

12 December 1995

Release of V5.20 TNT products

Introduction

Where have we been?

MicrolImages is pleased to distribute **V5.20** of the **TNT** products and the 37th quarterly release of the Map and Image Processing System (**TNTmips**). It has been over four months since you received **V5.10**. This has been the longest “quarter” between releases of the products of MicrolImages in the history of the company since 1986. As the past four months evolved, it became progressively clearer at MicrolImages that the significant advances offered by the use of the **TNT** products within Microsoft Windows **95** and **NT** would be worth the wait! The additional time also allowed the complete reissue of the **TNT** products for the Apple Mac and Power Mac, as well as some important new additions to the application processes. We think you will be well satisfied by these results now finally available in **V5.20** of the **TNT** products.

Since the advent of the **TNT** product series starting at **V4.00** we have never been able to make up the 4 to 6 week losses of time experienced in the release of **V4.00** to **V4.40** versions. It is complicated enough getting things out in quarters without trying to squeeze 12 weeks’ work into 8 or less while continuing to strive to reduce errors and other flaws. Now we have lost the additional six weeks and have decided to roll-over to the next quarter and declare that a virtual quarter has passed. Thus **V5.30** is now rescheduled for March to get us all back to the normal planned schedule of releases in March, June, September, and December which best fits around the American Christmas/New Year’s holiday and summer vacation seasons.

MicrolImages’ declaration of a free quarter benefits you as it means that your current subscription will span a longer time period which will result in more new features and enhancements. Unfortunately, it hurts here at MicrolImages as it effectively erases an entire quarter’s worth of upgrade revenue. However, this is partially offset by our savings in staff time, reproduction, and shipping for the virtual quarter.

Status of Client Base?

General comments.

MicrolImages is pleased to announce that more **TNTmips** and **TNTview** systems were ordered and delivered in the last quarter than in any of the previous 36 quarters. These results were achieved even when sales are normalized for the extra length of the quarter and sales of the lower cost **TNTatlas** products are excluded.

MicrolImages periodically gets requests and various kinds of pressure to extend special, off-schedule price quotes to clients, potential clients, or our distributors. If such practices were adopted, it would be difficult to claim fairness to all and then to determine who did, and who did not get such special considerations. Additionally, MicrolImages’ ethics and credibility in supplying professional products and information would also be lowered. MicrolImages’ “pricing fairness” approach is set forth in writing in the section entitled “Clarification of Prices” to all those who inquire

about the **TNT** products. This approach attempts to provide the best professional products possible at the lowest cost while acknowledging the benefits to all of volume pricing and the special support of educational institutions.

The good and the bad.

MicrolImages' staff very much appreciates the friendly input, suggestions, and compliments received from many of you over the past quarter. Some of these are summarized at the end of this MEMO in the section on testimonials. Positive written input is now outweighing negative by about 10 to 1.

Some clients are in frequent communication with MicrolImages, especially with the Software Support team. Contacts for this team continue to average over 100 a week. However, we seldom hear from some clients who are very actively using the **TNT** products. This may occur because one individual at a site coordinates all technical inquiries, which avoids confusion at both ends. Also our Representatives and Resellers give freely and generously of their time to assist their clients, especially to overcome language barriers. However, there are some clients who should call for help and don't. Please do, our success depends upon yours! MicrolImages does not always have the correct answer or the answer you want, but eventually most things get attention even if sometimes you have to be persistent.

Site commitments.

MicrolImages wishes to thank all the new clients who joined with us this quarter. All of you purchased your products at the prices set forth in our published domestic and international price lists. Your understanding of our firm pricing policies are greatly appreciated. The following new site commitments were made for 5 or more systems during the quarter.

California State University at Monterey Bay.

CSUMB, located in the general area of the former Fort Ord military base, became a new campus wide user of **TNTmips** during the past quarter with the initial purchase of 10 **UNIX** chairs and 11 **PC** based systems. An order for a larger number of Mac systems is also pending upon the test and acceptance of the new Mac version of the **TNTmips 5.20**. The price of the **TNT** products purchased by this University was that set forth within the normal MicrolImages price list and educational discount policy.

CSUMB is a brand new University dedicated this fall by President Clinton. It is staffed by experienced faculty generally drawn from similar departments in the California State University system or seconded part time from the large number of nearby research institutes in the San Francisco and Monterey Bay area. These faculty had the unique opportunity to start all over with new directions, software, computers, and eventually buildings. This also meant that new approaches could be taken to the formal educational programs, cooperative interfaces to the nearby research institutions, and the focus of the tool skill development of all the students.

The widespread use of spatial analysis tools (both **GIS** and image analysis) is to be one focus of this University's programs. In aggregate, the faculty and staff members making up the team selecting the software for this purpose were quite experienced from their previous teaching positions or current research activities in the use of

public domain and commercial software (Arc/Info, ERDAS, and so on). MicroImages is pleased that they have selected **TNTmips** for their new campus wide undertaking.

Due to varying student and faculty personal, professional, and research interests at this University, computer needs by discipline and interest span all popular platforms. With the realization that it is really the people that eventually count, the University is not trying to straitjacket the new campus with one computer solution, but is using an *ad hoc* mix of workstations, **PCs**, and Macs to support these diverse needs and interests. **TNTmips** meets these needs as it is available for all the diverse popular platforms selected while providing an identical user interface, processes, and Project File structure. As a result the students and teaching and research faculty of this institution will be able to easily and smoothly move between classrooms, disciplines, programs, and research project sites. After all, tools should be built to serve the user and not be designed to make their user serve them.

Geological Survey of Japan.

The **GSJ** has purchased 6 **TNTmips** systems with options and is considering addition units at this time. These systems are being used to prepare map materials with the Japanese 2-byte language support added to the **TNT** products over the last year.

University of Freiberg.

The Department of Geology of this German Institution has purchased 6 **TNTmips** systems with options for teaching and training purposes. These systems are being used in German using the full 1-byte font support of the **TNT** products.

Abbreviations.

Microsoft is confusing all of our communications with the naming of its operating system products. As a result, it is getting difficult to be precise when referring to these products without using a long string of words each time they are referenced. This makes it hard to understand the precise meaning in the long sentences which reference them. For simplicity, the following abbreviations have been adopted in this MEMO.

W31 = Microsoft Windows **3.1** or **3.11** (and you should all be using the more reliable Windows for Workgroups **3.11** by now).

NT = Microsoft **NT 3.1** or **3.5** (**3.1** is error prone and thus the **TNT** products require the use of **3.5** and its subsequent patches).

W95 = Microsoft Windows **95**

Mac = Apple Macintosh using the 68xxx Motorola processor and **MacOS 6.x** or **7.x**

Power Mac = Apple Macintosh using the 60x Motorola Power **PC** processor and **MacOS 7.x**

MI/X = MicroImages' **X** server for the respective Mac or **PC** microcomputer platform and operating system.

Summary of New Features.

The following is a brief summary of highlights of the new features and processes which are being released in **V5.20**.

A complete new suite of native 16-bit Mac and 32-bit Power Mac versions of the **TNT** products has been completed using new MicroImages **X (MI/X)** servers. They are included on the standard **V5.20 TNT** products **CD "A"**. Standard Mac and Power Mac point and click procedures are available for the installation of these new versions on the Mac and Power Mac platforms. A new and simpler **TNT** authorization key is also supported for insertion into the **ADB** (Apple Desktop Bus) cable leading to your mouse and keyboard. The alternative serial or universal version of the **TNT** key previously distributed is also still supported.

A complete, new native **W95** version of the **TNT** products and its new MicroImages' **X (MI/X)** server is provided on the standard **V5.20 TNT** product **CD "A"**. The user interface of this new version of **TNTmips** used within **W95** is significantly faster than using the native **W31** version within **W31** and thus its overall operation (interface and processing) are 2 to 3 times faster. A standard **W95** point and click procedure is also available for the installation of this version on the same **CD**.

The **X** server (**MI/X**) for the Windows **NT** systems running on Intel and Alpha based platforms has been redesigned and rewritten. A single **MI/X** will now handle both 8-bit and 24-bit displays and is smoother and faster in operation. A standard **NT** point and click procedure is also available for the installation of this version on the same **CD**.

A new *Prototype2* San Francisco **TNTatlas** sampler is now available and enclosed. It is prettier and faster than its predecessor. It has new point and click installation programs for **PCs** using **W95**, **W31**, and **NT**. **W95** has considerable improvement in the drivers and buffering provided for accessing **CDs**. As a result the images on this sample **CD** are read much faster by the **TNT** products from within **W95** and need not be copied to a hard drive for use as sample data in **TNTmips**, although it's still faster.

TrueType fonts can now be used on every platform supported for the **TNT** products including workstations and the Macs.

The display process now provides for transparent color fills of vector, **CAD**, and **TIN** layers.

Small icons are now available to represent object types on toolbars in the display process.

The **TNT** object editor can now select and edit **TIN** layers. Other additional useful **CAD** and vector layer edit tools have been added.

The conversion of a vector object to a **TIN** object can now be controlled by a query. The **TIN** object's vertices and their **Z** values can thus be selected or computed by a query applied to the vector object attributes.

A quintic surface fitting process is available to generate a raster object from a **TIN** object.

A kriging surface fitting process is available to generate a raster object from a **TIN** object.

A **DXF** file can now be hot linked for immediate use (without importing) as a **CAD** object for editing, etc. or as a layer in visualization. This is similar to the linking released in **V5.10** for the MapInfo's **MIF/MID** format.

A collection of several hundred point symbols has been provided. Any glyph or character in any TrueType font can also be used as a point symbol.

Raster export processes can now be added to moveable toolbar windows as large icons.

The polygon fitting (home range) process has been overhauled and improved in performance.

The general Ortho/**DEM** 3-step process has been further modified to provide increased **DEM** accuracy. Step 2 used to create the **DEM** raster object now optionally creates a second raster object containing the cross-correlation values for each elevation cell. Another option in Step 2 yields a **TIN** object whose vertices correspond to those patches of image cells in the stereo pair which yielded high cross-correlation.

What is underway now?

General. The Apple Mac versions of the **TNTatlas** are currently available and operating using the Microlmages **MI/X** server. However, there simply was not enough time to perfect simple **CD**-based installation processes for each in this already extra long quarter. A new *Prototype3* version of the San Francisco sample **TNTatlas** will be prepared with the added Mac versions for **V5.30** of the **TNT** products.

The import of **ESRI**'s ArcView shapefile format into a topological vector object has been added to **TNTmips**. It can be obtained from Software Support. It is also possible that by the time you call, the export will be available. Eventually a direct link to this format will be provided.

The conversion of a **TIN** object to a vector object is now available. It can be obtained from Software Support. It can be used to take the **TIN** object generated by the Ortho/**DEM** process, **TIN** editor, or elsewhere and then fit a surface (e.g. via kriging) to the vertices transferred to a vector object.

TrueType glyphs or characters contained in any fonts (fonts containing symbols are available) can now be converted to point symbols for use within **TNT** processes. Each glyph will be mapped into a single point symbol.

Footnote: It was interesting to find that the shapefile import process was just tested using the U.S. zip code boundaries on the sample data **CD** supplied by **ESRI** with ArcView 2.0. The states of Texas (TX_ZIP.SHP) and Nevada (NV_ZIP.SHP) would not properly import. ArcView 2.0 (for PC) was then used to access these shapefiles and it could not display these states. Microlmages then moved on to try the ArcView 2.1 sample data **CD** and found that the 2 other states of Missouri (MO_ZIP.SHP) and Mississippi (MS_ZIP.SHP) could not be imported but that Texas and Nevada would now import. ArcView 2.1 was then used and found that it also could not display Missouri and Mississippi. Seems like even the guys on top also have their problems getting it right. So what to do? Using the tools in **TNTmips** it was a

straightforward task to merge the missing states of Texas and Nevada from the ArcView V2.0 **CD** into all the other states imported from their V2.1 which automatically rebuilt the topology of the single vector object created.

For V5.30. The following features for possible release in **V5.30** have been started. However, please do not take these as firm commitments but more as an indication that MicrolImages is not running out of ideas or work.

The addition of the theme mapping feature common to MapInfo, AtlasGIS, Maptitude, ArcView and other similar products. Rather than “reinventing the wheel”. MicrolImages has purchased these and other products, the software engineers have installed and tried them, and will incorporate the best features of each.

Modification of the **2D** Display process to provide the multiple element selection feature for use with tabular database report similar to that available in the Object Editor.

The update and integration of the stand-alone raster editor into the object editor. This would make it possible for any kind of Project File layer (object) to be edited.

A new record can now be created while you are in the attribute tabular display mode. It is likely that various additional ways of forming these tabular attributes will be added soon: inserting rows for automatic subtotals, totals, means, etc.; setting column (e.g. field headings); and so on, with a way to save and redisplay the table with these properties.

MicrolImages is developing the concept of displaying “graphical fields” in tabular database tables. These small boxes will appear similar to numeric fields in the table, but will show in color the current point, line, or fill pattern associated with that record. Think of it as an automatic legend generator for database tables.

A totally rewritten scanner control program is being completed with icons and updated display options. It will still directly support all previously supported scanners via MicrolImages drivers. The new process will also support any new scanners or digital cameras via the **TWAIN** drivers provided by their manufacturers.

Attempts are underway to speed up the display of vector objects.

Under an agreement with Strategic Mapping Inc., MicrolImages has obtained both the external (*.**BNA**) and internal (*.**AGF**) format of AtlasGIS. Import, export, and linking will be added for these formats. Linking to the AtlasGIS internal formats will allow **TNT** products to directly read, display, and use these data sets. Conversely, **TNTmips** can provide edited and otherwise modified internal data sets for immediate use without importing by an AtlasGIS running concurrently.

A rewrite of the watershed process with improvements.

A new and smarter color line following process for incorporation in the **TNT** object editor.

Direct support of any color or black and white printer which is supplied with a Microsoft Windows printer driver.

An editor to allow the direct input of **COGO** data into a **TNTmips** object. This will include a means of loading and editing a **COGO** file prepared by some other system.

MI/X (Microlimages' X Server)

Overview. Major improvements or additions have taken place during the quarter in all the **MI/X** servers. **MI/X** for **W31** has received the least change as it has been stable and operating without any need for major alterations. The **MI/X** server for **NT** has been significantly improved in performance. New **MI/X** servers are available for **W95**, Mac, and Power Mac based platforms. The **MI/X** servers for **W95**, **NT**, and the Macs now provide similar interface performance (moving windows, starting windows, scrolling, etc.) to the native **X** windows interface on a workstation. Thus the **TNT** product interfaces via the **X** windows are now also only slightly slower than that of the native **NT**, **W95**, or Macs interfaces on the same platform.

for **W31**. It is no longer necessary to load separate **MI/X** servers for 8- or 24-bit operation. When **MI/X** for **W31** is loading, it automatically detects and operates with the **W31** display board driver you have selected with its associated color depth and resolution.

for **NT**. The **MI/X** for **NT** has been significantly modified to improve its general operation and revise some of its required network interface service. These changes yield a significantly faster and snappier interface. **MI/X** exposures, drags, scrolls and all other associated interface features now work smoothly under **NT** and out-perform those of the **MI/X** for **W31**.

It will no longer be necessary to load separate **MI/X** servers for 8- or 24-bit operation. When **MI/X** for **NT** is loading, it automatically detects and operates with the **NT** display board driver you have selected with its associated color depth and resolution.

Previously the installation and operation of the **MI/X** was cumbersome on an **NT** platform which was not part of a network and thus contained no network card. This situation required the installation of Microsoft's complicated loopback connector software to emulate the presence of network. The requirement to install this optional **NT** feature has been eliminated.

for **W95**. The new **MI/X** server provided for use with the **W95** operating system is exactly the process as that used for **NT** since both **W95** and **NT** are 32-bit operating systems with essentially identical **WIN32** graphics calls. This allowed the **MI/X** for **W95** version of the **TNT** products to be created by concentrating on improvements to the code for the existing **MI/X** for **NT**. **W95** is delivered network ready for use with **NT** as a server and thus required much the same refinements as noted above for **NT** for use with and without a network.

The **W95** interface on any given platform is significantly faster in many aspects than the older design **W31** and **NT** interfaces. As a result, the **MI/X** interface of the **TNT** products are significantly faster when used within **W95**. **MI/X** on a Pentium-based platform via used under **W95** provides an **X** interface performance equivalent to that of using **X** windows on a workstation.

for Mac and Power Mac. Microlimages is very happy to complete and release **MI/X** servers for both the Mac and Power Mac platforms. Creation and control of the code

for **MI/X** has enabled significant improvements in the performance of the **TNT** products on the Mac and Power Mac (more on this below in the section on Mac products).

