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## Release of V4.50 TNT products December 1993



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# Release of TNT V4.5 products

## *Introduction*

Principal effort on **TNTmips<sup>TM</sup>** since the shipment of **V4.40** has been concentrated on improving the reliability of all processes. Important new features added to **TNTmips 4.5** include the attachment and use of database records to raster cell values, expanded **SML** functions, a new unsupervised classification process based on a neural network concept, and a redesigned styles control and design interface. The on-line documentation has also been completed. Two new MicroImages Press publications are being released which include the final printing of the Application Note on Feature Mapping and a draft on Orthoimage and DEM Creation. As usual, all significant new features added to **V4.50** are reviewed in detail below.

The **CD-ROM** version of **TNTmips 4.5** is being supplied to every client irrespective of the status of your subscription. Floppy disk media for **PCs** and tape media for workstations are also supplied where so specified in your current product registration.

If you did not order **TNTmips 4.5**, you cannot install it from this **CD-ROM**. If you wish to do so now please contact MicroImages by FAX or phone to arrange to purchase the required updates to **V4.50**. MicroImages will immediately supply you with an authorization code by FAX. Entering this code when running the **TNTmips** installation process will allow you to complete the installation and use **V4.50** immediately. Any additional support feature (P5, X3, L3, and so on) can now be directly ordered via phone or FAX. A similar authorization code will be provided by phone or FAX which will allow the immediate installation and use of the new feature.

Loading a full install of the **TNTmips 4.5** processes onto your **PC** hard drive will require just less than 65 megabytes (40 mb on a doubled disk). The full installation size will vary for workstations depending upon the platform type as follows: Data General = 71 mb; Hewlett-Packard = 77 mb; Sun SPARCstation with Solaris 1.x = 73 mb; Sun SPARCstation with Solaris 2.x = 66 mb; SGI = 107 mb; Mac via **AU/X** = 62 mb; DEC Ultrix = 96 mb; IBM RS6000 = 134 mb.

Installing the on-line illustrations, which are not yet compressed, will require another 92 megabytes on any platform (40 mb on a doubled disk). Thus, as explained in detail in the 30 September memo entitled Release of **TNTmips 4.4**, it may be realistic to many of you who have a **CD-ROM** drive to leave the illustrations on the **CD-ROM** and let the on-line documentation process display them from this disk as needed.

**MIPS** and **TNTmips** are now in use in 52 Nations. The largest geographic area which is not covered is now mainland China.

**TNTmips 4.6** will be shipped to all active subscribers about mid-March on the normal quarterly release schedule.

## *<sup>TM</sup> TNTview*

### **Installation\_**

The use of **TNTview** (and **TNTatlas** when distributed) is included with every **TNTmips** system and was shipped with **V4.40** on **CD-ROM** but it was not made clear that every client could install and use this product. Those clients who subsequently inquired had to be given special instructions on how to install **TNTview 4.4** from the **CD-ROM**. Thus the **CD-ROM** for **V4.50** contains separate installation procedures for **TNTmips 4.5** and for **TNTview 4.5** for use with Microsoft Windows 3.1 (**MSW3.1**).

Use the **INSTALL** routine on the **CD-ROM** as described below in more detail for **TNTmips** to install **TNTview** on your hard drive or to set up to run directly from the **CD-ROM**. After this installation is complete set up an icon in **MSW3.1** as for any of your other **MSW3.1** software to start up and run **TNTview**. If you are not already familiar with this **MSW3.1** procedure please consult the instructions on the enclosed gold sheet entitled: Creating a Program Group with Icons for TNT products.

If **TNTview 4.5** is being installed on the same hard drive as **TNTmips 4.5**, it will detect this and share many of the files such as the **MI/X** function. Thus, the directory created for **TNTview** will have fewer files if installed on the same hard drive as **TNTmips**. If you install only **TNTview** on some other computer equipped with Microsoft Windows 3.1 (**MSW3.1**) it will require about 9.5 mb (6 mb on a doubled disk).

**TNTview** is designed for use by those using existing Project Files and HyperIndex stacks who wish to view and retrieve maps, images, database information, and make measurements. These users are not involved with the creation and maintenance of **GIS**, images, and final maps and may require a printed manual for quick reference. As outlined in the section below on 1994 publication plans, MicroImages will create a separate, large printed manual on **TNTview** early in 1994 and a draft will be presented at **AUW6**. Unfortunately, printing this manual will still pose the problems of how to keep it up with periodic improvements in **TNTview** and current with the quarterly modifications to its parent **TNTmips**.

### **No Color Printing.**

MicroImages has indicated from the onset that color printing would not be a feature included in **TNTview** or **TNTatlas**. These end-user or point-of-transaction oriented products would require even wider support of color and black and white printing than **TNTmips**. MicroImages also will restrict the use of the Map and Poster Layout process to **TNTmips** users. However, Pizazz Plus, an excellent, low-cost, specialty commercial product available to provide color printing on almost every color printer available for the past several years. This product can be run in **MSW3.1** as outlined below to print any screen or subsection thereof, which is displayed by **TNTview** or **TNTatlas**. Pizazz Plus is widely sold and can be obtained from the source you use to obtain your general purpose commercial software or from its manufacturer directly for \$150 as follows: Application Techniques, Inc.; 10 Lomar Park Drive; Pepperell, MA 01463; USA; business voice (508)433-5201; technical voice (508)433-8464; and FAX (508)433-8466.

### **Color Printing with Pizazz Plus.**

Pizazz Plus for **MSW3.1** provides a quick and convenient means of printing all or part of the image on your screen. It can also convert it to one of the many available standard file formats for export to a film recorder or service bureau. These formats include the **\*.TIF**, **\*.TGA**, **\*.RIE**, **\*.PIC**, **\*.PCX**, and **\*.GIF** formats, to name a few. The program is installed by selecting RUN... from **MSW3.1**'s Program Manager File Menu and typing the letter of the drive where the disk is inserted followed by setup (for example, **A:SETUP**).

You can capture screen images for use in Pizazz Plus using the PrtSc (print screen) key. You may have to hold down <Shift> as well, depending on your keyboard configuration. The full contents of the screen are captured in the Windows clipboard when you use the print screen function. You can then use <Alt-Tab> to jump directly to Pizazz Plus from **TNTmips**. Use PASTE (Ctrl+V) on the Edit menu to paste the contents of the clipboard into the Pizazz Plus window. You can print the full screen capture by selecting PRINT (Ctrl+P) from the File menu. Choosing CROP from the Effects menu provides an elastic box tool so that you can select a smaller portion of the captured screen to save or print. The image is automatically scaled to the printable area of a single page for printing. You can size the image to be smaller than the printable area, but printing over multiple pages is not supported.

## **<sup>TM</sup> TNTatlas**

**TNTatlas** will be completed at the beginning of this quarter after **AUW6** and will be offered for sale. **TNTatlas** will be distributed to all others with **TNTmips 4.6** in March. **TNTatlas** will be restricted to use HyperIndex stacks prepared in **TNTmips** but not other Project Files. It will have a significantly simpler user interface than **TNTmips** or **TNTview** as most of the use of a HyperIndex stack is highly interactive clicking and pointing. The only window activity required is the location and selection of the stack to be started if multiple choices are available or the selection of one from multiple objects where geographic overlap of objects occurs.

MicroImages is now accepting orders for 30-day delivery of 5 or more **TNTatlas** products. Domestic retail prices for a version for unrestricted use (e.g. any HyperIndex stack) are \$400 per unit for a PC (uses a black parallel key)

or \$500 per unit for any platform (uses a serial key). A license controlled version of TNTAtlas without a key to put on your **CD-ROM** to run with a specific HyperIndex stack(s) will be \$5000 per 100 units (minimum order) with decreasing price per unit with increasing quantity.

If a parallel key version of **TNTAtlas** is used (\$400), it can be installed from the **CD-ROM** or other media only on a **PC** using **MSW3.1**. If the universal version of **TNTAtlas** is purchased (\$500 due to a more expensive serial key) it can be installed from the **CD-ROM** on any platform supported by MicroImages products, and will run any HyperIndex stack transferred to that platform from any other platform (e.g., workstation to PC, PC to workstation, etc.).

The licensed or keyless version of **TNTAtlas** can be installed or run from the **CD-ROM** on any platform supported by MicroImages products and will be "bonded to" and run only the HyperIndex stack(s) which accompany it on that **CD-ROM**. All versions of **TNTAtlas** will be provided to you to place on your **CD-ROM** for this licensed version so plan to use only 600 mb of the possible 680 mb on your **CD-ROM** for your HyperIndex stack(s) in ISO 9660 format. Only one version of the HyperIndex stack is required regardless of the platform on which it might ultimately be used by the **TNTAtlas** software. This is because the **\*.RVC** Project File containing your HyperIndex stack is transparent to the platform used and all platforms read the universal ISO 9660 format.

## **TNTsdk<sup>TM</sup>**

The MicroImages software development kit is supplied with the new **V4.50** features for all supported platforms to those clients who have purchased it. It now contains the completed MicroImages (Motif Interface) Builder (**MI/B**). **MI/B** is an interactive **X**/Motif windows layout and design tool.

MicroImages would again like to call your attention to the fact that good public domain interactive design tools for Motif are not available. Commercial interactive Motif design tool kits have several significant limitations such as high price per user (for example, \$5000 per chair or user); limited to a few platforms; not available for use with **MS W3.1**, limited to a few C compilers; too expensive for our **TNTsdk** users; and others. MicroImages developed the **MI/B** for internal development as well as for the use of our clients, especially those of you using **TNTsdk** to extend **TNTmips**.

The **MI/B** is made available to you as part of the **TNTsdk** for any and all platforms without additional cost. The **MI/B** can be used to design an interface on one platform which can be immediately compiled together with your application code and used immediately across all platforms using **X**/Motif or a **MI/X** server.

MicroImages again strongly recommends that anyone using **TNTsdk** and **MI/B** should obtain Volume 6: Motif Programming Manual from the O'Reilly and Associates X Window System Series by Dan Heller for \$40; order number ISBN 0-937175-70-6 from O'Reilly and Associates, Inc.; 103A Morris Street; Sebastopol, CA 95472-9902; USA; voice (800)998-9938 or (707)829-0515; FAX (707)829-1040. A high quality catalog of the other books in this series and related technical publications can be obtained via the same phone numbers and address. An order form for O'Reilly publications was included as an Appendix with the previously distributed Application Note entitled: Software Development Kit.

### **New Features in MI/B.**

MicroImages Builder (**MI/B**) is a graphical process for building **X** Window user interface components for **OSF**/Motif 1.2 applications. It runs only on a **PC** within the **MI/X** server or on a Unix workstation using the **X** Window system. With **MI/B** you can define the look of your interface and test it immediately as you design it. You can create multiple interfaces at the same time. You can set resource values for a new widget when you create the widget or edit its resource values during a later session. You can also delete a widget at any time or clear all widgets to create a totally new interface design.

**MI/B** can specify most interface resources and visually examine and test them. You can create any widget of the following classes: **XmArrowButton**, **XmBulletinBoard**, **ButtonRow** (a row of **PushButtons** of the same size), **XmCascadeButton**, **XmDialogShell**, **XmDrawingArea**, **XmDrawnButton**, **XmForm**, **XmFrame**, **XmLabel**, **XmList**, **XmMainWindow**, **XmMenuBar** (using **MxCreateMenuBar**), **XmOptionMen** (using **MxCreateOptionsMenu**), **XmPanedWindow**, **XmPushButton**, **XmRadioBox**, **XmRadioBox**, **XmRowColumn**, **XmScale**, **XmScrollBar**,

XmScrolledList, XmScrolledText, XmScrolledWindow, XmSeperator, XmText, XmTextField, XmToggleButton.

You can set most resources which have the following data type: integer, short, position, dimension, Boolean, string, XmString, unsigned character, widget (for attachment).

The most powerful new feature in **V4.50** of **MI/B** is code generation. **MI/B** will generate standard 32-bit C code for the interface you design. However, this C code can be used only if you also have the **TNTsdk** function library since it calls functions which in turn check the hardware protection key.

