ***.RVC**) files between these platforms.

For Unix users of **TNTmips**, acquiring and installing all of **TNTmips** on a **MS W3.1 PC** platform requires a lot of extra work just to create additional MicroImages fonts from TrueType fonts. However, it is currently necessary since the **TNTmips** Outline Font Editor must access and use the font access function embedded in **MS W3.1** as described above. However, by **V4.40** MicroImages will make this much easier by

providing a pure **MS W3.1** utility for this activity. This little **MS W3.1** utility program will run on any convenient **PC** machine equipped only with **MS W3.1**, not **TNTmips**. The utility can be simply copied onto the machine and run within **MS W3.1** without anything else including a key. It will accept the TrueType character outlines from the **MS W3.1** font access function and generate an intermediate file of character outlines. It can not create a MicroImages font directly in an ***.OF** file as this kind of process requires that a **TNTmips** authorization key is present. You would then move this intermediate file to the workstation or Mac running **TNTmips** and use a new option in the Outline Font Editor to read it and create the normal MicroImages font object (***.OF** file) for your subsequent use.

You also might choose to create and use a MicroImages font which you import from another language such as Russian Cyrillic, Greek, and so on. After importing these MicroImages fonts from TrueType fonts with V4.30, you will have to figure out by trial and error which keyboard strokes and ASCII equivalents map into each character. After you make this table up, you can make a keyboard reference map for each font and keep it near the keyboard or simply paste the letters on the keys. MicroImages will work toward techniques to simplify this in V4.40. Those using languages with 2-bytes per character such as Chinese will have to be patient a little longer for the solution of the use of their characters in **TNTmips**. Certainly those of us working at MicroImages and you, are learning a lot more about fonts, letters, languages, encoding, keyboard entry methods, and so on than we ever thought we wanted to, or would have to learn in connection with a "simple" domestic image processing and GIS package!

Importing X System Fonts into MicroImages Fonts.

It is also possible to import font formats commonly used on an **X** System into MicroImages fonts for use in **V4.30**. **X** uses bit-mapped fonts which have raster instead of outline character descriptions. (The use of outline fonts is supported by **X** but their use is not yet common!) Importing the **X** bit mapped fonts by **TNTmips** into a MicroImages outline font produces characters which have the same choppy and straight line boundary flaws (no splines) found in the MicroImages fonts supplied and rendered in the **MIPS V3.33** and **TNTmips V4.20**. However, the tactical value of this **X** font import process is that those of you using workstations with 1 byte language fonts available for their user interface can also convert them immediately to MicroImages outline fonts for use within any **TNTmips** process. This may be of particular temporary value until you obtain good outline fonts in your language via TrueType fonts. It is also of value for workstation users who wish to create additional MicroImages fonts beyond the 5 bird fonts released with **V4.30** without importing additional MicroImages fonts via a special installation of **MS W3.1** on a **PC**.

The **X** font formats and their original file extensions which can be imported by **TNTmips** are the Bitmap Distribution Format (***.BDF**), Portable Compiled Font (***.PCF**), Server Normal Format (***.SNF**), and the ***.SCF** format. **BDF** fonts are by far the most commonly used and available. MicroImages has found that almost every 1 byte per character font that we had on our workstation products from various vendors could be accessed and converted in this fashion.

Importing X fonts, like the importing of TrueType fonts via **MS W3.1** outlined above, requires use of a part of the **X** System and Unix. First make sure the fonts are properly installed so that they are usable by the **X** Server operating on your Unix based system.

Within **TNTmips** use the outline font editor process (FILE/OPEN option) and you will be presented with a list of all the X fonts available to the server from which you can select the one that you wish to import. **TNTmips** will then request each character in the font and convert it into a character in an outline (*.OF) which you name and use in **TNTmips**.

Importing Postscript and other Fonts into MicroImages Fonts.

You may find that the fonts you have or would like to use are already available in some other format such as Postscript (Type 1 ATM or Type 3), Nimbus Q, or others from Bitstream, Agfa Compugraphic, etc. The commercial product Font Monger V1.5 produced by Ares Software Corp. at $150 retail and handled by software discounters can be used to convert these and many other fonts into TrueType as well as other popular formats. Font Monger is available for **MS W3.1** and the Mac and also contains a good font editor. For an even more advanced outline font editor for the Mac or **MS W3.1,** consider using Fontographer 4.0 which can even turn your personal cursive handwriting or printing into a TrueType font. A short review of FontMonger can be found in: Aileen Abernathy (August 1993); **FontMonger and Incubator Pro**; MacUser; pages 71 and 72.

Exporting MicroImages Fonts to **X** Server Fonts.