The **MI/X** servers replace those of White Pine's e**X**odus and Apple's Mac **X** (which is still not available for the Power Mac). The **MI/X** servers are faster for the **TNT** products than either of these other commercial products. e**X**odus, Mac **X**, and other similar commercial **X** servers are designed to make your Mac into an **X** terminal, controlling and interfacing to applications on a remote network or execution server. The **MI/X** server easily equals them in this remote use of the **TNT** products.

Other commercial **X** servers are not widely used for operation on a Mac where everything including the application software is executing on the single local, desktop Mac not connected to any network. As noted previously in past **MEMOs**, their interprocess communication is too frequent and slows down performance. Furthermore, the current **MacOS 7.1x** and **7.5x** are not providing pre-emptive multitasking on either the Mac or Power Mac (not until **MacOS 8.0** late next year). Thus each Mac process is suspended when another is started or selected via the MultiFinder. Very specialized code was necessary to overcome this limitation where the **TNT** products must run and intercommunicate automatically between several processes at once (e.g., **MI/X** server, menu, and an application process). The **MI/X** code has been optimized for this isolated local use of the **TNT** products and overcomes these local communication limitations of all these other commercial products.

Why **MI/X**? The popular commercial **X** servers for **W31**, **NT**, and **W95** allow remote use (changing a **PC** into an **X** terminal) but do not or inadequately support local applications. The **MI/X** servers all support fast local communication with **TNT** and any other **X** applications executing on the same platform. However, the **MI/X** servers are just as effective as these commercial **X** servers at turning a local desktop machine into an **X** terminal for use on a network (except the early **MI/X** for **W31** version which has no support for remote use).

None of the **MI/X** processes check the **TNT** products hardware authorization key and thus are in the public domain. Thus all the **MI/X** servers can be used on other microcomputers to function as **X** terminals (hopefully some of them will be used to communicate with **TNT** products). **MI/X** can also be used with any of your other **X**/Motif compliant applications on that local microcomputer if they are recompiled to use the standard (with modified functions) **X** libraries available from MicrolImages.

X supports superior network applications. It is increasingly common in scientific and educationally oriented workstation networks to use any number of **PCs** as **X** terminals to provide remote access to graphically oriented applications such as the **TNT** products. The economical and performance advantages of the use of a **PC** rather than a dedicated **X** terminal are readily understood (local storage, off-line use of non-network applications, etc.)

Some of you are still not familiar with this powerful aspect of **X** and the **TNT** products. It is now possible to take the appropriate **MI/X** from the **V5.20 TNT**

products **CD** (no key needed) and use them on a Mac, Power Mac, **W95**, or **NT** platform (but not **W31**) for remote network operation if the network uses **TCP/IP** protocol which is now very common. Any Mac or **PC** anywhere on the network using the free **MI/X**, or some other commercial equivalent product to emulate an **X** terminal, can operate any **X** based application running on any other kind of computer platform on the network. Call this remotely functioning platform equipped with an authorization key a **TNT** compute server (more than one can exist on the same network). The **TNT** compute server on the network can be any Mac, **PC**, or workstation. Also remember that the **TNT** Project Files are transparent to the kind of platform and operating system which created them on the network. Thus they can be located on a local machine or some other published hard drive such as a file server and freely passed around and used by a **TNT** compute server on the network.

It is important to carefully note that because of the way **X** operates, only the graphics and control information are moved back and forth over the network between the local **MI/X** server or **X** terminal and the remote **TNT** compute server! Thus, performance of the **TNT** products from a remote Mac, **PC**, or dedicated **X** terminal is just the same as if you are sitting at the console or keyboard of the compute server, within the limits of the speed of the network. Should the network be ethernet, the performance at the remote Mac or **PC** would be similar to that experienced directly at the console of the **TNT** compute server with the key attached.

For example, when a 500 Mb Priroda image is accessed by the **TNT** display process on the compute server, this server reads and computes the needed image and sends it into the **X** window on the local **MI/X** screen. The huge Priroda raster object does not move out to the local machine for this abstraction and display. **X** handles all the input windows you create in its interface, sends them for processing to the compute server, and gets back the resulting graphics, and constructs the windows. This is a small amount of data transfer at ethernet rates. Similarly all other **GIS**, **IPS**, and related applications of **TNTmips** will also execute on the remote server and send back and forth only your input and the portion you see on the screen to your local Mac, **PC**, **X** terminal, or workstation.

Apple Mac and Power Mac 7.1x and 7.5x

Rereleased. The Mac and Power Mac (PMac) versions of the **TNT** products are rereleased for use with **MacOS 7.1x** and **7.5x**. All those who previously purchased earlier versions of the **TNT** products specifically for the Mac [e.g. products **M45** or **M50**] will be upgraded to use these new versions.

A simple standard installation process is available for the Mac and Power Mac versions of the **TNT** products. It is described in more detail below in the section on Installation.

New Authorization Key. A new and simpler hardware authorization key is available for use with Mac and Power Mac versions of the **TNT** products. This key looks like a 6" piece of cable with a slight bulge in it like a snake that has swallowed a mouse. It is placed in the Apple Developer Bus (**ADB**) line which runs from the Mac computer to the keyboard and mouse. It simply plugs in "in line" to the keyboard and is

forgotten about. Its distinct advantage is that it does not tie up one of the limited serial ports on the Mac computers. Its disadvantage is that it cannot be transferred to other kinds of computers for the alternate use of the **TNT** products on a **PC** or **UNIX**, since the **ADB** is strictly an Apple concept. Thus this new key is convenient, but restricts its owner to operating their **TNT** products on Mac and Power Mac computers. This is the key which will be shipped with all orders for the Mac or Power Mac versions of the **TNT** products due to its added convenience.

New X servers. These new **TNT** products are being shipped with the new Microlimages **X** servers (**MI/X**) for the Mac and Power Mac. These **MI/X** servers have been completely developed by Microlimages and are being placed in the public domain as these **MI/X** servers do not check the Microlimages hardware authorization key. This also means that they can be subsequently included and used to operate the Mac and Power Mac versions of the **TNTatlas** process on each **CD**. This was not previously possible as the price and license of the White Pine, Mac **X**, and other commercial **X** servers prevented their incorporation into an inexpensive, **CD** based distribution oriented licensed version (keyless version) of the **TNTatlas** product.

These **MI/X** servers replace the White Pine eXodus server that Microlimages previously purchased and supplied to clients with the Mac versions of the **TNT** products or the earlier Apple Mac **X** server which has not yet been released for the Power Mac. The **MI/X** versions for the Mac are also superior in performance, especially when operated locally, that is, when communicating with a **TNT** or other application process operating on the same Mac which is running the **MI/X**.

Remote Operation. It should also be emphasized again that both of these **MI/X** servers for the Mac can be used to run the **TNT** products remotely over an appropriate network. Some of you still may not be familiar with the remote versus local use of **X**, as it affects the **TNT** products in particular. The expanded network potential of the **TNT** products has no equivalent with other commercial products which use only the Microsoft Windows or Mac interfaces. These powerful aspects of the design of the **TNT** products were reviewed in the section above on the **MI/X** servers.

Interface Performance. The **TNT** products interface performance on the Mac is similar to that on a **PC** of comparable speed running under **W31**.

Memory Management. The **MacOS** is behind those of the workstations and **W31**, **NT**, and **W95** in memory management as it cannot dynamically reallocate memory for or between processes (**RAM** doubler for the Mac does it to some extent). Thus each application you start on a Mac must have a specific block of memory allocated to it. Mac users are already familiar with using the "Get Info" dialog box to reset the preferred and recommended memory sizes of an application that has somehow indicated that it has run out of memory, usually by not running.

Eventually Apple will improve Mac memory management so that at the very least a process which has been suspended can release its unused memory to another process. Also remember that **MacOS 7.5x** and **W31** give up control, if and when they feel like it, so that other tasks can run, a technique called cooperative multitasking. Thus **MI/X**, the window manager, and display are each separate **TNT**

applications functioning in this fashion under **W31** and **MacOS7.5x**. **UNIX**, **NT**, and **W95** all provide preemptive multitasking where they can interrupt the active task and switch to a new task at regular intervals grabbing available computing time as needed following automatic or controllable priorities.

Dynamic memory management and preemptive multitasking are the key technical improvements which Apple must now make in the **MacOS 8.x** (code-named Copeland) to continue to compete.

For the operation of any single application on the Mac the **TNT** products use three processes: 1) the **MI/X** server, 2) the window manager, and 3) the application such as Display2D. All these require fixed blocks of memory which have to be initially set up as defaults by Microworks' software engineers. **V5.20** of the **TNT** application processes have all been set to load in 5 Mb of memory each. The **MI/X** server has been set to default to use 4 Mb and the window manager to 2 Mb. With the use of a slim **MacOS** of 5 Mb all these will fit and **TNTmips** processes will routinely operate on a Mac with 16 Mb of total real memory. Two application processes will also run in 16 Mb but slower since you will be using virtual memory and not real memory. RAM doubler (see below) significantly increases the apparent amount of memory available to the processes and speeds the simultaneous use of 2 or more **TNT** processes and switching between them.

Unfortunately you have to be careful about managing memory on a Mac when running **TNT** processes. Unless you have more memory available than the common 16 Mb, you will need to keep the size of each **TNT** process to the minimum. However, Mac software in general and **TNTmips** processes specifically are not forgiving about running out of memory. Thus it may be necessary for you to use the Get Info tool to raise the amount of memory available for any given application process which is asking for it or failing to complete a complex operation. This is not a common occurrence, but Microworks has set the defaults of all application processes as low as possible, and under some circumstances, this default may be too low for a complex task.

Operational Performance. **V5.20** of the **TNT** products for the Macs are faster than the previous releases (about 3 times faster than **V5.10** on the same machine) due to the performance improvements provided by the introduction of Microworks' **MI/X** servers. The new Metroworks **C** CodeWarrior **7** was also used for this complete recompile of these new versions. It has also improved the performance of the **TNT** products and is required (\$400) for the use of the **TNTsdk** for the Mac and Power Mac platforms.

It is easy to judge the performance the **TNT** products (and most others) on any platform. Processor speed in Megahertz seems to continually come back as the controlling factor. This is why manufacturers work so hard to advance it! Of course, advanced or poor motherboard design, hard drives, memory setup, display boards, operating system memory and task management, etc. can increase or decrease the effective "Megahertz" performance of a specific processor. (see PC Magazine table - page 191 enclosed) However, the simplest rule of thumb for judging the performance of any software in general, and **TNT** products in particular, is to

compare them across Mac, **PC**, and workstation in terms of processor generation and speed. The **TNT** products are some of the few truly identical products compiled for all popular platforms without programming code modifications. The following logic is thus suggested by the performance of the **TNT** products for the Mac.

The Motorola 68030 and 68040 chips when used with an optional math coprocessor (the 68881 and 68882) provide Macs which are contemporary with the **PCs** based upon the Intel 386 and 486 chip with integrated math coprocessors (remember, the 386SX and 486SX omitted the math coprocessor). Thus a Quadra 700 rated at 25 Mhz runs **TNTmips 5.2** about the same as a **PC** using a 486DX at 25 Mhz. Similarly, a Quadra 800 using a 68030 rated at 33 Mhz runs **TNTmips 5.2** about the same as a **PC** using a 486DX at 33 Mhz.

The latest Power **PC** based Macs based upon the **PPC** 604 chip may be contemporaries of the Pentium, **P5**, or 586 based **PCs**. Macs using the Motorola **PPC** 601 were introduced a year and a half ago by Apple (and subsequently those using the **PPC** 603) with a lot of marketing hype claiming that they were twice as fast as the Pentium. Experience and testing by many has proved that this simply is not so Power Mac computers based upon the **PPC** 601 compare along similar Megahertz ratings with 486DX based **PC** computers. Thus a 100 Mhz **PPC**-based machine is similar in general to a 100 Mhz 486DX-based machine. Due to many factors such as Apple's rushing it out the earlier Power Macs to compete, 16-bit to 32-bit file **I/O**, no changes in the **MacOS** 7.5 from that used on the 68xxx, the earlier Power Mac 601-based machines function consistently slower than their contemporary Macs (e.g. Quadra 800, 840, and 950) which even operate at lower megahertz ratings.

As a general rule of thumb the **TNT** products provide the same performance on a Mac or Power Mac as a similarly configured **PC** with a comparable processor and megahertz rating. The **TNTmips** products will not be practical on any 68xxx based Mac which is earlier, and thus slower than a Quadra 700 (e.g. 68000 or 68020 based). The **TNT** products will not operate at all on an 68xxx based Mac which does not have a math coprocessor, which was optional on most 68xxx-based Performas and some Quodras. Performas based on the **PPC** chips automatically have this accelerated math processing.

MicrolImages as yet has been unable to measure the performance of the **TNT** products on a new fast Power Mac (like the 8500 or 9500). A Power Computing Power Mac clone is on order with a model 604 PPC chip of 132 Mhz. It is configured almost identically to our Gateway 133 Mhz Pentium machines running **W31**, **NT**, and **W95**. By the time you read this, MicrolImages will have installed and tested the performance of **TNTmips** on this high-performance Mac.

At COMDEX 95 all the popular display board manufacturers (Matrox, ATI, Cardinal, STB, etc.) were demonstrating Mac drivers for their accelerated PCI bus-based boards for the PC. These are the same inexpensive display boards (\$200 to \$300) with 2 Mb of display memory (some VRAM some DRAM) that you will be buying this year for the PC and will significantly accelerate the Mac's display at the same low costs. MicrolImages has just checked with several of these vendors in order to buy

sample boards to test. Unfortunately the Mac drivers shown at COMDEX were beta versions and not yet ready for shipment.

Another collection of more expensive (\$500 to \$2500) and higher-performance display boards (more colors and color depth) are available now for the Power Macs with a PCI bus. These boards all provide from 1,600 or 1,920 by 1,200 pixels and 16 to 24 bits of color resolution via 4 to 6 Mb of **VRAM**. They are reviewed in the article: Fast on the Draw, If you've just bought one of Apple's new Power Macs, consider getting one of these superfast graphics cards to go with it. by Henry Bortman. In MacUser, January 1996, pages 97 to 104. Tables summarizing the characteristics and prices of these display boards are enclosed.

The switch of the Mac to the **PCI** bus will bring great rewards by allowing **PC** board manufacturers to easily extend their newest board level products without hardware change to the Mac platform (e.g. accelerated display boards, fast **SCSI**, etc.). MicrowImages recommends against buying any new Apple Power Mac or clone which does not provide empty **PCI** bus slots as their absence will severely limit access to these new Mac add-on devices at their familiar, lower **PC** prices.

Speed Doubler. The performance of **V5.20** of the **TNT** products on the Mac and Power Mac may be improved by using the inexpensive Connectrix Speed Doubler product. The amount of improvement depends upon the particular Mac or Power Mac being used. Speed Doubler increases the speed of loading and execution. If you do not have this Speed Doubler auxiliary product, it should be tried with all your applications!

RAM Doubler. The performance of **V5.20** of the **TNT** products on the Mac and Power Mac can be improved by using the inexpensive Connectrix **RAM** Doubler product. **RAM** Doubler replaces the native **MacOS** virtual memory with a faster variety. However, it also packs the memory being used, similar to a disk doubler, and thereby effectively increases the apparent real memory available as well.

Summary. A lean **MacOS** requires 3 to 4 Mb when loaded. Remember with **MacOS 7.5** you can use the extensions manager to maintain various minimal skinny startup configurations even if you have to keep restarting to get to use each of them. When the **MI/X**, window manager and Display2D are all loaded they and the system just fit in 16 Mb. The **MacOS** does not provide dynamic memory allocation (**RAM** doubler does this to some extent). Thus MicrowImages has set both the fixed and suggested memory for each **TNT** process to 5 Mb (you can reset this memory allocation if required). It is thus clear that **TNTmips** requires a Mac or Power Mac with a minimum of 16 Mb of real memory to operate. You can then add **RAM** doubler to dynamically allocate and virtualize this real memory to support starting more than one major process. If you do not have this auxiliary **RAM** doubler product, it should be tried with all your applications!