**MI/B** also allows you to save your current interface design to a special file (\*.MUD). This file can be reloaded by the **MI/B** and will reestablish your interface design so that it can be modified and extended to generate new C code.

### **Addendum to Application Note for TNTsdk**

A 16 page printed and illustrated addendum entitled **MI/B: MicroImages (Motif Interface) Builder** is enclosed with V4.50. Please add it to the draft Application Note entitled **Software Development Kit** you already have.

### ***TNTdemo*<sup>TM</sup>**

A new marketing product called **TNTdemo 4.5** is now available on the **V4.50 CD-ROM**. **TNTdemo 4.5** allows the test use of (**TNTmips**, **TNTview**, **TNTatlas** when available), and all optional features on any platform. MicroImages products tested via **TNTdemo** can be used without restriction for 1 month from startup, however Project Files prepared in the demo version of **TNTmips** cannot be used by any other regular, full price **TNT** series products. Upon full purchase of **TNTmips** the Project Files produced within the test **TNTmips** will be released for unlimited use via a utility process.

A brief summary of the initial terms governing the prepayment and use of any **TNT** product via **TNTdemo** are as follows, using **TNTmips** as an example. Additional terms and an order form will be mailed when prepared but **TNTdemo 4.5** is now available for purchase and installation.

- 1) **TNTdemo 4.5** can be purchased anywhere in the world by signing a license agreement and the prepayment of \$200 plus shipping by the method specified. This \$200 will not be refunded, but can be credited toward the purchase of **TNTmips**, **TNTview**, or **TNTatlas** if the protection key is returned. Prepayment for **TNTdemo** can be made by wire transfer, check, or by credit card (with credit card preferred). No discounts or mark-ups are allowed for any **TNTdemo** including those of Resellers or Representatives as it is being sold by MicroImages for the cost of the preparation of the materials.
- 2) **TNTdemo** will be shipped directly to the end-user using the shipping method specified. Direct shipment world-wide will insure that only the latest version of the **CD-ROM** will be provided together with the most recently published supporting materials.
- 3) All **TNTdemo** sales are final with no refunds. The normal 30-day money-back guarantee will also not apply if a **TNTdemo** product is converted to purchase.
- 4) **TNTdemo** is available only on **CD-ROM**.
- 5) Project Files prepared in the test version of **TNTmips** cannot be used by any other regular **TNT** series products. However, upon full purchase of **TNTmips**, the Project Files produced within the test **TNTmips** will be released by using a utility process.
- 6) The **TNTdemo** products will come complete with **CD-ROM**, protection key for **PC** or workstation as specified, Guide, Application Notes -- just as if the full products were purchased. Unlimited technical support will also be provided during the 30-day test period. Upon the completion of the test period nothing need be returned to MicroImages. If a subsequent purchase is made, the **TNTdemo** protection key will need to be returned for the \$200 product credit. A normal product key with the ordered features authorized will be shipped when the balance of the payment is received.

7) The "clock" for the 30-day test period for the products on the **TNTdemo** will start when any product is installed. MicroImages can not preset or reset this demo product to run longer than this 30-day period so plan to make your installation when you will have time to work with and test the **TNT** products.

## ***Installation from Tape and Floppies***

from floppies for Microsoft Windows 3.1 (MS W3.1).

The 5.25" disk version has 35 disks as follows: 29 containing processes (system outline fonts are not being replaced); 5 containing the on-line documentation; and 1 with the installation process and the utilities.

The 3.5" disk version has 30 disks as follows: 24 containing processes (outline fonts are not being replaced); 5 containing the on-line documentation; and 1 with the installation process and the utilities.

Running **INSTALL** from the corresponding floppy upgrades your key to authorize it for **V4.50**. It then decompresses and writes a copy of each process you have licensed from the floppies containing **V4.50** into a **TNTmips** directory on your hard drive. You must use the **INSTALL** routine on the **V4.50** installation disk supplied with this release on floppies to decompress the files during installation. Installing this **V4.50** will replace **V4.40** or earlier versions of **TNTmips** if the same hard drive is selected.

After this installation is complete set up an icon in **MSW3.1** as for any of your other **MSW3.1** software to start up and run **TNTview**. If you are not already familiar with this **MSW3.1** procedure please consult the instructions on the enclosed gold sheet entitled: Creating a Program Group with Icons for **TNT** products.

from tape for 8 brands of Unix.

If you have requested your Unix variant of **TNTmips 4.5** on 4 mm, 8 mm, or 1/4" **QIC** tape please see the instructions in the Detailed Installation and Optimization Manual (3-ring notebook) supplied with your original product, or shipped with **TNTmips 4.4** and dated 31 June 1993 or later. Alternatively, follow the instructions on the page which accompanies your tape. The large capacity 4 mm and 8 mm tapes contain all 8 Unix variant versions. The master installation process automatically checks for the type of Unix and platform you are using and installs that particular version of **TNTmips 4.5**. **QIC** tapes of 250 mb are being used with **V4.50** and have room for only 4 versions. The specific 4 were selected were Solaris 1.x and 2.x, SGI, and Data General as they are the most likely to be needed on **QIC** tape (the remaining 4 versions can be obtained by special request on **QIC** tape if needed). MicroImages would have used larger 550 mb **QIC** tape, but it was concluded that the majority of you who have **QIC** tape drives could not handle this larger capacity media.

## ***Installation from CD-ROM***

from CD-ROM for Microsoft Windows 3.1 (MSW3.1).

The installation from **CD-ROM** onto your **DOS** drive is simple. Run the **INSTALL** process on the **CD-ROM** and select the installation choices from the menu and all the files will be copied into the correct directories. Directories will be created if they are not already available. The time to install **V4.50** from a fast **CD-ROM** drive on a 486 is about 10 minutes. The time to load **V4.50** from a slow **CD-ROM** on a 386 is about 20 minutes. The times to load the illustrations for the on-line documentation are somewhat longer, as they take up somewhat more file space than the analysis processes.

After this installation is complete set up an icon in **MSW3.1** as for any of your other **MSW3.1** software to start up and run **TNTview**. If you are not already familiar with this **MSW3.1** procedure please consult the instructions on the enclosed gold sheet entitled: Creating a Program Group with Icons for **TNT** products.

from CD-ROM for 8 brands of Unix.

[Sun - Solaris 1.x, Sun - Solaris 2.x, SGI - **IRIX** 4.0.5, **DEC** - Ultrix version 4.3, **IBM** - **AIX** version 3.2, Mac -



**AU/X** version 3.01., **Data General - DG/UX** version 5.4.1, **HP - HP-UX** version A.08.07] If you have a red key authorized at level **U100** or higher, any of these Unix variant versions can be installed from the **CD-ROM** using the installation script of the appropriate name. For further assistance see the **README.UNX** file on the **CD-ROM**. Running the installation script will untar the appropriate file, create the proper directories, and place the files within them. It is suggested that you first erase all **V4.40** files and directories or rename the directories which contain them in order to insure that no older **V4.40** programs remain in the directories after the **V4.50** installation.

### **moving between platforms using the CD-ROM (or tape).**

The **CD-ROM** you have received contains all currently available versions of **TNTmips 4.5** and the appropriate installation routines. If you have purchased **TNTmips** for a workstation (**U100** = red key) you may attach this serial key to any supported workstation, **PC**, or Macintosh and quickly install **TNTmips 4.5** from this **CD-ROM**. Alternatively, you can run the **PC** version of **TNTmips** directly off this **CD-ROM** within 1 minute of its insertion into the drive.

If you have purchased **TNTmips** for a Macintosh (**U45/M** = red key) you may also attach your serial key to a **PC** and quickly install or run **TNTmips 4.5** from this **CD-ROM**.

Should you have the parallel key (**D30** to **D60** = black key) for a **PC**, your general use of the **CD-ROM** is the same but is restricted to the **PC** platform. These black **PC** keys can be exchanged for a universal or serial key for \$100 if you have purchased display product level **D45** or greater which is equivalent to the **U45/M** product level for the Mac version. This new universal or serial key would then allow installation of either the **PC** or Mac versions on these platforms.

Confusing? Just remember that MicroImages' pricing policies are always inclusive, not predatory. If you have paid enough to have a particular display level or special feature level, then MicroImages will try to make its use available to you on all the platforms we support.

It is now quite easy to move and install **TNTmips** from platform to platform via **CD-ROM** if your key is authorized for that level of use. Simply move the key and run the simple install program on the **CD-ROM** for that platform (no tedious disk insertions or time consuming tape access).

## ***Installation to Run Directly from CD-ROM***

### running directly from CD-ROM for PCs.

**TNTmips** processes can be effectively run directly off the **CD-ROM** at reasonable speeds. During the installation on a **PC** you have the choice to install to run directly off the **CD-ROM**. Select this option in lieu of a full install to transfer only about 1.8 megabytes of control files to your hard drive in about 1 minute (**TNTMIPS.INI**, **TNTMIPS.SAV**, **TNTMIPS.RES**, and others). With the drive access paths reset in your **AUTOEXEC.BAT** file during the install process, **TNTmips** can then be completely run from the **CD-ROM**.

After this installation is complete set up an icon in **MSW3.1** as for any of your other **MSW3.1** software to start up and run **TNTview**. If you are not already familiar with this **MSW3.1** procedure please consult the instructions on the enclosed gold sheet entitled: Creating a Program Group with Icons for TNT products.

Remember, for future reference, you may subsequently get correction programs for **V4.50** from MicroImages. If you are running **TNTmips** directly from the **CD-ROM**, these revised programs should be copied to the hard drive from the floppies (or a subsequent intermediate **CD-ROM**) into the appropriate directory which is set up in your path statement so that it will be checked first before the **CD-ROM**. In this fashion, these revised or patched programs will be found and used before the **CD-ROM** versions which they replace.

This same approach to running off a **CD-ROM** cannot be used on the workstation versions of **TNTmips 4.5** as all the process files are in a compressed tar format to save space on the **CD-ROM**. However, the illustrations for the on-line documentation are not compressed and can be used directly off the **CD-ROM** for any platform.

## *Running on Laptops*

**TNTmips** is being used on laptops by a small but increasing number of clients. All currently available laptops with built-in color screens are limited to 640 by 480 pixels by available display screen size and overall physical size. However, please remember that you can choose a smaller font reducing the size of the **TNT** product windows.

MicroImages had not anticipated running on these smaller **MSW3.1** screens and various **TNT** product windows are still oversized for this resolution, even when a small font is used. Since larger area color flat panel screens are not being announced or anticipated, MicroImages will carefully examine all **TNT** product windows next quarter to determine if they can be reduced to fit within the 640 by 480 pixel limitation. Generally this will be done by reducing the "gray" areas in those windows which are used too liberally.

A software switch will also be provided in **V4.60** in the preferences control window whereby all the gray area between the buttons and other gadgets in the windows in a given process can be eliminated. This will further reduce the size of the windows but will also make them harder to read.

## *Price Increase for Training*

MicroImages will increase its prices for training effective 1 February as following. Training at the MicroImages offices on a 1 on 1 basis or for a group will increase to \$400 per day. Training at a client's site will increase to \$450 per day plus expenses. Training at an international site will be \$500 per day plus expenses. Those who have scheduled training before 1 February will not be affected by these increases.

## *On-Line Documentation*

The on-line documentation is complete and current with the new features released in **V4.50**. This finally catches the documentation up with the current release and results from MicroImages larger investment in staff in this area over the past year (an increase from 3 to 7 writers).

**IMPORTANT.** The on-line illustrations for **TNTmips** have not yet been compressed and will take up a large amount of space on your hard drive (47 megabytes on your double spaced drive via **DOS 6.0**). If you are using a **CD-ROM** with **TNTmips** on any platform, then you may leave these illustrations on the **CD-ROM**. **TNTmips** will access the illustrations directly from the **CD-ROM** as needed. The access speed for this will not differ much as the illustrations are read sequentially with transfer rates similar to those of a hard drive.

