

15 February 1992

Release of TNT-MIPS V4.11

Introduction

TNT-MIPS V4.11 is being shipped to you on either 3.5" or 5.25" high density disks according to the preference expressed on your registration forms. Installation of **TNT-MIPS** will not alter your current **MIPS V3.32** in any way. It will create a complete new **TNT-MIPS** structure on your drive and subsequently recreate or update it with future releases.

Installation

Running **INSTALL** upgrades your key to authorize it for **V4.11**. It then decompresses and writes a copy of each process you have licensed from the disks containing **V4.11** into the selected directory on your hard drive. You must use the **INSTALL** routine on the installation disk supplied with this release to decompress the files during installation. Installing this **V4.11** will completely replace the earlier **V4.10** if the same hard drive is selected.

It is our suggestion that any **MIPS** user installing **TNT-MIPS** for the first time choose menu selection "T" (Install Minimal Test Version) offered by the **INSTALL** program. This approach will use about 5 megabytes of drive space. It will install only the **TNT-MIPS** display program and its associated support elements including the appropriate menu and the process to convert **RVF** project files into **RVC** project files. This comprehensive new display process is explained in detail in the printed reference material supplied earlier and in the on-line documentation and is the heart of **TNT-MIPS**.

When you experiment with the **TNT-MIPS** display process for the first time you will find that it is a much more comprehensive activity than in **MIPS V3.32**. It should be apparent that since the severe memory constraints of **MIPS** are being lifted by **MS W V3.1**, all our new processes will be considerably larger. Correspondingly, however, there will be fewer, longer loading processes involved as many formerly independent processes are consolidated into fewer, more comprehensive procedures.

After you have familiarized yourself with the display process and determined that it is correctly functioning, choose menu selection "M" (Install TNT-MIPS Version 4.11) on the **INSTALL** program to complete the loading of all the other available processes. **TNT-MIPS V4.11** will require somewhat less than 50 megabytes of your hard drive. Eventually this hard drive requirement will shrink somewhat as processes are further streamlined and integrated together.

The 5.25" version has 26 disks as follows: 21 containing processes; 1 supplemental with additional processes; 3 containing both the **TNT-MIPS** and **MIPS** documentation; and 1 with the installation and **MI** wrappers.

The 3.5" version has 23 disks as follows: 18 containing processes; 1 supplemental with additional processes; 3 containing both the **TNT-MIPS** and **MIPS** documentation; and 1 with the installation and **MI** wrappers.

The special supplemental disk contains additional processes and corrections added at the last moment and will be requested in the appropriate order after the main processes are being installed.

Status of Features

This release of **TNT-MIPS V4.11** is still only about a 95% equivalent of **MIPS V3.32** and a detailed list of the specific missing features is provided as the last section in this memo. This list differs from those provided with earlier releases of **TNT-MIPS** such as **V4.10** and seems longer, not shorter. However, please note the total list of features available in **MIPS** at this same level of detail is 31 pages while a similar list for the features in **TNT-MIPS V4.11** when created, would require about 45 pages.

The "missing pieces" lists provided with previous releases of **TNT-MIPS** provided information on the general processes in **MIPS** which were not yet available in **TNT-MIPS**. **TNT-MIPS V4.11** now contains all previous **MIPS** general processes except the one for reading from tape. Thus, you will find that this new list contains a complete inventory of the specific or low level **MIPS** features missing in **TNT-MIPS V4.11**.

A good portion of the still missing specific **MIPS** features may be of little interest to a specific user. For example, many of the import/export processes were implemented for a particular user or may no longer be used at all. Furthermore, many additional specific missing **MIPS** features are very special purpose and are used by only 1 or 2 users at most. Specific features, listed in bold in the list are considered of most importance and are currently being addressed first by the software engineers. User of **MIPS** should use this list as a guide to review the missing specific features and determine if what you need is available to support your conversion to **TNT-MIPS**. From Microlimages viewpoint, **V4.11** is a usable product for those who wish to begin using its new and advanced features.