Windows NT 3.51

The **X** server (**MI/X**) for Windows **NT** (Intel and Alpha) has been significantly modified as part of the preparation of an **MI/X** for **W95**. Both of these are true 32-bit operating systems with almost identical graphics libraries (**WIN32**). It has thus been

possible to create a single new 32-bit **MI/X** server which works with either **NT** or **W95**. This **MI/X** server is released with **V5.20** and significantly improves performance for the **NT** version of **TNTmips**. The windows user interface, and thus the **TNT** interface, for **NT** are slightly slower than when using **W95** due to **NT**'s additional overhead.

The single **MI/X** server for **NT** supports all color depths and resolutions supplied by your display board. If you have selected an 8-bit display driver, then **MI/X** senses and adjusts to this. If you have selected a 24-bit display driver, then **MI/X** operates in this mode. Thus you do not have to change **MI/X** servers if you change the display parameters used by **NT**.

NT is designed for installation in network environments with network cards installed. It has been difficult for those using **NT** on a **PC** without a network card to install **TNTmips**. This could be circumvented by installing **NT** so that it thinks that a network connection has been made (called the loopback modification). The new **MI/X** has been improved so that it no longer requires these special installation conditions. This has also resulted in improvements in the performance of the **X/Motif** interface in the **TNT** products for **NT**.

The revised **MI/X** for **NT**, just as its **V5.10** predecessor, does not check the **TNT** products authorization key and is thus in the public domain. Thus any **NT PC** can be set up to run **MI/X** without a key and used to operate via network a **TNTmips** which has been installed on some other computer (workstations, **PC**, or Mac under its operating system). Try this powerful **TNT** feature on your **NT** network.

MicrolImages is now able to recommend networks using **NT** on **PCs** as compute and/or file servers and remote lower cost **PC** client machines using **MI/X** with **NT** or **W95** (i.e. as **X** terminals).

IMPORTANT NOTICE: The **V5.20** of **TNT** products for **NT** on DEC Alpha stations is now updated to use **NT3.51**. As announced in the MicrolImages **MEMO** which accompanied the release of **V5.10** of the **TNT** products, Microsoft **NT3.1** (Intel or Alpha) is no longer supported by the **TNT** products or the MicrolImages software support engineers. Please invest the small amount of money needed to upgrade to Microsoft **NT3.51** to eliminate the defects in version **NT3.1**. Also be sure to apply all **NT3.51** patches to your **NT** system

Windows 95

A completely native **V5.20** of all **TNT** products is available for use with **W95**. Due to the similarities in **W95** and **NT**, no source code modifications were required. Microsoft **C++** was used to compile a single version of all the **TNT** products including **MI/X** for installation and use with either **W95** or **NT**! The only difference in the processes installed for **NT** or **W95** is the new installation process, since their user interfaces are different and support different standard installation procedures.

Recommending **W95**. MicrolImages recommends that the users of the **TNT** products under **W31** upgrade to **W95**. **W95** does not require more computer resources (drive space, memory, etc.) than you are currently using for **W31**. It has been stable for

the use of **TNTmips** both in emulation mode (**V5.10**) and in native mode (**V5.20**) both of which severely tax and test **W95**. The **TNTmips** user interface is significantly faster under **W95** than under **W31**. Microlimages has experienced no particular difficulty using other commercial **W31** software in the emulation mode under **W95** (Pagemaker, Word, etc.). **W95** has many of the standard network access features of **NT** built in. However, those who are still using older add-on equipment should proceed with caution and insure its operation (e.g. drivers) under **W95** or in a **W31** emulation mode (e.g. Trantor **SCSI** boards, **TARGA** video capture boards, older display boards, etc.).

Clients and Microlimages staff have been using the **W31** version of the **TNT** products with **W95** since its August release. No special errors have been reported by any of these users of **V5.10** which were related to the use of **W95** in the **W31** emulation mode. Several sites reported very slow operation of **TNTmips 5.1** in emulation mode under **W95**. In all cases this was traced to some **W95** setup error on that computer. All this speaks well for **W95** and **TNTmips**' robust design.

Running the **W31** version of **TNTmips 5.1** in emulation mode under **W95** was found to increase performance in some areas. For example, displaying all of the **TIGER** vector object for Solano County, **CA** with solid color lines was faster. On a Pentium 120 Mhz using **W31** without **SMARTDRV**, this display of the whole county directly from the San Francisco Atlas **CD** (quadspeed drive) takes about 5.5 minutes. With **SMARTDRV** set at 2 Mb, the same display takes 2.5 minutes. Using **V5.10** under **W95**, the same display takes 30 seconds. This Solano County, CA vector object is on the new **TNTatlas CD** if you wish to repeat this test. Similarly compound displays of several layers are faster under **W95**. Many features of **W95** account for such gains especially the much better built-in memory cache (no more **SMARTDRV**), the automatic virtual drive, the faster **CD** driver support, and so on.

During the past quarter Microlimages has set up many of its own Pentiums so that they have **W95**, **W31**, and **NT** all installed. Microlimages' staff can thus choose to boot up under any one of these 3 systems and use them equally well with our internal network. Consistently our development, documentation, and support staff now boot into **W95** and use that version of **TNTmips**. Why, because **W95** provides a better and faster interface which helps them get their **TNTmips** tasks done sooner. All those using **TNTmips** have machines with 16 Mb of memory and thus Microlimages recommends an immediate switch to **W95** from **W31**.

MI/X performance. A native **X** server (**MI/X**) for Windows **95** is now available in **V5.20**. Since both **W95** and **NT** are true 32-bit operating systems with almost identical graphics libraries (**WIN32**) a single **MI/X** server is now used with both these **TNT** products. This new **MI/X** for **W95** server significantly improves performance for the **W95** version of **TNTmips** over your previous use in **V5.10** of the **MI/X** for **W31**. This is due in part to the fact that the new "native" **MI/X** for **W95** server operates only in 32-bit mode with **W95**. The **W31** server constantly switches between 32-bit **TNT** applications and a 16-bit mode in order to communicate with the 16-bit operation of **W31** and **DOS**.

MicrolImages has frequently pointed out that you have always been running 32-bit applications in **TNTmips** (classification, vector display, etc.) since you started. The use of 32-bit compilers and processes was incorporated into the **TNT** products from the onset over 3 years ago. As a result there are no direct numeric computation improvements in **TNT** processes when used under **NT** or **W95**. The improvements associated with using **W95** are in the user interface performance, **CD-ROM** drivers, improved and automatic virtual memory, improved memory management and protection, better buffering, and so on.

The single **MI/X** server for **W95** supports all color depth and resolutions supplied by your display board. If you have selected an 8-bit display driver, then **MI/X** senses and adjusts to this. If you have selected a 24-bit display driver, then **MI/X** operates in this mode. Thus you do not have to change **MI/X** servers if you change the driver used within **W95**.

How fast is the new **W95 X** server? It compares favorably with the operation of normal **W95** interface on the same machine. On a Pentium with a modern display board it provides an **X** interface which is just as fast as a workstation. File lists scroll far more rapidly than you can read them. Windows move almost instantly. Text in dialog boxes flash into place. It now requires about 2/3 the time to start or load to the main menu bar in the **W95** version of **TNTmips 5.2** compared to using **W31** (about 9 seconds on a Pentium 120 Mhz to start **TNTmips 5.2** in **W95**).

The **MI/X** server for **W95** does not check the **TNT** products authorization key and is in the public domain. **W95** also has built-in network support when used with a **PC** server equipped with **NT**. Thus any suitable **W95 PC** can be set up to run **MI/X** without a key and used to operate via network a **TNTmips** which has been installed on some other computer (workstations, **PC**, or Mac under its operating system). Just try this powerful feature unless you are already familiar with how **X** terminals work on **UNIX** based workstations. MicrolImages is now able to recommend network (LAN) setups which use **W95** on **PCs** to operate as **X** terminals to manipulate **TNTmips** and other software on other compute servers (workstations, **PCs**, or Macs).

IMPORTANT NOTICE: Please note that, as has been the case with the **NT** versions of the **TNT** products, the **W95** version will run only with new gray hardware authorization keys or the red, green, or blue universal serial keys. The older black keys which still may be used with the **W31** systems are not useable with **W95** and must be returned to MicrolImages for an exchange which costs \$50 plus return shipping.

Installation

Completely new installation processes are provided for **V5.20** of the **TNT** products for use with the Mac and Power Mac and **NT** and **W95**. Those for use with the Macs use the standard Apple process and are slow. Those for use with **NT** and **W95** also follow the standard Microsoft procedures and thus now install very similarly to those provided for use with **TNTmips 5.1** for the **W31** version only. The **W31**, **NT**, and **W95** installation procedures are now very fast. This makes it quite easy to

temporarily install your key and **TNT** products on some other computer in your office, add the software to a portable, demonstrate the ease of use of **TNTview** or **TNTatlas** at a client site, remove a workstation key for temporary trial on a **PC**, and so on. Installations for use on the various workstation platforms remain about the same and use their respective scripts provided on the **TNT** products **CDs**.

* Faster / simpler installations.

Details on these new installation procedures are presented below. Sample installation times are as follows (all times are in minutes). **TNTview** and **TNTatlas** were installed “over the top” of **TNTmips** and shared components. They would take a little longer if installed independently.

	for W31 §	for NT §	for W95 §	for Power Mac§§
TNTmips 5.22:54	4:00	2:50	38:	for all
TNTview 5.2 :18	:12	:18		
TNTatlas 5.2 :15	:15	:15		
Illustrations	4:40	2:00	2:26	

§ used a standard Gateway Pentium 120 Mhz (16 Mb and quad speed **CD**)

§§ used a standard Power Mac at 60 Mhz (16 Mb and dual speed **CD**)

TNT products used on a **PC** via **W31**, **NT** , or **W95** no longer require or make any modifications in your **AUTOEXEC.BAT** or **CONFIG.SYS** files. The need for the **TNTPATH** in your **AUTOEXEC.BAT** has been eliminated. This will simplify the installation of the **TNT** products for new clients. It also avoids some confusion for existing clients. However, those clients who already have **V5.10** or earlier installed will have had this now unnecessary path inserted into the **AUTOEXEC.BAT** files by the earlier installation program. This **TNTPATH** can now be deleted from your **AUTOEXEC.BAT**. Specific instructions are noted below advising how to remove this previous modification. Clients using **UNIX** variants are not affected by this change.

* Installation via networks.

Those using **W31**, **NT**, and **W95** can make easy “over the network” installations via **NT**, **NFS**, or almost any other network software. This is very convenient for client sites with system managers with a network upon which there are multiple local **TNT** clients. Simply place **CD “A”** for **V5.20** of the **TNT** products on the **CD-ROM** drive of the network server or any other platform accessible from all needed locations. From the local client **PC** or on the network server select this **CD-ROM** drive and start the appropriate **SETUP_xx.EXE** process directly from the **CD**. The installation process for the **W31**, **NT**, and/or **W95** versions will request the full path to **CD “A”** if the appropriate directories are not automatically found where the **SETUP** process expects them to be. Next simply supply the full network/drive path to the directory where the installation will be made and it will be completed over the network onto the machine designated. If you have a number of local machines to upgrade you can speed up this approach by first copying the contents of the appropriate **W31**, **NT**, and/or **W95** directories from the **CD “A”** onto any “published” hard drive on the network.

W31 Installation.

An improved standard **W31** SETUP process is available to install the **TNT** products on the **W31** platform. Simply use RUN from the "File" menu in the Program Manager and select the SETUP_31.EXE program in the root directory on **CD "A"**. Then follow the instructions in the dialog boxes which lead you step by step through the installation of all the **TNT** products. The installation process will set up a **Tnt_31** folder on the hard drive you designate and copy all the **TNT** processes, fonts, illustrations, etc. into this and appropriate subfolders. Upon completion you will also find that this new installation process has created and opened a **TNT products** program group on your desktop that contains three new and distinct **TNT** product icons. Mousing the new icon for **TNTmips**, **TNTview**, or **TNTatlas** will immediately launch that application.

A **TNTPATH** is no longer needed in your AUTOEXEC.BAT. You should clean up your AUTOEXEC.BAT file by editing it to delete the line looking like this: SET **TNTPATH=C:\TNT**. This line was inserted into your AUTOEXEC.BAT during the installation of all previous versions of the **TNT** products. Also remove the directory which was previously created when installing **V5.10** or any earlier version of the **TNT** products and which is designated by the **TNTPATH** statement in AUTOEXEC.BAT.

* **NT** Installation.

A new, separate **NT** standard SETUP process is available to install the **TNT** products on the **NT** Intel and **NT** Alpha platforms. They operate identically to the installation process provided for **W31**. Simply use RUN from the "File" menu in the Program Manager and select the Setup_nt.exe (for **NT** on an Intel platform) or Setup_al.exe (for **NT** on a DEC Alpha platform) program in the root directory on **CD "A"**. Then follow the instructions in the dialog boxes which lead you step by step through the installation of all the **TNT** products. The installation process will set up a **Tnt_nt** folder on the hard drive you designate and copy all the **TNT** processes, fonts, illustrations, etc. into this and appropriate subfolders. Upon completion you will also find that this new installation process has created and opened a **TNT products** program group on your desktop that contains three new and distinct **TNT** product icons. Mousing the new icon for **TNTmips**, **TNTview**, or **TNTatlas** will immediately launch that application.

* **W95** Installation.

The new standard **W95** installation process is even simpler than those provided for **W31** and **NT**. It uses improved and simpler procedures enabled by new installation support features in **W95**. When you insert your **CD "A"** into the **PC** a **TNT** products icon labeled **Tnt_v520_a** will appear on your main window and the setup folder will be opened. Mouse the icon labeled **Setup_95.exe**. This will automatically establish a **Tnt_95** directory on the hard drive you designate and lead you step by step through the installation of all the **TNT** products. Upon completion you will find that this installation process has opened a **TNT products** folder on your desktop which contains three new and distinct **TNT** product icons. Mousing the new icon for **TNTmips**, **TNTview**, or **TNTatlas** will immediately launch that application.

* **MacOS** Installation.

A new process is provided for the installation of the **TNT** products on the Mac and Power Mac platforms using **MacOS 7.1x** and **7.5x**. Insert your **CD "A"** into the Mac drive. Also insert the special installation floppy disk into the Mac. Then locate the **TNT install** icon on the floppy drive and mouse it to start the normal Mac installer. Simply follow the instructions in the dialog box provided. Upon completion you will find that the Mac installation process has created a **TNT products 5.2** folder where you specified. All the **TNT** products are placed in this folder into a subfolder named **TNT files**. Do not move any of these components out of this **TNT files** folder as this is where the system expects to find them. You will also find in the **TNT products 5.2** folder the three new and distinct **TNT** product icons. Mousing the new icon for **TNTmips**, **TNTview**, or **TNTatlas** will immediately launch that application.

Floppy Disk. The use of an auxiliary floppy disk for the **V5.20** Mac and Power installation processes is an exception to the normal self contained **TNT CD** based procedures for all other platforms. There was insufficient time this quarter to work out the procedures to get an Apple installation process to execute off the generic **CD "A"**. These procedures will be resolved for the release of **V5.30**. In the meantime, simply use the installation on the floppy provided to all those with the Mac and Power Mac versions of **TNTmips**.

Any other client who wishes to install and try these Mac and Power Mac versions with their key can simply contact Microlimages or a Representative or Reseller to receive a copy of the Apple installation disk. The installation of the Mac versions by those using a **PC** requires that you already have a serial key (red, green, or blue) at the level **D50** or higher. All those with serial keys on workstations can also make this installation.

Faster Installation and Loading. Installation on a Mac computer can be slow compared to that on a **W31**, **NT**, or **W95** platform. Microlimages uses the standard installation program provided by Apple and which you already use for most other software products you install. This Apple process seems like it was designed a couple of years ago for the installation of smaller products from 5 or 10 floppy disks, and not for Microsoft Office or **TNTmips 5.2** from **CD-ROMs**. Their approach first loads as much as it can from floppy disks (all for a few floppies) to memory or temporary drive space, then assembles it, then writes it to the hard drive. All this causes very degraded access to the **CD**. This program is very slow in creating and copying many small files such as the more than 1000 illustrations for the on-line documentation. This appears to be due to the poor buffering used by this program when accessing a **CD-ROM**.

