NOVADYNE™

Technical Operations

ON-LINE

Published for System Software Users

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LOGON:

Win A Month's FREE Maintenance!

That's no typo! If one month of free Novadyne maintenance sounds good then read on.

It has been almost three years since we conducted our last survey. Needless to say, a lot has changed since then. So, just to demonstrate how serious we are about constantly improving the quality of our services and products, we will draw one survey at random from all those received by close of business on July 31, 1992. The lucky winner will receive one free month of maintenance (not including REALITY® O/S charges).

The only fine print is this:

1. To be eligible, the system must be under Novadyne maintenance at the time of the drawing;
2. Only one entry per System ID will be accepted;
3. Survey must be filled out in its entirety;
4. Value of the prize will be based on the contract amount for the System ID selected in the drawing;
5. Customers with multiple systems may submit one survey per system under maintenance.

So don't delay! Complete the postage paid survey in the center of this issue and return today. The winner and survey results will be announced in the next issue of *ON-LINE*.

- Steve Gill

Highlights inside ON-LINE

ON-LINE Marks Fifth Anniversary

It's hard to believe that we are already into our fifth year of publishing *ON-LINE*. Perhaps not so hard for the individuals whom we have asked to write articles issue after issue, but in retrospect, it hardly seems like it has been five years.

Your *ON-LINE* staff is very proud of this newsletter and the way in which it has evolved over the years. There are numerous reasons for this, but primarily because we believe it is the finest (and perhaps the *only*) technical newsletter of its kind, specifically produced for end-users. In addition to being mailed to all known users of McDonnell Douglas computer systems, *ON-LINE* participates in a newsletter exchange program with all the active PICK User Groups in the United States.

ON-LINE was originally conceived as a means of conveying information vital to efficient and trouble-free computing. Many articles have been written in direct response to trends observed in the calls we receive. Having thoroughly addressed (and in some cases *readdressed*) the more serious and repetitive problems, we broadened the scope of *ON-LINE* to include some very in-depth articles in the areas of data communications, environmental factors, and system performance to name just a few.

The Marketing column has been expanding to provide timely information about new products and services available from Novadyne. Think Tank was introduced to afford a glimpse at, and perhaps an appreciation of, the creative genius that goes into writing an operating system.

It is rewarding to look back on the accomplishments and progress made during the first five years. It is even more rewarding to consider the impact *ON-LINE* has made in allowing your business to run a little smoother, a little quicker and with a lot fewer disruptions.

The next twenty issues are blank. Your feedback and comments on the enclosed survey will enable us to fill them with the information you will need to help keep pace with the ever changing challenges of today's business world.

- Steve Gill

Introducing the P2000 Terminal

Due to overwhelming demand for PRISM®-compatible terminals, Novadyne is pleased to introduce the P2000 terminal.

When AMPEX® (manufacturer of the PRISM 7 & 9) discontinued their data terminal business, a substantial void was created for PRISM terminals. Through a joint effort between Novadyne and LINK Technologies (manufacturer of the MC2 and MC5 terminals) a terminal has been developed that will meet the demands of our customer base for PRISM compatibility as well as provide several other popular terminal emulations.

Based on the Link MC5, the P2000 is reliable, economical (especially compared to the Prism 9), and supports the following frequently requested features:

- PRISM 7 compatible (no more application conversions)
- compatible to all currently supported REALITY® Operating System releases
- screen/video attributes
- message line
- page back (six pages of screen memory in PRISM emulation only)
- programmable function keys
- 80 and 132 column mode

In addition, the following MC5 standard features are provided:

- two fully configurable RS232 Serial Ports
- VT100 and VT220 emulations - for DEC compatibility
- ADDS® VP, ADDS 60, WYSE® 50 and 60 emulations
- Aux Printer - RS232 serial or Centronics parallel
- Keyboard choice - ANSI, EPC or ASCII

For those customers who have already purchased MC5 terminals through Novadyne, the PRISM emulation is just a simple upgrade that can be performed by your Field Engineer (see related article on page 4).

For those customers who have been looking high and low for PRISM 7 and 9 terminals on the 'used' market, now you can contact NOVA-DIRECT at (800) 926-6823 and purchase a new P2000 terminal.