TNT-MIPS V4.20 will be shipped to you in about mid-March on the normal release schedule. It is our plan that the specific missing features will be available in that release with the exception of lower priority import/export processes. At that time Microlimages will resume its normal quarterly upgrade schedule with the release of **TNT-MIPS V4.30** in June. For most of our software engineers, the period between March and June will be occupied by a second pass through **TNT-MIPS** to speed processes up, reduce hard drive space requirements, and catch features which were omitted from the initial reprogramming of **MIPS** into **TNT-MIPS**. In March or April, Microlimages also anticipates returning to business as usual with most of our software engineering time devoted to new enhancements of existing processes which you recommend and entirely new processes. At that time, we also anticipate instituting a more rigorous quality control program for **TNT-MIPS** as its code stabilizes.

On-Line Documentation

A total of 455 printed pages of **TNT-MIPS** documentation are included with **V4.11**. Unfortunately this still consists of detailed documentation on the display process and miscellaneous other sections as it is hard to document the those processes with incomplete of missing features. The on-line documentation printing capability of **MIPS** is available but still will not print the illustrations.

A copy of the completed portion of the documentation including all illustrations has been deposited at Kinkos in Lincoln as in the past. Please be careful to specify the exact version number should you order a printed copy of the documentation from Kinkos as they have both **V3.32** and **V4.11** on hand.

MicroImages X Server (MI/X)

Driver errors. The **MI/X** server to run X Windows inside of Microsoft Windows **V3.1 (MS W 3.1)** has now been perfected and contains no currently known errors. The last 3 problems with **TNT-MIPS** running with our **MI/X** have been traced to errors within the **MS W 3.1** drivers for the respective display boards as follows.

1) The latest 8-bit drivers for the Diamond Speedstar 24X do not manage some color situations correctly and this can be visually verified within **MS W 3.1** or by running the Driver Compatibility Test (DCT) supplied as part of the **MS W 3.1** developer kit. Diamond's more recent drivers for this board cause the colors in the text bar in every **MI/X** windows to change in peculiar ways. More seriously, it will cause discoloration's in the display of optimized color images when used in the 8-bit color mode. This error has been communicated to Diamond. An early Diamond driver designated **V1.01** seems to work correctly so use it and not their higher number versions. Contact MicroImages for a copy of this driver if you do not have it.

2) The Truevision 1024 32XP and ATI Ultra Pro2 have the same error where the driver provides a property when interrogated which is incorrect. A special **TNT-MIPS** set up feature is required to work-around this error until resolved by their manufacturers. Contact technical support if you get a **MS W 3.1** error message when running **TNT-MIPS** display process with these boards. This work-around slightly reduces the maximum performance of these boards in TNT-MIPS by a few percent. The drivers for these boards will pass the DCT which does not test how this bit is set. However, MicroImages has provided both manufacturers with source code on a small test program which will demonstrate that this error is present and await their response.

The above information is provided so that you will take note that board vendors are not thoroughly testing their display drivers. This seems especially evident where the drivers are used by 32 bit applications such as **TNT-MIPS**. It is estimated that probably 95% of the **MS W 3.1** application programs use Microsoft C which provides for 16 bit applications and will not encounter the error in the Truevision and ATI drivers noted above. Unfortunately, there are so many **MS W 3.1** supported boards and drivers that it is going to be impossible for MicroImages to test and validate them all.

Full color support. The **MI/X** servers for 8-, 16- and 24-bit color operation are automatically installed as part of **TNT-MIPS V4.11**. Simply set or change your desired color mode and resolution within **MS W 3.1** and then restart **MS W 3.1**. The **MI/X** server will detect the **MS W 3.1** driver you have selected and use it. The **TNT-MIPS** processes have also all been adjusted to support use of these **MI/X** servers, Mac display support, and also the 8-bit and 24-bit X Servers supplied with workstation display boards.

Text display speedup. The **MI/X** server has been modified so that interface text plotted on any display boards is 4 times faster. With this change you will find that the speed of the **MI/X** interface (e.g. putting up and moving windows, dialog boxes, etc.) on a new, fast windows board (e.g. ATI Ultra Pro2) on a 486 based processor is not that much different than the native use of X on a workstation. This speed comparison does not

include loading processes such as the standard 2-D display process or displaying objects which are related to the drive, bus, and processor of the system being used and not **MI/X** or the **MS W 3.1** display board.