An equivalent of 1465 single-spaced printed pages of on-line documentation are included with **V4.50**. Small, additional new sections were completed after the master disks were created for the reproduction process. These 33 additional pages are included in supplemental, printed form. The on-line documentation printing capability is available but will not yet print the on-line illustrations.

All 7 of the MicroImages technical writing staff spent most of the 5 weeks prior to the reproduction of **V4.50** in testing the processes for general correct operation and for concurrence with the on-line documentation. Since the on-line documentation for **V4.50** is essentially complete and concurrent, it will now only be modified in future releases as new features are added or existing features are altered and improved.

As in the past, a master copy of the **V4.50** on-line documentation, including illustrations, has been deposited at Kinko's Copy Center in Lincoln for your direct ordering. It does not include the temporary supplemental printed sections which you are directly receiving with **V4.50**. Please be careful to specify the exact version number for the documentation you wish to order from Kinko's given they have both **V3.32** (no changes for **V3.33**) and **V4.50** 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 V3.33** (specify single or double sided) is approximately \$80 plus the charge for shipping by the method specified. The printed copy of the 1465 pages for **TNTmips 4.5** (specify single or double sided) is approximately \$120 plus the charge for shipping by the method you specify. A credit card is the best way to pay Kinko's for both the copying and shipping.

## *Sample Data*

Several alterations have been made in the **TNTmips** sample datasets. Please delete your copies of the sample data for which replacement files occur in the DATA directory on the **CD-ROM** for **V4.50**. Then copy the new sample data off the **CD-ROM**. The one significant change is that the topology has been corrected for **CBSOILS.RVC**.

## *Microlimages X Server (MI/X)*

### **Windows 3.1 for the PC.**

The **MI/X** server released with **V4.50** was found to have an incipient error which was hard to trace. This error resulted in unpredictable failures in **TNTmips** which made no particular sense, were not repeatable, and did not provide cogent error messages. If you used only one or 2 processes you could operate indefinitely. If a large number of different windows were opened and closed, especially when jumping around between various processes, you would eventually encounter this error in some form or another. The potential for this error to occur was cured only if **MSW3.1** was exited and reentered periodically. The error did not occur on workstations.

This error in the **MI/X** server for **PC** has been resolved and a new **MI/X** will be installed as part of **V4.50**. A new **MI/X** server is also being included on floppy disks for those who use **TNTmips** but are not currently upgrading to **V4.50**. This new **MI/X** also runs about 25% faster than the **MI/X** distributed with **V4.40**.

The replacement **MI/X** for those who will continue to use **V4.40** is contained on the enclosed floppy disks (3 disks if 5.25" and 2 disks if 3.5"). Simply run the **RESTFILE** process on the first disk. This will place these new **V4.40** files in your **TNTmips 4.4** subdirectory overwriting the corresponding **V4.40 MI/X** files.

### **Windows 4.0 for the PC.**

Microlimages is tracking the hype surrounding this future product. Our forecast is that **MI/X** is likely to work better with this release. It will provide an integrated user interface and operating system which are based on 32-bit coding and memory management. Thus under **MSW4.0** the **MI/X** graphics processes will not be switching back and forth to 16-bit operations to accommodate everything displayed by **MI/X** via **MSW3.1**.

Since the **TNT** suite of products is built around a 32-bit standard approach it is anticipated that these Microlimages products would be released concurrently with **MSW4.0**, assuming advanced development kits are provided from Microsoft as in the past. Certainly we are all anxious to overcome some of the limitations in **MSW3.1**.

### **Windows NT for the Intel based and DEC Alpha PCs.**

The **MI/X** server was not finished for **NT** as planned during the past quarter, due to the departure of the software engineer assigned to complete it and a lot of concentration on perfecting many existing **TNTmips** processes by the remaining software engineers. It also took most of the quarter to convince **DEC** that we did not have, but were entitled to the final release of the **NT** development tools for our Alpha **AXP** platform and the proper firmware to use these tools. However, final beta versions of **TNTmips** for both these processor using **NT** will be demonstrated at **AUW6** together with a working beta version of the **MI/X** server.

### **Future New Platforms.**

The release of the **TNT** products for **NT** on the Intel and Alpha **AXP** platforms will bring the total number of platforms supported by these products to 11. Microlimages would now be happy to have your input

concerning other platform and/or operating system combinations which you are using or plan on committing to use. Possibilities being considered by Microlimages are discussed below. Note that Microlimages is more likely to add platforms when a client, or potential client, makes a significant commitment to buy **TNT** products for them. Also please note that just because a platform is being widely touted with media hype does not mean that it is readily available to you or to Microlimages with a complete set of development tools and associated documentation.

DEC Alpha **AXP** via **OSF/1**. Porting of **TNT** products to **OSF/1** for the DEC Alpha **AXP** platforms is being considered by Microlimages at this time. **OSF/1** is a DEC Unix variant that will replace Ultrix, DEC's other Unix variant, during the next year and also **VMS**. Supporting **OSF/1** would allow the higher end, more powerful DEC Alpha **AXP** systems to be used.

IBM Workstations using PowerPC and **AIX**. These machines are only just beginning to become available. Given that **IBM's AIX** is the worst Unix available at this time, this combination remains lower on the Microlimages priority list.

PCs using PowerPC and **NT**. This product combination would be high on our list as soon as it is readily available to Microlimages with the necessary tools.

PCs using **MIPS** Chips and **NT**. This combination is already available using the first release of Windows **NT** and the Watcom 9.5 "C" compiler. However, no one seems to be selling any of the machines designed around this combination, and we have no requests for it. This would be a very easy one to do as will all new platforms built around other chips running **NT**..

Macintosh using PowerPC and **AUX** or **AIX**. At this time is not clear when or which Unix will be provided for these new Macs as many rumors abound. However, it is Microlimages' speculation that Unix and **TNT** products will run well on the PowerPC based Macs.

## ***Use on a 586/60***

Microlimages and several clients have purchased standard Gateway 2000 586/60 based configurations with all standard features. A copy of an advertisement on the two currently available Gateway configurations at \$3000 and \$4000 is included with **V4.50**. Both of these configurations have been tested by Microlimages. **TNTmips 4.5** was installed on each of these machines in 30 to 60 minutes via their built-in **CD-ROM** drive. This included the time necessary to alter the standard **MSW3.1** configuration with which they are shipped (e.g. 640 by 480 driver, small permanent swap space, etc.). While Microlimages recommends a Matrox **MGA II** board for those assembling their own machine, we are also quite pleased with the **ATI** board for the new **PCI** bus and which are shipped with these 2 standard Gateway configurations.

Dell has recently started advertising a similar package for \$4000, but it is not as good a buy, as the #9 display board used with it has only 1 mb of **VRAM** which limits this system to 1024 by 768 pixels by 256 colors whereas the standard \$4000 Gateway package supports 1280 by 1024 pixels by 256 colors. Furthermore, the Dell package also does not include the bundled Microsoft software.

## ***Sun Solaris Errors***

There have been additional errors acknowledged by Sun in Solaris 1.x in Open Windows version 3 when used with a Motif 1.2 programs such as **TNTmips**. If you are not sure if you are using Open Windows version 3, check this on the Open Windows start-up screen. **TNTmips 4.3** used Motif 1.1 and is not affected! **TNTmips 4.4 and 4.5** use Motif 1.2 and will be affected!

If your version of Open Windows has not been patched you will experience serious problems with Motif 1.2 based software. Please check with your systems manager to make sure all these patches have been applied to upgrade you for operation with Motif 1.2 processes. Please make careful note to bring to their attention that the required patches vary depending upon whether you have a Sun class 4C

(older) or "Sun class 4M (newer) machine.

Solaris 2.3 has been released by Sun and **TNTmips** will soon be checked out with it. Please contact MicroImages if you are already using this product and are having any difficulties.

## ***File Locking***

Project File locking has now been perfected for release in **TNTmips 4.5** via the functions which use the **RVC** files. This now prevents problems and damage to a Project File when you attempt to use 2 or more **TNTmips** processes to simultaneously write into it. File locking in the Project File will now simply announce via a dialog box that the file you are trying to access is already in use by another process or system. This dialog box will provide you with the current user, machine name, when locked, and the process accessing the file and will let you retry your access. The foreground process you are running will automatically recheck the locked file when this dialog box is displayed every 30 seconds (by default) to see if the file has been unlocked by its user. If a locked file is encountered during a batch operation the process will continue to attempt to access the locked file using this same increment for a period of 60 minutes (by default). Both these intervals can be changed by editing FileOpenRetryInterval and MaxFileOpenRetryTime times respectively in seconds in the **TNTMIPS.INI** file.

## ***New TNTmips Features***

### **Display 2D and Raster Database Attachments.**

You may now attach database records to raster cell values in objects in the same way that they can be attached and used with points, lines, and polygons in **CAD** and vector objects. For example, a soil map in an integer raster object uses cell values to store categorical values representing soil identities (e.g. soil **SaS** is represented as a "2" wherever it occurs, type **VgR** by "211", **ScS** by a "0", and so on). All the associated properties of these soils can now be stored in attached database tables just as with vector and **CAD** objects. Thus everywhere a cell of value "2" occurs it can be attached to a set of database records containing all the properties of that soil, exactly as if that soil was stored as a polygon in a vector object.

This fundamental important new feature for **TNTmips** has been provided with **V4.50** together with some beginning tools to use it in the display and **SML** processes. Future integrated raster, vector, and **CAD** links to database tables will subsequently lead to important and new synergistic results when you begin to feed back your imaginative use of this new capability in connection with other processes in **TNTmips** which already integrate raster, vector, and **CAD** objects. The synergistic processes which result in the next year will be another example of the way in which MicroImages plans to distinguish **TNTmips** from competing products. Those products which have not yet paid the price for integrating raster, vector, **CAD**, and database objects into a single interactive system will not allow these advanced concepts to be implemented (e.g. ArcINFO with ERDAS!).

There are currently several **GIS** systems which attach database records to cell values and then manipulate these "virtual rasters" in their display and **GIS** processes. Many other **GIS** systems efficiently handle vector objects and databases for **GIS** analysis. However, only those which give equal weight and attention to the efficient storage, management, and visualization of raster, vector, **CAD**, and database material will achieve advanced results. These expected results will be the blending of **GIS**, image processing, **CAD** data preparation, and databases into a ubiquitous new computer use in spatial database analysis and visualization.

A very tiny, simple little example of the result of this careful integration is that the **TNTmips 4.5** display process can now display all the database records for a selected point when a raster object is overlaid by a vector object. In other words, the records will be displayed for both the raster cell value and the polygon within which that cell occurs.

Display is one of the first processes to support cell value attachments to database tables. Overall this addition to display operates just as previously for database records attached to vector and **CAD** elements. You can select, create, attach and edit database records just as with line elements. Please consult the on-line documentation on these new capabilities and how to operate them. Processes that manipulate raster objects will retain database

attachments if the actual raster cell values are not changed.

At **AUW6** (and released with **V4.60**) these "virtual rasters" will be displayed directly by selecting a database entry. For example, an image of the infiltration rate of a soil stored in its attached table can be displayed rather than the soil type stored in the real raster object. Subsequently, a database query will be used to design a virtual raster from the virtual objects within a single project file. Finally, if display can be extended to allow query to combine and display virtual objects between project files, then near real time visualization of raster **GIS** concepts will result.

All of this will be possible within all **TNT** product's visualization processes which already manage real rasters of different cell size or scale, extents, map projections, data types, etc. and can then be overlaid by query with vector and **CAD** objects of similar variant properties. Of course, this will continue to require increased desktop computer power at low cost which is clearly on the way to you from equipment manufacturers.

**SML** is the other initial process which can handle raster cell values with database records attached and these new features will be discussed in detail below. Other existing **TNTmips** processes will need to be modified to accommodate and use this new concept. Some are obvious to you and **MicroImages** at this time such as carrying database tables through the object management processes such as converting between raster objects and **CAD** and vector objects. Other ideas will be spontaneous and synergistic and may occur only to you, especially since **MicroImages** is not an "end-user" of **TNTmips** on projects. Please communicate any and all of your imaginative ideas to **MicroImages** to sort out and consider. Obviously, written ideas will get more circulation and attention than casual comments to a **MicroImages** technical support specialist, but all are welcome.