Experimentation at Microlimages has shown that the installation of the **TNT** products on a Mac or Power Mac can vary over a range of 3 to 1 depending upon how many extensions you have active during installation. For example, under the best conditions with the minimum of number extensions active it takes 13 to 15 minutes to install all the **TNT** processes from a dual speed **CD** to a hard drive on a Power Mac 6100. It can take over an hour with the normal flock of extensions installed as is usual with a Mac.

Installation of the **TNT** products will take about 1/3 the time if only the needed extensions are loaded which include only Apple CD-ROM and Foreign File Access options. If you have Speed Doubler then also load the extensions: Speed Access, Speed Copy, and Speed Emulator. Do not use High Sierra! Since it is one of the drivers which can be used by Foreign File Access, and not an independent extension, it must literally be removed from the Extensions folder. On a Mac or Power Mac you will normally have many more extensions turned on which will significantly slow down the installation of any software.

Tests also show that having many unused extensions loaded will slow down the startup or load times of each **TNT** process and other commercial software by up to 20%. Why this occurs requires further investigation as it is not yet known whether it is due to a specific extension or simply due to the total number of extensions loaded.

How slow is slow? If you follow all the advice above it will take less than 40 minutes to install **TNTmips** (11 minutes), **TNTview** (2.5 minutes), **TNTatlas** (2.5 minutes), the on-line documentation, and the illustrations on a standard Power Mac model 6100 (16 Mb memory and dual speed **CD**). If you simply go ahead and install with all extensions on etc. it may take 150 minutes for the same installation. This compares with 6 to 7 minutes to install all the same products and illustrations within **W31**, **NT**, or **W95**. Unfortunately, at present Microlimages can see little that can be done about this disparity between platform types until Apple provides a new standard installation process oriented toward **CDs**.

Apple Installation Error. There is an error present in Apple's Mac standard installation program which will affect the installation of the **TNT** products and others. If you want to install on any hard drive other than the one containing the system, then an "error of type 1" will occur when mouse the "Destination Folder". This error can be avoided by going to the Control Panel for General Controls. In the lower right Documents box select either of the two choices other than the Documents folder. The three choices in this box determine the default locations for your Save As... actions: 1) Folder containing the application; 2) Last folder used in application (the obvious choice); or 3) Documents folder. Unfortunately this stupid Documents folder is the default set in this Documents box by the installation of the **MacOS 7.5x** system and will thus error in any attempt to install on a non-system (e.g. second) hard drive until changed.

UNIX Installations.

The Installation procedures for **UNIX** based workstations remain the same as in **V5.10**. These scripts used to install **UNIX** workstations already follow the standard installation procedures on these platforms and continue to require only incremental changes to improve them.

Installed Sizes. Loading a full installation of **TNTmips 5.2** onto your hard drive (exclusive of illustrations) requires the following storage space in megabytes. The illustrations will add another 22 Mb to these values.

PC using W31	90
PC using W95	110
PC using NT (Intel)	110

DEC using NT (Alpha)	107
Mac using MacOS 7.1 (680xx)	64
Power Mac using MacOS 7.5 (PPC 60x)	74
Hewlett Packard workstation using HPUX	100
SGI workstation using IRIX	126
Sun workstation using Solaris 1.x	91
Sun workstation using Solaris 2.x	82
DEC workstation using OSF/1	139

V5.20 of the **TNT** products for the **DEC** Ultrix, Data General Aviiion, and **IBM** RS/6000 platforms are available upon special request for which a special CD will be produced.

Upgrading.

If you did not order **TNTmips 5.2**, and wish to do so now, please contact MicroImages by **FAX**, phone, or email to arrange to purchase your quarterly upgrade to **V5.20**. Upon receipt of your order, MicroImages will immediately supply you with an authorization code by return FAX. Entering this code when running the installation process will allow you to complete the installation and immediately start to use **TNTmips 5.2** and the other **TNT** products.

If you do not have an annual subscription to **TNTmips**, you can purchase **V5.20** under the elective upgrade plan at the cost in the table below. Please remember that new features have been added to **TNTmips** with each quarter. Thus, the more quarters you are behind **V5.20**, the higher your upgrade cost, up to a fixed limit. Upgrades from all previous versions of **MIPS** and **TNTmips 4.7** or earlier are the same, fixed cost shown below. As usual, there is no special additional charge for the upgrade of your special peripheral support features, **TNTlink**, or **TNTsdk** which you may have added to your basic **TNTmips** system.

Within the **NAFTA** reselling area (Canada, U.S., and Mexico):

<u>Product Code</u>	<u>Price to upgrade from TNTmips:</u>				<u>MIPS: V5.10</u>	
	V5.00	V4.90	V4.80	V4.70	any version	
D30 to D60 (CDs)	\$250	450	600	700	750	750
D80	\$375	675	900	1050	1125	1125
M50 (replaced U45)	\$250	450	600	700	750	750
U100	\$450	800	1000	1200	1300	
U200	\$780	1400	1875	2200	2350	
U300	\$1030	1850	2475	2900	3100	

For all other nations:

<u>Product Code</u>	<u>Price to upgrade from TNTmips:</u>				<u>MIPS: V5.10</u>	
	V5.00	V4.90	V4.80	V4.70	any version	
D30 to D60 (CDs)	\$300	560	750	875	940	940
D80	\$425	800	1050	1225	1300	1300
M50 (replaces U45)	\$300	560	750	875	940	940
U100	\$500	850	1050	1250	1350	

U200	\$830	1450	1925	2250	2400
U300	\$1080	1900	2525	2950	3150

M50 is the new product code for the Apple Macintosh **MacOS 7.1x** and **7.5x** versions and replaces their older designation as **U45** for the Mac using **AUX**.

TNTsdk® 5.2 for TNTmips 5.2

TNTsdk can now be easily installed on **W31**, **W95**, **NT**, and **MacOS 7.1x** and **7.5x** based platforms using the new installation process described above.

TIN toolkit.

A new suite of library functions is available for the creation, manipulation, and editing of **TIN** objects. These new functions have been the basis for additions to the **TNT** object editor to add new nodes and lines to **TIN** structure and provide a number of different methods for element deletion within **TIN** structure such as: node, triangle, and edge deletion with or without filling remaining areas with new triangles. These interactive editing features allow the creation of multiple-hull structures with one **TIN** object to define lakes and islands. All functions which operate on **TIN** objects automatically ensure topological integrity of the **TIN** model.

Compilers used.

The **TNTsdk** for **W95** uses the Microsoft Visual **C++ V2.2** sold for use with the **W95** operating system. This is the same Microsoft compiler that has been used for the previous releases of the **TNT** products for use with the **NT**. Those planning to use the **TNTsdk** will need to use this version to compile a native application for both the **W95** and **NT** platforms. Watcom **C V9.0**, **9.5**, or **10.0** will continue to be the compiler used with the **W31** versions of the **TNT** products and is still required for the use of **TNTsdk**. Remember that while **TNTsdk** lets you create portable source code for use on each platform, you must compile that code using the specific compiler required for each platform.

The Mac and Power Mac versions of the **TNT** products are compiled with Metrowerks Code Warrior **7 C++**. This single compiler can be used to compile native 16-bit applications on a Mac or native 32-bit applications on a Power Mac. Those planning to use the **TNTsdk** will need to use this **C** to compile native applications for Mac platforms.

TNTview™ 5.2

The new features available in **TNTview** mirror exactly the new features described below for the **TNTmips** display process (e.g. transparency, object icons, etc.). It has been decided by MicroImages that the following additional features available in **TNTmips** will also be made available in **TNTview**, probably with the release of **V5.30** of the **TNT** products.

Import and Hot Linking. **TNTview** clients will be able to use any raster, vector, **CAD**, **TIN**, and database import or hot linking process available in **TNTmips**. **TNTview** clients will not be able to use any export process as it is not the function of **TNTview** to assist in preparing data for use in some other competing system. The inclusion of

flexible and varied import processes previously available only in **TNTmips** allows a wide variety of other commercial data sets to be imported and used as layers in the advanced spatial visualization processes in **TNTview**. The growing list of formats which can be linked to allow **TNTview** to immediately, directly, and uniquely use as layers the datasets created by other systems, even over networks. This modification to **TNTview** is not a major change and will be available during the next quarter for those eager to try it early.

SML support. It is being debated at MicroImages whether to allow **TNTview** users to use **SML** scripts developed within **TNTmips**.

Color Printing. As has been noted in a previous **MEMO**, a limited color printing capability is to be provided in **TNTmips**, **TNTview**, and **TNTAtlas**, possibly within **V5.30**. A high priority for **V5.30** is the support of the Microsoft Windows generic printer drivers used with **W31**, **NT**, and **W95**. When these drivers are available in the **TNT** products, together with the existing Postscript capabilities, most color printers will be useable by **TNTmips**. The limitation on the new, no-cost color printing features to be incorporated into all **TNT** products will be that only what can be displayed on the screen can be printed. Larger format map and poster products will still be controlled by the optional printer support feature extensions and restricted to **TNTmips**.

Installation. **TNTview** can now be easily independently installed on **W31**, **NT**, **W95**, and the **MacOS 7.1x** and **7.5x** based systems using the same simple new installation procedure provided for use in **TNTmips 5.2**. With your **TNTmips** or **TNTview** authorization key attached, simply select to install **TNTview** from the appropriate product list presented by the appropriate installation process.

TNTAtlas™ 5.2

TNTAtlas can now be easily independently installed on **W31**, **NT**, **W95**, and the **MacOS 7.1x** and **7.5x** based systems using the same simple new installation procedure provided for use in **TNTmips 5.2**. With your **TNTmips**, **TNTview**, or **TNTAtlas** authorization key attached, simply select to install **TNTAtlas** from the appropriate product list presented by the appropriate installation process.

TNTAtlas™ sampler of San Francisco

Your new *Prototype2* San Francisco **TNTAtlas** and its simple installation reference card is enclosed. This sampler is still considered a work in progress. Not just for the software, but how one designs an atlas, which is analogous to designing a home page on the World Wide Web. When preparing a **TNTAtlas**, you end up being a producer of a multimedia product, but one designed specifically to support the needs and interests of the potential users of the geographic and related image materials it contains.

The new atlas is simpler to install on all platforms. It contains more artistic and attractive index screens. It is also much faster in the display of large raster data, since the large rasters it contains are pyramided and tiled. On a Pentium 120 or 133 Mhz using **W95** it takes only 3 or 4 seconds to display any portion of the single band

images on this sampler from a quad speed CD drive. Rasters now display so fast that the display of vector objects seems slow by comparison and thus vector display is the focus of thought on how it might be improved.

Prototype2 still lacks the **TNTatlas** software to operate it on the Mac and Power Mac platforms. MicroImages now has its own **X** server for the Mac which can be included on the *Prototype3* sampler **CD**. However, as has been pointed out earlier, the process for the direct installation of the **TNT** products from a **CD** using a program also on the same **CD** has not yet been perfected by MicroImages.

The new color image on *Prototype2* of the label of San Francisco **TNTatlas CD** is well known to all who have visited San Francisco as the Golden Gate bridge which occurs in many of the objects. Unfortunately the color San Francisco Bridge image on this **CD** is pale and washed out due to a MicroImages error in the form that the image file was transferred to the **CD** at the duplication plant.

No manualette is available for *Prototype2*. It may not be needed except perhaps in the operation of special tools (e.g., measurements).

REMINDER. Pizzazz Plus and many other products can print any color screen which you save to the clipboard at any point during the operation of this sample **TNTatlas**. Alternately you can use the ALT and then the PRINTSCRN keys to copy the screen to the windows clipboard and subsequently paste the contents of the clipboard into any paint program for Windows (works even better under **W95** than **W31** or **NT**)

TNTdemo™ 5.2

The **TNTdemo** for the unlimited use of all the **TNT** products for 30 days can now also be used with the Apple Mac and Power Mac and **W95** platforms. The standard "A" and "B" **CDs** used to release **V5.20** of the **TNT** products now contain these new products for use via **TNTdemo**.

PRICE CHANGE. A minor but significant change is made in the cost of the **TNTdemo**. Previously the \$200 prepaid charge was only refunded if the end client purchased a **TNT** product and returned the **TNTdemo** authorization key. Now the return of the key will be all that is necessary to receive the \$200 refund check (but not the shipping charge) - there is no requirement to subsequently purchase a **TNT** product to receive the refund. Nothing else is changed in the **TNTdemo** program except for this guaranteed refund when the authorization key is returned for reuse. The promotional paperwork for this product will not be changed at present to reflect this small but important change.

This policy change will be of most benefit to those potential clients who wish to try the **TNT** products. Often those working for larger organizations have difficulty in convincing their superiors to commit to the \$200 as it is seen as a commitment to ultimately purchase. This change makes it less committal to try **TNTmips** and easier to find the dollars (even in one's own pocket) since it will eventually be refunded.

The change will be of even greater benefit to Representatives and Resellers who can now pay the \$200 on behalf of a potential client (bottom one half of the order

form). After the **TNTdemo** 30 day period is over the \$200 can then be recouped by the return of the authorization key to MicrolImages. It will still be required that the prospective client complete (or the Rep/Reseller complete for them) the order form and that the client signs the order form acknowledging that they understand the terms of use of the **TNTdemo** package.

On-Line Documentation

Effort continues at a good pace to catch the on-line documentation up with the changes in the interface of **TNTmips**. Initial draft documentation is available for all the new processes released in **V5.20** and the Ortho/**DEM** process which was not documented in **V5.10**. The size of the printed version has increased to 2068 single spaced pages plus the 75 supplemental pages on new processes.

Four last minute documentation sections were completed for **V5.20** after the master **CDs** were created for the reproduction process. These 79 additional pages are included in supplemental, printed form as follows.

- Manipulating Database Information in 2D Display (12 pages)
- Create and Edit Tin Objects in Object Editor (13 pages)
- Stereoscopic Modeling (34 pages)
- Kriging (16 pages)

Tutorial

Two MicrolImages U.S. Resellers have now prepared a tutorial for **TNTmips** which can be purchased separately from them. A sample lesson reproduced from this tutorial together with information on how to order it from them is enclosed. It is designed to assist in the teaching of undergraduates and advanced high school students in the use of **TNTmips** for spatial analysis in 26 lessons. This tutorial is also useful for other professionals just getting started with **TNTmips** without any formal **TNTmips** training.

New TNTmips Application Features

- * Paragraphs or main sections preceded by this symbol "*" introduce significant new processes, or features in existing processes, which are released for the first time in **TNTmips 5.2**.

System Level.

- * When defining the moveable ToolBars the user may now specify the command to be executed. This allows the easy addition of non-**TNT** processes to the **TNTmips** Toolbars.

- * TrueType fonts can now be directly selected and used for text in any **TNT** process and product. The new MicrolImages internationalized TrueType font rendering engine makes this possible. This rendering engine is used within all the **TNT** products on every platform (Macs, **PCs**, and workstations). Simply copy your favorite 1- or 2-byte TrueType fonts to your fonts subdirectory, and they will be immediately available for selection by name from within **TNTmips**. Alternatively, if the font(s) is already located somewhere on your system for use with other software, simply

locate it for the **TNT** product the first time you wish to use it. The older bird or outline fonts provided with each **TNTmips** can also still be selected.

The separate **TIN** profile process no longer exists. Support for **TIN** profiling has been added to Measurement tools in Display **2D** where there is one integrated process showing profiles of raster and **TIN** objects and layers. Showing profiles for **TIN** objects previously allowed only the use of straight lines. The modified measurement tools version displays profiles of any shape available including circular and polyline shaped tools. There is also a new option on "Profile View" dialog that allows saving the profile in the text file including x, y coordinates, cumulative distance, and z-value.

User Interface.

* Fixed Toolbars. The fixed Toolbars introduced with **V5.00** with 16 by 16 pixel small push button icons and associated ToolTips have been added to additional processes. Among them are new, symbolic icons representing generic raster, vector, **CAD**, **TIN**, text, and database objects. The most obvious place these are used is for 3 toolbars in the Display window where they help you select the object type to be used. For example, in the layer subsection mouse the raster icon if you wish to select a raster object as your layer. These small generic object icons are also incorporated as part of larger 32 by 32 pixel icons. For example a 32 by 32 pixel icon showing a vector object icon in the upper left corner and a raster icon in the lower left is used to represent the vector to raster conversion process.