MicroImages is now experimenting with the techniques needed to convert a MicroImages outline font into the bit mapped formats needed for **X** and Unix. In this fashion the MicroImages outline font might be used to create fonts in the Bitmap Distribution Format (***.BDF**) which could then be installed by Unix and used by **X**. This would allow any MicroImages font to be used to customize the **X**/Motif interface used in **TNTmips**. This has particular value in converting the **TNTmips** user interface to a "local" language where ***.BDF** fonts may not be as readily available as TrueType fonts.

Map and Poster Layout.

The style for the text used on map grids and scale bars can now be selected. The outline bird fonts can thus be selected and used in bold, outline, enhanced, and so on.

Database Forms.

You may now interactively design a layout or template to control how your database records are displayed for viewing and editing. Database fields can be selected and positioned. The size and formatting of the numeric fields can be specified (e.g. decimal places and left/right justification). Descriptive labels can be prepared and placed to explain the fields displayed. A simple column view of selected fields can be used which is helpful when more than one record is attached to each vector/**CAD** element.

Application Notes

Software Development Kit (**TNTsdk**).

This Application Note has been essentially completed in a draft form with the addition of a final section of additional code examples and associated discussion. Please insert the new section provided with this shipping in your existing draft copy. This Application Note will now begin to move through final editing, printing, and shipment to all.

One additional source code section added includes a complete listing of the **TNTmips** process for converting a **CAD** object to vector object (**CADTOVEC.C**) together with a narrative discussion of the structure and function of this program. This complete

TNTmips process was selected as an example as it illustrates how to read and write line-type objects, the difference between **CAD** and vector objects from a software viewpoint, and how to create the topology for a vector object. Reading and writing a raster object is covered in detail in the earlier examples in this Application Note.

Another source code sample is **VECTSTAT.C** which illustrates the use of **TNTmips** standard data structures to access and manipulate coordinate information at the lowest level.

A final section provides the details needed to assist you in preparing your own new functions with **TNTsdk** which can in turn be used in your **SML** scripts.

Feature Mapping.
This Application Note has been essentially completed in a draft form with the addition of final sections of 40 pages in length. The new sections contain new illustrations of how you can employ the unique Feature Mapping in **TNTmips** in ways which may not have yet occur to you. Please insert the new section provided with this shipping into your existing draft copy. This Application Note will now begin to move through final editing, printing, and shipment to all.

Exclusive International Representatives

MIPS/TNTmips is currently in operation in 45 nations with several new nations pending. The following new Representatives have been welcomed to our distribution network since the distribution of **TNTmips V4.20**.

Russia
The area of "new" Russia will now be serviced for MicroImages products by a wholly Russian owned firm **VIDAR** Ltd.; P.O. Box 16; Moscow 109028; Russia; voice (7095)297-1720; FAX (7095)297-1720. Dimitry E. Frolov is the principal to contact at **VIDAR**, and he is responsible for their GIS and image processing activities. **VIDAR** also has a major subdivision which has produced and markets a medical image processing system throughout Russia. They have also developed and sell a low cost introductory **GIS** process and related software products. **VIDAR** has begun demonstrating **TNTmips** and is moving to concluding sales of several initial systems. **VIDAR** has translated most of the Guide into Russian and placed a series of advertisements in Computer-World Moscow.

Spain
The area of Spain will now be serviced for MicroImages products by **SAICA**; C/ Aristoteles; 9 - Bajo B; Madrid 28027; Spain; voice (341)404-8894; FAX (341)405-4304. Miguel Pelaz is the owner and contact at **SAICA**. **SAICA** markets surveying, map making, **GPS**, and soft photogrammetric solutions in the Iberian Peninsula and is now expanding into **GIS** and remote sensing business activities.

Domestic Resellers and VARs

Arizona Area
Landrum & Arras, located in Payson, Arizona (between Phoenix and Flagstaff) will provide access to the products of MicroImages in the general area of Arizona and New Mexico. This new company offers a variety of services such as **GPS** field data surveys,

GIS and image preparation and analysis, system assembly and installation, training, and similar activities. Tracy and Darrell, the Principals, are experienced **MIPS** and **TNTmips** users who can be contacted at P.O. Box 536; Payson, AZ 85547-0536; voice (602)472-7731; FAX (602)472-7731.

New Image Printers/Plotters Supported

HP Paper.

HP has a special new paper available for use with color ink jet printers such as the 300XL, 550C, 1200 models. It is the LXJet Series Glossy Paper, catalog #HP51636H and is about $1 per sheet. This is not the normal high clay content special paper sold by **HP** for its ink jet printers. This paper looks and feels like glossy photo print paper or plastic and does not absorb the ink drops like the normal special **HP** ink jet recommended.

Anyone who has an **HP** color ink jet printer must try this new paper as it provides a remarkable increase in the print quality for images. Due to its high cost, you should develop your color images using the regular paper and then insert and use this special paper for the final copy if the highest quality product is warranted. It is not yet known if these glossy sheets can be obtained in the large sheets needed for the large format **HP** color ink jet described below.