Another idea circulating at **MicroImages** for this general line of attack is to also allow database records to be attached to a cell's position (e.g. its row and column). Some here say this approach can always be accommodated by an overlay of a vector object with only points in it. This has advantages as no matter how you warp the raster and vector objects, as long as you maintain topology, the points will not be lost. Undersampling a raster object can result in a particular cell position being lost. Will this method of attachment of database records to rasters may or may not be of use to you?

### **Other 2D Display Modifications**

The title bar label for "Windows" has been changed to "Views" within **TNTmips**. There are already too many "Windows" items in this world to keep track of, especially within the operation of **TNTmips**!

You can now reorder groups by selecting the group in the list of groups and then selecting **RAISE**, **LOWER**, **TOP**, or **BOTTOM** menu options. The most common place where this will be useful is to raise or lower the order in which overlapping groups will be displayed and used in a complex Map and Poster Layout. Group order, just like layer order in a group, controls how things such as line elements will overlap and replace each other when rendered. Changing group order also helps by letting you display first any group you are actively working with so you can abort the display of subsequent groups of no current interest to you.

Previously, when zoomed in on a large raster (e.g. satellite image) with many smaller, local overlays of vector or **CAD** objects (e.g. **DLG** of 7.5 quads), it was sometimes time consuming to software pan around to find and display these area of overlay of object with limited extents. Often finding these "lost" layers would require zooming out and finding the overlay's extent and then zooming into that area. You can now simply select a layer from the scrolling list and this will pan to the current display to the center of that layer using the **LAYER / PAN** option on the menu. This feature is also of use when dealing with relocating zooms of large Map and Poster Layouts (e.g. to see scale bar, north arrow, a text block, etc.).

An exact resampling option has been added for the accurate display of projection changes of rasters as they are displayed. Previously, only the default affine or approximate method was available in display. For example, when objects having large geographic extents and conforming to different projections are used and you zoomed in far enough, you could see the misplacement between the positions provided by the approximate projection changes. Choosing the optional 'Exact' method will cause an exact projection conversion and will of course slow the process down. Of course, misregistration and inaccuracies can still result from improper or inaccurate georeferencing of one of the objects used in the group.

The display of large raster objects using either the affine or exact mode of resampling is now accomplished by the incorporation of tile buffering in this subprocess. This decrease in display time can be quite significant if the raster is large or is to undergo a significant distortion such as a large or 90 degree rotation.

MicroImages has had several calls about slow display rates in **V4.40** which resulted when the user did not realize that they had left the transparency feature turned on from a previous use. When left set in this mode the subsequent uses of display were needlessly testing every cell value for transparency. The null cell transparency feature will now always default to no or be off and must be deliberately turned on if you want to use it.

The measurement tools will now automatically use the scale or cell size value if no georeferencing is available for the object. If georeferencing is available it will be given preferential use over these values.

### **On-Line Help\_**

On-line help is now available for the main menu window.

An "About **TNTmips**" option has been added which will display the current **MSW3.1** display resolution and the color depth which you are using.

### **Faster Interface**

**MI/X** operates up to 25% faster. This improvement will be most noticeable on slower 386 based machines.

### **Cut and Paste\_**

Often, one of the first things asked by new **TNTmips** users when they first encounter its **MI/X** server and the **X** Window interface is, "can I cut and paste into other processes currently running in other **MSW3.1** applications"? Since **TNTmips** is simply another standard **MSW3.1** application, this can be done just as with any other **MSW3.1** program. If you need help on this simple procedure please see your **MSW3.1** manual or the one page instruction sheet entitled Using Microsoft Windows' Copy and Paste Functions with **TNTmips** included with this shipment.

### **Compressed Rasters\_**

Linking tiled, compressed, **TIFF** format rasters to a Project File was almost ready to ship with **V4.50**. It will be demonstrated at **AUW6** and the necessary auxiliary processes prepared for release in **V4.60**. The process uses the **LZW** compression within each tile within the object. Linking to this file provides a way to attach to compressed rasters in the efficient tiled form required for large rasters. The compression can be set to lossless and still give large compression ratios if simple map and other line materials are stored in the raster objects. Using the **TIFF** raster as linked means that it is not present twice on your hard drive during the import process. Decompression from **LZW** format is fast but creating a raster in **LZW** format pays the price in terms of being slow. Linking to a **TIFF** file also maintains the raster in a standard form which other software can then read. However, please note that not many software packages yet employ the tiled raster format and thus support this **TIFF** format.

### **Setting Preferences\_**

When setting up your preferences you can now designate that the **MI/X** server be automatically closed when the user exits the main menu and no other processes are running.

### **Converting Color\_**

You can now specify whether you wish to view your **HIS** input/output ranges as 0 to 100% or 0 to 255 data steps.

Contrast enhancement can now be performed in the intensity, brightness, and saturation mode.

### **Project File Maintenance\_**

As discussed in an earlier section, Project Files are now automatically locked by current access by you or some other user (e.g. via another user on the network). A Project File will remain locked until its access is completed and you will have to "stand-in-line" until it is unlocked by the application using it. However, this previous user might exit **TNTmips** incorrectly, hang his system, or even you may exit **TNTmips** via **MSW3.1** using <alt F4>. Under these circumstances the Project File remains locked. The Project File Maintenance process now provides an option to unlock these "locked" files.

### **Georeferencing.**

The positioning of control points now allows "half step" increments when moving crosshairs by using the arrow keys. This allows more accurate positioning of control points within rasters by choosing either the center of cells or between them. Of course, software zoom can be used to gain even more position control within a cell.

The error was corrected which produced an Application Error when switching from the Overlay to Separate view mode.

### **On-Line Documentation.**

It was erroneously stated in the Release Memo accompanying **V4.40** that the on-line documentation text could be exported for use in some other word processor or editor. This could be done only with the control codes embedded for on-line use. **V4.50** will now allow the option to be selected to retain or filter out these codes when exporting the text for use elsewhere.

### **Importing and Exporting Rasters.**

The general import process now verifies that files in an import file list exist before beginning the import. This prevents "file not found" errors half way through a long, overnight job.

Tile buffering has been improved for importing ERDAS files yielding an approximately 10X speedup for larger files. This change has only a minor impact on importing smaller files.

Be sure to contact technical support if the import of your favorite raster file from a hard drive seems abnormally and disproportionately slower with larger files than with proportionally smaller files. Also, if possible, arrange to read files (as in import) from one hard drive and write the new files onto a different physical drive to speed up all processes.

### **Copying Rasters.**

The database records attached to cells in raster objects will be copied in this process.

The dialog box now reports the name of the raster being copied which is useful if multiple rasters are being copied.

### **2D Vector or CAD Object Conversion to Raster Objects.**

Trimming and georeferencing to match an existing raster object can now be accomplished as part of the conversion from vector or **CAD** object to a new raster object. Any existing raster object can be selected for reference. When such a reference raster is designated the new raster object created in this process will have the same dimensions, extent, cell size, and georeference as the raster which is also often already in the same target Project File.

This valuable feature expands upon a similar feature in **MIPS V3.33**. However, moving beyond **MIPS**, the expanded **TNTmips** process will automatically change the projection of the source vector or **CAD** objects being converted. This is a very useful feature when extracting a portion of a vector or **CAD** object (usually polygons) and creating a raster to match an image or some other existing set of rasters for use together in **SML** or other subsequent process.



This is an example of a process which will also need to be modified in the future to transfer the database records attached to vector or **CAD** elements (e.g. polygons) to the raster object as records attached to the new cell values.

### **Mosaicking.**

The main layout window defaults to a smaller size and retains size changes between sessions. It has also been redesigned so that it has an improved layout.

Objects positioned and overlaid in mosaic by the manual approach are now automatically hooked together to move in tandem until independent movement is selected. These views will remain hooked together in size and position if the process or even **TNTmips** is exited and restarted.

### **Principal Components.**

The interface of this process has been redesigned and streamlined.

All numeric raster data types can now be processed.

### **Importing and Exporting CAD/Vectors.**

Several ArcINFO Coverage import errors were fixed. The problems which were fixed first for individual users which requested them and now are being released for all were connected with importing database tables and the speed of the process.

Tydac Spans vectors (**\*.VEC/\*.VEH**) and their associated database tables (**\*.TBA**) can now be imported and exported.

Documentation of the ArcINFO Export or **\*.E00** format has now found its way to MicroImages. An import program for this potentially very useful interface will be started immediately after **AUW6**. Unfortunately, the success of this step can not be forecast at this time as this documentation may or may not be sufficiently complete and detailed.

MicroImages has had many requests to provide an import for the Vector Product Format (**VPF**) used by the Digital Chart of the World. This has not appeared to be a very meaningful format to provide an import process to a Project File since once the **RVC** file was created and distributed (it's a public domain dataset) the import process would not be useful as no other significant data is appearing in this format. Furthermore, others claimed to have this data ready to distribute on **CD-ROM** in **\*.RVC** format and in other mutual formats such as Mapinfo. However, since these products have not emerged, and so many people have requested this data, we plan to proceed ahead. The end result may be a **CD-ROM(s)** with the data in Project Files in a **TNTAtlas** for sale or an import process or both.

### **Printing Speed.**

Modified buffering has been added to increase the printing speed for larger input and output rasters. The results are most significant for larger input or output raster objects and depends upon the number of columns and other object size factors. No particular effect will be noticed with smaller input and output rasters. Sample results with the 12 megabyte Millington Sample Map (raster only), which created a print raster for a 11" by 22" page in **V4.40**, printed in 22 minutes and with **V4.50** printed in 17 minutes using a Sun with no other users. Again, the larger the raster the greater the effect of this change as other portions of the process will be controlling the speed with smaller rasters.

Exceptions: This increase will not result if the Floyd-Steinberg, Jarvis-Judice-Ninke, or Stucki dither patterns are selected. For more information on the selection and effect of the various dither patterns in **TNTmips** please consult pages 11 to 14 and 72 in your Application Note entitled Map and Poster Layout.

MicroImages plans to devote serious attention this next quarter to attempt to speed up the processes of preparing a print file and a dithered print raster.

## Color Merge Process.

The color merge process now accepts several input raster data types and merges them and creates a raster object with the specified datatype. Output raster objects of 16-bit and 24-bit color composites can be created from most input raster objects. The 8-bit color composite raster object can only be created when all the input raster objects are also 8-bit color composites.

The following table describes the possible inputs and their outputs. If you need a combination not listed please ask for it.

input 8-bit color composite	output 8-bit color composite
input 16-bit color composite	output 16-bit and 24-bit color composite
input 24-bit color composite	output 16-bit and 24-bit color composite
input 8-bit RG&B	output 16-bit and 24 bit color composite
mixed inputs (not including 8-bit color composite)	output 16-bit and 24-bit color composite

The current requirements for input objects are that they have the same orientation, cell size, and row and column numbers. There is no limit to the number of objects that can be merged. When the merge occurs, it is the raster cell value, and not the color, that is transferred to the final output raster. The cell values in the output raster object are assigned colors according to the color table of the raster object that is "on top". Future modifications may provide the ability to merge either cell values or colors.

Note that in the color merge process the null values in the raster object selected first and showing at the top of the input list will be filled by data values for corresponding cells from the next input raster. This continues until there are no remaining null value cells in the output raster, or until the input list is completed, whichever occurs first.

## Raster Analysis.

A binary raster object can be inverted, exchanging 0 and 1 values. A new raster object will be formed as the operation is not performed in place.

A new stand-alone, automated contrast matching process is available for 8-bit rasters. It can be found under PREPARE / RASTER / MATCH CONTRAST. It can be used to adjust and match contrast between images which overlap but are not necessarily being mosaicked.

