



# Reference Point

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Technical Resources for DataCAD®

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## Hardware: Unraveling the mystery

During the past year, PC hardware developments have come at a rapid pace; they have been accompanied by an increased level of competition between vendors. The rate at which developments have occurred is partly a product of natural competition and in part driven by pressures on the marketplace induced by the popularity of Microsoft Windows. The result is a proliferation of new technology at dramatically decreasing prices. However, the pace at which new technologies have been introduced has made hardware specification decisions more complex for the buyer.

The following article provides clarification of issues surrounding current (and anticipated) hardware technology. The intent is to provide to the DataCAD user sufficient information for him/her to make informed purchasing decisions.

**Defining the objectives** of the purchase is critical to the success of the undertaking. The buyer must determine the use to which the system will be put. This question is answered by an examination of the software that is to be installed on the system. It is assumed that DataCAD will be a primary application, but other applications may be installed as well. What are the demands of those applications? What operating system will be used? MS DOS? DR DOS? OS/2? Will MS Windows be installed? Is Windows NT being considered as a future operating system? The answers to these questions define the "shape" of the system. It may be that a stand-alone DataCAD system is sought, with no regard to other current or future software requirements. Alternatively, the system may be a platform for future operating system and software upgrades.

**Sourcing a system** is one of the first decisions that a user must make. The direct channel (mail order) offers systems at incredibly low prices, but with a degree of risk. The buyer must specify a system, choose a vendor, install and configure software, and provide his/her own "tech support" for the system (with the aid of telephone support from the vendor). Further, the entry of IBM, Compaq, AST, and other "high end" ven-

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### *In this issue:*

Discussion of hardware topics is presented; sections titled **System Architecture** and **Chip Tricks** discuss the key elements of a PC system. **Recommended Hardware Specifications** are presented for a basic DataCAD station and a Windows system. Use of the **Matrox Impression 1024** graphics card is described as an example of the direction in which affordable graphics are moving.

**A Problem Documentation Form** is provided. It may be used as a means of communicating with Cadkey Technical Support staff in the event of problems occurring when running DataCAD.

**User Input** describes a means for displaying 256 colors on screen in DataCAD; comment on this from Cadkey Tech Support staff is included in **Tech Support**. Guidelines are presented for using the Hewlett Packard Design Jet plotter. A reported problem with using SMARTDRV.EXE, the Windows 3.1 disk cache driver, is discussed.

**Third Party Products** provides a listing of DCAL macros, template & symbol libraries, etc. that are currently available for use with DataCAD. The new **Steelcase Symbol Library** and the DCAL macro through which it is implemented are described in some detail.

**News** of Cadkey's planning process and a new DataCAD price promotion are presented.

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# Problem Documentation Form

Use this form to document a problem occurring when running DataCAD. Photocopy it; fill it in as completely as possible. FAX it and printouts of AUTOEXEC.BAT and CONFIG.SYS to Cadkey Technical Support. Tech Support will use the information on this form to isolate the problem and assist in rectifying it.

**Tech Support:**  
(203) 298-8888 ext. 8060

**Tech Support FAX:**  
(203) 298-6404

Name: \_\_\_\_\_  
Company Name: \_\_\_\_\_  
Phone Number: \_\_\_\_\_  
FAX Number: \_\_\_\_\_  
DataCAD Serial Number: \_\_\_\_\_  
Maintenance Contract #: \_\_\_\_\_  
Date: \_\_\_\_\_

What Cadkey, Inc. software version are you running?  
 DataCAD v4.06  DataCAD v4.0  DataCAD v3.6e  
 DataCAD 128  Velocity v1.2  Other

Please describe briefly the problem you are experiencing:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Was the software installed to hard disk from the original distribution diskettes?  
 Yes  No  Don't know

How many DataCAD stations are you running? \_\_\_\_\_

How many stations are experiencing this problem? \_\_\_\_\_

How frequently does this problem occur? (choose one)  
 Several times a day  Once a day  
 Once every few days  Once a week  
 Once every few weeks  Once a month  
 Once every few months  Other

Since you first started experiencing this problem, has the frequency of the failure occurrences increased?  
 Yes  No

Does the failure occur during a specific function or operation? If yes, describe the operation.  
 Yes  No  
\_\_\_\_\_  
\_\_\_\_\_

Do you get an error message when the failure occurs?  
 Yes  No

Message: \_\_\_\_\_

Does the failure occur only in a specific drawing file(s)?  
 Yes  No

Is DataCAD configured to use a Default Drawing?  
 Yes  No

Is DataCAD configured using a RAM disk for Virtual Files?  
 Yes  No

Is the failure reproducible?  Yes  No

Can you reproduce the failure in a new drawing file?  
 Yes  No

Is the failure intermittent?  Yes  No

What is the manufacturer brand name and model of your computer? \_\_\_\_\_

What processor/clock rate does your computer have?  
 386-20MHz  386-25MHz  386-33MHz  
 486-25MHz  486-33MHz  486-50MHz  
 486DX/2-50MHZ  486DX/2-66MHZ  
 Other: \_\_\_\_\_

What BIOS does your computer use? (displayed on screen at power-up)  
 Phoenix BIOS version: \_\_\_\_\_  
 AMI (American Megatrends) BIOS version: \_\_\_\_\_  
 Award BIOS version: \_\_\_\_\_  
 DTK BIOS version: \_\_\_\_\_  
 Other: \_\_\_\_\_

Total amount of RAM installed in your computer:  
 1 Megabyte  4 Megabytes  8 Megabytes  
 16 Megabytes  Other: \_\_\_\_\_

What bus architecture does your computer have?  
 ISA  EISA  MCA  
 Local Bus  Other: \_\_\_\_\_

What brand of mouse or digitizer are you using?  
 Microsoft  Logitech  MouseSystems  
 Other: \_\_\_\_\_

What brand/model of plotter are you using?  
 Calcomp model: \_\_\_\_\_  
 Hewlett Packard model: \_\_\_\_\_  
 Other: \_\_\_\_\_

What graphics card are you using? \_\_\_\_\_

What version of DOS are you running?  
 MS DOS 3.3  MS DOS 4.01  MS DOS 5.0  
 Compaq MS DOS 3.31  Other: \_\_\_\_\_

How much free disk space is available? \_\_\_\_\_

What memory manager are you using?  
 HIMEM.SYS + EMM386.EXE (MS DOS 5.0, Windows 3.0, 3.1)  
 QEMM (Quarterdeck)  
 386MAX (Qualitas)  
 CEMM (Compaq)  
 Not running memory manager  
 Other: \_\_\_\_\_

What disk cache software are you running?  
 SMARTDRV.SYS (MS DOS 5.0, Windows 3.0 version)  
 SMARTDRV.EXE (Windows 3.1 version)  
 Super PCKWIK  
 Not running disk cache  Other: \_\_\_\_\_

What network software and version are you running?  
 Novell Netware version: \_\_\_\_\_  
 Lantastic version: \_\_\_\_\_  
 Not running network software  
 Other: \_\_\_\_\_

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dors into "low end" pricing competition has put further pressure on the market. The intense price competition that is currently being experienced in the marketplace has driven a number of vendors out of business. Direct channel purchases should be made with an eye to the stability of the vendor.