- Brian H. McKinstry

MARKETING

Novadyne Announces PC Integration For REALITY

Novadyne Computer Systems has introduced large interactive data base management and independent workstation power and flexibility through a new product called PC Integration (PCi).

The PCi products, supplied through Pixel, Ltd., provide full integration of personal computers with REALITY®-based host systems, as well as to most PICK®-based systems. Expanding the use of terminal emulation, file inquiry and file transfer to PCs over local area networks, these products include support of REALITY S-LAN connection via direct PC connection or through a Novell® Gateway, as well as asynchronous communications.

PCi consists of five products designed to harness the power of the PC within a distributed information environment. The five products are:

Asynchronous TERMiTE 3.0™
LAN /Gateway TERMiTE 3.0
PCi S-LAN Interface Software Module
PCi S-LAN Interface Controller Card
PCi Novell Gateway Software module

- Asynchronous TERMiTE 3.0 - is a terminal emulation program which provides additional intelligent workstation functions. These include management of multi-tasking of up to eight sessions from a single PC workstation. With TERMiTE 3.0, window-like functionality can be easily added to the REALITY environment. A DATA/BASIC™ library is available to include function bars and pull down menus to the REALITY application. Further, TERMiTE 3.0 runs as a DOS application under windows. TERMiTE is also fully compatible with DOS 5.0. The REALITY host system file access and control software for handling requests from any PC using TERMiTE 3.0 is uploaded from the PC. The Async version can be upgraded to LAN as required.
- LAN TERMiTE 3.0 - adds a LAN interface capability to the basic Asynchronous version of TERMiTE 3.0. This capability can be combined with either a direct S-LAN connection or a Novell Ethernet Gateway connection to meet a wide range of application and configuration requirements. This version is also compatible with a wide range of networks used in

other system environments found in the PICK market.

- PCi S-LAN Interface Software Module - provides a direct interface between an existing standard Ethernet LAN and a REALITY S-LAN and gives the PC user full TERMiTE functionality across the LAN.
- S-LAN Interface Controller Card - Any interface controller card that supports the NDIS interface (Western Digital WD8003E or equivalent) card may be used for this purpose. Novadyne will provide a quote on an S-LAN interface card if required.
- PCi Novell Gateway Software Module - provides an interface between a REALITY S-LAN based system and a Novell Ethernet LAN (Note: Other types of LANs can be requested on an RPQ basis). Full TERMiTE functionality is available to any Novell workstation.

In addition to S-LAN compatibility, there is support for a wide range of networks that is constantly being expanded. Included in these currently are Novell's LAN Workplace for DOS and Sun's PC/NFS.

PCi is also compatible with RealLink 2.1 from McDonnell Douglas and can co-reside on the same systems. However, please note that RealLink is not supported on DOS 5.0.

To ensure proper control and data integrity of these networks, Novadyne Networking Consulting Services are available. The new TERMiTE 3.0 products are guaranteed 100 percent compatible with all versions of PICK, Prime INFORMATION™, PI+, UniData,® UniVerse™ and REALITY®.

- Hugh Sheean

Novadyne Exhibits at International SPECTRUM 92 Show

Hustle and bustle...lots of planning and thousands of cups of coffee later, Novadyne was among the 110+ exhibitors at the Anaheim Convention Center for the 1992 edition of the International Data Base Managers Association's Spectrum Manufacturer's Conference and Exhibition. For the eighth year in a row, Novadyne participated in the PICK® marketplace's largest and most prestigious tradeshow.

This year's theme focussed on Novadyne's new product offerings and their complimentary orientation with Novadyne's current product base.

A brand new Series 14/400 system (upgrade from the existing 14/200) offering three-to-four times greater performance and a multi-user DOS®/REALITY® environment was introduced.

In addition, a broad and powerful family of UNIX®-based open systems called Series M, based on the Motorola Delta Series, was a surprise announcement (see article on page 5 for specific information).

And, a new family of PC integration products to replace RealLink, offering full integration of personal computers with REALITY- and PICK-based host systems via Async or LAN connection was introduced.