## Attaching Database Tables to Raster Objects.

Raster objects containing integer data types can now have database tables attached to them. See comments on new **SML** features below for plans relative to adding this feature for use with other data types. Records in these database tables are attached to cell values in a raster using the process Prepare / Database / Attach. To complete this attachment the database must contain a field which contains the cell values. For best results use a raster object containing unsigned integer data types ranging from 1-bit (binary) to 32-bit.

Attachment to signed integer and floating point rasters (by data range) will be released in **V4.60**. However, using these raster types will not take advantage of the optimizations that are possible for unsigned data values making lookup operations somewhat slower.

Attachments to **RGB** cell values may be possible if needed and a logical approach deduced.

Attachment of a different database record to a given cell might also be possible by using its cell position (row and col) if this creates useful applications.

Each raster object in **V4.50** with an attached database automatically has a table named "Internal" which contains one field named "Value". This might be modified in a future so that the table for **RGB** raster objects contains fields for red, green, and blue.

### **Surface Fitting.**

Additional control parameters have been added to the Minimum Curvature surface fitting process.

a) There are now 3 different initialization options:

- i) Linear Interpolation - used for line elements,
- ii) Piecewise - used for point elements, and
- iii) Inverse Distance - used for either point or line elements.

b) The iteration process has been modified to be a coarse to fine process, a starting grid ratio can be selected depending on the smoothness of the surface.

c) A blanking distance parameter has been added as a control to ignore the region far away from the data points.

d) Logarithmic option can be used to reduce distortion due to highly skewed data such as geochemical data.

The Inverse Distance approach is now a stand-alone, separate process which becomes the sixth surface fitting approach in **TNTmips**.

### **Validating Vector Objects.**

You can now optionally validate (fix) a vector object and have the changes and corrections written back into the same vector object.

### **Classification.**

A new Adaptive Resonance Algorithm for Unsupervised Learning has been added as a new multispectral classification process in **TNTmips 4.5** and uses neural network techniques. Basically, during the learning process, the input patterns and stored prototypes are said to resonate when they are sufficiently similar. When an input pattern is not sufficiently similar to any existing prototype, a new class will be generated. This input pattern will be utilized as the new prototype, using a previously uncommitted output unit. The model utilizes concepts from the biologically-based adaptive resonance theory. Specifically, the algorithm implemented here is designed for continuous value application such as multispectral clustering, with Euclidean distance used as the metric for measuring similarities.

The whole process must satisfy two properties: stability and plasticity. Stability means that when new features are introduced, old features must be properly preserved. Plasticity means that when new features are introduced, the system must learn quickly. It is not easy to have both stability and plasticity; and this is the so-called stability-plasticity dilemma. To deal with the dilemma, the process utilizes a vigilance test during the learning process. If the vigilance test is passed, implying that the input pattern and the stored prototype are sufficiently close; then we modify partially the old structure of the prototype class, so the system retains most of the old characteristics. This satisfies the stability requirement. On the other hand, if the vigilance test is not passed, implying that the input pattern and stored prototype are not sufficiently close; then we would build a new prototype class based on this new input pattern so that this new class can learn this type of new features quickly. This satisfies the plasticity requirement.

The process requires three input parameters: the threshold value, the maximum number of iterations and the raster sampling rate. The threshold value is the measurement by which the vigilance test is made. Instead of counting the number of matching features as done in the original model, the Euclidean distance is computed between the input

pattern and the prototype. The process then determines the node for which the distance is the least. It maintains "vigilance" by setting radii for cluster centers. A pattern lying outside of this hypersphere would not be accepted as belonging to that cluster even if that node has already been selected. This radius is the threshold value to be selected by you. The maximum number of iterations is to be specified so that the program would have adequate, but not excessive, computational time to finish the process. The learning process terminates when either the maximum number of iterations is reached or the process generates no new clusters at a given iteration; whichever comes first. The raster sampling rate is the sample increment used in the learning process. During the first (n-1) iterations, the clustering operation is performed using the sample increment specified. During the last (nth) iteration, each pixel is labeled for the entire raster; thus no subsampling is involved. In essence, one can save substantial computer time by using large sample increment for the learning, although at the risk that some information may be lost.

The program produces an output file containing the adjusted weights of each node after each iteration. It also gives a distribution of the cells assigned to each node after each iteration. In addition, the user can look at the status dialog box to see how far the process has progressed. The program is written to handle images of arbitrary size, whether a line contains 512, 1024 or 50,000 columns. The program can dynamically adjust its memory requirements. The number of raster objects or images used can be large easily handling hyperspectral imagery such as a Project File containing **AVIRIS** hyperspectral images of 210 raster objects. The number of clusters or classes generated can be as many as the number of input column samples.

The advantage of this approach in comparison with other unsupervised learning algorithms, such as K-means, is two-fold. First, this approach is usually faster for obtaining the same number of classes. If you limit the number of iterations to two: one for clustering and one for class labeling; then the speed improvement is substantial. Second, there are only three parameters to be specified in this algorithm. (For K-means, five parameters are to be specified.) The threshold value is also used to control the number of classes to be generated. The process suggests a reasonable range for this value and the default value is a good place to start. In an extreme case when the number of clusters created exceeds the allowable limit, an error message is generated with the suggestion that a higher threshold value should be used.

Further information on the concept used in this new TNTmips classification process can be found in Nonrandom Initialization for Backpropagation Using Thresholded Correlation Learning Vector Analysis (TCLVA), 1994, Robert Li, Ming Xu; and Don Nelson, J. of Artificial Neural Networks 1(1):131-144. Additional information on this topic is presented in the Introduction to the Theory of Neural Computation., 1991, J. Hertz, A. Krogh, and R. Palmer, Lecture Notes of Volume I, Santa Fe Institute, Studies in the Sciences of Complexity, pages 228 to 232.

### **X-Y Digitizing.**

Support for digitizers (and all other serial communications) has been improved for workstations operating under Unix.

### **Designing Vector Styles.**

The complicated series of dialog boxes used to edit line, point, and polygon styles for display "By Attribute" has been replaced with a new dialog box which is much easier to use.

The new style editor interface has all the controls in one dialog box so that windows are not continuously coming and going. There is now a scrolled list of styles at the top of the new, single style editor window so that all styles can be edited from this one window instead of one at a time.

The main style assignment window in **V4.40** had buttons marked "New" which created a new style, and "Edit" which edited the selected style. To avoid confusion there is no longer a "New" button in that window, just an "Edit" button which brings up the new style editor allowing you to edit all the styles. The "New" button which allows you to create a new style is now in this new window.

**CAD** styles still uses the same user interface as in **V4.40** and will be adjusted to the new format in **V4.60** together with those additional changes you suggest for the vector styles interface after trying it.

## Running SML Scripts.

It is now possible to give **SML** the name of an **SML** script on the command line. For example:

```
sml -nowait d:\data\myscript.sml
```

**SML** will load the script, check the syntax, and execute the script. When the script is finished execution it will report how long it took to run and wait for your selection of the "OK" button. If given the optional "-nowait" flag as shown above, the execution of the script will not report the time or wait for the OK button. If a syntax error occurs the editor window will be displayed and the cursor will be placed where the error occurs. This new feature can also be used with the new feature added to elsewhere that allows a command to be run automatically when **TNTmips 4.5** is started up

**IMPORTANT**, this now allows you to run your **SML** script from an icon within **MSW3.1**. The icon is created by following the instructions in the single gold page included with **V4.50** entitled: Creating a Program Group with Icons for TNT products. The command line should read:

```
tntstart sml -nowait scriptname
```

## SML Database Query.

A database query can now refer to the object that the query is to be performed on. There will be a symbol called "Vect" which refers to the vector object being queried. There will also be a symbol named "CAD" when querying a CAD object. Subsequently a "Rast" symbol will refer to the raster object being queried if a use for it occurs. These symbols are also used for several of the other new features outlined below.

## SML Vector Database Queries.

The built-in tables for vector objects have been renamed. In **V4.40** each vector object automatically had tables named "Line", "Point", and "Poly". In **V4.50** they have all been renamed to "Internal" in order to reassign "Line", "Point", and "Poly" as outlined below.

## Access to Raster Databases from within SML.

If R is a raster object used as a variable, then the expression R.table.field can now be used where "table" is the name of a table under the raster specified by R and "field" is the name of a field in that table. The expression will return the value of the specified field for the first record attached to the cell value of R at the current location. Since the actual raster will not be selected until the script is run, **SML** has no way to know when it parses the script if the specified field is a character or numeric field. To handle this, the field will be assumed to be numeric unless you add a "\$" to the end of the field name. The dollar sign is not part of the field name itself, it just indicates to **SML** that the field is a character string.

Legal forms are:

R.table.field

R[lin,col].table.field

Value of "field" in the first record of "table" attached to the cell value of raster "R" at the given position. If the position is not specified, the "current" position is assumed. (This only makes sense in the context of a foreach loop).

R[lin,col].table[n].field

Same as above, but uses the value of the "field" from the Nth record attached to the given cell value.

R.table[@n].field

The value of "field" from the Nth record of "table". This ignores attachments and accesses the table directly.

### **Access to Vector Databases from within SML**

Vector tables can be accessed from within **SML** using expressions similar to the raster table expressions above. If "V" is a vector symbol, then ...

V.point[n].table[m].field

V.line[n].table[m].field

V.poly[n].table[m].field

V.node[n].table[m].field

refer to the field named "field" in the Mth record of "table" attached to the Nth point, line, polygon, and node respectively. As in the raster table expressions, the reference to record number (the "[m]" in the examples above) can be omitted, and is the same as specifying ...table[1]... which means the first attached record. The element number (the "[n]" in the examples) can also be omitted. In this case, the "current" element number, will be used.

The form:

V.point.table[@n].field

refers to the Nth record of the table, as opposed to the Nth record attached to a given element.

### **New SML Constructs:**

Foreach loops can be used on vector elements. The syntax is:

for each element\_type[n] in V

where element\_type can be "point", "line", "poly", or "node" the "[n]" part is optional and can be omitted. If given, then the variable "n" (or whatever variable you specify) will be used as the loop counter. Also, as with the raster foreach construct, "for each" can be one word or 2. For example:

GetInputVector(V) # Allow user to select vector for V

sum = 0

for each point in V begin

sum = sum + V.point.well\_info.depth

end

mean = sum / NumVectorPoints(V)

### **New SML Math Functions:**

NumRecords(table)

Returns the number of records in the given table. For example:

sum = 0

```
for i = 1 to NumRecords(R.table)
```

```
sum = sum + R.table[@i].value
```

```
mean = sum / NumRecords(R.table)
```

```
StrToNum(string)
```

Takes a character string and returns the value as a number. This is useful for cases where numeric data is stored in a character field in a database.

### **New SML Raster Functions:**

```
ReadHistogram(Raster, histo)
```

Reads a raster histogram into the given array. Raster should be 8-bit unsigned (other raster types will be implemented in the future). For example:

```
array histo[256]
```

```
ReadHistogram(Raster, histo)
```

```
for i =0 to 255 print(i, histo[i])
```

### **New SML Vector Functions:**

```
GetInputVector(Vector)
```

Asks the user to select a vector object for processing. The variable used as the argument must start with a capital letter and not have been previously used for a raster. (Note: This function will only be available in **SML** and not in query operations)

```
NumVectorPoints(Vector)
```

Returns the number of points in the specified vector object.

```
NumVectorLines(Vector)
```

Returns the number of lines in the specified vector object.

```
NumVectorPolys(Vector)
```

Returns the number of polygons in the specified vector object.

```
NumVectorNodes(Vector)
```

Returns the number of nodes in the specified vector object.

### **SML Georeference Functions:** (this is a whole new category functions)

```
GeorefAlloc()
```

Returns a georeference id for use with other georeference functions.

**GeorefFree()**

Frees a georeference id so that it can be reused (reallocated).

**GeorefGetParms(georef)**

Pops up the standard projection selection dialog and allows you to select projection parameters for the given georeference id. The georeference id parameter is optional and if omitted, one will be allocated and returned.

**GeorefTrans(georef1, x1, y1, georef2, x2, y2)**

This function translates a point (x1, y1) from one projection (georef1) to another (georef2) and returns the result the result in (x2, y2).