Purchasing from dealers or CAD consultants eliminates much of this anxiety. Dealer-purchased units can be installed on-site as *turnkey* systems; software training and hardware support can often be bundled with the initial purchase price. The buyer must decide whether the additional cost of a system purchased through a dealer or consultant is sufficiently offset by the level of service that can be provided.

In the case of either source for the purchase, an understanding of the components of the hardware specification is very important. Obviously, when purchasing from the direct channel, the buyer must be well informed. Similarly, when negotiating with a dealer or consultant, the buyer should have a reasonable understanding of the system under consideration.

Just as an architect working with a structural consultant must have a rudimentary understanding of structural engineering, the specifier of a new computer should have a working knowledge of its basic components when negotiating its purchase.

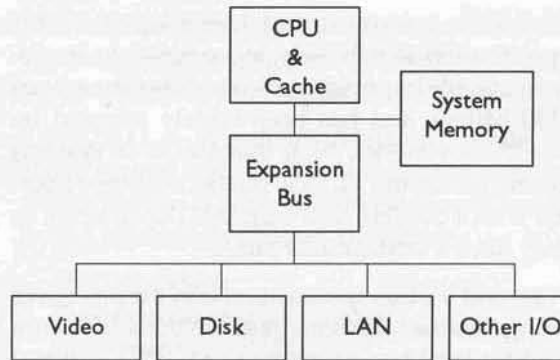
### System Architecture

The current "hot" innovation in PC's is Local Bus. To understand what this is and the role it plays in system performance, *system architecture* must be discussed.

Figure 1 illustrates the traditional PC bus, as first introduced with the IBM AT. In a typical (non-upgradable) 386 SX ISA bus system, the CPU accesses system memory through a 16 bit bus, the same as in 286 systems. In DX ISA bus systems, memory access is through a 32 bit bus. As the data throughput of the 32 bit bus is vastly greater than that of the 16 bit bus, this alone is reason to *avoid any SX based system*.

In a DX system, data flows between the CPU and peripheral devices (graphics card, hard disk controller, etc.) on a 16 bit, 8MHz bus. The traditional AT bus yields a data throughput rate of less than 10 MBps. Faster processors and more demanding applications (re: Windows) tax this bus design.

An early response to this limitation was the development of MCA and EISA bus specifications. Both of these provided 32 bit access to peripherals

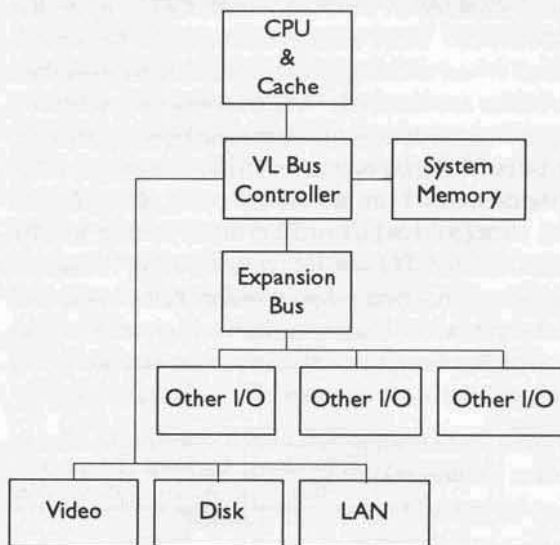


**Figure 1**  
Traditional PC/AT Architecture

at (theoretical) speeds of up to 20MHz. EISA and MCA bus designs have a theoretical data throughput of 30 MBps. Due to the expense of designing and manufacturing graphics cards and disk controllers to these specs, neither has met with much commercial success.

Last year, systems began to appear featuring **Local Bus** architecture. The earliest of these were based on mother boards and graphics cards based on a design by Opti. These were quickly followed by systems based on the VESA (Video Electronics Standards Association) Local Bus specification. This is the spec that has been widely adopted by mother board and peripheral device vendors.

The VL bus specification (Figure 2) may be integrated with ISA, EISA, and MCA designs. It calls for a 32 bit bus operating at the CPU's external speed (up to 33 MHz) between the CPU and as many as three VL bus peripherals (graphics card,



**Figure 2**  
VL Bus Architecture

### Definition of Terms:

**CPU:** Central Processing Unit  
The "brain" of a PC which performs the bulk of the processing work. Most often referred to by the last three digits in its full name (286, 386, 486; 486), its class (SX, DX, or DX2) and its speed rating, expressed in Megahertz. An Intel CPU referred to as a 386DX-33 is an 80386 CPU, DX class (it accesses memory through a 32 bit bus), operating at 33MHz.

**ISA:** Industry Standard Architecture. Originally established by IBM with the release of the AT, the ISA standard established a 16 bit system architecture that standardized the relationship between the key components of a PC. By conforming to the standard, peripheral vendors can design (and sell) boards that operate in systems manufactured by others. The acceptance of the ISA spec as an industry standard was a key factor in the development of the "clone" market and, hence, the PC industry.

**MCA:** Micro Channel Architecture. IBM-specified upgrade to the ISA standard. The MCA spec provides a 32 bit bus to peripheral devices. IBM continues to market MCA systems, but it has not been widely adopted by other vendors.

**EISA:** Extended Industry Standard Architecture. A competing 32 bit architecture specified by a consortium of system manufacturers (led by Compaq). More widely accepted than MCA, EISA systems are available from a number of vendors. High performance EISA hard disk controllers are popular in file server applications, where high levels of data throughput are required.

**VESA:** Video Electronics Standards Association. This is a trade group comprised of hardware and software vendors that has established a series of industry-wide standard specifications. Their goal is to provide means by which products from competing vendors may work together.

**VL Bus:** VESA Local Bus. VESA's local bus specification.

**PCI:** Peripheral Component Interconnect. Intel's proposed PC architecture specification.

**LAN:** Local Area Network.

**MBps:** Megabits per second. A measure of data throughput.

**External Processor Cache:**

Starting with 386 systems, mother board designers have included external processor caches (sometimes referred to as SRAM caches) to improve the performance of their systems. These caches typically are sized at 64k, 128k, or 256k and are comprised of fast (20ns) Static Random Access Memory (SRAM).