There are now a total of 138 of the 16 by 16 pixel small icons in **TNTmips 5.2** (increased from 115 in **V5.10**). A 3 page reference chart of the **V5.20** small icons is attached to this MEMO. The small icons which are newly introduced with **V5.20** are specifically indicated. These icons can also be directly viewed with a more expanded description in Appendix 2 of the on-line documentation

Custom Toolbars. Large Icons can now be placed on any moveable toolbar to initiate direct export of rasters to each external format (**ERDAS**, **PCI**, **TIFF**, etc.). You will also find an expanding collection of large icons available to represent the import, export, linking, conversion, and copying of objects. Three pages of color illustrations of these icons and their uses are attached for your quick review. Wherever possible the design of the icon contains the icon of the other commercial products and the action to be taken. For example a 32 by 32 pixel icon representing the import of a **DXF** file is made up of a 16 by 16 pixel Auto**CAD** logo icon and a 16 by 16 pixel icon representing a generic **TNT CAD** object with a curved arrow to represent importing. Similarly the same icon composition with a link would represent performing a hot link from a **CAD** object to a **DXF** file and so on for copying and exporting using related symbolism.

* Hot Link to AutoCAD *.DXF.

It is no longer necessary to import a *.**DXF** file in **TNTmips**. Simply establish a hot link to incorporate the *.**DXF** file as a **CAD** object in any Project File. Every process which opens and reads this **CAD** object from that Project File will function just as if the linked object had been imported. So far hot links have been established for most

raster formats and the **MIF/MID** and **DXF CAD** formats. The next hot link added will be to a topological vector object, probably the **USGS *.DLG** format.

2D Viewing.

* The polygons displayed from a vector object can now be displayed with transparent color fills. The style settings of the polygon designate the solid color fill for the polygon and the transparency level of it. However, the designed transparency level of all polygons can be toggled on and off at the actual time of display by using the transparency effects toggle button on the Options menu in the Display **2D** process. For example, if the polygons are the only layer displayed then set the toggle to display them as solid. Alternately, if the same polygons are displayed as a layer over a raster then make them transparent. A color print illustrating the use of such transparent fills is attached to this MEMO.

* Small icons have been added to the main control window for commonly used operations. These operations include opening, saving, and printing layouts, adding, removing, raising, lowering, hiding, unhiding layers and groups and creating various layer types.

A layer which has been previously hidden is now indicated in the layer list by a minus (-) sign preceding the layer name.

The display of a vector layer now allows the selection and display of “enhanced” text for labels in addition to the other available modes (italics, bold, outline, ...). The enhanced text mode allow the use of a 2-color character rendering. This provides a character outline in one color while the interior of the character is filled with a separate color. This enhanced kind of color text insures that the letters will show up on a complex color image background.

* Line patterns can now be designed to have either flat and rounded ends for continuous or dashed lines.

The Raster Correlation window now allows the display of any “line” for which an equation will also be shown.

The tool for examining the values in individual raster cells now also allows manual editing of the values in the cells. This feature is now also available for all data types.

The Map Coordinates display now allows all available distance units. Previously only feet and meter units could be displayed.

Color maps may now be saved for binary raster objects. This avoids complications when other processes subsequently use such raster objects and use their color map subobjects.

*** Pin Mapping.**

Pin mapping can now move an existing pin to a new location, change its style, and all other characteristics controlled by its attributes. With Examine Attributes selected you are shown the single record display for any pin you select. Now simply select and edit any field in this record. For example, enter a new X and Y value. Your next action such as selecting a new pin to edit, closing the table, selecting a new tool, etc. will show the pin in its new location. Another useful edit would be to simply edit in a new style for the pin.

A new pin can be added to an existing pin map display layer. Choose the New Record menu option. Then fill out the attribute fields for that pin's style, location, and other desired fields. Your next action such as selecting a new pin to edit, closing the table, selecting a new tool, etc. will show the pin in its new location.

The labels used in pin mapping can now be more intuitively created when using queries by simply using the print() or printf() query commands instead of creating a "Label\$" string.

Point Symbols.

* A collection of 472 pre-made point symbols is now available. Two color pages are attached displaying the contents of this collection. Since some parts of some of the symbols are white they have been displayed on these pages as legends over a blue background using Map and Poster Layout.

Each group of related symbols on the attached charts (circles, diamonds, etc.) is a style object. The individual names next to each symbol on the prints are the style name and also the symbol name. If you want to select one of these symbols simply select this name. Since it is also the style name, you can also use a query to assign this drawing style.

This symbol collection was completed at the last minute when the packing and shipping operation for **V5.20** were underway. Thus, you will need to make a special effort to obtain the symbols for use this quarter. If you want this supplemental symbol set please request a new STDSTYLE.RVC (standard symbol set) from MicroImages' Software Support and it will be airmailed to you on a floppy. It can also be downloaded via **FTP** from ftp.microimages.com. After you have this new symbols file delete the STDSTYLE.RVC you currently have installed (dated 18 May 95 or earlier) and copy the new file of the same name to the same location. However, be careful if you have created your own point, line or polygon styles and inadvertently saved them into the existing STDSTYLE.RVC. Please note that you should be storing any styles you create in a separate *.RVC file (e.g., MY_STYLE.RVC) otherwise each time a new version of **TNTmips** is installed you will lose the special styles you have created.

Video Digitizing.

The automatic interval capture (intervalometer) feature available in **DOS MIPS** has been implemented for **TNTmips**.

You will also find information enclosed on the "SNAPPY" video capture device which can be attached to a parallel port (but not to the **TNT** key!). This \$200 device is available at most discount computer stores such as Best Buy and quite effectively replaces any need for the expensive, messy Truevision **TARGA** boards in airvideo and other video applications. It is supplied with a **TWAIN** driver and thus it is anticipated that this new device will be directly supported by **V5.30** for video capture in much the same fashion as the **TARGA** display boards.

Georeferencing.

An option has been added to create a simple affine georeference for rasters based upon the selection of a specific corner and the entry of a cell size. This information is often available for rasters which are imported from public-domain datasets.

Combine Rasters.

This process and its interface have been rewritten to current standards. It is now easier to select and enter parameters, defaults are retained, etc.

Importing Rasters.

The MicroBrian raster format can now be imported or linked to.

The georeference material which accompanies the ER-Mapper format is now imported into a georeference subobject if the map projection is selected from the list provided.

An option has been added so that during import of **TIFF** files the red and blue bands can be swapped. Service bureaus and other software products cannot seem to agree on whether the correct order is **RGB** or **BGR**.

*** Exporting Rasters.**

The process to export raster objects was rewritten to support the use of individual export options via the large icons on toolbars. Multi-object selection is now available for all export formats.

Raster objects can now be exported to the ER-Mapper raster format but the georeference and map projection information will be left behind. ER-Mapper has a documented, but unusual way of storing this auxiliary information.

MicroBrian's raster format (***.IMG**) can now be exported.

Raster objects can now be exported to the publicly documented MicroImages' Generic Georeferenced Format (**GGR** format). This format was first released and documented for import and linking for clients who were writing software or designing data collection systems to collect georeferenced rasters with additional unspecified ancillary or header data requirements. There have been many requests to provide an export to this same format for use in connection with SML scripts, to take out georeferenced rasters for use in external software, and so on.

Surface Fitting.

An option has been added to show the coefficients for the fit of a polynomial surface.

*** Surface Fitting by Kriging.** *(a work in progress)*

What is it? A complete new surface fitting process has been added which uses kriging to generate a raster object for the points extracted from a objects and it's attributes by a query. Kriging is an estimation process named after D.G. Krige, a South African mining engineer and pioneer in the application of statistical methods to mine evaluation. Krige developed his approach with several very important properties that made it invaluable for processing his geophysical observations. Subsequently the methods expanded widely for surface estimation in geophysics and computational geology.

Many surface fitting approaches are deliberately designed to smooth out irregularities in the surface. For example, a polynomial surface is fit to a sampling of points known to be error prone, but also known to represent a smooth surface without discontinuities, such as the lens distortion of an airphoto. One important property of a surface derived by kriging is that it tries to preserve or even highlight

the local characteristics (e.g. faults and other discontinuities) of the surface being estimated. How and what kind of surface irregularities are preserved or created depends upon how the kriging methods are applied and controlled.

Why has it been added? Suddenly kriging is expanding widely to other disciplines such as environmental and civil engineering, archaeology, health, biology, etc. These disciplines are experiencing explosive geographic data growth and changes by using inexpensive **GPS** devices in the collection of all kinds of geographically distributed data. This has greatly densified these kinds of data sets representing some kind of a data surface and distribution. Preserving and locating the irregularities of these surfaces is often the immediate and direct goal of the current studies. However, characterizing such data sets as surfaces is now leading their owners directly into **GIS** as they begin to investigate how the **GPS** sampled data interrelates with other spatial information which may be available (e.g. soil maps, topography, geology, etc.). The home range or polygon fitting methods available in **TNTmips** are examples of other methods provided to reduce point samples to polygons for their further geographical analysis. Combining realistic representations of surfaces and data distributions with other spatial information is the direct goal of the modern, integrated **GIS** and **IPS** systems such as **TNTmips**.

How does it work? Kriging applies statistical optimal properties to provide measures of the error or uncertainty of the fitted surface. It then uses the information from a variogram to find an optimal set of weights that are used in the estimation of the surface at each unsampled location. Please note that variograms can be graphed in this process using the X-Y plotting tool provided. The variogram is a measure of the degree of the spatial dependence between input samples as a function of the distance between them. This information allows kriging to estimate the missing values for the rest of the surface according to the geographical distribution and magnitude of the input sample points.

TNTmips provides the new Universal Kriging procedure that also allows for the estimation of the drift. The drift value of each cell of the surface raster can also be optionally saved as a raster object and viewed. Drift is analogous to a trend surface except that the drift estimate is based only on the control points within some neighborhood around the location being estimated. The GEOSOFT specifications currently available to MicroImages do not indicate that this option for computing drift is available in the current version of that software package.

This new **TNT** process can provide computer surface estimation without any drift (ordinary kriging) and with polynomial drift of up to order 5 (quintic surface). There are also several variogram models available for the variogram modeling step: linear (gives good result for almost any kind of data), spherical, exponential, Gaussian, and quadratic (power).

How do I tune it? The quality of the kriged surface strongly depends upon your variogram model selection. Thus the process also provides a cross-validation option to assist in its optimal application. The option first derives the surface model from input points and selected kriging characteristics. The model is then applied to the same input points to estimate their values and display the total mean error and

standard deviation of their estimations. This allows a very fast evaluation of how the surface yielded by kriging will fit the input sample values. It provides the basis for selecting the most appropriate variogram model before actually computing the entire surface.

An option is available to create a second raster object that contains the standard error of estimation for every cell in the surface raster object. Among other uses, this raster object will show those areas where the surface is poorly defined and additional sample points are needed. This raster object contains 32-bit floating numbers for each raster cell. It can be directly displayed or otherwise analyzed to determine how statistically significant the computed surface is defined at each unknown cell by the selected kriging model, query point filter, parameters, and so on. One approach would be to convert the 32-bit floating point raster to 8-bit and then display the estimated surface raster object and the error of estimation object in green and red respectively or via any of the other visualization methods (contouring, 3D, etc.) provided by the **TNT** products. The SURFER software product does not save this raster but GEOSOFT does. However, both products lack the advanced visualization tools needed to properly inspect and use such information.

How fast is it? The performance of this process (i.e., time to finish) is directly dependent on the number of sample points selected to define the surface. Other parameters which significantly impact on performance are the number of points per sector (i.e. desired number of neighbor points used for each raster cell estimated for the surface). The drift order which you select also has an impact if it is being estimated. The following results were achieved on a Gateway Pentium with a 133 MHz processor using 701 sample points and checking 25 nearest neighbor points for each estimated cell in the output raster object. Under these conditions about 5 minutes were required to generate an output raster of 256 by 190 cells (48640 computed cells).

Future additions? Possible future additions to the kriging process might include the following features.

- 1) Adding statistical methods to filter the sample points to remove outliers. The current query methods would be used in combination with these future statistical methods.
- 2) A "jackknife" or blind sample testing procedure to allow the easy use of two vector, CAD, or TIN objects or the subdivision of the points in one object to provide sample and control points. The sample points would be used to form the estimation model and the control points used for its independent validation.
- 3) Implement co-kriging: kriging weights computed for one property (e.g., a soil porosity - stored as point attributes) are then used for the estimation of another (e.g., soil contamination - also stored as point attributes but not the same points as the porosity).
- 4) Implement multiGaussian kriging: kriging applied to the normal score transformations of the input sample points. This would be a generalization of lognormal kriging.
- 5) Implement indicator kriging: kriging of the indicator transforms of the data.

6) Implement disjunctive kriging: kriging of specific polynomial transforms of the data.

7) Add the capability to use a user-defined variogram and additional extended tools for variogram estimation and modeling.

The addition of these and other enhancements depends as usual upon both the interest in, and use of, kriging by existing clients and Microlmages perception of the their impact on future sales. Thus your feedback is important as always.

Additional information? The following technical references were some of those used in preparing the kriging process. They can be consulted by those who wish to pursue the topic in more detail.

Optimal Interpolation by Kriging. by P. Delfiner and J. P. Delhomme. 1973. in Display and Analysis of Spatial Data. NATO Advanced Institute. pp. 96-115. (378 total pages)

Kriging. by John C. Davis. 1986. in Statistics and Data Analysis in Geology (second edition). from John Wiley and Sons, Inc. pp 383-403 (646 total pages).

Geostatistical Software Library and Users Guide (GSLIB). by Clayton V. Deutsch and Andre G. Journel. 1992. Oxford University Press, Inc. 340 pages.

Raster Editor.

The raster editor, like other **TNT** processes, now allows direct use of TrueType fonts of 1- or 2-byte characters. It also now retains font and font style selection information as defaults between sessions.

Upon shipment of **V5.20**, work will immediately commence on the rewrite and integration of the currently separate raster editor into the new **TNT** object editor. When completed, all separate editors will be deleted as all object types can then be edited by simply selecting a layer of that type. Besides integrating this raster editing into the new **TNT** edit process it will be updated to use the new color icons, toolbars, and related interface features.

Mosaic.

The background and wireframe colors can now be set and will be retained as defaults for use in a future session.

*** Ortho/DEM.**

The original three separate steps are still occur as individual processes: 1) computing new epipolar images from the known image geometry, 2) producing a relative **DEM** by image cross-correlation, and 3) computing a restitution of the original image via the **DEM** to produce an orthophoto or orthoimage (from SPOT). It has not yet been possible to integrate all three into a single more easily managed process.

The following adjustments and alterations have been made in these individual processes to improve their accuracy. More input controls and refinements are provided. All intermediate statistical results can now be saved.

DEM Extraction. (step 2 via Prepare / Raster / Stereoscopic Modeling / **DEM** Extraction).

An option is provided whereby you may select the desired level of smoothing (number of passes or iterations) from 1 to 100. The standard or default smoothing

levels have been changed from those of **V5.10**: medium - 4 passes instead of 2, heavy - 8 passes instead of 3, and the extra heavy level has been removed and can be selected up to 100 by the optional route. The smoothing method applied can also be selected from Shepard, inverse, bilinear, and quadratic.

* An option has been provided to "Save Correlation Data" to create a raster object containing the final correlation value for each **DEM** cell as an 8-bit unsigned raster. Each cell contains its correlation value in percent where the correlation coefficient is multiplied by 100, i.e., a cell value of 50 equals the correlation coefficient 0.5. When this correlation raster object is displayed with a color spread, it immediately pinpoints areas where additional tie points are required to improve the **DEM**. A color plate showing a sample of this kind of evaluation is attached to this MEMO.

* An option has been added to create a **TIN** object corresponding to the **DEM** surface. This **TIN** is created for those cells in the **DEM** which had high correlation coefficients. However, the vertices in the **TIN** object contain the elevations for those cells. Subsequently other known elevation information can be added to this **TIN** object using the new **TIN** layer editing feature in the **TNT** object editor. Remember that this an ortho**TIN** object is georeferenced by Step 1 and 2. Thus it can be edited over a scan of a topographic map to put in the locations and elevation of drainages, estimates of the tops of hills not precise enough to be used as control or tie points, and so on for any other positions or lines available to refine the surface. Finally, the **TIN** can be converted to a elevation or alternate **DEM** raster object by any one of the **TNT** surface fitting processes, especially the new quintic and kriging options.