HP Designjet 650C.

Recently **HP** announced a 300 dpi, large format, color printer using the same ink jet cartridge methodology as their smaller format printers such as the 300XL and the new 1200 units. Two models are available: D size at $8500 retail, and E size at $10,000 retail. They are already widely available at a discount. Both come standard with parallel and serial interfaces with other interfaces available as options. Both are supported by **TNTmips V4.30** under printer product feature P15. Their direct support strictly as pen plotters will be via **HPGL** requiring feature **L3**.

These are high quality devices which are important developments in connection with image display and **GIS**. They finally provide the individual user and small group user comparable hard copy results to those obtained on much more expensive large format color electrostatic printers. They are also well built, which is reflected by the low cost of their on-site annual maintenance fee of about $350 compared to $5000 and up for the electrostatic devices.

MicroImages has just supported these printers and can not yet comment on their quality. We will be preparing sample image maps over the next few weeks. The material cost for these printers will be higher than electrostatic unless you refill your own ink cartridges but is easily offset by the much lower maintenance costs. They print at about 1/2 the rate of the electrostatic printers. Since the 650C makes only 1 pass for all 4 colors this makes its effective time to print color about 1/2 that of the electrostatics which must make 4 passes. The time to print a complete print from a premade color print raster at D size is about 7 minutes.

A reproduction of the color brochure on these excellent HP printers is enclosed with this shipment.

HP LaserJet 4 (model C2001A).

This 600 dpi black and white laser printer supports letter and legal size paper via parallel or serial ports. Its use for printing and plotting within **TNTmips** requires printer support feature **P0** which is included in the basic price of every **TNTmips** package. Please note that both the standard bird font reference chart and the graymap of the **SPOT** image of Crow Butte which are attached were printed on this printer. A driver is also available for this printer for use with **MIPS V3.33**.

HP DesignJet 600 (model C2848A).
This 600 dpi black ink jet printer is capable of printing and plotting on letter to E-size paper via serial or parallel ports. Its use for printing and plotting via a raster within **TNTmips** requires printer support feature P15. Its direct support strictly as a pen plotter will be via **HPGL** requiring feature L3.

FARGO Primera (model 76000).
This 204 dpi color thermal transfer printer is capable of printing on letter paper via a parallel port. For those of you who are familiar with the early Calcomp ColorMaster and PlotMaster thermal transfer color printers, this printer produces similar results at a much lower price and higher speed using printer support feature **P5**. The retail price of the printer is $1000 and supplies cost $.45 per page.

FARGO has just announced a $250 firmware modification to this basic $1000 printer which allows it to also print with sublimation printer technology on foil and paper of about $3 per unit. With this advanced dual printing capability, you can use the less expensive thermal transfer foil and paper for lower quality needs and for draft work. The higher quality, more expensive sublimation materials can then be substituted for selected final results. MicroImages has only seen samples of the results for the sublimation modification and they looked photographic-like and good. **TNTmips** does not yet support the sublimation option but it will be added as soon as FARGO can supply the necessary software support tools.

A reproduction of the color brochure on the basic Primera printer is included with this shipment together with a copy of a press release announcing its modification into a sublimation printer. A list of the International distributors is also included should you wish to inquire how to obtain this interesting new printer in your Nation.

*Advanced User Workshop 6 (**AUW6**)*

The Sixth Advanced User Workshop (**AUW6**) will be held in Lincoln as usual on the bitter cold days of 11, 12, and 13 January 1994. January 14 (a Friday) will be scheduled as an additional "open day" for the workshop so you can all visit with your favorite programmer and technical support specialist. The fee for the 3 day formal workshop will be $400, and the open day will be provided without charge. Please make plans early for these dates if you are outside the U.S. and/or with a government agency requiring long range planning.

Staff Changes and Expansions

Dr. G. Tomas Murauskas has joined the MicroImages team as a Technical Writing Specialist. Tom has a **BA** degree in geography from McGill University in 1980. His **MA** in geography was completed at the University of Saskatchewan in 1984 with a thesis

entitled "The Expansion of the Northern Saskatchewan In-Migration Field and Changes in the Perceived Friction of Distance". His **PhD** in geography at the University of Oklahoma in 1989 was completed with a thesis entitled "Nuclear Waste Repository Siting and Locational Conflict Analysis: A Contextual Approach". Previously Tom has also worked on such projects as oil field and pipeline database assembly in Western Canada, spatial analysis of demographic data, methods for reconciliation of nuclear waste site conflicts, and image processing of vegetation in Big Bend National Park. Tom's initial assignment will be contributing to the pending "big push" to complete the first draft of the documentation for **TNTmips**.