Intel's 486DX and DX2 CPU's feature internal 9k caches. Testing indicates that system performance is enhanced by the addition of an external processor cache to a 486 CPU. System vendors generally provide the SRAM cache as a standard feature, with upgrades to its size optional.

Generally, the faster the CPU's internal operation, the more it will benefit from increasing the size of the SRAM cache.

As a guideline, a 486DX 33 should probably have at least a 128k SRAM cache, a 486DX2 66 at least 256k.

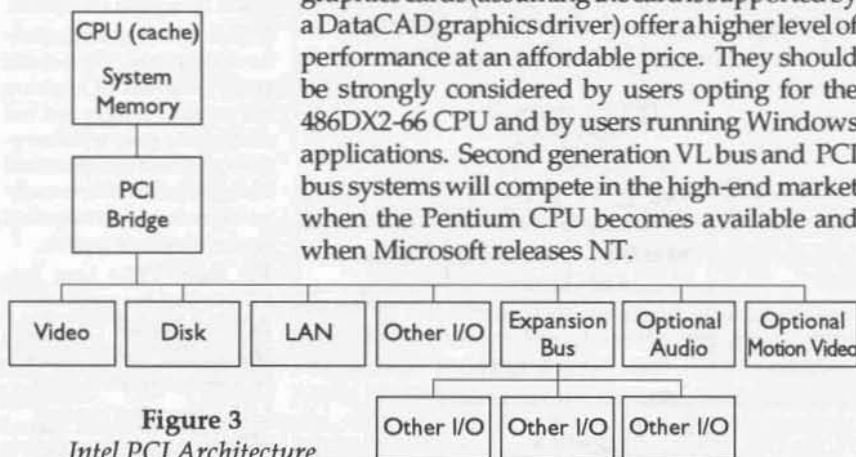
hard disk controller, and Lan adapter). This specification is relatively inexpensive to implement, yields impressive gains in data throughput (130 MBps), and has been widely adopted by hardware vendors. Note that 486DX-50 systems cannot utilize the VL local bus because they operate with a 50MHz data bus; 486DX2-50's can, as they have a 25MHz data bus.

A second VL bus specification is in the process of being finalized. Systems based on this will feature a 64 bit local bus running at the CPU's external processor speed. It has a theoretical data throughput of 250 MBps. This specification is intended for use with Intel's Pentium (586, P5) CPU.

**The PCI bus** is a competing local bus standard, designed and promoted by Intel. Originally a member of the VESA local bus consortium, Intel dropped out to develop/promote its PCI spec. Systems based on this local bus specification should begin to appear in the Spring of 1993.

Where the VL bus is an evolution of previous bus architectures, PCI represents a more sophisticated redesign of PC architecture. In this design (see Figure 3), a PCI controller bridge connects to the CPU bus and to 10 peripheral devices on a 33MHz, 32 bit bus. The PCI bridge is compatible with current 32 bit and future 64 bit CPU's (Pentium), making upgradable (32 bit to 64 bit CPU's) system boards feasible. It is also compatible with multi-processor designs, which will be supported by NT. It has a data throughput of 130MBps.

**Which bus is on the right route** for DataCAD users? The traditional AT bus provides very good performance in DataCAD with CPU's up to the 486DX-33. EISA bus systems should be considered when caching ESDI or SCSI hard disk controllers are desired. VL bus systems with VL graphics cards (assuming the card is supported by a DataCAD graphics driver) offer a higher level of performance at an affordable price. They should be strongly considered by users opting for the 486DX2-66 CPU and by users running Windows applications. Second generation VL bus and PCI bus systems will compete in the high-end market when the Pentium CPU becomes available and when Microsoft releases NT.



**Figure 3**  
Intel PCI Architecture

**Chip Tricks**

Reading through the advertisements in a computer magazine, attempting to decipher exactly which CPU is featured in any given system, can be an extremely confusing undertaking. There are literally hundreds of varieties of 386 and 486 CPU's, manufactured by a number of different vendors, on the market today. What is the difference in performance between the various chips?

**386 vs. 486:** With one exception, 386 CPU's should not be considered in today's market. 386's require the addition of a 387 math coprocessor and do not perform as well as a 486 at the same speed rating. The cost differential between comparable 386DX and 486DX CPU's is negligible today. The one exception to this is the AMD DXC/40, a 40MHz CPU that performs at a level roughly equivalent to the Intel 486DX-33. On an extremely tight budget, this chip might make sense.

**Which 486?** At this writing, the answer is surprisingly simple. There are really only four 486 CPU's that offer the level of performance that is required by DataCAD (and Windows): Intel's 486DX-33, 486DX-50, 486DX2-50, and 486DX2-66. Intel's 486SX's do not include math coprocessors. The 486SL's are low power (3.3 volts) chips intended for notebook computers. Price/performance considerations eliminate the 486DX-25.

AMD's efforts to bring 486 CPU's to market, to follow on their successful 386's, have been stalled by legal wrangling with Intel. Cyrix's 486SLC and 486DLC chips are pin compatible with the 386SX socket, access system memory and peripheral devices through a 16 bit bus, and require math coprocessors. Their new Cx486S2/50 is a clock doubling 25/50MHz CPU, with no math coprocessor, that is being marketed as an upgrade to 486SX systems.

The Intel **486DX-33** should be considered as the baseline against which the other CPU's may be evaluated, offering robust performance at an extremely competitive price. A **486DX-50** system, with a 50MHz data bus, is substantially more expensive, as it requires a completely new (compared to a 33MHz) mother board design to eliminate radio frequency interference problems. In an EISA system, with a caching hard disk controller, this processor can turn in some very impressive performance numbers. Graphics performance will be very good, as well, but not up to the level of a VL bus accelerated card unless a (very expensive) EISA coprocessed graphics card is installed.



The **486DX2-50** operates externally at 25MHz, internally at 50MHz. The CPU can be installed in a lightly modified 486DX-25 mother board and provides overall performance that is slightly above that of a 486DX-33 and substantially below that of a 486DX-50. Since it can be used with the VL bus, a variety of system configurations based on this CPU are available.

The **486DX2-66** is Intel's other clock doubler, operating internally at 66MHz, externally at 33MHz. Since systems utilizing this CPU are based on 486DX-33's, which are almost commodity items at this point, they are generally priced significantly below similarly configured 486DX-50 systems. They offer performance that is comparable to 486DX-50's, sometimes better, sometimes not, depending upon hardware configuration and the software being run. A VL bus 486DX2-66 represents the affordable high end of the PC market today.