The option for editing the **TIN** object created by Step 2 is only useful when a map or related information is available to supply georeferenced information for editing into the **TIN** object. As much of this information as possible should have been originally included in the tie points selection before Step 2 was computed. However, many hill tops and related features cannot be accurately co-located in position in both images for use as tie points. Obviously, it would be more desirable to use stereo viewing methods to draw in drainages, hill tops, and other key elevation features for use as part of the tie point collection for Step 2. This is the general direction of the development of this **TNT** process. However, it now must await the pending modifications to the display process to provide the stereo viewing and floating cursor options. This will then lead to the addition of "heads up" stereo digitizing and editing to draw in drainages, hill tops, cliffs, and other such control features for future use in this process.

Restitution. (step 3 via Prepare / Raster / Stereoscopic Modeling / Restitution).

Clients are routinely using this step to produce orthoimages from existing **DEMs** (e.g., a **USGS DEM** or **DMA** data). A modification has been provided so that the multiple file selection feature is available. This allows multiple restitution operations to be set up in "batch" fashion and run over night.

Documentation.

An on-line, illustrated manual subsection is now available for this process and is provided in printed form. The **DEM** which results from the application of Steps 1 and 2 can also be found on the *Prototype2* of the new San Francisco **TNTAtlas** included

with **V5.20**. This **DEM** was derived from the **USGS NHAP** stereo photos also included in the same atlas. Please note that these **CIR** airphotos were scanned with a low cost commercial scanner. These images were collected at 40,000 feet or 12.192 kilometers above the surface with an 8.02 inch or 208.40 mm inch focal length lens. Approximately 700 tie points were input which took several hours. The 70 control points were simply measured from an existing 1/24,000 topographic map. The total operator time to prepare this **DEM** was about 2 mandays when starting with scanned images and previous experience in using this process. An additional 9 hours of overnight computer time was used on a Gateway 133 Mhz Pentium to run the final 1 by 1 (unsampled) **DEM** computation. Conclusions: good soft photogrammetry results take days to achieve for each stereo model.

Improving Accuracy.

The following are suggestions for further improving your **DEM** results over those shown in the *Prototype2* and the **DEM/ortho** documentation.

1) Fly at a lower altitude! This will add more specific, well-defined features for use as control and tie points and throughout the cross-correlation step between images. It will also increase the parallax improving the vertical accuracy. Disadvantage: increases cost and the number of stereo models involved. Also increases digital storage requirements.

2) Scan at a higher resolution with a higher quality scanner! This will again define much more specific image features. Disadvantage: increased storage requirements and computational time.

3) Collect accurate control points! MicroImages has been unable to collect control points with an accurate GPS in the area of any of the stereo models available for testing. While only a few well chosen control points are required, they must be accurately located on the ground and correspondingly in the image.

4) Add more tie points! The more control points distributed all over the model area the better your results will be. Make sure that all the topographic highs and lows contain tie points, especially along drainages and ridge lines. Disadvantages: minimum as tie point collection is easy with the tools provided (e.g. auto position adjustment). With experience, hundreds of tie points can be added with 1 or 2 hours of effort.

5) Further improvements in **TNTmips**! MicroImages is learning more and more about how to provide easier to use soft photogrammetric methods which produce better results. For example, stereo viewing would allow tracing of drainages and other important linear features which provide critical tie points.

Over Expectations.

It is important to warn anyone planning to use any analytical or soft photogrammetry stereo/**DEM** methods by any software and hardware vendor that this is not an activity to enter into lightly. However, using restitution to prepare an orthophoto map from an existing **DEM** and associated airphotos is quite easily completed.

What you cannot do. The preparation of an accurate **DEM** is much more complicated and the most accurate results (e.g. 1 meter elevation accuracy) take

several man-months per each 1/24,000 quad area. Are you prepared to put that kind of effort into any project? Conclusion: large operational projects of this kind are best left to those professional engineering and consulting firms who specialize in such work.

What you can do. It is also possible for you, as a casual photogrammetrist, to produce acceptable results with this **TNT** process depending upon what your objective is, the associated accuracy requirements, and the time and materials available. The following are examples of the casual use of the results of the current Ortho/**DEM** process in other **GIS** and **IPS** applications.

It is quite easy to prepare a **DEM** for 3D visualization as the requirement for accuracy is low. A suitable **DEM** can be derived by stereo methods in a hurry or alternatively by surface fitting. The human eye will not detect any minor, local surface elevation errors in such an application. For example, even with a vector drainage overlay you will not notice in 3D that a stream would have to flow uphill over a hump in the elevation model!

MicrolImages has had the opportunity to inspect the **DEMs** produced by other approaches and then used to prepare orthophotos. The newer **DEMs** produced by **USGS** are now derived as a byproduct of the tedious, analytical methods used in the preparation of these excellent contour maps. However, the older **DEMs** produced semiautomatically by scanning and computation from the existing **USGS** topographic maps are very poor in appearance. If you review the 20 individual **DEMs** on the *Prototype2 TNTAtlas* you will easily be able to tell which method was used for each (the scanning method caused elevation errors in obvious horizontal (scan) oriented streaks). However, even these poorer quality **DEMs** produce acceptable orthophoto maps. MicrolImages has reviewed some **DEMs** prepared with other very expensive systems by experienced professional engineering firms which are terrible in appearance but produce quite acceptable orthophoto quadrangles.

The sample **CD** for *Prototype2* of San Francisco **TNTAtlas** contains a **USGS DEM** for the Hayward map quadrangle, **NAHP** stereo **CIR** airphoto pairs covering this quad, and the **TNTmips** derived **DEM** for the top 1/3 of this quad. A test orthoimage can be prepared with the restitution process (Step 3) using either one of these **CIR NAHP** color stereo airphotos and the **DEM** computed from them by the **TNTmips** ortho/**DEM** process (Steps 1 and 2). Similarly another test orthoimage can be prepared with the restitution process (Step 3) using the same airphoto and the **USGS DEM**. Virtually no difference can be detected between these 2 orthoimages if they are overlaid using their georeferences in red and green by Display2D. Clearly, a super accurate **DEM** is not required to prepare a very useful orthophoto for many uses including the updating of **GIS** data sets.

Import/Export of Vectors.

MicrolImages has reached a cooperative agreement with Strategic Mapping Incorporated, the manufacturers of Atlas **GIS**. This has provided MicrolImages with both the external ***.BNA** and internal ***.AGF** formats for the data sets used in Atlas **GIS**. Import, export, and linking processes will be created in **V5.30** of the **TNT**

products to allow easy preparation and alteration of these data sets for Atlas **GIS** users.

Polygon Fitting.

The polygon fitting processes were rewritten to provide an improved interface and performance.

Object Editing.

Vector/CAD layer editing. Extensive work has continued on this process to increase its robustness and add new features. Quadratic and Bezier splines can now be applied to smooth lines in **CAD** and vector layers. The free end of a vector line can now be moved or added to. If both ends of the line are free then the whole line can be moved. A free end is when a node is at that end with only one line attached to it. A "cancel" operation can be selected during an exit if there are objects that have been modified and need to be saved either in place or as new objects?

* TIN layer editing. A **TIN** layer can now be selected from a composite display and edited. A separate section of printed documentation on this process is included to better introduce these new features. **TIN** objects are becoming progressively more important in **TNTmips** as they are integrated into various processes. A **TIN** object can now be generated by several processes such as from a **DEM** creation, conversion from a vector via a query, by important point extraction from a raster object, during surface fitting, and so on. **TINs** are now becoming an important means of quantitatively creating, representing, and analyzing **3D** surfaces in **TNTmips**.

The addition of the ability to visually edit surface features into and out of a **TIN** object is an important new tool. It allow the creation of drainages, fault lines, and many other surface discontinuities and changes while the **TIN** overlays an image such as an orthophoto, scanned map, or satellite raster object. The **TNT** object editor is unique in that it allows you to edit changes in a **TIN** layer (and thus the object) while it overlays any and all other object types. Furthermore it recomputes and redisplay the new **TIN** layer promptly when the redraw button is moused.

Thus you might envision a future option where the portion of the raster surface being viewed is overlaid by the **TIN** which was used to create it. Altering the **TIN** then causes the portion of the surface being viewed to be recomputed and redisplayed. A second **3D** display view might then be slaved to this **TIN** and surface combination which redisplay as the surface is altered.

Currently the new **TIN** layer editor presents a set of icons to allow the following alterations to the associated object. All edit actions on a **TIN** insure the topology of the **TIN** and yield only Delaunay triangles. Triangle vertices and edges can be added. Edges, vertices, and whole triangles can be deleted with or without the remaining areas being filled with new triangles. When such non-fill areas are interactively created they can define multiple hull structures which are outside the **TIN** object, such as an island in a **TIN** or a shoreline surrounding a **TIN**.

Editing to add or refine those hulls created within the original **TIN** object is a very important concept in refining a surface. For example, the Ortho/**DEM** cross

correlation process now yields a **TIN** object as well as a **DEM** raster object. This **TIN** object is georeferenced and can be overlaid upon an existing map, **DLG** drainage, etc. The drainages can then be edited into the **TIN** object to provide more control when the surface or **DEM** raster is computed. However, the lakes can also be edited in to form hulls so that the surface fitting routine will ignore them when computing a surface. The **Z** values of the vertices of the points defining the edge of a lake can even be edited to reflect a consistent value equal to the level of the water.

Similarly the following case occurred during the last quarter. Contours from the Digital Chart of the World (**DCW**) were used to compute a surface fitting several islands. Since the surface fitting process did not know about the water areas, it created strange ripples and artifacts in those areas which in turn caused some bias in the island elevation rasters. A **TIN** of this data set would have yielded triangles covering all the areas including the water. However, now the **TIN** layer editor would allow the islands of data to be defined as hulls which would then act as closed areas for triangles within a single **TIN** object with an extent spanning several islands. Alternately a modification is needed so that polygons in a vector object (the land/water boundary layer in the **DCW**) can be intersected with the contour layer to define hulls when the **TIN** object is being formed.

The older, individual vector editing (**EDITVECT**) and CAD editing (**EDITCAD**) processes first released three years ago (**V4.00**) will not be reissued with **V5.30** if the color line following feature has been added to the new **TNT** object edit process as scheduled.

TIN toolkit.

Created a suite of libraries for dynamic **TIN** editing and manipulations. Some of the functions for interactive **TIN** editing are already available in **TNT** edit. This set of functions allows users to add new nodes and lines to **TIN** structure, and provide a number of different methods for element deletion within **TIN** structure such as: node, triangle, and edge deletion with or without filling remaining areas with new triangles. Such functionality will make interactive editing possible or creation of a multiple-hull structure with one **TIN** object and will also help in definition of lakes and islands in the **TIN** model. All operations under **TIN** objects automatically ensure topological integrity of the **TIN** model.

TIN to Raster conversion.

There is a new quintic interpolation method that considers the surface model to be smooth and continuous. This method creates surfaces without abrupt changes in the surface normal as it crosses an edge between triangles. Quintic interpolation employs a bivariate fifth-degree polynomial surface fitting in x and y . The interpolating polynomial function is defined in each triangle and determined by the given z -value at the **TIN** nodes and estimated values of partial derivatives at each triangle vertex.

Vector to TIN conversion.

Queries can now be used to select input elements for **TIN** generation separately for point and line elements. The same possibility is available for definition of the z -value of input elements. Any attribute or combination of them from attached database

fields can be selected as the vertices for the **TIN** object. Some changes were implemented in **TIN** generation algorithm to improve reliability of the method.

Changes in Distribution of TNT products

No territories in 1997. All Reps and Resellers have been earlier informed.

No further exclusive representatives will be signed. New international Resellers will be able to sell anywhere in the world that they choose except for those areas restricted until 1997: Europe, Reps, illegal.

Southern Africa Territory.

MicrolImages is no longer represented in Southern Africa by Neil Pendock and IMAGE Processing Consultants. Clients and parties interested in the **TNT** products located in this area should contact MicrolImages directly for sales information until new distribution channels are available in Southern Africa. Technical assistance will, as has always been the case, continue to be available directly from MicrolImages by phone, FAX, or email.

Peru.

MicrolImages is no longer represented in Peru by Julio Robles and CHASKY S.R.L. Clients and parties interested in the **TNT** products located in Peru should contact MicrolImages directly for sales information until new distribution channels are available for Peru. Technical assistance will, as has always been the case, continue to be available directly from MicrolImages by phone, FAX, or email.

Iran.

MicrolImages' representation in Iran by Sohrab Batmanglidj and CHKON, Co. has been suspended due to the U.S. embargo placed on the sale of any products to this nation.

Restricted Sales.

Regardless of MicrolImages' opinion in such matters, U.S. Government regulations and laws prohibit the sales of products produced by U.S. companies to the following nations:

Afghanistan	Cuba	Iran	Bosnia / Herzegovina
Iraq	North Korea	Libya	Central African Rep.
Somalia	Tunisia		

These restrictions also prohibit the sales of U.S. products to anyone, anywhere for transshipment to these nations. Should MicrolImages be found to be violating these regulations, either deliberately or by negligence, it would result in the prohibition of the export of our products to any nation.

New Image Printers/Plotters Supported

HP850 Series Printers. The new low cost (\$500) HP850C and HP855C color ink-jet printers produce very good quality 8.5 by 11" color prints (see enclosed data sheets). These printers are much faster in printing 300 dpi color images (1 to 2 pages per minute) than the cheaper HP650 printers or the Canon color ink jet printers. They also provide very good quality 600 dpi general text printing at 6 to 7

pages per minute. These printers can be used directly within **TNTmips** by selecting the driver for the HPXL300 printer from the list.

HP250 Series Printers. Hewlett-Packard has quietly introduced two low-cost, large format color ink-jet printers as HP250 DesignJets. For some reason they are not pushing the marketing of these new 24 by 36" and 36 by 48" products, and it is even hard to obtain a brochure describing them. Both were probably introduced to compete with the original low-cost Calcomp TechJet color ink jet printers and to function primarily as color plotters. These HP250 color printers use the same 300 dpi ink cartridges as the HP650 series. Microlimages' use of one of these printers for 3 months has demonstrated that it produces approximately the same quality results as the HP650 series. You will find the discount prices of these products to be \$2400 and \$3250 in the enclosed sample catalog. These low prices and large formats may be the reason why HP has not yet introduced a new 11 by 17" format printer to replace the HP300XL.

The principal difference from the HP650 is that the HP250 printers require hand feeding of sheet paper rather than being roll fed. Their construction is also of less durable nature as they are designed for reduced volume relative to the roll feed HP650. However, the HP250 printers make excellent large format color image printers for individuals or small office operations at an affordable price. These printers can be used directly within **TNTmips** by selecting the driver for the HP650 printers from the list.

HP750 Series Printers. The HP650 series printers have been replaced by a new HP750 and HP755 (see enclosed data sheets). These printers are faster, support more media types (similar to NovaJets), and have increased black and white resolution from 300 dpi to 600 dpi by using a new, higher resolution black and white cartridge which is also used in the HP1600 desktop color ink jet printer. The 300 dpi color cartridges are identical to those used in the HP250, 650, 1200, and 1600 printers. Microlimages is still awaiting delivery of an HP750 printer for evaluation. You will find the discount prices of these products to be \$5300 and \$9850 (for Postscript and 68 Mb of memory) in the enclosed sample catalog. These printers can be used directly within **TNTmips** by selecting the driver for the HP650 printers from the list.

HP Color Laser Printer. HP announced a new second generation color laser printer months ago. Uncharacteristically for HP, it does not seem to actually be available as yet as it was not seen at COMDEX 95, has not yet been reviewed in the magazines, and Microlimages has not yet received its developers unit. It is hoped that this second attempt by HP to provide a color laser will be far superior to the poor quality initial unit reported upon in a previous MEMO.

IMPORTANT NOTICE: Please remember that printing from within **TNTmips** on a **PC** does not require Postscript and its associated large memory requirements. Usually the lowest amount of memory supplied with the printer will suffice for printing from within **TNTmips**. Add-on memory and its large expense is only required if you use a printer with a Postscript interface.

Calcomp TechJet. At COMDEX 95 Calcomp introduced an improved version of its popular TechJet printer which uses the 360 dpi Canon color inkjet cartridges. The most important innovation in this new printer is the incorporation of tubes and other "plumbing" which allows the tiny Canon ink cartridges/heads to draw ink from reservoirs mounted at the end of the printer. Unfortunately the suggested retail price was about \$15,000. The Calcomp TechJet printers can be used directly within **TNTmips** by selecting the driver for the HP650 printers from the list and using the HP inkjet emulation supplied with the printers.