Christopher Dore has joined the MicroImages team as a Technical Writing Specialist. Chris received his **BA** in 1982 in anthropology from Washington State University. His **MA** in anthropology was completed at the University of Pennsylvania in 1986 with a thesis entitled "Cultural Spaces in a Philadelphia Restaurant". Chris is **ABD** (All But Dissertation) for a **PhD** in Anthropology at the University of New Mexico. Chris is considering the use of **TNTmips** in the analysis of the Maya artifacts collected as part of field work in Yucatan Mexico. His objective is the explanation of the Maya city/community interrelationships based upon 50,000 artifacts inventoried under the sponsorship of the National Geographic Society and others together with soil, topographic, architectural, and related parameters mapped for a 2 kilometer by 2 kilometer site. Previously Chris has taught introductory courses in archaeology and anthropology and conducted extensive field archaeological surveys in Mexico, New Mexico, and Colorado. Chris' initial assignment is contributing to the pending "big push" to complete the first draft of the documentation for **TNTmips**.

Rich Ervin has joined MicroImages as a Technical Support Software Engineer for our clients and for network support of MicroImages' internal systems. Rich received his **BS** degree in physics from the University of Nebraska in Lincoln in 1992. Rich also has previous Air Force experience in photographic image interpretation and programming and in software support responsibilities within the University framework.

Thomas C. Schafer has joined the MicroImages team as a Technical Support Specialist for direct client support. Tom received his **BS** in 1983 in geography from the University of Nebraska at Omaha. His **MA** in geography was completed at the University of Nebraska at Omaha in 1989 with a thesis entitled "Impacts of Climate Change on Selected Great Plains Counties, 1890 - 1960". Tom has previous employment experience in a commercial agricultural testing laboratory and the teaching of introductory geography courses at the University level. Tom brings to 4 the total number of MicroImages staff whose primary task is to provide our clients with verbal and written technical support. These staff include Terry Peterson, Steve Sizer, Rich Ervin, and Tom Schafer.

Bin Chen has joined the MicroImages team as Software Engineer for code preparation. Bin Chen received his **BS** degree in mathematics in 1984 from Capital Normal University in Beijing and an **MS** in computer science from the University of Nebraska at Lincoln in 1993. Bin has previous working experience in teaching mathematics in a Beijing high school. Bin's initial training assignment will be to prepare a first software draft of an interactive Motif window design tool for internal use by other MicroImages software engineers and those clients who use the Software Development Kit (**TNTsdk**).

Employment Opportunities

MicroImages assisted in the connection of two experienced **MIPS/TNTmips** users with new positions during the last quarter. Since then MicroImages has received several new requests for experienced users and for new positions at varying professional levels. Please contact MicroImages for assistance in such employment matters so that all the systems and experienced **MIPS/TNTmips** masters are kept busy.

Promotional Activities

MicroImages has made a test mailing of 3000 fliers to computer oriented companies to recruit possible representatives in the following nations: Columbia, Costa Rica, Ecuador, Egypt, El Salvador, Greece, Guatemala, Honduras, Hungary, Malaysia, Netherlands, Panama, Paraguay, Peru, Philippines, Slovenia, Turkey, Ukraine, Uruguay, Venezuela, and Yugoslavia.

Another promotional mailing was made to 1250 U.S. and Canadian companies engaged in mining exploration as listed in the Randol Mining Directory.

A test mailing of 1000 was also made to those International Mining Companies listed in the E&MJ International Mining Directory whose names began with A, B, or C. International mailings will be continued to the remaining companies in this directory based upon the results of this test mailing.

Advertising continues in a wide variety of publications. Modified advertisements listing the names and contact information of our Exclusive Representatives in the respective areas have been placed in test **GIS** and remote sensing publications in United States, Australia, Europe, and Asian publications.

Features missing from V4.30

The **MIPS V3.33** features listed below are not available in **TNTmips V4.30**. These features are being reworked as time allows. If any particular feature listed is specifically holding up your conversion to **TNTmips V4.30** or your projects please let us know so we can give their conversion a higher priority.

<u>Generally used features.</u>

- Raster profile display
- ArcINFO Coverage import
- Elliptical arcs - (arc, wedge, and chord) can not be created
- Snap to grid feature is not available in **CAD** editor
- Vector route tracing
- Printers which communicate via **GPIB**, **SCSI**, and Xerox **VPI** cards
- Making legends for the screen and Map and Poster Layout (being redesigned)
- Preparing and showing a slide show
- "CLASS-CMAP" - special image analysis routine
- Importing all raster formats directly from open reel **CCT** tapes.

<u>Specialized features</u> used by 1 or a few users.

- Transfer of labels from vector polygons in Feature Mapping
- Dual raster color overlay method for georeferencing
- Automatic interval capturing (intervalometer) in video digitizing

WDBII - World Data bank II import (use **RVFTORVC** to convert)