Intel markets a couple of upgrade options for users. **OverDrive** sockets on some mother boards enable users to upgrade from 486SX to higher rated 486's (all the way up to the DX2 66) simply by plugging in a new CPU. They also have released OverDrive kits, containing a new CPU, a new system clock, a chip puller, and instructions. These allow users to upgrade 486DX-25's to DX2-50's and DX-33's to DX2-66's. *Before undertaking an OverDrive upgrade, users should check with their mother board vendor to assure that the upgrade is supported.* Also, the DX2's run hot; adequate ventilation is a must. CPU fans are available that can help to keep the temperature under control.

## Recommendations

From the above discussion, some conclusions may be drawn leading to system recommendations. The following are intended as general guidelines; they are not intended as absolutes. Depending upon vendor options, the user may opt for additional features depending upon the trade off of price and features.

**Basic DataCAD Station** to run DataCAD as the primary application and some DOS utilities in support of DataCAD, with no concern for Windows applications:

- 486DX-33MHz
- 8 megabytes RAM
- 200 megabyte hard disk
- Super VGA (1024 x 768 non-interlaced)
- ISA bus
- 15" - 17" monitor

This level of system is available from virtually all vendors; the price competition at this level is fierce and the user will find extremely good value.

**DataCAD + Windows Station:** While the above system will run Windows adequately, users who rely on Windows applications will benefit from a moderately upgraded system:

- 486DX2-66MHz
- 256k external processor cache
- 12-16 megabytes RAM
- 200 - 350 megabyte hard disk
- cached EISA or VL bus disk controller
- 2nd generation Windows accelerator
- VL or EISA bus
- 17" - 19" monitor

Depending upon vendor and the particular hardware options, this system can be priced anywhere from a moderate increase over the first system to three times its cost.

**Future Station:** Don't buy a system today based on a guess about future hardware or software. The DataCAD + Windows system listed above will perform adequately with the initial release of NT, according to reports from NT beta testers (though 16 megabytes of RAM would be a good choice). When NT and its applications begin to ship, hardware will follow that is geared to it. Just as the popularity of Windows 3.1 has driven the development of the VL bus and advances in graphics cards and hard disk drives, NT and its applications will have a major influence upon the shape of systems on the market a year from now.

Further, release of the Pentium CPU will drive system architecture and peripheral component design in new directions; capabilities of the VL and PCI bus specs used in conjunction with the Pentium will be explored by hardware vendors. First generation "Pentium upgradable" systems that are just now appearing on the market are selling at premium prices. If the history of PC design is any guide, it will be another nine months to a year before a "standard" design around this chip will have evolved to the point where market competition has driven pricing of these systems to affordable levels.

A rule of thumb: Avoid the newest and hottest; buy at the 90<sup>th</sup> percentile of the hardware scale. Proven technology + price competition = value.

*In the next issue, some of the new VL bus/Windows accelerator graphics cards will be discussed, with an eye to the availability of DataCAD drivers.*

## Input devices:

*Two additional pieces of hardware bear consideration in this context: the mouse and the keyboard. Since the user relies on these devices all of the time, the efficiency with which they work is important.*

*The original developers of DataCAD wrote an interface that accesses menus through the function keys (F1-F10 and S1-S10). The interface was developed at a time when the standard keyboard layout placed the function keys on the left side of the keyboard. Since quick access to menus relies on the use of the function keys, using one with this, original, layout greatly enhances efficiency in DataCAD.*

*Most new systems are supplied with keyboards having the function keys in a row across the top. Aftermarket keyboards that have the function keys on the left are available for less than \$100. The cost of such an upgrade is quickly repaid in user efficiency.*

*Additionally, a number of new keyboards feature programmable keys, to which sequences of often-used keystrokes may be saved (to battery-backed RAM on the keyboard). Many DataCAD users have utilized this feature to accelerate operations.*

*A growing number of users of mouse-dependent software have reported that they are suffering from tendonitis in their "mouse hand." Though improper seating and posture are prime causes of the phenomenon, an awkwardly designed mouse can contribute to it.*

*Ergonomically designed, reasonably priced, 3-button mice and trackballs (which some users swear by) are available from a variety of vendors as solutions.*

*I have had great success with the NORTHGATE OMNIKEY ULTRA keyboard, which has function keys on the left and on the top. The keyboard can be configured so that the left-side keys operate as function keys and the top row is used as a set of programmable keys.*

*I have written in the past about my preference for the LOGITECH MOUSEMAN, which I can also strongly recommend, particularly because it comes in left- and right-handed models.*



## USER INPUT

From Charles Sawyer, an interesting discovery (see Tech Support, next page, for a response by Cadkey):

Sawyer/Architects  
69 Canal St.  
Boston MA 02114  
(617) 367-5975 FAX: (617) 367-5930

As an architect and DataCAD novice, my DataCAD education has been exclusively directed toward learning the nuts and bolts required to produce working drawings. It is ironic then that the technique I recently stumbled across has more to do with an area I spend no time in at all, namely decorating. More specifically, screen decoration, or COLORS.

**Commonly held assumption:** DataCAD limits us to the use of 16 colors. Each one may be modified as desired through CONFIG, but the total number of available colors cannot be increased. We are limited to the display of only 16 colors on the screen.

**Discovery:** 256 colors are readily available for use on my screen (486-25, Everex Viewpoint TC graphics card).

Any or all can be displayed at one time. Custom colors #1 through #15 are the standard DataCAD colors. Custom colors #17-#256 span the rainbow, ranging from the garish to the yummy to the sensitive and subtle to the can't-be-seen (with my background screen config, colors above #210 are essentially invisible).

**Technique:** Draw a line. Go to the Change/Color menu. Select Custom. Enter a number between 16 and 256 (90 in this example). Select the line: it changes to the Custom Color. Enter the Identify menu (I) and select the Custom-Colored line. Select F4 (which should show the custom color number: 90, in this case). This sets the current color to 90. Now *any* custom color is accessible by scrolling with the (k,K) keyboard interrupt.

**Relationship of custom colors to pen selection:** DataCAD seems to deal with colors/pens in repeated groups of 32. Custom colors #1-15 are correlated exactly to the pen selections for standard DataCAD colors White through Yellow. Custom colors #16-32 *have no pen association*. Custom colors #33-47 again have the pen associations of White to Yellow, and so on up to #256. For instance, #136 will plot with the Light Gray pen, #197 with the Cyan pen, and #112 (a lovely Hampton Bisque) will not plot at all.

**Custom colors vs. DataCAD colors:**

**Common features:** Custom colors perform exactly the same as DataCAD colors in most ways. Standard operations such as Stretch, Copy, Move, Enlarge, and Rotate work normally. Custom colors can be used for text, to make symbols, and be assigned to layers. Custom colors may be saved to file for use another day.