In concert with these newest products, Novadyne also featured recently-announced Novaport Asynch Expander for the Sun SPARC® and MP products, a desktop and deskside serial port and disk expansion system that leverages the power of Sun Microsystem workstations to create cost-effective, UNIX- based multiuser systems designed for commercial applications requiring extensive connectivity.

Unique to this year's show was the "teaming up" with one of Novadyne's Value Added Dealers -- Creative Synergy -- in the booth. Together, the combined integration capabilities created a powerful "one word solution" message.

Overall attendance at this year's show was far better than in years past and there was a renewed sense of energy at this show. The Novadyne booth had continual demonstrations going throughout the entire three-day period. If you missed the opportunity to come by the Novadyne booth at Spectrum, please make every effort to attend one of the upcoming PICK User Meetings taking place at a location near you (see following article).

- Pat Dwight

Novadyne Supports PICK User Meetings

In addition to exhibiting at the Spectrum '92 Tradeshow, Novadyne has focussed increased emphasis on the numerous PICK® user meetings and exhibits scheduled throughout the country this year. Novadyne has already participated in EAI's User Group meeting and the National Capital Area PICK Users Group meeting in April and the Chicago PICK Users Fair, MSA Users Group meeting, Creative Computer Solutions Western Regional User Group meeting, and PICK Users of Florida conference in May.

We also plan to participate in several additional PICK user group functions beginning in June and continuing throughout the year. If your user group is planning an exhibit or function not listed below, please contact Kathy Mobilia at (714) 566-3805 and let her know.

Event	City	Date
BITS Show	San Francisco	June 1-2
PICK Users of Florida	Orlando	Aug 16-17
Orange County Assoc. of PICK Professionals	Irvine	September
San Diego PICK User Group PICK Fair	San Diego	Oct 11-12
Northern New England PICK User Group PICK Fair	Burlingame	October

Participation in these User Groups allows Novadyne to remain close to our users and ISOs, and helps expose and/or introduce new products and services in a broader more comprehensive way. We plan to publish this list in future issues of *ON-LINE* so that users can plan to stop by and talk to Novadyne representatives in their locales.

- Pat Dwight

Novadyne's New Terminal Offers PRISM Emulation!

In response to customer demand, Novadyne has developed firmware for the Link MC5 terminal that provides all the functionality of a PRISM® 7 terminal and much more. (For a detailed list of P2000 features see related article on Page 2.) The P2000, Novadyne's new PRISM emulation terminal, is now available for purchase through NOVADIRECT.

P2000 Features:

Full PRISM 7 compatibility, plus the following PRISM 9 features:

- Page Back (six pages of screen memory in PRISM mode)
- Programmable function keys
- 80 and 132 column display mode
- VT220 emulation

The P2000 also supports the following MC5 features:

- Two fully configurable RS232 Serial Ports
- VT100 emulation - for DEC® compatibility
- ADDS® Viewpoint, ADDS 60, WYSE® 50 & 60 emulations
- Auxiliary printer port - RS232 serial or Centronics parallel
- Keyboard choice - ANSI, ASCII or EPC

P2000 COST:

Terminal	$360.00
Keyboard	$100.00

Link MC5 to Novadyne P2000 upgrades are also available:

	First Upgrade/Additional Each
Regular Service Call	$110.00/85.00*
Special Service Call	$185.00/85.00*

NOTE:
*These prices include firmware and installation. To receive the special $85 price, additional upgrades must be performed on the same service call. Please call NOVADIRECT for further details.

ORDER TODAY!

(800) 926-6823

- Charlotte Chadwick

Novadyne Unveils Series M Dynamic Multiprocessor: Combining REALITY and PICK-based Applications With UNIX

Novadyne has introduced the Series M product family, a broad and powerful range of UNIX®-based open systems that supports the all new REALITY® X Operating Environment.

Combining REALITY compatibility with industry leading price/performance in the UNIX market, Series M gives Novadyne competitive leadership in the open systems marketplace for REALITY and PICK®-based applications.

In collaboration with Motorola Computer Systems Division, Inc., Novadyne has the exclusive rights to distribute, service and support the Series M product line with REALITY X. Additionally, Novadyne distributes and supports the uniVerse® and UniData® operating environments on the Series M platforms.