MI/X test mode. Installing **TNT-MIPS** will provide the regular 8- and 24-bit **MI/X** servers (16-bit displays are handled by the 24-bit **MI/X**). **V4.11** also installs duplicate TEST versions of these same **MI/X** servers. These TEST servers are identical to the normal versions but contain additional code which will set up a file in your **TNT-MIPS** directory named XSSTATS.TXT. When you use any **TNT-MIPS** process with either of these TEST **MI/X** servers it will not show any visual change but will record in this file the number of calls which **MI/X** makes to each **MS W 3.1** graphical function and how long the functions take to execute.

Sending MicroImages a listing of this file, created during a simple use of the 2-D display program, together with the board type and **MS W 3.1** driver version used will help MicroImages and you determine the efficiency of your **MS W 3.1** setup and the particular display board you are using.

After **TNT-MIPS V4.11** is installed, typing **TNT-MIPS "TEST"** with the space and quote marks will load and use these special 8- or 24- bit **MI/X** servers and create the XSSTATS.TXT file. The name of the XSSTATS.TXT file created and used for the these statistics can also be changed by editing it in the TNTMIPS.INI file. MicroImages plans to expand this TEST procedure further into a means by which you can grade or rate the speed of display boards for their actual performance with **TNT-MIPS**.

OPTIMIZING MS W 3.1

Again MicroImages emphasizes that efficient use of robust application software such as **TNT-MIPS** requires a carefully optimized installation of **MS W 3.1**. A review of some of the critical installation features follow. A short but important copyrighted article on this same topic occurs in PC Magazine, 8 December 1992, pages 389-391, entitled Making Windows Scream - Painlessly. Another more complex source of information on optimization can be found in Chapter 14 of the manual provided with **MS W 3.1**.

Smartdrive. Smartdrive **V4.0** comes with **MS W 3.1** and uses extended memory as a cache buffer for your hard drive. The above article states that "installing Smartdrive or its equivalent is the single most important change to boost Window's [**MS W 3.1**] speed". To use this feature simply add the command SMARTDRV into your AUTOEXEC.BAT file. The number following SMARTDRIVE sets the amount of memory in kilobytes used for this cache at the DOS level. For systems with 8 megabytes use SMARTDRV 2048 512. The second numeric parameter is the amount of memory used for this cache buffer by, and within, **MS W 3.1**. Varying this memory parameter will speed up or slow down the **MS W 3.1** interface and **TNT-MIPS** interface reactions in turn. Inversely, it will provide more or less of your total real memory to your actual applications such as display, classification, mosaic and so on within **TNT-MIPS**. The 512 used above slows down the **MS W 3.1** (offset by faster display boards) and speeds up applications. Determine for yourself the value you wish to set for this second parameter. Then check that it is really what you think it is using the WinSleuth GOLD application MicroImages has provided to you.

Permanent swap space. Do not use temporary swap space for **MS W 3.1** for your virtual memory. Set up your swap space within **MS W 3.1** to be permanent and at least

16 megabytes. **MS W 3.1** will not allow a large permanent space to be set up on a fragmented drive. Permanent swap space must be contiguous so make sure to run an optimizer on your drive to defragment it just before setting up the permanent swap space. Once a drive area has been used as permanent swap space it will be permanently allocated and will not be available for other processes and can not become fragmented. The alternative of temporary swap space is created as needed and can start out highly fragmented or gradually becomes fragmented. This significantly slows **MS W 3.1**.

FastDisk. The same virtual memory dialog box used to set up swap space shows a small check box at the bottom labeled "Use 32- Bit Disk Access". Make sure to select this option to allow **MS W 3.1** to use its own protected-mode drivers. If the check box and label do not appear then your drive controller will not support this feature. Caution, however as 5% of the time the option is presented but its use can destroy files. **ABSOLUTELY**, do not use this option with drive compression software such as Stacker or SuperStor. Under any circumstances back your hard drive up first before trying it if you are unsure.

Print manager. Using the print manager takes significant memory permanently away from the use of **MS W 3.1**. Shut off the print manager as it does not provide that many useful features!

Miscellaneous others. The following additional, more complex procedures are documented in the PC Magazine article referenced above. Defragment your hard drive periodically. Run CHECKDSK outside of **MS W 3.1** to check for lost allocation units or cross-linked files. Watch out for your WIN.INI and SYSTEM.INI files set up at installation. Microlimages never does anything to these files but installation of other software can alter them to optimize their performance with callous regard to your other applications.