**Limitations discovered to date:**

1. Non-printing custom colors cannot be retrieved through SelSet/Mask/Color.
2. Printable custom colors may be retrieved through SelSet/Mask/Color, but only by using the associated DataCAD color. For instance, if you wish to mask color #142, you would select Lt Magenta. #142 will then be masked, but so will Lt Magenta, #46, #78, #110, #174, #206, and #238. An interesting conclusion: A standard is no different than a custom one in this respect; a custom color such as #142 is not individually maskable, but neither is a standard DataCAD color!
3. Custom colors cannot be specified for dimension text or dimension arrows.

**Not investigated:** DXF issues, how affected by different graphics cards, future support of, and probably lots of other important stuff.

**Thoughts on the use of Custom colors:**

**Fabulous uses:** Entities never to be printed, i.e. construction lines and drafting notes. Never again give up a DataCAD color to a Pen0 assignment for plotting, or worry about having to turn off a construction lines layer before plotting. This comes as even better news for laser printer users (at least HP IIIP users): with DataCAD's standard palette, there is no way to have a color on screen that will not print. With custom colors, you now have 136 screen colors that will not print.

**OK uses:** 105 additional printable/plottable colors for production drawings. But use in a prudent, measured, cautious, Republican manner, because: 1. color masking can get confusing; 2. along with the opportunities of additional colors come certain drawing management obligations, and 3. you are a DOS person.

**Poor use:** Working drawings as Impressionist fantasies.

**Uninvestigated uses:** Color study, rendering, and graphics oriented uses.

Charles Sawyer has created a drawing file (COLORS.DC3) that illustrates the 256 color palette and the relationship between plotting and non-plotting colors. It is available through Cheapware.



## TECH SUPPORT

### 256 Color tricks

Cadkey Tech Support staff provides the following response to Charles Sawyer's discovery: "This anomaly could be regarded as a 'feature' or a 'bug,' depending upon your point of view. In any case, regardless of its usefulness, it should be considered as anomalous behavior, since DataCAD was not intended to act this way. Of course, we could not recommend using DataCAD in a way other than how it was intended to be used. The results could be at best unpredictable, and at worst destructive. *Be advised that if you take advantage of this 'feature,' you do so at your own risk.*"

**From the editor:** I have explored this phenomenon using two different graphics cards, run with different graphics drivers: VESA256.EXE and CK\_911.EXE. I can verify that I was able to display 256 colors in DataCAD with both drivers. Also, the non-plotting "feature" was evident when plotting with both the HPGL and LaserJet III plotter drivers. Other users have replicated the phenomenon using other graphics cards/driver combinations, as well.

It should be noted that, to explore this, it is necessary to use a card/driver combination which enables selection in DataCAD's CONFIG for display of 256 colors. This option must be selected to get the desired effect.

I will continue to explore the phenomenon in a most cautious way, avoiding it in any drawing file which I regard as critical. I will report in future issues on any further insight that comes to light around this matter, based on my own experiences and those of other users.

### Autosave problem with Smartdrv.exe

Some users have reported a problem with DataCAD's AUTOSAVE function writing .ASV files of 0 bytesize. Troubleshooting indicates that the problem lies with the write-caching feature of SMARTDRV.EXE, the disk cache driver shipped with Windows 3.1. SMARTDRV.EXE users are advised to use the /c parameter to turn off write caching. The command line in AUTOEXEC.BAT for a 1 megabyte disk cache would be:

```
C:\WINDOWS\SMARTDRV 1024 /C
```

### Hewlett Packard DesignJet Plotter

Product Name: DesignJet 600 plotter  
 Model Number: C2848A  
 Product accessory: C1642A-HP-IB Modular I/O  
 HP Customer Support Phone: (208) 323-2551

### Plotter Specification

Min. Media Size: Y axis: 21 cm (8.3")  
 X axis: 28 cm (11") sheet only  
 Max. Media Size: Y axis: 91.7 cm (36.1")  
 X axis: 130 cm (51") sheet only  
 Max. Plotting Area: Y axis: about 5 mm (.2") } to edge of sheet  
 X axis: 17 mm (.67") }  
 Resolution: Enhanced Mode: 600 x 600 DPI  
 Final Mode: 300 x 300 DPI  
 Draft Mode: 300 x 300 DPI

### Plotter Control Panel settings: Utilities menu

Page Format:  
 Size: ARCH E or BEST ISO A  
 Rotate: 0  
 Margins: Expand  
 Mirroring: Off  
 Plotter Setup:  
 Graphics Lang.: HP-GL/2 or 7586  
 Dry Time: Fast  
 Pen Check: On  
 Media Bypass: Off  
 Plot Management:  
 Queue: On  
 Nesting: Off  
 RS-232-C Setup: Centronics  
 Language: English  
 Config: Factory  
 Factory Settings:  
 Baud Rate: 9600  
 Handshake: Both  
 Parity: None (0)  
 Pen Settings:  
 Current Palette: Software  
 Merge Control: Off  
 Statistics (36" roll): Max X = 1199 mm  
 Max Y = 904 mm  
 Code Rev = 3.0  
 RAM Present = 4Mb  
 ROM SIMM = none

Cable: 6' Parallel Centronics

### DataCAD Configuration Program

Current Plotter: Hewlett Packard HP-GL (large D or E size) plotter or Hewlett Packard HP-GL (Large roll feed) plotter or Hewlett Packard (LaserJet III version)

Port: LPT1 or corresponding port

### DataCAD Plotter Menu

For maximum plotting area, CUSTOM should be selected in the PLOTTER/PAPER SIZE menu and set 2" greater than the actual size. For instance, if the plot is to be plotted on a 36" roll, the Y axis should be set to 38". This lets the hardware clipping limits take over and allows plotting within 3/16" of the edge of the media. This increment should be set in both the X and Y axes, and works for both 24" and 36" rolls.

There is, however, an anomaly with a 30" roll. Plotting to a 30" roll will produce an image less than 24" in the Y axis; HP does not support the 30" roll at this time. 30" sheet media may be utilized normally.

### Check your battery, sir?

In virtually all PC designs, critical setup information (CMOS) is stored in battery-backed memory. When the battery loses power, the system fails to boot. Usually, an error message appears indicating that the hard disk cannot be recognized.

To correct this, the battery must be replaced and the setup information must be reset. Most systems display a message at bootup indicating how to enter the CMOS setup: "press DEL to enter setup," for instance.

Much of the information in the CMOS setup is obvious to the user; however, a number of settings may not be. HARD DISK TYPE is usually one that users may have trouble determining. This information is usually provided by the hard disk maker on a label on the hard disk itself. It is not unheard of, though, to encounter a hard disk which is either unlabelled or installed with the label hidden by other components.

Users are advised, before experiencing CMOS setup problems resulting from a dead battery, to enter the system SETUP and copy down all of the settings. Save this documentation and refer to it when it becomes necessary to replace the battery.