Low Prices. A CAD Warehouse catalog is enclosed which provides discount price references for the large format printers of Hewlett Packard, Calcomp, and Summagraphics. The prices of other related large format scanners and digitizers may be of interest as well. These prices are about as low as are known to MicrolImages. While you may not purchase equipment from this particular discount company, their published prices may be useful to determine what you should be paying and provide the leverage to obtain comparable prices from your local sources of these products.

All color prints attached to this MEMO were printed with HP 1200 or HP1600 color inkjet printers on regular copy paper.

New Scanners Supported

The new scanner support program for MicrolImages is nearing completion. As part of this rewrite, the process is being modernized and updated with an improved icon based interface. Those scanners previously supported by MicrolImages drivers will continue to be supported in such a fashion by the new scanner process. However, the new process will also support **TWAIN** as a standard interface to the many scanners and digital cameras. This software interface is provided by most of these equipment manufacturers for Windows and **MacOS** based computers. Via this **TWAIN** driver many, many new scanners will immediately be supported by this new **TNTmips** scanning process. Thus it will no longer be necessary to consult this section or MicrolImages to determine if a specific scanner is supported.

Kodak CIR Camera. Kodak has manufactured a special edition **CIR** digital camera in a limited run (10 units) initially. The cost of this camera is about \$15,000 or approximately twice the cost of their equivalent color camera. Some synoptic information begged from Kodak on this camera has been reproduced by MicrolImages and is enclosed. At this point it is unclear what kind of development and marketing effort Kodak will devote to this device. It has been difficult for MicrolImages to obtain even the limited information enclosed on this special product, which seems to be a "secret" even though it could be of considerable interest to those in remote sensing and **GIS**. This **CIR** and the regular Kodak color digital cameras support **TWAIN** as a software interface standard. Thus these products will be directly supported by this pending software interface addition to **TNTmips** for scanners and digital cameras.

Computers

Pentium-Pro.

MicrolImages is now getting inquiries about the use of microcomputers based upon the new Intel Pentium-Pro or **P6** processor chip. Concurrently you may also be reading articles pointing out that this new processor does not improve (and may even slightly degrade) the performance of 16-bit based applications. Conversely, at the same megahertz the Pentium-Pro provides twice the performance for 32-bit applications over the Pentium. As outlined earlier in this **MEMO, V5.20** of the **TNT** products for **W95** and **NT** are now all entirely 32-bit compliant with these 32-bit operating systems. Thus the **TNT** products are ready to provide you with all the improved performance of the Pentium-Pro based microcomputer.

Common Pentium-Pro based microcomputers are already appearing with 1, 2, or 4 processor chips. **W95** and **NT** automatically allow **TNT** processes to efficiently use these additional processors. However, it should be anticipated that MicrolImages will alter its pricing and license policy to reflect the fact that these new multiprocessor Pentium-Pro microcomputers allow powerful network compute servers to be established. Under these conditions several, separate users can simultaneously obtain a Pentium-Pro processor on a single microcomputer to operate **TNT** products. Each individual, separate user's access to a **TNT** product will eventually be controlled by the level or kind of license purchased from MicrolImages.

These changes will instigate license control of multiple simultaneous users on a single computer (with or without multiple processors). However, as is currently the case, a single individual user may still be able to open multiple copies of a **TNT** product. Your continued unaltered opportunity as an individual single user to start **TNTmips** 2 or 3 times will become much more useful with the increased power of a multiprocessor based Pentium-Pro or Pentium based microcomputer. For example, you would commonly run some time consuming analysis in one copy of **TNTmips** and then start and use another copy to display and review other objects or to set up another task.

Portables.

The best portable PC inspected at COMDEX 95 in November was the Toshiba model 700CS which retails for \$5000. It provides a portable for **TNTmips** which is almost equivalent to most high end office platforms used by many of you. A copy of the brochure for this product is enclosed and summary of its features follows. About the only obvious lacking built-in feature is a modem and access to ethernet, both of which can easily be made via a PCMCIA card added to optional desktop expansion docking station.

Toshiba **TECRA** model **700CT**

- 120 Mhz Pentium Processor (low powered 2.9 volts)

- 16 Mb **DRAM**

- 1.2 Gb removable hard drive

- 11.3" diagonal color screen, 800 by 600 pixels (very bright and easily viewed)

- external monitor support via internal **PCI** bus architecture

- plug in tray for alternate use of quad speed **CD-ROM** or 3.5" floppy drive

- 2 **PCMCIA** slots

- Built in sound card and dual speakers

Infrared data port for printer communication
 Lithium battery
 3 year warrantee
 Less than 7 pounds
 Optional desktop dock with **PCI** slots, larger speakers, additional drive trays
 and **PCMCIA** slots, **SCSI** port

Pentiums.

The best high end Pentium for this quarter is still the Gateway P5-133. Since faster 150 and 166 Mhz Pentium chips are just beginning to ship, no higher end standard PC product is yet available. However, Gateway has now spiced up this high end machine with expanded features and lowered the price. A comparison between last quarter's recommendation and what is available now for the same price is shown below.

A graph is enclosed from a September PC Magazine article (see citation below) which ranks 66 brands of 120 and 133 Mhz microcomputers tested by PC Labs. It plots decreased cost versus increasing performance. It is important to observe from this table that care must be taken in selecting such a machine at the present time. While all manufacturers use the Intel 120 or 133 Mhz Pentium, some are not using the advanced, improved supporting chip sets and other components. This can result in considerable variation in the total performance of the platform. For example, in the range of \$3000 to \$4000, where most of these products occur, the performance can vary as much as 50% higher than the poorer performing platforms. Please also note that the Gateway P5-133 recommended last quarter (and this is the highest ranked of all) while the Gateway P5-120 recommended more or less for the last year by Microlmages is one of the best for both performance and price. Both of these machines are designed and marketed nearby in the Midwest United States, an area know for its conservative approach in producing quality products.

Gateway P5-133XL

for V5.10 (\$4400)	for V5.20 (\$4000)
Intel 133 Mhz Pentium	same
16 MB EDO RAM	same
256 Kb Cache	same
1.6 Gb 10 ms IDE Hard Drive	1.6 Gb 9 ms DMA Mode2 EIDE
PCI Enhanced IDE Interface	same
17" Vivitron Color Monitor (Trinitron, .26dp)	same
64-bit ATI Graphics w/ 2 Mb VRAM	Matrox MGA w/ 2 MB WRAM
quad-speed CD-ROM with 3 disk changer	6X EIDE CD-ROM w/o changer
3.5" diskette drive	same
28.8 FAX/modem	same
Sound systems and speakers from Wavetable	same
9-bay tower case	same
keyboard and MS mouse	same
WFW3.11	W95 , MS Pro. Office (w/ Access Db)
3 year parts warranty	same

MicrolImages has internally installed 12 of the Gateway 133 Mhz high end machines recommended this and last quarter under a lease. Each machine is identical and set up to boot into **W31**, **W95**, or **NT** as its user chooses. None of these 12 computers required any replacement parts or exchanges from Gateway. However, as was typical of most personal computers, some memory contacts needed cleaning and reseating and a couple of drive connectors were loose.

Leasing. Gateway now has a reasonable leasing program. It is assumed that this is limited to the United States and Canada. As noted, MicrolImages leased 12 Pentium 133s of the design noted above under this program on a 3 years to own program. Other time periods and terms are available. Dell also has a leasing program. Call their regular sales numbers for additional information.

It seems that everyone at MicrolImages must have at least 3 computers/terminals in their office to work effectively (typically a Pentium, an **X** terminal, and a Mac). This the ultimate in multitasking: program development and testing on the Pentium, email and program testing on the **X** terminal, and writing or designing on the Mac station. This is in addition to the many different kinds of workstations scattered around the offices for common use and the semi-retired 486s scattered around for special purpose use (**CD** duplication, floppy duplication, special testing, etc.). This all makes for a very complex little Local Area Network (**LAN**), since almost all machines are networked together in a single **LAN**.

And, in general the heating bill at MicrolImages in winter is now very low. This is the only place around where table fans are run only in the winter. However, the air-conditioning and power capacity are rapidly becoming a problem and the fuses should begin to burn out and limit things soon. There are already some circuits where the use of Microwave ovens and similar devices are already prohibited.

However, it is maximizing the creative ability of our innovative staff that really counts at a small company like MicrolImages. Clearly every professional needs their older 486 microcomputer for writing, email, Internet, etc. and a new, state of the art Pentium or Pentium-Pro for power processing to produce the products for which they were employed. Unfortunately many of you have reported that those who hold the purse strings at your sites cannot be convinced to upgrade your **486/25s** to **586/133s** (a 5 times increase in productivity), let alone let you have 2 machines and a chair with wheels in your office for multitasking. This is especially true if you work for a government agency which has no direct measures of productivity. Thus, perhaps leasing is a more palatable means of upgrading your production machine without giving up an existing, functioning, and still useful **PC**. It is worth a try!

Promotional Activities

The *Prototype2* San Francisco **TNTatlas CD** and its associated graphics materials was the significant promotional item prepared during this quarter.

MicrolImages continues its low-key advertising campaign choosing to continue to invest as much as possible in product development. Direct mailings, Representative and Reseller, and client referrals are currently the principal means of promoting the **TNT** products. Expensive color advertising does not particularly result in inquires to

buy products. It seems to be designed to create a widely known image for a product or company. Advanced capabilities, a good quality product, reasonable pricing, satisfied purchasers, and similar actions also create a good company image. MicrolImages does plan any additional and different kind of marketing activity during 1996.

On the subject of mass marketing efforts, MicrolImages has just read the received a copy of an email message between two sites in Australia. This message originated in West Perth, Australia and is uncollaborated rumor at this time. It is in NetSpeak as follows:

“heard on the grapevine the erm retrenched 3 ppl last week. apparently sales of the PC version of er5 about 1/5 of projections; hence the rather rapid price reductions we saw recently. so I guess if u release a buggy product u shouldn’t expect the market to buy it... unless of course your name is bill gates.”

[An approximate translation of this from NetSpeak into English follows. I heard on the network today that Ermapper fired or reassigned 3 people last week. Apparently sales of the PC version of V5.0 is about 20% of projections expected from their marketing blitz. It seems that they have released a buggy version and can not expect to sell it. They will now have to invest more money to get it right.]

It is interesting to observe that MapInfo and AtlasGIS are increasing the general professional public’s interest in **GIS**, and as a result in **IPS** and remote sensing. The number of individuals who responded to MicrolImages’ direct mailing of identical materials is increasing (approaching 10% in some cases). This seems to be most directly related to increased use of these other products which are quite effective in the business geographics of the U.S. However, these lower-cost products leave room and even create a spin-off interest in the creation and use of **GIS** materials in other activities and nations.

As has been noted earlier, MicrolImages has signed an agreement with Strategic Mapping Inc. to directly support their internal formats. This allows **TNTmips** users to directly use, create, and edit GIS and image materials with AtlasGIS. At the present time MicrolImages is seeking to establish a similar working relationship with MapInfo. It is important to note that MapInfo has officially announced that they are discontinuing the development of their products for **UNIX**-based platforms. It is assumed that this is to focus their efforts upon their excellent **PC** products and their competition with **ESRI** and ArcView.

Very interesting short reviews of ArcView 2.1 and MapInfo 3.0 occurred separately in a recent national computer magazine (copies enclosed). ArcView 2.1 receives a 1 on a scale of 1 to 4 (4 being best). However, what is even more important is the insight which this reviewer, who is probably only casually visiting the desktop mapping arena, sets forth. A key conclusion is that ArcView 2.1 is a specialized data viewer for all those trapped inside the **ESRI** data world.

Articles Citing MicrolImages Products.

Please send a reprint or a reference on your publications containing references to the use of **TNT** products. This will enable MicrolImages to cite it here and all can review the type of applications being made of these products.

Puzzling Out the Next-Generation GIS. Your next GIS will fit all the pieces together in one integrated system: data collection from diverse sources, analysis and preparation processes, complex visualization tools and accessible presentation methods for nontechnical users. GIS World for October 1995. by Keith Ghormley. pp 50-52. (reprint enclosed)

[Keith Ghormley is a Scientific Writer on the staff of MicrolImages Press.]

GIS on the exploration household PC. Paydirt (Australian Mining Magazine) for September 1995. by Tania Winter. page 31. (copy enclosed)

[Geo Mapping Technologies Pty. Ltd. quoted in this note is a consulting firm located in Brisbane and a MicrolImages International Representative.]

Landscape Ecology and Diversity Patterns in the Seasonal Tropics from Landsat TM Imagery. Ecological Applications, 5(2), 1995. Jose M. by Rey-Benayas and Kevin O. Pope. Geo Eco Arc Research. 2222 Foothills Boulevard, Suite E-272. La Canada, California 91011. pp. 386-394.

Geographic Analysis of Coral Reef in Jakarta Bay Using TNTmips Software. International Workshop on the Throughflow Studies in and around Indonesians Water, BPPT-JAMSTEC, Jakarta, October 1992. by Suprajaka Suwahyuono and Sukendra Martha. 12 pages.

Creating Cultural Resource Data Layers: Experiences from the Nebraska Cultural Resources GIS Project, Part 1: Creating the Data Layers. Society of American Archaeology Bulletin, 13(4), September/October 1995. by LuAnn Wandsnider and Christopher Dore. pp. 25-26. (copy enclosed)

PC Magazine.

MicrolImages continues to receive and review about 100 computer and GIS related publications per month. However, the one magazine which continues to contain the most useful information is PC Magazine. This magazine has continued its PC Lab which tests all aspects of computer software and equipment and publishes critical reviews and makes well grounded recommendations. PC Magazine, Byte, and PC Week are the only computer magazines which are not controlled by the products they review and their advertisers. Most other magazines are highly biased and dare not offend their principal advertisers in fear of losing that advertising. Ziff-Davis, the publisher of PC Magazine and many, many other computer publications, has just been sold to a Japanese group for an amount near one billion dollars.

All MicrolImages' clients who currently make decisions about computer software and equipment should subscribe to PC Magazine. It routinely contains reviews that will save you money and assist in making those tough choices about what to buy.

PC Magazine now has a home page on the **www** at **<http://www.pcmag.com>** where you will find a synopsis of each of its important articles. However, the important, and complex review tables printed in each magazine are not provided via this route.

Thus a subscription to the printed publication is important even if it arrives by surface mail in your nation 2 months later than your **www** preview of the article. The following useful review articles appeared in **PC** magazine during the past quarter. MicroImages comments are appended to several.

Your Next OS - Performance Results. Do the new 32-bit operating systems live up to their performance claims? Exhaustive performance testing gives a definitive answer. by Ben Z. Gottesman, Jay Munro, Deval Shah, Danny Smith, and Todd Feinman. PC Magazine, Vol. 14, No. 6. September 26, 1995. pages 144 to 159.

Your next OS - Stability & Capacity. Our stress tests provide hard data on the comparative robustness and capacity of the four competing operating systems. by Matt Pietrek. PC Magazine, Vol. 14, No. 6. September 26, 1995. pages 162 to 181.

Pentium 120s / 133s - Setting the Pace. The fastest PCs you can buy - those based on Intel's 120- and 133-Mhz Pentium processors - offer breathtaking performance. Yet they're not as expensive as you might expect. PC Magazine Labs tests 66 high-end systems to find the best. by Robert S. Anthony. PC Magazine, Vol. 14, No. 6. September 26, 1995. pages 183 to 236.

Serving Up Apps - Network Operating Systems. Many of today's Intel x86- based NOSs have the power and features to run server applications. But which server NOS is right for your business needs. by David S. Linthicum. PC Magazine, Vol. 14, No. 18. October 24, 1995. pages 205 to 236.

[Excellent report on PC Lab's tests of multiuser network via MSNT3.51, OS/2 2.11, SCO release 5, and UnixWare 2/01. Report evaluates performance as a function of active clients on network and number of x86 processors (1, 2, 3, or 4) in the network server. Editor's choice was MSNT3.51, magazine for details. Required reading for those contemplating PC based network.]

PowerPC - A Work in Progress. PowerPC systems running Windows NT are finally here, but their prospects are questionable. Compared with Pentium PCs, they don't offer significant advantages in performance or price, and native software remains rare. PC Labs examines the machines that were supposed to redefine computing. by Jim Seymour. PC Magazine, Vol. 14, No. 18. October 24, 1995. pages 185 to 202.