DOS setup reviewed. The following is a review of the suggested setup parameters for setup of **DOS 5.0** for **MS W 3.1** and **TNT-MIPS**: use HIMEM.SYS; DOS=HIGH,UMB; BUFFERS=45; and FILES=90. Do not load EMM386 unless you need expanded memory for other purposes as its setup is complicated and it can destroy data on optical drives.

Real memory. Your real memory should be at least 8 megabytes and more will speed up **TNT-MIPS** processes by using real memory rather than real plus virtual memory. More importantly, you should check to make sure that almost all your real memory is made available to windows and is not reserved by disk cache software such as Smartdisk or something else.

The amount of real memory available when **MS W 3.1** is operating can only be determined indirectly using **MS W 3.1**. First set your swap space (permanent or temporary to "none" not "0") and then check the total amount of memory (real plus swap space) available with the within **MS W 3.1**. With no swap space set up this total equals the real memory available. The WinSleuth GOLD software will directly report from within **MS W 3.1** the real memory as well as temporary or permanent swap space you have available. The real memory available to **MS W 3.1** should be about 8 megabytes less the 1 mb used by **DOS** and **MS W 3.1**.

Additional memory beyond 8 megabytes will speed up **MS W 3.1**, **TNT-MIPS**, and applications. Additional memory will be used to reduce roll-out and reloading of processes to/from hard disk swap space; make more memory available for applications; and related.

Mono board removal. **IMPORTANT** - If you have a monochrome board in your machine (such as for use with **MIPS V3.32**) you should remove it. An 8-bit mono board will slow down communications with your color display board when used with **MS W 3.1** to 1/2 the rate which would be achieved if the mono board was removed. Some display boards, such as the Diamond Speedstar 24X, come with a software utilities like SETBUS16 and SETBUS8 which will software engage or disengage the monochrome board. These utilities are color display board specific and are supplied by the board's manufacturer.

RAMdrive. **MIPS V3.32** required that any additional memory above 1 megabyte to be set up as a RAMdrive to be used. **ABSOLUTELY** do not set up a RAMdrive for **TNT-MIPS** as this memory is permanently allocated and it will not be used by any **MS W 3.1** application.

Accelerated display boards. **TNT-MIPS** permits the selection and use of any display board and monitor combination available to you via your equipment supplier. Formerly with **MIPS** you selected, usually with MicrolImages assistance, off the charts of display boards supported directly by MicrolImages drivers. Now you should be forewarned that the selection and use of slow, old fashioned, (albeit) extremely cheap boards with **MS W 3.1** drivers will offer slow **MS W 3.1** and **TNT-MIPS** performance. To assist you in this area, MicrolImages can provide information on the new, economical, but greatly accelerated display boards which are now available to significantly speed up **MS W 3.1** user interface and thereby the **TNT-MIPS** interface.

Expectations. Some of the above gets pretty complicated and indeterminate for the individual user. It will take some experimentation or expert help to get it right. Remember, MicrolImages did not make up the rules of this game, Microsoft did. Overall, the best yardstick is to find some one who has a nicely set up 386 or 486 running MS W 3.1 and gage its performance against the way your machine works. Another procedure is to time how long **TNT-MIPS** takes to open its first window after you click on the icon and check this with MicrolImages. Another timing to report is how long it takes the display to open all its windows when from the time 2-D is selected. On a 386/20 machine the minimum for each can be expected to be somewhat under 40 seconds each. On a 486/66 machine these processes can be loaded in 10 to 15 seconds depending on the drive controller. One would guess that the first 586's will load these processes in 5 to 10 seconds. Workstations load things in pieces and their speeds for the same processes should not be used as base lines for PC's.

Please note that MicrolImages has designed **TNT-MIPS** for the future. In two years you will be using all its advanced features at the same hardware price on hyped up 586 or 686 machines using 32 to 64 megabytes of real memory, an advanced 32 bit bus, improved Microsoft Windows or **NT** products, and with much faster video cards communicating directly with the main processor. All this will make for very fast performance. However, in the meantime, it is important to insure that you wring all the performance possible out of your current 386 or 486 machines by optimizing their setup.

New Features

There have been hundreds of new features beyond those in **MIPS V3.31** added via **TNT-MIPS**. As of yet no detailed list of these new features has been compiled nor were they document in the release notes as was the case with each regular quarterly **MIPS** release. With the release of this **V4.11** the listing of new features added will resume and follows.