Consisting of the Motorola Delta Series 88000 RISC processor, the Series M offers a wide range of system capacity and covers a broad range of performance. This family of systems consists of two models: the Series M Model 8420 with a single 88K 38 MHz RISC processor for departmental applications, and the Model 8640 which supports two or four tightly coupled symmetrical 88K 34 MHz multiprocessors for large applications.

Designed to support from four to 128 concurrent users, the Series M systems operate as true dynamic, tightly coupled, symmetrical multiprocessor configurations. Under this architecture, high throughput is achieved without having to change the design of an application.

The REALITY X operating environment provides ROS 7.0 functionality and complete compatibility with DATA/BASIC object code.

"Our existing customers can move to a system which gives them expandability without the expense and inefficiencies of normal software migration," said Novadyne vice president of sales and marketing Bob Garbutt. "They now have access to a complete range of UNIX-based development tools and application packages via a powerful upgrade path," he said.

Series M conforms to all major standards by taking advantage of the growing catalog of "open systems" software. In addition, Series M uses industry standard communications protocols to integrate proprietary and open hardware systems within the same organization and integrates existing and long-established applications software.

And, at this time, Novadyne is the only vendor offering scaleable, open systems solutions while supplying a complete range of services which enables users to take full advantage of the systems, from training and applications software to consultative services and facilities management.

In addition, the standard service and support upon which Novadyne has established its reputation as the service leader in the PICK market, is available to Series M customers.

- Hugh Sheean

STARPOWER

Speeding Up SORTS and SELECTS

In the last issue of *ON-LINE* we talked a little bit about item-ids and how they may or may not be indicative of the data which they contain. There are certainly pros and cons to assigning item-ids which bear a logical connection to their data; however, if assigned sensibly the pros should far out weigh the cons.

If your item-ids *do* relate to the data, then it may be possible to leverage this relationship when using ENGLISH®. An ENGLISH SORT or SELECT will run much faster if it is only working with the item-id.

Let's use Novadyne's Central Dispatch INCIDENTS file as an example. Each item-id in the INCIDENTS file consists of six leading digits, which represent the date (YYMMDD) and, appended to that, a sequential number for each incident opened on a particular day. Therefore,

910904108 is the 108th incident opened on Sept. 4, 1991;

9204274 is the fourth incident opened on April 27, 1992.

Now, suppose you wanted to look at all the incidents for September of 1991. You can use the more common attribute select:

```
:SELECT INCIDENTS WITH DATE GE
 "09/01/91" AND LE "09/30/91"
```

or, since you know the convention used in assigning item-ids:

```
:SELECT INCIDENTS = '9109]'
```

Example 2, in addition to requiring fewer key strokes, will run several orders of magnitude faster than the first. Here's why:

Example 1 has to search through each and every item in the file, find the date (which most likely will be stored in internal format), compare the date and save the item if the date matches the parameters specified.

Example 2, on the other hand, only has to compare four bytes in the item-id and save the item if a match exists. Since '0' is the only possible digit to precede '9' in the month position, this example can be made even more efficient so that only three bytes are compared:

```
:SELECT INCIDENTS = '91^9]'
```

If you were certain that there were no incidents from 1981, 1971, etc. it can be further streamlined so that only two bytes are checked:

```
:SELECT INCIDENTS = '^1^9]'
```

It is very likely that you will want to specify some other selection criteria that does not relate directly to the item-id. That's no problem, because you can place the remainder of your selection criteria right after the item-id specification. For example:

```
:SELECT INCIDENTS = '^1^9]' WITH MODEL
  "M9000"
```

This will select all incidents opened in September of 1991 for M9000 systems.

If you just want to generate a report of all incidents for that month, consider the following:

```
:SORT INCIDENTS = '^1^9]' WITH MODEL
 "M9000" BY S/N BY DATE CUST.NAME S/N
 DATE PROD MODEL PROBLEM HEADING "REP
ORT OF M9000 INCIDENTS FOR SEPTEMBER
, 1991" (P
```

This technique is most effective, of course, when working with very large files. It also requires that there be something truly distinct about the item-ids for the data being sought. If, for example, the INCIDENTS file contained only incidents for the current year, and you wanted a report of *all* incidents for the year, this technique would not cause the report to run any faster and would actually make it run a little longer.