[Please see tables enclosed. This article tests many popular native applications on 133 Mhz machines using the PowerPC (e.g. Apple Power Mac model 9500 using PowerPC 604 processor and Tangent 5133 using Pentium processor. In general these tests debunk the claims that in practical situations the equivalent PowerPC based machines are 2 times faster. In fact, for most applications and tests the 604 based machines were about the same as the Pentium, except for the Power Mac 9500 which was much slower. I guess we have to realize that a lot of the early untested publicity was just IBM, Apple, and Motorola hype.

Recently an article was published in the MicroStation Magazine stated that MicroStation's new release for the Mac was 5 times faster than the Windows based product. These untested claims published in a product controlled magazine should be treated with great deal of speculation!]

And Color for All. Whether you want a cheap ink jet printer for your home, a laser printer for your business, or a high-end machine for prepress proofing, it has been a banner year for color. by M. David Stone. PC Magazine, Vol. 14, No. 9 November 7, 1995. pages 223 to 229.

Good Enough and Better. Ink jet printing now has three distinct markets: Low-cost entries for homes users, business-class machines, and high-end printers for graphic artists. no author. PC Magazine, Vol. 14, No. 9 November 7, 1995. pages 229 to 242.

[All current color ink jet printers from Canon, DEC, HP, Lexmark, Olivetti, and Tektronics were tested. The HP Deskjet 600 (\$369) and HP Deskjet 1600 (\$1699) received the highest grades in the categories of cheap and more expensive. However, Microlimages recommends that those clients with limited funds consider adding some more money to buy the HP Deskjet 850 (\$658). It has higher quality and speed than the 600 but was not selected as it is currently more expensive than entry level 600 printer.]

About to Break Out. Color laser printing has come a long way in the past year. Output quality is much improved, and prices are almost reasonable. Though it's not perfect yet, it will be soon. no author. PC Magazine, Vol. 14, No. 9 November 7, 1995. pages 243 to 265.

[The color laser printers from Apple, QMS, Tektronix, and Xerox were tested. The following are the conclusions the PC Magazine editors reached: "Last year when we did this feature, we didn't award an Editor's Choice because we felt that neither the technology nor the products were quite mature enough. We're going to draw a bye this year as well."

It is important to note that Hewlett-Packard's color laser printer is conspicuously missing from the printers tested and reported upon. The first generation of HP's color laser did not receive Microlimages' recommendation when it was used last year for a **TNTmips** produced sample print sent to all clients. Thus is concluded that HP did not want this original color laser printer reviewed. However, HP is beginning shipment of a second generation, new and improved color laser printer to purchasers this week. Microlimages will receive one of the first and report upon its results in the next **MEMO** which will probably include a sample color print.]

Guide to Color Output. Great-looking color output used to be impossible from a PC. Then it became possible but expensive. With this year's printers, it's both possible and affordable, with some low-cost ink printers turning out attractive color pages and thermal dye printers dipping under \$1,000. no author. PC Magazine, Vol. 14, No. 9 November 7, 1995. pages 257 to 265.

[This article reproduces in color a sample print prepared on a wide range of color printers.]

What Price Perfection. If you need unbeatable color output for business use or prepress proofing, it's only money away. no author. PC Magazine, Vol. 14, No. 9 November 7, 1995. pages 266 to 282.

[Expensive color printers using a variety of technologies to achieve high quality color printing were reviewed. They included all the printers available from Kodak, Fargo, GPC, Mitsubishi, NEC, Seiko, 3M, and Tektronix. The Editor's Choice went to Tektronix Phaser 240 (\$3695 for 8.1 by 10.0" printable area using thermal wax transfer technology), the Tektronix Phaser 440 (\$7995 for 9.3 by 12.7" printable area using dye sublimation technology), and the Tektronix Phaser 480X (\$14995 for 11.9 by 17.2" printable area using dye sublimation technology). Note that while Tektronix receives the recommendation here for output quality they receive the lowest marks in the article cited below for reliability and service.]

Tipping the Balance. Before you put your money on the counter, check one more thing: the printer maker's track record. We surveyed our readers to see how the top printer vendors rate in their overall reliability, the availability and quality of their tech support, their service, and more. by John J. Gilmartin and Jamie M. Bsales. PC Magazine, Vol. 14, No. 9 November 7, 1995. pages 299 to 305.

[Among 19 printer manufacturers, Hewlett-Packard, Canon, and Epson were in the top of four categories receiving "A" grade. The bottom or worst printer manufacturers receiving a "D" were ALPS, Tandy, Tektronix.]

[The results of this article should be of particular interest to those of you working in remote areas where obtaining repairs is difficult or impossible. Hewlett-Packard printers come out on top in price and results (see above articles) but is also shown in this article to be the least likely to need repair and the easiest to get repaired. While Tektronix high end printers get high marks for results they get very poor grades for service. These test conclusions also agree with MicrolImages' experience with client's reports on the use of many different printers.]

How Many Files Do You Need? The FILES setting in your CONFIG.SYS file could be costing you precious memory. by Jeff Prosis. PC Magazine, Vol. 14, No. 6. September 26, 1995. pages 245 to 250.

Other Publications of Particular Interest.

The Smart Manager's Guide to Purchasing, Implementing, and Running a Geographic Information System. OnWord Press, 2530 Camino Entrada, Santa Fe, NM 87505-4835. by George B. Korte. 220 pages.

Staff Additions

Roger A. Kohl has joined MicrolImages as a software support engineer. Roger will be helping clients via the software support team. He received a Bachelor of Science in Agriculture at **UNL** in 1989 and a Computer Programming Diploma in 1993 from a Lincoln commercial trade school. His previous employment has been in the landscape and horticultural field with part-time activity in computer installation and operation.

Anita Winters has joined MicrolImages as an administrative assistant. Anita is responsible for all of MicrolImages' in-house publication of materials. She received a Bachelor of Arts in English at **UNL** in 1993 and an associate of Arts from McCook Community College in 1991. Her previous work experience has been in the University Mathematics Library.

Christopher C. Boe has joined MicrolImages Press as a scientific writer. Chris obtained a Bachelors of Science in Geological Engineering from the South Dakota School of Mines and Technology in Rapid City in 1987. Chris then completed post-graduate work toward a Masters work in Business Administration as related to the Environment at San Diego State University in 1991. He has worked as a geological engineer since 1987. After graduation Chris was initially employed by the Homestake Mining Company in Lead, SD. Since 1988 he has worked in private consulting, providing technical services in a variety of related facets. Chris has extensive experience in cost estimating, developing proposals, coordinating, and managing projects related to environmental and geotechnical geology.

Valeriy I. Dronov joins Dmitry Frolov as the second software engineer to journey from Moscow to Lincoln to join MicrolImages' software development team. Val completed the equivalent of a Bachelor of Science degree in mathematics at Lomonosov Moscow State University in 1986. He then completed the equivalent of a Masters Degree for military officers at the Malinovskij Military Armored Tank Academy in Moscow in 1988 with a program of study in the mathematical theory for the security of armament and military equipment. From graduation until 1993 Val was a commissioned officer and Research Assistant at the Gukovskij Military Air Engineering Academy in Moscow leaving with the rank of Captain. Upon separation from the Russian military he has been a full time software engineer working on database and image processing projects at Vidar Ltd., MicrolImages' Russian representative, until his departure for Lincoln. Val's initial responsibilities at MicrolImages will be in the creation of mathematically oriented algorithms.

AUW8

The annual Advanced Users' Workshop number 8 (**AUW8**) will be held in Lincoln, Nebraska on 23, 24, 25, 26 January 1996. A special mailing of material on this workshop has recently been made to all active clients. Please remember to fill out and return the registration form it contained as the capacity of the facility available for the workshop MicrolImages is limited.

Testimonials

The following are some of the comments to MicrolImages during the last quarter exactly as written except for the [edit] alterations in [brackets] to keep them anonymous. Obviously many more comments are received by MicrolImages by voice and can not be accurately reproduced here. Please note that these quotations are not edited from their original form in spelling, grammar, punctuation, etc.

A negative response was received during the quarter and is not included. It was to the effect that the client is unhappy that they had a subscription for **TNTmips** through **V5.00**, considering the lack of new **GIS** and **IPS** features introduced during the previous year. Clearly the perception of the value of the new features added quarterly is related to the individual requirements of each client.

A second negative response was received concerning a problem with a specific unfulfilled request for software support. MicrolImages' support team works hard to

provide software support promptly handling over 100 inquires each week, but, sometimes things get lost around here just as in your office.

From a South American client on 31 July 1995. (using **V5.00**)

*“As of this morning, [a company] is connected to the Internet! Please let me know if there is a version of the **TNT** editor more recent than that on the 5.0 release **CD**, available on tnt.microimages.com. I'd like to use it with my digitizer, those icons are marvelous!”*

*“Yesterday I used the manual entry mode for lines, for the first time. It saved me a lot of extra work, as previously I would draw polygons using a GEOSOFT function, then convert to dxf, then import into **TNT**, then have to erase all the intermediate files. Thanks!”*

From a South African client on 11 August 1995. (using **V5.00**)

*“The program I wrote [for use with **TNTsdk**] seems to be working well and is giving meaningful results. If possible I would like to add a feature that labels the triangles that I'm drawing in the vector object. In other words, I would like the triangles to be numbered, on screen, for identification purposes.”*

“Could you please suggest a way of doing this.”

[an example snippet of C code was supplied in response]

From a Slovakian client on 18 August 1995. (using **V5.10**)

“I congratulate MicroImages for pyramiding. I didn't believe my eyes that SPOT raster (70 MB) was displayed in 3 seconds.”

From an international representative on 11 August 1995. (using **V5.10**)

*“I feel that they are about to place an order for **TNTmips**. They were very impressed with the trial and are promoting the advantages of **TNTmips** over ArcInfo. Generally, there is a very positive attitude to **TNTmips** within the [a nation] geophysical area. The **TNTmips** user in [mining company A] is strongly promoting **TNTmips**, even in other companies. Last week I received a referral from a [mining company B] who were told by [company A] that **TNTmips** was “the greatest thing since sliced bread”. Also the [a national organization] mentioned **TNTmips** in a [their Journal] recently as a capable system along with ArcInfo.”*

From an international representative on 31 August 1995. (using **V5.10**)

*“The people of [a client site] are working with **TNTmips** on the Sun and things are going good. You will be happy to hear this: on that workstation (a Sun Sparc 2), prior to the upgrade to the last Solaris, they had SynerGIS (a **GIS** software you may know). They used it with their ArcInfo data. With the upgrade of **OS** they delete SynerGIS and other packages and they are using now **TNTmips**! They will continue to use their ArcInfo **PC**'s to digitize and to generate the data. [A client] learned **TNTmips** on his own quickly and very enthusiastic about it.*

[It's about time ArcInfo began to feed data into **TNTmips**, after all we and others have fed them for years. It is also interesting to note that someone who already had experience in another complex **GIS** was able to make a fast switch. Remember

back when you learned your first word processor or complex editor, probably your first serious computer use? It took quite a bit of time and frustration. But, when you switched to another brand it was quite easy. By then you knew how a word processor was set up and simply looked for the equivalent procedures in the new product.]

From an NAFTA reseller on 31 August 1995. (using **V5.10**)

*"[A client] took special time to tell me that he was very pleased with the support provided by Microlimages in getting ready for this summer's processing. He wants to continue with **TNTmips**. ...*

From a South America client's interoffice memo on 30 August 1995. (using **V5.10**)

*"There are two routes by which **TNTmips** can be upgraded:"*

"1) Annual subscription: cost \$1000, includes 4 quarterly releases shipped by DHL."

"2) One-off upgrade to the latest version: cost-effective if you are upgrading from a very old version (max cost \$940) but not if you upgrade more than once a year (\$300 per quarter elapsed since license was purchased).

*"When [a name] first purchased **MIPS** (the boss at the head office), it was felt that the second route was preferable; once it could be shown that a newer revision was required, a motivation would exist to upgrade."*

*"Now that **TNTmips** has been in continuous use in [a site] for some time, it has become clear that the upgrades released every quarter are required. Each release for the last 18 months has offered either a new necessary feature, or a time-saving modification. Thus it is considered desirable to pay the annual subscription at this time; there is no commitment to subscribe again next year."*

... ..

"As a spin-off to the change to our subscriber status, the good relationship already established with Microlimages would be further enhanced, resulting in even closer attention being paid to our requests and suggestions for future developments."

From a recent letter received from an international location. (not currently a client)

*"For 10 years I have been working in the field of geographical information systems. For 3 years now I have been using **TNTmips** (first **MIPS**) in my working field of environmental and geotechnical engineering. As well as **TNTmips** I have experience with several other **GIS** systems. As part of my current position I am responsible for keeping abreast of the **GIS** market in order to advise my company on future **GIS** strategy."*

*"Further to my research I have come to the conclusion that no product is comparable to **TNTmips**; **TNTmips** offers excellent functionality for a realistic price."*

From an international representative on 19 October 1995. (using **V5.10**)

*"Today A1 size map was successfully printed out as was tested before (see attached). A0 will be tested and the result will be reported sometime. Original vector data (geology) was created by **PC** Arc/Info in [a country] and imported easily by **TNTmips** by Prepare/Import/Vector/ArcCoverage. I made a style object and*

assigned to the polygon (primary keyed in advance). This job is for checking of attributes inputted by **PC Arc/Info**. Why they choose **TNTmips**, not **PC Arc/Info** is that setting up the printing environment for **PC Arc/Info** was not easy. [a name] and his colleagues were satisfied with **TNTmips**. So easy.”

“To show a sample print-out I bought a Canon BJC-600 printer yesterday. BJC-600 was selected in **TNTmips** and could print out the attached two maps. Second map is same data for first, but backgrounded by DCW-PO [Digital Chart of the World-Political Outlines] data (projected by Lambert Azimuthal equal area).”

“**TNTmips** sites whom I showed these sample plotout showed same surprise for its nice quality and inexpensiveness of printer itself.”

From an international representative on 22 October 1995. (using **V5.10**)

“I recently used **TNTmips** to convert scanned maps to vectors, I am very impressed with the efficiency of the system. I just did the automatic line following and then used the vector filter to dissolve tiny polygons, snap undershoots, and delete dangles and specs. I hadn’t used the vector filter module before. **TNTmips** certainly provides professional consultants such as myself with a range of useful and specialized services to offer.”

From a FAX from a French client on 25 October 1995. (using **V5.10**)

“We have installed **TNTmips 5.1** in our Dec Alpha Workstation. It’s running well.”

[This client is multiplatform oriented and uses **TNTmips** on a **PCs** as well]

Extracted from a short article in Pay Dirt magazine published in Australia for mining professionals.

“The most accessible of the new generation **GIS** are called Desktop Mapping packages. MapInfo, Arcview and MapMaker are examples of this type of system. These user-friendly programs run under Microsoft Windows and share information with other Windows programs such as spreadsheets, word processors and presentation packages. Most DeskTop **GIS** can be learned quickly by someone familiar with other Windows programs. The value of the DeskTop systems is that they provide a means for integrating, displaying and printing maps, survey data and other geological information. Their principle limitation is their inability to perform the sophisticated data processing that is often required to build a **GIS** database from scratch.”

“At a higher level of complexity, even professional **GIS** systems are becoming cheaper, more powerful and far easier to use. The new generation professional **GIS** is epitomized by the **TNTmips** system. **GIS** means data integration and **TNTmips** integrated all types of geological information with alacrity. This package combines a fully functional **GIS** with a complete Image Processing System, in addition to 3D **CAD** and relational database management. The image processing functions include many that were previously found only in specialized geophysical packages including the ability to interactively enhance 32 bit geophysical images in a variety of color models. The system runs on **IBM** compatible **PCs** and Macintosh computers as well as most **UNIX** workstations. The new generation **GIS** ignore traditional distinctions

*between **GIS**, **CAD** and Image Processing, concentrating instead on providing the full range of spatial processing functionality."*

From a FAX from a beta test site on 21 November 1995. (using **V5.20** beta)

"Display and interface processes are much faster than before (2-3 times faster, I believe). This makes RGBB a useful option"

"Extra icons under Display 2D ... are quite useful."

"The Hide/Unhide Icon on Layer control is great for displaying one layer in a group of layers (turn on then off to do this)."

[this beta tester was using the new native **W95** version]