RVFTORVC conversion. This process now runs about 10 times faster. Using **DOS COPY** to move a large 200 megabyte ***.RVF** file from an erasable optical drive to a hard drive would take about 15 minutes. Converting this typical ***.RVF** file to ***.RVC** using the same equipment would take about 3 times as long. No further efforts to speed up this process are planned as it is about maximized now.

Default window positions. The positions to which windows are dragged and arranged are now remembered even when **TNT-MIPS** is restarted. This is an important addition as it avoids the constant repositioning of a stack of windows.

Changing desktop colors. The background color of your MI/X desktop can now be changed. Eventually an interactive, easy method will be provided. Until then, you will need to change colors by editing the line **ROOTCOLOR=SLATE BLUE** in the **TNTMIPS.INI** file in the **TNTMIPS** subdirectory. The file **RGB.TXT** in this same directory contains a list of the descriptive color names you may select from. Simply make **ROOTCOLOR=** the new color you desire.

Default project file positions. The project file is remembered and becomes the default in when another object is to be selected such as in an **RGB** case. A new, single **RGB** select window will be available in **V4.20** so that each of the 3 color objects can be selected from a single window. This process has already been added in feature mapping but insufficient time was available to incorporate it in the general image display process for this release.

View position window. A view position window now pops in as soon as a raster object is selected and can be used to select the subportion of the raster for display. This provides a graphical means of selecting the raster area to be viewed. The speed of displaying a small raster object 1:1 has been doubled. The scroll bars now support the 10% and 90% scroll positions standard in all similar other Motif based systems.

Please avoid displaying a very large raster (e.g. a complete SPOT image or RGB LANDSAT TM) which will be sampled to all fit in the display window. This will take a long time as the special buffer technique to sample a huge raster out of the "tiled" storage of raster objects will not be available until **V4.20**. Use the view position window to inspect such rasters 1:1 in small sections and you will find that the section will display very quickly as that portion of the "tiled" buffering is being used. Remember, just the simple **DOS** copying of a SPOT or LANDSAT scene can take 5 to 10 minutes and the resizing of the full scene will involve reading the whole raster, resampling the pixels needed, and possibly changing their map projection.

Status reports. Multiline status reports are now displayed in various processes (e.g.,, printing). These will be expanded into other processes to provide more information about what is happening in an executing process.

Process status. A sliding bar has been implemented in a couple of places (e.g., printing) and its changing length graphically illustrates the percentage complete of an executing process. The use of this bar will migrate though out other processes wherever appropriate.

Classification. Supervised and unsupervised neural network classification processes have been added. A mask can now be used in all supervised classification processes to define the irregular area(s) to be processed.

DEM/orthophotos. Relative and absolute orientation models are available for both airphoto and SPOT stereo image. **DEM** and orthophotos processes can now be used with airphoto stereo pairs. Statistical results are reported for both relative and absolute orientation model solutions. These include a report as to the goodness of fit of the epipolar geometry determined from the tie points when subsequently checked with these tie points. Similarly the absolute orientation of each image, which is determined from control points is checked and reported for goodness of fit to the control points.

Editing **CAD** objects. The georeference information can now be preset for a empty **CAD** object which you create for your work session.

Editing vector objects. The georeference information can now be preset for a empty vector object which you create for your work session.

Color smart line following. This process exists a formerly in both the **CAD** and vector editing processes. However, the underlying algorithm has been completely changed. The line is now traced much faster and can more accurately stay on the color line (e.g., contour lines when they come close together in steep terrain).

Scanning. Now uses the same window display features of the new 2-D display.

Mosaciking. The raster, vector, and **CAD** mosaicking processes now been integrated into a single process and use a common, consistent user interface and setup procedure.

Outline font editor. Multiple characters can now be edited at one time (such as in building up complex characters).

HyperIndex. A generic polygon can be drawn to define an index or link area.

TNT-MIPS display has allowed a complex window to be built up of multiple rasters and **CAD** and vector overlays. Correspondingly, display has allows you to automatically redisplay these composite windows or "super-objects" at any time or perform zoom, scroll, measure, and other regular display functions. Hyper, as an integrated portion of display, can now be used to link these windows or "super-objects" together. When the HyperIndex is subsequently used to access that window or "super-object" as daughter, the complex window will be constructed and may, in turn, be linked to other windows.