**GeorefAngleToNorth(georef, x, y)**

This function returns the angle between true north and the projection's north at the given point. The result is in radians. To convert it degrees, multiply the result by deg (a predefined constant equal to 180/pi).

**GetGeorefObject(Object)**

This function takes any object variable (Raster, Vector, or CAD) and asks user to select a georeference subobject for that object. The function returns a georeference id suitable for use in the other Georef functions.

**GetLastUsedGeorefObject(Object)**

This function is similar to GetGeorefObject(), but instead of asking you to select a georeference subobject, it just uses the one that was used "last".

**ObjectToMap(Object, x, y, georef, mapx, mapy)**

This function takes an object variable and converts a point (x, y) from the object's coordinate system (line and column for rasters) to the given georeference and returns the result in mapx and mapy.

**MapToObject(georef, mapx, mapy, Object, x, y)**

This function is similar to ObjectToMap in reverse.

#

# Sample script to demonstrate new georeference functions

#

```

clear()                # Clear the screen
GetInputRaster(R)     # Select raster
georef = GetGeorefObject(R) # Select georef subobject
dest = GeorefGetParms() # Select a new projection

```

# Convert upper left corner of raster to the projection

# of the georeference object and print it out

```
ObjectToMap(R,0,0,georef,x,y)
```



```

print(x,y)

# Convert upper left corner of raster to the projection

# selected using GeorefGetParms()

ObjectToMap(R,0,0,dest,x,y)

print(x,y)

# Example of converting from one projection to another

GeorefTrans(georef, x, y, dest, x1, y1)

print(x1,y1)

```

### **Importing TrueType™ Fonts for the X Window System.**

The **TNTmips 4.5** outline font editor will now convert TrueType outline fonts to Bitmap Distribution Format (\*.**BDF**) fonts for direct use by **MI/X** or **X/Unix** workstations. Use this process from within **TNTmips** to create the "local" language character fonts on a **PC** needed to translate the **MI/X** user interface to a local language (e.g. to edit resource files [button contents, titles, etc.], message file, error messages, etc.). Use the **TNTmips** utility described below on any **PC** equipped with **MSW3.1** (no **TNTmips** required) to create identical \*.**BDF** fonts for use to similarly localize a workstation version of **TNTmips**. Please use only with fixed (monospaced) font widths, as the process does not yet work well with proportional spaced TrueType fonts.

A font selection window can be accessed in the **TNTmips** font editor showing all the TrueType fonts anywhere on your hard drive (any font available to any of your **MSW3.1** programs). Use this window to select 1 or more fonts and point sizes and then to start the conversion process. Each TrueType outline font will be converted to a bitmapped \*.**BDF** font and stored in a file named with the first 8 characters of the TrueType font. Place these fonts wherever your X-fonts are stored for the **X** server and then install and use them. Ask for further detailed information in using these fonts via MicroImages Technical Support.

### ***MicroImages Utilities*** (MI utilities are not protected by the hardware key!)

#### **TTFTOBDF.EXE** (32-bit **MSW3.1** application)

For those using a workstation with **X/Unix**, a separate **MSW3.1** utility program called **TTFTOBDF** has been created for converting TrueType to \*.**BDF** on any nearby **PC** equipped with **MSW3.1**. Use this utility from within **MSW3.1** to create the "local" language character fonts on a **PC** needed to translate the **X** Server user interface on your workstation to a local language (e.g. to edit resource files [button contents, titles, etc.], message file, error messages, etc.). Please use only with fixed (monospaced) font widths, as the process does not yet work well with proportional spaced TrueType fonts. Place these fonts wherever your **X**-fonts are stored for the **X** server and then install and use them. Ask for further detailed information in using these fonts via MicroImages Technical Support.

### ***Display Boards***

The latest comprehensive article on the advanced display boards for **MSW3.1** is entitled [2 mb Video Boards - Pumping Pixels](#); **PC Magazine**; Volume 12; Number 21; December 7, 1993; pages 251 to 330. This comprehensive review article is a must for anyone about to buy a new, fast, advanced performance board for **TNTmips** and **MSW3.1**.

MicroImages currently recommends the Matrox MGA display boards with 2 mb of **VRAM** due to their versatility, speed, and special features which include the use of all **VRAM** providing as high as 1600 by 1200 pixels at 256 colors on the 2 mb **VRAM** board, use of all memory as "addressable space" for **MSW3.1**, and hardware scroll and

pan. The best buy is the Matrox Ultima **2AH MGA** board with 2 mb of **VRAM** for the **ISA** bus with 2 mb of **VRAM** has a retail price of \$700.

These Matrox boards are also available with 3 mb of **VRAM** memory and for the **ISA**, **VL**, **MCA**, and **PCI** buses. Below is brief summary of these Matrox boards and their highest resolution and current retail prices. All boards have hardware zoom and pan.

Important, Matrox **MGA** boards with large addressable display memory areas can be set to display a smaller viewable area on a lower resolution monitor and scroll this area over the larger addressable area by moving the mouse. Thus a **MGA** based board with 2 mb of **VRAM** can be set to provide a desktop of 1600 by 1200 by 8-bit color and can be set to display directly on a 1600 by 1200 pixels on an appropriate (and expensive) 21" monitor. However, the same board can be set up to provide the same 1600 by 1200 by 8-bit color desktop under **MSW3.1** (addressable space) but display a 1280 by 1024 pixel by 8-bit color display on a good quality 17" monitor (now inexpensive) and to scroll over the larger area by moving the mouse.

Other combinations of desktop size and viewable area are also available such as 1600 by 1200 pixels viewed via 1024 by 768 pixels on a 14" or 15" monitor. The ideal desktop arrangement to use of such combinations is to size the main window (e.g. main display window) of each **TNTmips** process to equal the viewable area on the monitor in the lower left corner of the desktop or addressable area. The other auxiliary or support windows, dialog boxes, etc. can be set off to the top and left of the main window in the processes. Normal use would then expose the main window filling the screen and then you simply move the mouse (as you would normally do anyway) to expose and select from the auxiliary windows.

Remember that **MSW3.1** and **TNTmips** (as did **MIPS** with similar boards) use the large addressable area and know nothing about the smaller viewable area which is controlled only by the setup of the electronic output components for the board. Thus the display level required by **TNTmips** is set by the larger desktop addressable area and not the area viewed by the monitor.

Matrox **MGA** Impression 3AH (3 mb **VRAM**, **ISA** bus therefore **EISA** bus) \$1000

top resolutions B, E, G, I

Matrox **MGA** Impression 3MH (3 mb **VRAM**, **MCA** bus) \$1100

top resolutions = B, E, G, I

\*\* Matrox **MGA** Ultima 2AH (2 mb, **ISA** bus therefore **EISA** bus) \$700

top resolutions = B, E, G, J, L

Matrox **MGA** Ultima 2MH (2 mb, **MCA** bus) \$900

top resolutions = B, E, G, J, L

Matrox **MGA** PCI2 (2 mb, **PCI** bus) \$600

top resolutions = E, G, J, L

\*\* Matrox **MGA** PCI2+ (2 mb **PCI** bus) [can be expanded to 4 mb **VRAM**] \$700

top resolutions = B, E, G, J, L

Matrox **MGA** PCI4 (4 mb, **PCI** bus) \$1000

top resolutions = A, C

Matrox **MGA** VL2 (2 mb, VL bus) \$600

top resolutions = E, G, J, L

\*\* Matrox **MGA** VL2+ (2 mb VL bus) [can be expanded to 4 mb **VRAM**] \$700

top resolutions = B, E, G, J, L

Matrox **MGA** VL4 (4 mb, VL bus) \$1000

top resolutions = A, C

Only highest resolution at maximum colors are listed in the above board list. Lower resolutions at that color resolution can also be used.

resolution A 1600 by 1280 pixels by 16-bit color

resolution B 1600 by 1280 pixels by 8-bit color

resolution C 1280 by 1024 pixels by 24-color

resolution D 1280 by 1024 pixels by 16-color

resolution E 1280 by 1024 pixels by 8-bit color

resolution F 1152 by 852 pixels by 24-bit color

resolution G 1152 by 852 pixels by 16-bit color

resolution H 1152 by 852 pixels by 8-bit color [standard Sun SPARCstation display]

resolution I 1024 by 768 pixels by 24-bit color

resolution J 1024 by 768 pixels by 16-bit color

resolution K 1024 by 768 pixels by 8-bit color

resolution L 800 by 600 pixels by 24-bit

resolution M 800 by 600 pixels by 16-bit

resolution N 800 by 600 pixels by 8-bit

\*\* At this time MicroImages recommends these Matrox boards as the overall best performance and cost for **TNTmips**. This is of course subject to change at any time with the continuous introduction of new **MSW3.1** display boards and progressively lower prices.

*Important note:* You will note that with the capabilities of some of these low cost **MSW3.1** boards far exceed the capability available for workstations. Off hand, MicroImages does not know of any display boards available for workstations at 1600 by 1200 pixels. Furthermore, boards of 24-bit color resolution on these same workstations usually cost more than \$5000.

Final notes, if you ever want the **MGA** board to operate at the 1600 by 1200 pixel resolution as a directly displayed desktop on a 21" monitor make sure it has the optional higher speed RAMDAC (inexpensive). For direct display or viewable area of 1280 by 1024 pixels the optional RAMDAC option is not needed. Also make sure any

Matrox board uses the Matrox Graphics Adapter (**MGA**) chip as earlier Matrox boards still sold (e.g. 1280 by 1024 pixels by 24-bit color with 4.5 mb **VRAM**) use old TI34010 graphics chips and others which would be much too slow for **MSW3.1**.

## ***Display Monitors***

The most recent detailed review of 17" monitors, a size which we recommend be considered as minimum for **TNTmips**, is entitled 17-Inch Monitors: A Wider View; PC Magazine; Volume 12; Number 5; December 14, 1993; pages 161 to 227. Pages 216 to 222 containing the basic tables comparing these monitors are included with **V4.50**. Clients considering a new 17" monitor for **MSW3.1** should acquire the complete article and review the detailed discussion of each of these many monitors.

## ***New Image Printers/Plotters Supported***

### **FARGO Primera (model 76000).**

This 204 dpi printer was supported in **V4.30** in its thermal transfer configuration. In this mode it is capable of printing on 8.5" by 11" paper via a parallel port using the **P5** printer support feature. The retail price of the printer for the thermal transfer mode is \$1000 and supplies cost \$.50 per page.

**V4.50** supports this printer in its sublimation color printing configuration to prepare photographic like prints using the same **P5** printer support feature and a parallel port. Each FARGO printer can use both configurations by switching supplies if ordered with the sublimation printing option. The cost of the printer to support both modes is \$1250. The supplies to prepare a sublimation print are \$3.00 per 8.5" by 11" page.

### **Versatec Electrostatic.**

The support for these printers has been modified to support 5 color print passes in addition to the previous 4 pass support. Five printing passes may provide higher quality images for printers which are not as carefully calibrated in alignment. Five pass printing will first print the calibration track along the side of the paper followed by the black, cyan, magenta, and yellow passes.

### **HP 650C for MIPS V3.33.**

Printer support for this excellent large format color ink jet printer will be retroactively added to **MIPS V3.33** in late January under a special contract. However, its use will be available to every **V3.33** user who has printer support feature **P15** and makes a special request for it after 1 February 1994.

## ***New Scanners Supported***

### **CalComp Scanplus II.**

This scanner has been supported for use on **PCs** and **MSW3.1** under scanner support feature product **S15** using a **SCSI** interface card. Its support can also be readily extended to the other platforms supported by **TNTmips** via **SCSI** if requested. It has a media width of 40" and a scan width of 36". It can be purchased to scan in 8-bit grayscale in various models as follows: model 400 for 400 dpi; model 500 for 500 dpi; model 800 for 800 dpi; and model 1000 for 1000 dpi with optical resolutions of 138, 277, 416, and 555 dpi respectively.