# Matrox Impression 1024 Graphics Card

Matrox Electronic Systems Ltd.  
1055 St. Regis Blvd.  
Dorval, PQ  
Canada H9P 2T4  
(800) 4 MATROX

Long a leader in the high-end graphics card market, Matrox has introduced a new, affordable, 24 bit graphics card, the Impression 1024. Though it is aimed at users of 24 bit paint and illustration software running under Windows, it functions admirably in DataCAD and Velocity as well.

The Impression 1024 is a full length 16 bit ISA card based on the S<sup>3</sup>86C911 Windows accelerator chip. It utilizes a Brooktree RAMDAC for its color palette and is populated with 3 megabytes of VRAM. The card incorporates VGA so the user is not required to utilize a second card for bootup in DOS, as is the case with some other high resolution cards. Installation of the card requires that the user set two jumpers on the card to coordinate with the monitor's highest scanning frequencies.

Once the board is physically installed, the system is booted to DOS and software drivers are installed. The Matrox supplied drivers for Windows enable resolutions of 640 x 480, 800 x 600, and 1024 x 768. At all resolutions, Windows may be displayed in either 256 or 16.7 million colors, non-interlaced.

Two Windows software utilities are included with the board. WinSqueeze is a JPEG-compliant 24 bit color file compressor. File size of images can be compressed by as much as a factor of 15, with some loss of detail (which Matrox warns the user of). PixelTouch enables hot-key zooming by factors of 2x and 4x; panning across zoomed views occurs when the cursor touched the edge of the zoomed view.

Matrox also ships with the board the two S<sup>3</sup> drivers for DataCAD: CK\_911.EXE and DL\_911.EXE. As discussed in the Summer, 1992 issue of *Reference Point*, the DL\_911.EXE driver (which incorporates both the graphics and display list drivers in a single executable file) should not be used. Use of CK\_911.EXE with the Impression 1024 allows resolutions in DataCAD and Velocity of 640 x 480, 800 x 600, and 1024 x 768 in either 16 or 256 colors. 1280 x 960 and 1280 x 1024, 16 colors are also supported.

**Performance** of the card in Windows, at all resolutions running in 256 color mode is on par with first-generation Windows accelerators. It is noticeably quicker than a standard Super VGA

card, but not as much so as the performance yielded by the second-generation cards now becoming available. In 24 bit modes, performance slows considerably; this is a function of the fact that, in 24 bit mode, the card must generate 256 times more information than it does at 256 colors.

In DataCAD, the S<sup>3</sup> driver is very good. Using Bruce Kaplan's macro REDRAW.DCX, a test file was refreshed 10 times in 31 seconds, compared with a score of 42 seconds using a Diamond SpeedStar Super VGA card and the VESA256.EXE driver. Velocity screen performance is on par with the SpeedStar card.

**Two limitations** exist in the use of this card by DataCAD and Velocity users. First, Velocity cannot be run in 24 bit color as the card must be run with the S<sup>3</sup> driver. As when using a Super VGA card, 24 bit images generated in Velocity must be sent to Targa file format. Unlike Super VGA cards, though, when the Impression 1024 runs a Windows paint application in 24 bit color and the Targa file is accessed, it may be displayed and edited in 24 bit color.

Second, in testing the card, it was not possible to get DataCAD to run as a DOS application under Windows. The usual strategy for accomplishing this is to load the DataCAD driver (CK\_911.EXE in this case) to the High DOS memory area prior to entering Windows and to access DataCAD through a PIF (Program Information File). No amount of tinkering with PIF settings, DataCAD CONFIG settings, and Windows resolutions would allow DataCAD to run under Windows with the Impression 1024.

Technical support personnel at Matrox were very helpful in trying to resolve this, making a number of suggestions. In the end, it was determined that the problem is caused by methods used by the card to retain video memory when suspending Windows and entering a full screen DOS graphics application. As best performance, *with any graphics card*, in Windows, DataCAD, and Velocity is accomplished through the use of discreet configurations, and because rebooting between them is advised in any case, this second limitation should be regarded as minor.

Priced at \$695, the Impression 1024 offers to the DataCAD/Velocity/Windows user exceptional value. A single card solution, its 24 bit performance is matched or exceeded only by cards costing 2 to 3 times more than it.





# Steelcase Furniture Library

Intellicon Incorporated  
8933 Western Way, Suite 17  
Jacksonville, FL 32256  
(904) 363-2223

Intellicon, Inc. has recently released a comprehensive library of Steelcase furnishings in DataCAD symbol format. The symbols are placed in a drawing through the use of a DCAL macro, STCFSL.DCX. The product ships on nine 3 1/2" diskettes, with files in a compressed (.ZIP) format. The installation program allows the user to specify the drives and directories to which the macro and the symbols are installed. It also allows for a partial installation of the symbols; the user may select which product line(s) to install.

This last point is important as a full installation requires 28 megabytes of hard disk space to store approximately 5,600 symbols, installed to 175 directories. No template files are included, the macro accesses the symbols directly. Installation of the symbols to a different logical drive (a second hard disk, partition, or removable media) from that on which DataCAD is installed is supported.

The install routine creates a directory, \FSL, to which three files are installed: SYMBOL.IDX, SYMBOL.SIZ, and SYMBOL.XIF; these files provide to the macro an index to the installed symbols. Under the \FSL directory \DCAD is created. To it, 20 (in a full installation) .DAT files are installed which provide further information to the macro for display of product line information. Below the \DCAD directory, two levels of subdirectories are created, the lower of which contain the actual symbol (.SM3) files. Finally, the DCAL macro, STCFSL.DCX, is installed to the user-specified directory for DataCAD macros: \MTEC\DCX, typically.

The Steelcase product lines included are: Series 9000, Avenir, Desks, Elective Elements, General/8800 Computer Furniture, Context, Vertical Files (730 and 752 Series), Lateral Files, Paladin, and Dearborn.

The macro is simple to operate. STCFSL appears as a menu option under MACROS and is selected. The initial menu lists, at the top, the installed product lines and, at the bottom, three "command" menus: TOOL MNU, REPORT, AND REL SIF. The user first selects the desired product line; products and available options are presented in subsequent menus, which become available depending upon the previously selected options. As the user moves through this series of menus, three options appear at the bot-

tom of the menu bar: TOOL MNU, which jumps directly to the TOOL menu, PREVIOUS, which moves back one menu level, and (PRODUCT), which displays the product line name that was chosen from the initial menu and, if selected, returns the user to the main menu.

Once the desired product has been specified by selecting options in these menus, the user is prompted to place the symbol. After a point is selected (left or center mouse button), a prompt appears requesting the angle of rotation at which the symbol will be placed (the default value is 0). The symbol is then placed in the drawing.