Printing. Considerably more information is now provided during the actual process of printing to a file or a printer.

SML. New shortcut operators += -= *= /= %= are available following the same syntax as in "C" For example, a += b is the same as a = a + b. The colon ":" is now accepted at the end of any statement to correspond with C and Pascal. However, it is ignored by SML and is allowed to avoid syntax errors with those C

experienced C programmers using **SML** who automatically add it. A new PRINTF() new function is available to print formatted text

Editor. The graphical windows oriented editor was new in **V4.10**. In **V4.11** it now supports setting the tab interval (Settabs). The backspace key will now delete a character if the cursor is not at the first column. Correspondingly, it will delete a line and append the content of that line to the end of the previous line if the cursor is at the first column.

Application Note Outlines

Internationalization and Localization (I&L). These have been additions to the draft of this Application Note since its previous version and a new copy is enclosed. Written work on this note is being temporary suspended until additional software effort can be expended to provide some needed processes which include creating a multilingual 2-byte UNICODE font (Chinese, English, etc.) for use in translating the **TNT-MIPS** user interface; a 2-byte UNICODE text editor (current 1-byte editor being adapted); and a keyboard method devised for Chinese (as an example and test case).

Feature Mapping. Usually we do not provide advance information on writing projects which have just begun. However, a partially complete draft of an Application Note on this important topic should be available for shipment with **TNT-MIPS V4.20** and will be based upon the **TNT-MIPS** version of Feature Mapping.

Advanced User Workshop 5 (AUW5)

The Fifth Advanced User Workshop (**AUW5**) was completed as planned. A copy of the general program outline is enclosed for your file.

Miscellaneous

MicroImages periodically receives requests from sites which are seeking staff experienced with **MIPS/TNT-MIPS** and alternately from those experienced in its use. We are happy to assist in ensuring that those who enjoy working with **MIPS/TNT-MIPS** find opportunities to do so. Unfortunately it seems usually the case that the positions become open when no-one is available and visa-versa. Currently we have reference to a couple of individuals who are seeking to move to new sites where they can continue to work with **MIPS/TNT-MIPS**. Please note that unfortunately only those staff familiar with the operation of our products can be assisted.

Missing features to ship as V4.20

8 March 1993 development cut off date
20 March 1993 shipping date

Main Menu

- Setting up preferences

Display in 2D

- 2-D (correlation) histogram

- Interactive (e.g., sun) shading

- Raster profiling tool

- Raw raster data value displays for an outline box in view window

- "CLASS-CMAP": special image analysis routine

- Vector route tracing

Select and style vector/CAD elements by query

Graphical positioning of groups (will also provide this interactive feature for Map and Poster Layout)

Complex number raster display (for Fourier raster displays)

Save measurements into a file

Measurement tool for solid areas and their boundaries

Direct display from TARGA and TIFF format

Editing CAD objects

Elements which can not be created:

elliptical arcs - (arc, wedge, and chord)

block insert

Tools not available:

line snap snap to grid

line join **line break**

Editing vector objects

Tools not available:

move copy

snap to grid

editing and adding text labels

pan to elements by database query

database manipulation due to intersecting lines

adding attributes into database for new elements

Editing raster objects

Creating new paint brushes

Boundary and smart fill

Moving an area will not change the area (no zoom, shrink, or rotate)

Outline font selection

Color map editor

Styles can not be used for fill patterns, line patterns, or line thickness

16-bit color composite editing

24-bit color composite editing

Numeric editing of cell values

Undo with a polygon

Undo from a source file

Create a new, empty raster

Font style/view window

Georeferencing

Snapping point selected to nearest vector/CAD element

Overlay of vector/CAD on raster

Raster to raster (overlay method)

Raster to raster (side by side method)

Warping and resampling objects

Manual raster resampling by entering angle and output raster scale

Changing raster projections

Warping vector/CAD objects to change to a new projection using georeference information

Database Reports

- All features

Video Digitizing

- Support for the Truevision AT-Vista**

- Support for Atronic Professional Image Board

- Automatic interval capturing (intervalometer)