The Scanplus II is identical to scanners marketed by Ideal and Context as all these scanners are made in Denmark by Contex and simply renamed. In fact, assistance in supporting them for **TNTmips** had to be obtained directly from Denmark. Thus scanners sold under these other names are also supported.

### **Nikon Coolscan.**

The Nikon Coolscan has been supported for use on **PCs** and **MSW3.1** under scanner support feature product **S5** using its **SCSI** interface. Its support can also be readily extended to any other platforms supported by **TNTmips** via **SCSI** if requested. This 35 mm color scanner operates up to the maximum resolution of 2700 dpi and 8 bits for each of red, green, and blue. The area scanned from slides is 24.3 mm by 36.5 mm. The external Coolscan is 1.85 by 5.83 by 12.61 inches and retails for \$2500. The internal Coolscan is 1.65 by 5.83 by 8.20 inches, mounts in an internal 1/2 height drive bay, and retails for \$2200. The principal drawback of this scanner is that it is slow when scanning at full resolution of 2700 dpi.

### **UMAX Scanners.**

The **UMAX** color scanners now work under **MSW3.1** with either the **UMAX** proprietary **SCSI** interface card and the Trantor **SCSI** interface cards using the standard **ASPI** software interface.

### **Howtek Scanmaster III+.**

The interface of the Scanmaster III+, available previously for the **PC** via **MSW3.1**, is now available for the Sun SPARCstation workstations using the appropriate National Instruments **GPIB (IEEE 488)** interface card. Currently a similar interface is being completed for the **IBM RS6000** workstation. Support for the other workstations supported by **TNTmips** can be readily supplied on request. Since the Scanmaster III+ is similar in interface requirements to the Scanmaster III and earlier Howtek and Sharp scanners, it is likely that these scanners are also usable.

### **Other Scanners.**

MicrolImages has now completed its own support of **SCSI** and **GPIB** interfaces for all platforms supported by **TNTmips** products. This will enable the cross platform support of many new scanners, printers, and film recorders if their manufacturer will supply an appropriate description of the control commands and a loaner unit.

## ***No Further Data Services***

### **CD-ROM Preparation.**

The Release Memo accompanying the shipment of **TNTmips 4.4** announced that MicrolImages would provide services for transferring selected standard image data types (Landsat TM, Spot, etc.) to **CD-ROM**. The very first attempt to provide such a service (and others examples of providing similar services in the past) has convinced MicrolImages to immediately discontinue any services of any type and to refer such custom operations to our Resellers and Representatives.

The first attempt at **CD-ROM** preparation occupied a great deal of time on the part of MicrolImages and ended up uncovering that the images provided were both non-standard (modified by a previous owner) and damaged. This resulted in considerable loss of time and money at MicrolImages and in the client requiring the results blaming MicrolImages for the delays and lack of results. MicrolImages has enough problems without taking on the problems of altered and corrupted data access.

### **Other Service Sources.**

MicrolImages will no longer provide special data preparation services of any type. This includes data format conversion from tapes to EO cartridges and preparation of **CD-ROMS** from **\*.RVC** files. These special services can be obtained from most MicrolImages Resellers in the U.S. and several Representatives. Many of these companies can also provide other services such as color scanning of film and maps and color printing.

The following MicrolImages Resellers and Representatives are known to have **CD-R** (CD-Record)

devices and may provide transfer of your data to a **CD-ROM**: NPA in London; Delta Graphics in Huntsville; Paris and Associates in Fresno; and Comp-Tron in Baltimore.

Several other U.S. companies specialize in data media conversion such as conversion of files from open reel tape, 4 mm DAT, 8 mm Exabyte, QIC tape, and other tape formats into **EO** and **CD-ROM** cartridges as well as many other similar conversion services.

## ***Software and Writing Services***

MicrolImages will still be happy to discuss contracting for software and writing projects which advance the **TNT** product series and its ultimate use by all clients. Software projects could be new extensions and features which would be made available to all clients. In general these projects can be considered as simply setting a higher priority on adding the feature and thus the cost would be partially underwritten by MicrolImages. Writing projects might be those which would assist a specific group of users in understanding and applying **TNT** products to specific projects and objectives. The results of these writing projects might be published by their sponsors or MicrolImages Press.

## ***Airvideo Seminar***

A one day videoconference entitled Application of Airborne Video Remote Sensing with **GPS** by Dr. William Anderson of the Center for Mapping at Ohio State will be broadcast 25 January 1993. A flier describing this videoconference is enclosed with **V4.50**.

MicrolImages has been informed that anyone in the Denver area can attend this seminar without cost under the sponsorship of the Bureau of Reclamation in Conference Room 4 of the Veteran Administration Regional Office at 4 Union Blvd. (near the Denver Federal Center). Please call Lee Werth at the Bureau of Reclamation at (303)236-4340 if you have any additional questions.

## ***Exclusive International Representatives***

Slovakia and Czech Republics. MicrolImages products will now be available from Geocomplex a.s.; Sladkovicova 5; 052 01 Spisska Nova Ves; Slovensko; voice (429)652-4031; FAX (429)652-4238. Geocomplex has 4 regional offices in Slovakia in Bratislava, Spisska, Banska Bystrica, and Kosice but initial contacts should be with Dr. Slavomir Daniel in Spisska. Dr. Daniel has his principal background in geophysics and a Doctorate in Natural Sciences and additional recent professional studies at the Geological Survey of Finland. He and his colleagues at Geocomplex have completed several internal projects with **TNTmips** with systems installed at several end user sites in these new Republics. Geocomplex is the major engineering firm in Slovakia specializing in regional geology, hydrology, ecology, mineral and energy prospecting, and geophysics. Geocomplex also publishes the bimonthly, high quality professional journal entitled *Mineralia slovaca* in tandem with the State enterprise of Geologicky prieskum.

Iran. MicrolImages products will now be available in Iran from CHKON, Co., North Eskandari Street; Mohamadi Alley; Number 21; Tehran 14197; Iran; voice (982)192-6411; and FAX (982)192-7908. Sohrab Batmanglidj, who owns CHKON and Lumar Kansaar, a geophysical consulting company, is a graduate of the Colorado School of Mines in geophysical engineering and worked for about 20 years in the U.S. with Phelps Dodge, CONOCO, and Rocky Mountain Energy.

Zimbabwe. MicrolImages products will now be available from the Environmental and Remote Sensing Institute; P.O. Box 2406; Harare; Zimbabwe; voice (263)473-1049; FAX (263)445-628. Fatima Ferraz, an experienced **TNTmips** user previously working with MicrolImages in Johannesburg and Cape Town in South Africa has recently set up this location in Harare. She will operate in tandem with Neil Pendock and Image Processing Consultants, the MicrolImages Representative for Southern Africa.

No Brasil. EIKON located in Sao Paulo will no longer represent MicrolImages for the sale of products in Brasil. All Brazilian clients and known potential clients have been notified of this directly and requested

to transact any further business directly with MicrolImages or our Representatives in Chile or Argentina until a such time as a new Representative is appointed.

## ***Domestic Reseller and VARs***

Colorado Area. Walsh Environmental Scientists and Engineers, Inc. will provide access to the products of MicrolImages via their Boulder, Colorado main office. Walsh conducts environmental studies in the U. S. and Internationally and has project offices in Omaha and elsewhere. Dr. Tom Furst, an experienced **TNTmips** user is coordinating Walsh's Representation of MicrolImages products and their expanding **GIS** and image processing activities. He can be reached at 4888 Pearl East Circle, Suite 108; Boulder, CO 80301; voice (303)443-3282; FAX (303)433-0367.

Alabama Area. GeoTechnologies located in Huntsville, Alabama has been renamed Delta Graphics Corp. but remains at the same location and phone numbers.

Texas Area. Advanced Programming Concepts has closed their El Paso office with the successful completion of the installation of their products and **TNTmips** at a military site. Don Buckley has transferred to their Austin, Texas office and he and David Sietsema will now resell and integrate MicrolImages products from this central office.

No Maine Area. Kork Mapping located in Maine was purchased 100% during the last quarter by Autometrics. As a result, MicrolImages has concluded that it will no longer be appropriate for Kork Mapping to operate as a Reseller or VAR. This is due in large part to the fact that Autometrics is currently closely allied with ERDAS Inc. Autometrics also developed the OrthoMAX software concept which is currently licensed and sold by ERDAS as an option for their workstation systems. Kork's continuation as a Reseller and VAR would have automatically provided Autometrics with Reseller and VAR status and information with regard to the products of MicrolImages.

## ***Application Notes***

### Feature Mapping.

The final printing of the Application Note entitled Feature Mapping of 153 pages by Dr. Merri Skrdla is being transmitted with **TNTmips 4.5**. All image illustrations were prepared in **TNTmips** in color and cut and pasted from **TNTmips** into Pagemaker for the Apple Macintosh. While graphics illustrations were prepared in color, the Application Note would have been far too expensive to print in color.

Feature Mapping is a process unique to **TNTmips** and **MIPS** before it and results from 9 years of serious thought and coding on the part of the principles at MicrolImages. It is designed to "keep the expert in the image processing loop" and yet increase the accuracy and speed with which features can be extracted from marginal multispectral digital imagery such as airvideo, airslides, and airphotos. This process should have wider use by clients but is often not understood or tried. It is hoped that with its extensive and excellent treatment in this Application Note that the objectives of this unique approach will be more fully understood by all clients and reviewed for use in your projects.

### Orthoimage and DEM Creation.

A preliminary draft of an Application Note entitled Orthoimage and DEM Creation of 71 pages is enclosed explaining how to use these new processes within **TNTmips 4.5**. While not yet edited, this carefully illustrated contribution by Keith Ghormley will help you test and apply these processes.

## ***MicrolImages Press Plans for 1994***

The Objectives The goal of MicrolImages over the next several years will be to broaden the base of use of GIS and integrated image processing under the general concepts of visualization and spatial

database analysis. A *much greater number* of professionals should make "personal" use of these concepts than do currently. In general these professionals already have spatial data but do not know how to go about organizing and using it. They also have other professional objectives and do not want to become specialists in these new fields but merely to employ the techniques. The wide spread of powerful mainframe and workstation-like desktop computers to many desktops based upon the 586, PowerPC, Alpha **AXP**, and other new processors will make powerful processing tools available to everyone. The corresponding simplification and spread of powerful "unifying" operating systems such as **NT**, **OS/2**, and Unix will properly harness this power providing the end user with easily used **MSW3.1** and **X** System user interfaces.

Certainly the first wave of microcomputer use has shown us that a concept like spreadsheets can widely impact on all our professional activities even though few professionals ever stated that "I need something like a personal spreadsheet process on my desktop" before they were invented. More recently Autodesk has shown the way for another type of professional need to be satisfied by the wide-spread use of a complex microcomputer tool. A lot more professionals now use AutoCAD than would ever have admitted a need for it in its early days. A similar spread of complex spatial data visualization and management are predicted by many including MicrolImages.

What will further this penetration of these new concepts into solving your and your uninitiated associate's daily spatial database management problems? It is the opinion of MicrolImages that we, as a company, have the base products (**TNTmips™**, **TNTview™**, **TNTatlas™**, **TNTsdk™**, and **TNTdemo™**) completed to provide a basis for the further development and extension of this concept into a wider application area and user population. What is now needed is a lot of educational oriented materials which will clearly portray the components and opportunities of these new methods and illustrate how to apply them. The careful preparation of such materials is why you will now find that MicrolImages has as many experienced scientific writers (documentation specialists) on its staff as software engineers who create the processes. This is also why you will find that we will jointly expand the employment of these disciplines in tandem as future income and associated expansion plans allow.

The Current Situation. Currently MicrolImages provides clients with the equivalent of about 3000 pages of single spaced reference materials with extensive illustration. About 1/2 of this is in the on-line documentation and the remainder in the Application Notes, Guide, Installation Manual, and other miscellaneous materials. Some of this material relates back to **MIPS** and must be updated but is still conceptually correct and usable as only the user interface references have changed between products. Some of the older materials will be updated and others will be replaced. At present we do not plan to rewrite the Guide as it was already getting too big and thus difficult to maintain in an "up to date status". The principal effort of 1994 will be to expand the Guide into at least 1500 pages of additional well written and illustrated, focused Application Notes.