The symbol graphics are dimensionally accurate 2D lines; the symbol insertion points are logical to a typical placement of the symbols. Users should find that, when used in conjunction with the Steelcase catalogs, complex furnishings layouts are quickly assembled.

The TOOL MENU provides to the user direct access to seven DataCAD editing commands: MOVE, COPY, EDIT, ROTATE, MIRROR, LAYER, ERASE, and SET PATH. It also provides nine editing commands of its own: SYM INFO, COPY INFO, PUT TAG, USER SYM, TAG VIS, PLACE CP, SYM NAME, STLE NO, and LAST SYM. These provide tools for manipulating the symbols and their (reportable) attributes.

The REPORT command is used to create a summary report (takeoff) of the placed symbols. The report consists of quantity, tag, description, style number, and style qualifier. The user may specify that the report be sent to screen, printer, or file.

The RELEASE SIF command generates a report file in .SF format (Furniture Symbol Library Standard Interchange Format). The .SF file can be imported by any Steelcase-approved specification software package to generate a complete furniture specification.

The documentation that accompanies this product is thorough and clearly written. The macro is simple to use, as it follows standard conventions for the construction of DataCAD menus and is based on the logical structure of the Steelcase product lines.

This macro and its accompanying symbol library, provides a comprehensive, efficient, and easy to use tool for utilizing Steelcase products. For users who specify Steelcase with any regularity, it will prove to be a source of efficiency and accuracy in every day practice.



## Third Party Products

The following lists currently available third party products for DataCAD. It includes fonts, DCAL macros, symbol/template libraries, and publications. Products sold through Cheapware are not included; a Cheapware flyer is enclosed with this issue. This listing is, in all likelihood, incomplete; the editor apologizes in advance for any omissions. Corrections and additions to this list will be published in future issues of *Reference Point* as new information becomes available.

### Templates and Symbol Libraries

#### Architect's Toolkit-3D Interiors Architect's Toolkit-Interior Planning Architect's Toolkit-2D Site

Beacon Design Systems  
Box 7116  
Paducah, KY 42002-7116  
(800) 788-7436  
FAX: (502) 442-5430  
Gary Gresham

*3D Interiors* provides simple and complex residential and office furnishings; 254 symbols. *Interior Planning* contains 447 symbols of residential and office furnishings, individually and grouped. It also includes typical kitchen layouts. *2D Site* provides plan and elevation symbols for trees and shrubs, benches, lamps, and autos; 291 symbols. Elevation symbols include "masking" entities to facilitate hidden line removal.

#### Cases Templates

Architectural CAD of Colorado  
7170 W. 8th Place  
Denver, CO 80215  
(303) 237-7812  
FAX: (303) 233-7106  
William L. Coppock, AIA

*3D symbols for cabinets, appliances, plumbing fixtures, and accessories. 444 symbols for creating layouts for kitchens, bathrooms, and other architectural uses.*

#### Organic CADD

Neo Graphix  
Rt. 660, P.O. Box 347  
Earlsville, VA 22936  
(804) 973-0580  
FAX: (804) 296-8720  
Fred Oesch

*Rendering and construction document libraries for use from schematic design through working drawings. Modules include: Sampler, Interior, Exterior, Landscape, People, 3D Fill Patterns, Plan, Elevation, Section, Schedules, & Sports Fields. 3D clip art and fill patterns described in the Summer, 1992 issue of Reference Point.*

#### Note:

A new edition of the *Cadkey Applications Guide*, listing DataCAD third-party products is available.

Contact Cathy Smith at ext. 7237 for further information.

### DCAL Macros

#### Blocker DC Sprint TouchUp

Corporate Network Systems  
P.O. Box 965  
30A Rte 1 Suite 1  
Yarmouth, ME 04096  
(207) 846-0772  
Bill D'Amico

*Blocker* performs space diagramming and reporting inside DataCAD, functioning as a schematic space planning tool. Diagrammatic sketches are converted to walls to form the basis of floor plan drawings. *DC Sprint* is a set of nine DataCAD utilities that enhance editing operations within drawing files and facilitate transfer of information between files. *TouchUp*, a 3D hatching tool, was described in the Summer, 1992 issue of *Reference Point*.

#### cadKEYNOTE v. 3.02

Integrated Systems  
P.O. Box 19635  
Raleigh, NC 27619  
(919) 781-1300  
FAX: (919) 781-5006  
David Ward Jones

*cadKEYNOTE* places and updates keynotes adjacent to a graphic; it searches/sorts keynotes to automatically create a legend. It can automatically search a Master-Specifications Library and copy sections to a directory for editing.

#### Command Performance Hatch Manager Layer Manager

Design/Program Associates  
Route 1, Box 114-C  
Afton, VA 22920  
(703) 456-8686  
John Fornaro

*Command Performance* is a set of 11 utilities that provide enhancements to DataCAD operations. *Hatch Manager* provides to the user the ability to define and manipulate hatch patterns from within DataCAD. *Layer Manager* facilitates the process of saving and loading layer files.

#### The DCAD-Render Interface

David Pendery  
14 Tremont Street  
Cambridge, MA 02139  
(617) 661-2545

*The DCAD-Render Interface* is a DCAL macro program that runs in DataCAD and produces photorealistic renderings with Pixar's RenderMan. Current features include smooth, unfaceted shading for all types of 3D surfaces, multiple positionable light sources with shadows, and library of shaders for architectural materials and custom texture maps. Package includes DOS RenderMan.



## DCAL Macros

### Plot40 DHW40

Hitch & Associates  
3309 Childers St.  
Raleigh, NC 27612  
(919) 782-4373  
John Hitch

*Plot40 is a DCAL macro that facilitates layout and pre-viewing of multiple scale plotting from within a single DataCAD drawing file. DH40 is a DCAL macro that provides parametric tools for drawing (in 2D elevation drawings) casement and double hung windows.*

### QBIDS Professional Estimator

Demarest Architects  
110 Hiller Drive  
Oakland, CA 94618  
(510) 644-1206

*DCAL macro that links to estimating and database management software. This software is currently unavailable; it is in the process of being rewritten: inquiries welcome.*

### Roof Builder 2.5 BldWall

People Software  
2746 Barrett Pass Road  
Pollock Pines, CA 95726  
(916) 644-8841  
FAX: (916) 644-8730  
Eric Zetterberg

*Roof Builder is a 3D roof modeling macro, facilitating the construction of complex and simple roof forms. BldWall is a 3D wall macro that integrates with Roof Builder 2.5. Walls entered in 2D are created as 3D slabs and trim automatically to their corresponding roofs.*

### Roofer

River City Software, Inc.  
9570 Regency Sq. Blvd.  
Suite 325  
Jacksonville, FL 32225-8100  
(904) 721-8246  
FAX: (904) 727-9182  
David Deal, Scott McPherson