On-Line Manual

- Glossary access

Raster Analysis

- Simple algebraic combinations**

- Thresholding and range selection**

- Predefined functions (e.g. vegetation indices)**

- Slope, aspect, and shading**

Feature Mapping

- Transfer of labels from vector polygons

- "Exact" color matching identification mode

- Restarting a incomplete process saved earlier

Surface Fitting

- Data base query for Z-values to be fit.**

Buffer zones around vector elements

- Automatically intersect buffer zones created for all elements**

- Transfer of attributes of elements to buffer zone polygons**

Copying of vector objects

- Lines are clipped at boundary of the region selected, the optional selection to keep or omit lines crossing the boundary is not available

Spatial filtering

- Editing of a filter kernel

- Filtering of the display image "in place" by selecting a region using a box, circle, or polygon

- Can not reposition position of "in situ" test results

- Setting options such as thresholding, scale, and offset

Fourier

- Can not display complex variable rasters

- Quick test in small areas

Destripe raster objects

- Manual destriping

- Auto destriping

- Quick test in small areas

Removing trends in raster objects

- Display the trend found

- Show the trend equation

Mosaicking raster objects

- Manual abutment using a line segment which can be positioned

Batch mode procedure

Editing fonts

Testing a font appearance using a crosshair

Editing a stroke (single line) font - the Stork font

Editing using bsplines

Copying between characters

HyperIndex

Lateral movement at a given level in a stack between objects

Create links back to parent object so that a "break-in" start in the middle of a stack can back-up

Linking via vector object polygons and thus click on a polygon and move through the stack

Spatial Manipulation Language (SML)

User input functions: INPUT and INPUT\$

Global functions (global minimum, global maximum, and others)

Solving a system of linear equations

Function to copy subobjects

Display function for creating a slide show

Database procedures

Forms: for user definable layouts for viewing/editing fields

Attach: to attaching records to vector/CAD elements by X/Y fields in the database tables.

Scanning

Scanning into TIFF, TARGA, and 8-bit composite color

Thresholding and scanning to binary files

User-defined contrast adjustments

Retaining defaults

Scanners which communicate via GPIB

Pen plotter output

Styling by class (key field attribute)

Styling by database query

Multi-page output to spread drawing over larger area

Plotting point symbols (formerly plotted for nodes)

Manual calibration to enter control points to warp vector for overplotting existing map

Plotting by scale

Hardcopy

Printing test strips to setup a color balance

Using a log-curve for color balancing

Text and scale bars

Map grids do not show coordinates

Selecting only specific pages from a multipage print setup

Printers which communicate via GPIB, SCSI, and Xerox VPI cards

Making legends

Vector Import Formats

TIGER **MOSS**
ARC/INFO Coverage, Generate
TYDAC - Spans VEH/VEC
MMI - Mapinfo Map Interchange
WDBII - World Data bank II
Text - coordinates from text files into point elements
Database - coordinates from tables into point elements

Vector Export Formats

MOSS **DXF - AutoCAD**
ARC/INFO Generate
MMI - Mapinfo Map Interchange
MBI - Mapinfo Boundary Interchange
GRASS - Vectors
GSMAP - USGS format
DLG-OPT - Optional DLG

CAD Import Formats

MOSS
IDGS - Intergraph internal format
SIF - Intergraph Standard Interchange Format
MMI - Mapinfo Map Interchange
MBI - Mapinfo Boundary Interchange

CAD Export Formats

IDGS - Intergraph internal format
MMI - Mapinfo Map Interchange
MBI - Mapinfo Boundary Interchange
GSMAP - USGS format

Raster import formats

generic	MicroPIPS
All formats directly form tape	ApplePIPS
GRASS	EPPL7
ASCII values fro a text file	Vohs
XYZ ASCII	I2S
PCX	GAC/LAC
USGS DEM	TIROS
ADRG	TM Fast Format
DTED	TM TIPS
CCRS	EOSAT
NITF	Terra-Mar
GRD	SPANS
GXF	Scan-CAD
PCIPS	IDIMS
MacPaint	RIPS
MIPS.DAT (6 years back)	

Raster export formats

generic	ApplePIPS
GRASS	MicroPIPS

ASCII
PCX
CCRS
GRD
GXF

EPPL7
IDIMS
RIPS
MacPaint
PCIPS

Raster Conversion Utility

RGB to/from 8-, 16-, and 24-bit composite color

RGB to/from HIS

RGB to/from HBS

Fast Wetland Counting (MARKWET)

All features

Miscellaneous

User defined map projections

Contrast sensitive help is absent from all processes

Batch processes are not yet available