1994 Plans. The on-line documentation is now complete and current and can be maintained as part of the Application Note activity during 1994. Thus the 7 full time professional writers, a layout specialist, and any additional staff added to MicrolImages Press, will devote most of their creative time to preparing 14 new and revised Applications Notes. They have been instructed to concentrate first on the writing of the core of these Notes leaving the "boiler plate" of glossaries, table-of-contents, introductory and concluding materials, supportive sections, etc. until last. This will enable MicrolImages to reproduce partially complete, but very useful draft materials on several of these topic areas as early as the mailing of **V4.60** with more complete and useful materials with **V4.70** in June.

These new publication tasks for the staff of MicrolImages Press are outlined below for your review together with the identification of the writer to whom they are currently assigned. As part of the careful creation of these detailed Application Notes each of these professionals are responsible for the quarterly updating of the documentation on their processes as well as their quality control. They are also now members of the design team for the same processes.

1995 and Beyond. What would be the next step in the creation of materials to help educate professionals and managers as to the value of using spatial database methods? Certainly other media could be considered such as scheduled training and video or other multimedia based materials. The



next kind of written materials created could be something which might be called case studies or discipline application reviews. These reviews would focus on outlining how the new spatial data management concepts could be used in a particular discipline or management activity. For example an application review might cover how a county government could employ these methods in its activity. Another might focus on the various uses of the concepts in a nature, conservation, or related environmental organization. A third could focus on how public and private forest industries might employ the concepts. A very import topic would be to review all the possible applications in supporting the study of the spread of disease and insects - at present this is an important potential area of use in saving lives which has little penetration by this methodology.

Microlimages Press would be pleased to take on the challenge of how to convince a whole discipline or potential group of users if and as internal funds become available. It would also be possible to immediately undertake such writing projects under contract to external fund sources. This is part of our future marketing challenge but is also an important future challenge in 1995 and beyond in assisting professionals in understanding the potential applications of the available, powerful spatial analysis tools of the present and future. It is also one of the important feedback loops by which we learn what is needed to enable our products to be better applied within an application's area.

Writing Priorities for 1994. The following are the first priority writing tasks for 1994. The second priority tasks are listed in the second group. These priorities may not make sense to you in terms of importance of the process. However, they are set by a number of factors including the current state of the process (Pin Mapping is very important but not quite done), current experience of the writer, the number of clients using the process, the current availability of the materials, need for marketing materials, and so on. These priorities are subject to change at any time as circumstances dictate.

### **1st Priority in 1994**

Visualization of Geo-information will provide extensive illustration with accompanying descriptions of the many complex uses of the display process in **TNTmips**. A complete, extensively illustrated Application Note is needed on this topic as the visualization tools now provided with **TNTmips**, in contrast with **MIPS**, have many expanded features which are not going to be fully used unless explained and well illustrated. **Dr. Merri Skrdla and Rick Otoupalik**

Color Promo Brochure will likely be a 16 page illustrated color brochure which would provide an overview of what **TNTmips** is and illustrate its use and processes. **Dr. Merri Skrdla**

Map and Poster Layout will be revised from **MIPS** to **TNTmips** status, extended to cover new pen plotting capabilities, and reprinted. **Mary Sutton**

TNTview Manual will be prepared at about 300 pages. This will be a printed manual as **TNTview** is targeted at a more casual user of the Microlimages complex visualization tools who will want this physical reference for review before buying and while using this product. This manual will consist basically of a revised version of the on-line manual for the **TNTmips** display process which omits the features which have been deleted from **TNTview** such as the printing process, creation of multiple groups, etc. **Carol Wells**

Creating Vector and CAD Materials will deal in an integrated fashion with such topics as vector objects and their topology, editing vectors, X-Y digitizing, smart line following, thinning and filtering elements, import and export of vector objects, standard attributes, attaching databases, preparing the form of database reports, copying databases, validating topology, and so on. **Dr. Tom Murauskas**

Creating, Representing, and Visualizing Surfaces will cover such processes as surface fitting, contouring rasters, color separation and smart line following, vector to raster conversion, autoboundaries, viewshed, watershed, slope, aspect, shading, 3D display, 2D to 3D conversion, etc. **Dr. (elect) Chris Dore**

Finding Spatial Relationships (title will probably be changed) will cover topics related to analyzing **CAD**

and vector objects such as home range, buffer zones, intersections, vector and **CAD** copying, and others with extensive focus on database query in such processes. **Tom Schafer**

Advertising Fliers are being prepared for **TNTmips**, **TNTview**, and **TNTatlas**. These 1 or 2 page promotional items for each product will have a color cover and contain a summary description of the functions of that product. All three will be in a visual format which interrelates the products. **Keith Ghormley and Rick Otoupalik**

Spatial Manipulation Language will be updated from **MIPS** to **TNTmips** and reprinted. Many new functions have been added in **SML** such as attachment and manipulation of databases attached to rasters, processing georeference information, adding your own functions to **SML**, and so on. **Keith Ghormley**

## **2nd Priority in 1994**

Air Photo Interpretation will also deal with the vector and **CAD** editing processes. However, this Application Note will focus upon explaining their use for those familiar with air photo interpretation. These clients wish to use these same tools for interpreting images for preparing maps electronically which may not have any further use in a **GIS**. The topics addressed will cover how to interpret a wide variety of images (35 mm, airvideo, NAPP, NAPH, Priroda, SPOT, etc.) and processes (warping, trend removal, etc.). **Dr. Merri Skrdla**

Creating and Manipulating Rasters will cover such topics as editing rasters, copy rasters, raster analysis, vector and **CAD** conversion to rasters, color merge, import and export of rasters, scanning, video capture, manual resampling, description and conversion of raster data types, applying contrast, etc. **Mary Sutton**

HyperIndex® concept will be discussed dealing with how to make stacks and the many ways they can be used. The use and distribution of these stacks with MicroImages' new **TNTatlas** product (licensed and protected versions) will be covered in detail to assist you in planning, preparing, and publishing your own materials for distribution with this "run time" product. **TNTatlas** will not need a manual as it will have a simple user interface which can accompany the **CD-ROM** or other media on a small reference card or foldout. **Carol Wells**

Georeferencing GIS Materials will cover such special topics as warping raster, vector, and **CAD** objects and creating and transferring georeferencing. Map projections and geodes will be discussed briefly as needed. **Dr. Tom Murauskas**

Pin Mapping will explain an entirely new concept coming into **TNTmips** which will be explained together with its applications as it is released in **TNTmips**. Pin mapping will be a visualization strategy oriented toward those clients more familiar and comfortable with database manipulations. It will allow database queries to automatically generate map and image overlays without being attached to any object. Its use requires that geographic coordinate information be stored within the database record structure. **Dr. (elect) Chris Dore**

Image Processing is an overview of these concepts. The general topics will cover automatic classification methods, filtering, enhancement, principal components, progressive transformations, multilinear regression, raster analysis, vegetation transforms, tassal cap, and other topics. Generally these topics are covered in many good text and reference books. However, this **AN** will summarize this material focusing upon their use and providing extensive references to other technical materials on these topics. **Dr. (elect) Chris Dore**

Mosaicking raster, vector, and CAD objects will be extracted from the current **MIPS** Guide, revised to cover the **TNTmips** approach, and applications shown to a wide variety of objects. **Tom Schafer**

Software Development Kit will be updated and printed in final form. The new topics will cover developing

processes for multiple platforms, use of the MicrolImages (Motif Interface) Builder (**MIB**), standard interface design elements, and other new topics. **Keith Ghormley**

Internationalization and Localization will be updated and printed in final form. New topics will be Truetype conversion to outline fonts (e.g. bird fonts), Truetype conversion to **\*.BDF** font for use in **X** Windows interface, outline font editor, and the pending multilanguage keyboard entry methods. **Keith Ghormley**

Orthoimage and DEM Creation will be revised and extended as appropriate.

### **Keith Ghormley**

Soil Map Vectorization will be modified from the **MIPS** approach and expanded to show how to handle maps and drawings of other types. **Keith Ghormley**

Guide to System Features may be prepared but is already extensively covered in the on-line documentation and changes somewhat each quarter. If this Application Note is prepared it would cover such features as validating topology, running batch jobs, managing project files, converting Truetype fonts for use, outline font editor, text editor, keyboard setup for other languages, preferences, etc. **not assigned**

Guide to MicrolImages Information Resources may eventually be needed. MicrolImages already provides over 3000 pages of single spaced illustrated written materials. Each printed item contains its own table-of-contents, index, and glossary. However, MicrolImages Press is now setting out to create potentially thousands of additional pages and it will eventually be necessary to supply some sort of electronic and printed cross-reference to all these various reference materials. A comprehensive cross index to all topics in all publications would be useful. This Application Note might also be an appropriate place for a discussion of the on-line manual, why it's on-line, how to use it, how to export its text and illustration for use in your own syllabuses and training materials or for translation. A discussion of how to cut and paste images and screens from **TNTmips** would assist you in illustrating you own materials. Finally, a comprehensive list could be included of other information resources available including papers, books, and related materials. **not assigned**

## ***Staff Changes and Expansions***

George Ren is no longer employed as a software engineer at MicrolImages. George was responsible for the maintenance and improvement of the filter, home range, copy vector, intersect, and other **TNTmips** processes.

Ben Hollingsworth has just departed from MicrolImages after working part time on **MIPS** and then **TNTmips** for 4.5 years while a computer science student at the University of Nebraska at Lincoln. Ben will now devote full time for a semester to finishing his **BS** degree.

Steve Mackie left MicrolImages after just 1 month to take a job at the Construction Engineering Research Labs at the Corps of Engineers in Champaign, Illinois (a different Division than the developers of GRASS) and also a MicrolImages installation.

Faith K. Rolfsen has just joined MicrolImages as a software engineer. Faith returned to school after a long absence and recently completed her **BS** degree in Mathematics and Computer Science at Peru State College in Nebraska. Faith's initial responsibility will be to convert the route tracing process in **MIPS** to run in **TNTmips** and to add new features.

Scott Richert has just joined the MicrolImages team as a technical support specialist. This maintains at 5 the number of these support specialists provided to assist you at no charge via phone, FAX, and training in the use of **TNTmips** and other MicrolImages products. Scott received his **BA** degree in Anthropology and Archeology from the University of North Dakota in 1982. In 1990 Scott completed his **MS** degree in

GeoEnvironmental Studies from Shippensburg University in Pennsylvania. Previous to joining MicrolImages Scott has been working for 3 years as a Geographic Information Specialist for the Lebanon County Conservation District in Pennsylvania. During this period he was responsible for learning and using **GPS**, GRASS via Unix, LTPlus, and related tools. Scott will bring his previous experience in "do it yourself" **GIS** to assist you as **TNTmips** begins to mature in this area.

Future Staff planned for MicrolImages over the next 6 months include several additional software engineers, a marketing administrative assistant, a marketing specialist, and a scientific writer. Recommendations for any of these positions will be appreciated.

## ***Staff Available***

A Russian geophysicist with 30 years of experience, most recently as a Chief Geophysicist and as a Senior Research Scientist in Moscow, has recently relocated into the United States and has contacted MicrolImages seeking employment. This individual has recent experience with **TNTmips** and several of our competitors' **GIS** and image processing systems. He speaks and writes English well and would probably be restricted by his visa to employment within the United States. His salary requirements are moderate. Please contact MicrolImages for further information.

## ***Features missing from V4.50***

The **MIPS V3.33** features listed below are not available in **TNTmips 4.5**. These features are being reworked as time allows. If any particular feature listed is specifically holding up your conversion to **TNTmips 4.5** or your projects please let us know so we can give their conversion a higher priority.

### Generally used features.

\*\* Raster profile display

\*\* 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 Xerox **VPI** card

\*\* 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.

### Specialized features 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 data

\* *now completed post production of V4.50, contact Technical Support*

\*\* *likely to be worked on this quarter, ask for status if you need before **V4.60***

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