*A parametric 3D modeling macro for the construction of roof models in DataCAD, Roofer constructs standard roof types and includes tools for customizing them. Parametric tools for the construction of dormers are featured.*

### Set Pens

Kaplan & Associates, Architects  
7003 Ballast Ct.  
Burke, VA 22015-4401  
(202) 267-9596

*This macro allows the user to save, load, & edit Pen Table Files, external files holding color/pen assignment information for up to 99 pens. The user may create multiple pen assignment configurations suitable to a variety of tasks.*

### Set Text Set Line

Sets, Ltd.  
114 Commonwealth Ave.  
Boston, MA 02114  
(617) 267-6980  
Rick Gleason

*Create, save, and edit predefined settings for Text and Linetype parameters. When invoked, the DataCAD settings are changed relative to the current plot scale. Set\_Line includes a MultiLine function which allows predefined groupings of lines to be drawn together.*

## Fonts

### Arcdraft America

1560 Twin Lakes Circle  
Tallahassee, FL 32301  
(800) 447-4165  
Tim Hammet

*Custom fonts for DataCAD made to order.*

### Symbol Graphics, Inc.

1047 West 6th Street  
Corona, CA 91720  
(714) 735-1622

*DataCAD fonts.*

## DOS Utility

### AutoTPL

Hitch & Associates  
3309 Childers St.  
Raleigh, NC 27612  
(919) 782-4373  
John Hitch

*A DOS program that enables management of DataCAD symbol & template files on hard and floppy disks.*

## Publications

### Beginning DataCAD

Dr. Leonard Nassman  
Microcomputer Education Systems, Inc.  
4900 Blazer Parkway  
Dublin, OH 43017  
(614) 793-3069  
FAX: (614) 766-3605

*An introductory, project-based DataCAD tutorial. It is accompanied by a set of ten video tapes that illustrate specific operations in DataCAD (available individually or as a set). Reviewed vol. 2, no. 1.*

### Cheap Tricks

Shu Associates  
10 Thacher St.  
Boston, MA. 02113  
(617) 367-9622 (voice and FAX)

*A monthly newsletter for DataCAD architects. Regular features include "Cheap Trick of the Month," "Computere," and "DataCAD Tutor."*

### DataCAD for the Architect, 2nd ed.

Carol Buehrens  
TAB Books  
Blue Ridge Summit, PA 17294-0850  
*Comprehensive source book on DataCAD usage in a "lesson and exercise" format. It includes an Operations Guide covering advanced topics and menu operations. Reviewed vol. 1, no. 2.*

### WindowIn on DataCAD.

Back issues available from:  
Philip Hart  
9 High St.  
Brunswick, ME 04011  
(207) 729-0907

*A DataCAD newsletter, published monthly, 1987-1991. Every DataCAD command explored in depth. Back issues available individually, by volume, or as complete sets.*

## Realtime

### Realtime

Stereocad, Inc.  
655 S. Fair Oaks Ave.  
Sunnyvale, CA 90486  
(408) 245-5201

*Realtime, an affordable Virtual Reality product, performs real-time "walk-throughs" of architectural models at multiple frames per second. It is a stand-alone program that provides instant animation, sophisticated lighting and shadowing, and interactive control of "camera" functions. Transfer to Realtime of models created in DataCAD is accomplished through DXF translation.*



### News from Cadkey

At this writing (early January, 1993) Cadkey, Inc. is in the final stages of a "top-to-bottom" re-evaluation of the company. This process was initiated in early October in conjunction with the appointments of Malcolm Davies, as President and C.E.O., and George Krucik, as Senior Vice President. The evaluation has been described as an all-encompassing one.

Every aspect of the company has undergone intense scrutiny. Changes have been made to staffing structure, with resulting reassignment of personnel and responsibilities. Product development, planning and marketing goals have been evaluated. The DataCAD promotions currently underway are a result of this process.

In March, 1993, a "re-launch" of the company is planned. At that time, Cadkey will make a series of announcements resulting from this evaluation process. Corporate goals and long-term strategic planning will be formally announced and an 18 month product plan will be described.

Of particular interest to DataCAD users will be the portions of the plan pertaining to Cadkey's commitment to the AEC market, specifically the DataCAD product line, and clarification of product development based on the previously announced Parthenon technology. Cadkey representatives have recently offered public assurances to DataCAD users pertaining to the company's long-term commitment to the AEC product line.

The Spring, 1993 issue of *Reference Point* will be timed to coincide with this corporate event. It will contain the official announcements. It will also include an in-depth discussion of the portions of them that are of direct concern to DataCAD users.

### Cadkey and CompuServe

As an added service to end users, Cadkey, Inc. has a section in the CompuServe™ CADD/CAM/CAE Vendor Forum. To reach it, type: GO CADKEY at the ! prompt in CompuServe.

As yet, not everyone at Cadkey who will be involved with CompuServe has received her/his User I.D. and modem. Lou Bodnar, Clay Rogers, Mark Hyjek, and Frank Simpson (User I.D.: 72640, 3560) will be on-line soon.

Mark White can be contacted on CompuServe at User I.D.: 72640, 3570. Malcolm Davies can be contacted on CompuServe at User I.D.: 73417, 2373. Both are active now.

We look forward to providing a complete listing in the next issue of *Reference Point*.

### DataCAD at NAHB

Cadkey will be presenting DataCAD at the National Association of Home Builders' show, February 19 to 22, at the Las Vegas Convention Center, Las Vegas, Nevada.

### New Users Group:

Natal DataCAD User Group  
RaeTech, Natal  
First Floor  
NBS Building  
82 Brand Road  
Berea, Natal  
Republic of South Africa  
contact: Quinton van Loggarenberg  
tel: 27-31-216955  
fax: 27-31-217092

#### Address Correction:

Charlotte Area DataCAD Users Group  
Entre Business Systems Group  
4301-0 Stuart Andrew Blvd.  
Charlotte, NC 28217  
contact: Dan Pisano  
(704) 523-7760

#### New Phone Number:

Philip Hart may now be reached at:  
(207) 729-0907

### CONTACT

**Cadkey:** (203) 298-8888  
**Lou Bodnar:** ext. 6425  
A/E/C Marketing  
**Mark Hyjek:** ext. 8060  
Technical Support  
**Clay Rogers:** ext. 8060  
Quality Assurance  
**Frank Simpson:** ext. 6443  
Marketing Publications  
**Mark White:** ext. 6455  
A/E/C Product Management  
**Tech Support FAX:**  
(203) 298-6404  
**Cadkey Bulletin Board:**  
(203) 298-6405  
(8 bits, no parity, 1 stop bit)

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