Another means of assuring that SORTs are running as fast as possible is to sort by DICTs that are Left justified (L on attribute 9 of the Attribute Definition Item) if at all possible. There are perfectly valid reasons to SORT Right justified, but there is greater overhead involved and the added CPU milliseconds required are significant.

Using a test file of 50,000 items, a 6 MIC Series 6000 takes 34 percent *longer* to SORT a five digit field by a Right justified DICT than the same DICT using Left justification. This is normal in all REALITY® and REALITY-like systems. Performing the same benchmark on a 30 MIC Series 18 running 7.0 revealed only a 10 to 14 percent difference. This speaks very highly of the increased efficiency of 7.0. (Unofficial reports indicate that 7.1 executes Right justified fields just as fast as it does Left justified.)

Another method of reducing SORT and SELECT time is best implemented when designing the data base. Data attributes that will most commonly be used for SORTing and SELECTing should be placed near the top of the item rather than the bottom. The reason for this is quite simple. In order for the ENGLISH processor to arrive at attribute 1, takes only a few instructions. To get to attribute 30, it must scan everything from the beginning of the item until it reaches attribute 30; the more data in between, the longer it takes. Therefore, SORTing or SELECTing very large files with very large items can be greatly enhanced if the attributes specified are near the top of the item.

SORTing or SELECTing by DICTs that have Correlative codes on attribute 8 will also take longer than DICTs that do not or that use Conversion codes on attribute 7. This is because Correlative codes are processed *before* the SORT or SELECT takes place. The more complex the Correlative (File Translates, Algebraic codes, etc.) the longer it will take. This is a good incentive to examine your Dictionary items and make sure that Correlatives are only used when absolutely necessary.

Now, with all this said, let's return to reality for just a moment (pun unavoidable). In order for the CPU to perform a SORT or SELECT, the items being processed have to be brought from disk into main memory. It is of minimal value to fine tune the data structure and ENGLISH syntax if the files containing the data are improperly sized. Far and away, the largest amount of time required to perform any ENGLISH function is the time it takes to move the data from disk to main memory. A poorly sized file causes the disk subsystem to spend inordinate periods of time searching for the data while the CPU has gone off to service another user's request (so much for optimization!) (For a refresher on file-sizing see *ON-LINE* Volume 2, No. 1.)

So, while there are various techniques which can reduce the CPU milliseconds required to perform SORTs and SELECTs, any effort towards optimization has to begin with ensuring that the applicable files are correctly sized. This will yield the greatest performance improvement of all. Once the files are properly sized, the other techniques covered in this article can be applied for even greater efficiency.

[In the next issue we will look at some methods of evaluating and quantifying the performance enhancements you make to your own system.]

• Steve Gill

Care and Feeding of Your 8mm Tape Drive

With the introduction of 8mm tape technology into the world of computers, a few complications have arisen due to the similarity to its consumer product counterpart --the 8mm VCR and camcorder.

Cleaning kits designed for consumer video products may cause excessive wear on the tape head. This is due to the abrasive, sanding action they employ to clean heads. The abrasive cleaning tapes are readily available at costs two-to-three times *less* than the non-abrasive Exabyte-developed cleaning tapes, enticing unwary users into an apparent cost savings. (NOTE: Sony has recently introduced a data grade cleaning cartridge that is approved by Exabyte--the 8mm drive manufacturer--and is available through the NOVADIRECT catalog.)

Even with the approved cleaning cartridges, some care must be taken with how often an 8mm drive is cleaned. Exabyte states that cleaning should be performed every 30 days or 30 hours of use, whichever comes first. Unfortunately, this too, may accelerate wear of the read/write head.

The Megatape 8mm drive that Novadyne sells for use on McDonnell Douglas computer systems has a front panel display which indicates (among other things) the percentage of retries encountered when writing to or reading from a particular tape. In order to avoid unnecessary wear on the tape head, it is now recommended that the head cleaner be used only when the number of retries displayed on the panel exceeds six percent.

We have received a number of tapes from various users to perform conversions, recoveries, etc. that were video grade. Unless specifically requested to return 'the tape', Novadyne will substitute a data grade tape. This is to encourage the use of data grade tapes at all times. As one data grade tape vendor says, "While video grade is used to back-up data, its use has declined in the recent past for a variety of reasons, the most prevalent being unreliability."

When data grade 8mm tapes are manufactured, the process is similar to that of video grade, but with some very important differences:

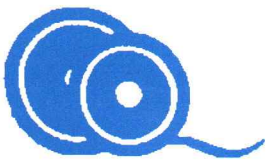
- Coating equipment, which applies the magnetic media, is run at slower speeds to ensure ultra uniformity of the media.
- Quality Control of the data grade product is more stringent, thus some rejects may be relegated to video status.
- BOT and EOT sensors are metallic.
- The cartridge itself is made to higher standards which include reduced static susceptibility.

Price consideration should not be an important factor to today's user because the cost per megabyte is so low. If a data grade tape costs $20.00 versus $7.00 for video grade, that works out to $0.008 per megabyte versus $0.003 (and remember that 1/2" tape costs are approximately $0.182 per megabyte). This is a small price to pay for secure data and peace of mind. As one customer who used video grade tape for over a year before encountering problems commented, "One week's worth of lost information was all it took to get me to go to data grade." If you are using video grade tape, can you really afford to lose any of the information in your data base?

- Brian H. McKinstry

ROS

More Editor Tricks



One of the more powerful features of the REALITY® Line Editor is the Prestore function. The Prestore function enables one to custom design and store a sequence of Editor commands which then can be invoked by entering *Pn* < *Return* >, where *n* is the number of the Prestored command to be executed. This is especially useful when the same Editor operation must be performed on multiple items in a file. In instances where a great deal of logic is not involved, using a Prestore sequence may be faster and easier than writing a DATA/BASIC™ program or a PROC to accomplish the same objective.

You may not realize it, but every time you Edit an item and then do a *P* < *Return* > to display the first 22 lines, you use a Prestore. This can be verified by entering *?P* or *PD* the next time you use the Editor. *?Pn* displays the contents of a specific prestore command, while *PD* displays the contents of all ten registers (P0 through P9). What you will find is that *P* is actually *L22* prestored in P(0).

The syntax of a Prestore command is fairly straightforward. At the Editor prompt (.), start by specifying the number of the Prestore you wish to create, such as P1. Insert a space and then enter the first Editor command to be executed. If you wish to add another command, just hit the Escape

key and enter the next command. Multiple operations may be executed sequentially as long as each is separated by an Escape character. When the Prestore sequence is complete, enter a *<Return>* to return to the Editor prompt. To execute, simply enter *P1<Return>*. For example:

```
.P1 G14[R/trailer/tractor[FI[P1
```

will go to line 14, replace the string 'trailer' with 'tractor', file the item and go to the next item if one exists. If the specified string is not found, the item will be filed unchanged. (Note: [= Escape Character)

Those of you who are familiar with the Prestore feature, have probably found that it appears to have a few limitations. Most notably, it is not obvious how to Insert data within a Prestore context. Say for example you wanted to go to line 20 of a series of items and replace the existing data with something else. Unless the existing data on attribute 20 is the same in *every* item, the *R*eplace command would not be practical. Likewise, the two examples below will not work either:

```
.P1 G20[R[This is new text[FI[P1
```

```
.P1 G20[DE[I[this is new text[FI[P1
```

In the first example, the system will execute the *R*eplace command and then halt waiting for input. It cannot process what follows because it is only *text*, not an Editor command.

The second example has the same problem. The *I*nput command will execute and then halt waiting for input because what follows is not an Editor command either.

However, by using some of the Editor features covered in the last issue and some new ones, it *is* possible to add data. The following example will replace everything in attribute 20 with 'This is new text', file the item and go to the next.

```
.P1 G20[TR/^[AP/This is new text[FI[P1
```

In this example, *TR/^* (^ is the wild card) *TR*uncates line 20 beginning with the first character (*TR//* works as well). This actually creates a null attribute. With line 20 now blank, the *AP*pend command can be used to add the new data.

Inserting a new attribute is actually less complicated than replacing one. Consider the following data item:

```
 1MSG904
001 FERRARI
002 1992
003 VA
.
.
etc
```

Suppose you have a large file or a list of items and you want to insert a new attribute after attribute 002. If you are working from a list, then perform a *GET-LIST {listname}*. If you are modifying the entire file then *ED filename* *.

```
.P1 G2[I RED[FI[P1
```

In this example, *G2* goes to Line 2, *I RED* inserts the new data and now becomes attribute 3, *FI* files the item and goes to the next, and *P1* starts the process all over again.

```
 1MSG904
001 FERRARI
002 1992
003 RED
004 VA
.
.
etc
```

The Editor allows you to store up to nine Prestore commands during any session, all of which remain in the stack until you log off. The commands also remain in tact regardless of what file or item you may be editing. In other words, a Prestore command created while editing an item in file 'A' may also be invoked or modified while editing an item in file 'B'.

Normally, any Editor function results in something being output to the terminal. If you are making massive changes through the Editor, the process can be greatly accelerated by executing the *'P'* command at TCL before entering the Editor and initiating the update process. The *'P'* command hushes output to the terminal which drastically cuts down on system resources.

While the Prestore feature and the Editor in general are extremely powerful tools, they should only be used if you are intimately familiar with the data structure and the data base. Using the Editor to enter or update data may circumvent error checking or other validation and updating normally accomplished through a user interface.

- Steve Gill

Current OS Releases And Patches

The table on page 9 contains the most current Operating System (OS) revisions and patch levels for each supported system. Novadyne is responsible for installing all REALITY® Operating System patch tapes. If your computer system is under maintenance with Novadyne, OS patches will be installed as a value-added service at a time mutually agreeable to you and Novadyne. Systems not under Novadyne maintenance may have OS patches installed on a T & M basis.

ON-LINE Reader's Questionnaire

Your opinion counts! Please tell us what you think about the *ON-LINE* newsletter.

1. Please rate *ON-LINE* on the following categories;

(Please circle rating)	Low				High
Technical Information	1	2	3	4	5
Article Length	1	2	3	4	5
Readability	1	2	3	4	5
Topic Relevance	1	2	3	4	5
Appearance	1	2	3	4	5
Frequency	1	2	3	4	5

2. Which columns provide you with the most useful information?
(Please rank top three in order) _____
_____

3. Which columns are you least interested in reading? _____
_____

4. In your own words, please state what you like best about *ON-LINE.*
_____

5. What don't you like about *ON-LINE?*
_____

6. Would you like additional copies of *ON-LINE* sent to your company?
_____ No _____ Yes. If yes, how many copies? _____
(Please list names and mailstops)
_____
_____

7. Do you have any other data processing equipment that you would like to have Novadyne maintain? _____ No _____Yes
If so, what? _____
_____

8. Do you have or anticipate any system expansion or upgrade requirements in the near future? _____ No _____Yes

Please take a few more moments to provide the following information:

Your Name: _____
Your Title: _____
Company: _____
Address: _____
City: _____
Phone Number: (_____) _____ Ext. _____
System Serial Number: _____ OS Release: _____
Relationship: _____ Dealer _____ End-user _____ Other _____

Thank you for responding to our questionnaire!

FOLD FOLD

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IF MAILED IN THE
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1700 E. St. Andrew Place
P.O. Box 35060
Santa Ana, CA 92705-6560

If you do not have the current patch tape installed for your particular Operating System, please contact your Field Engineer (FE) through Central Dispatch to schedule a time for installation.

Series	Release	Patches (PP = Paper Patches)
4700	4.3RevD	PP1-2
6000	2.3RevD	RevC Tape (Includes PP 1-175)
	1.1RevD	RevB Tape
	7.0RevP	Block Tape 5 Courtesy Tape B
6000 Enhanced	2.4RevA	RevA Tape (Includes PP 1-175)
	7.0RevP	Block Tape 5 Courtesy Tape B
9000	5.3RevD	RevD Tape (Includes PP 1-157)
	1.3RevC	RevA Tape
18	6.0RevF	RevC Tape (Includes PP 1-165)
	7.0RevP	Block Tape 5 Courtesy Tape B

- Mike Bingman

THINK TANK

REALITY 7.1

[In the last issue, Henry Eggers discussed Spooler and Transaction Logging enhancements in REALITY® 7.1. This installment of Think Tank concludes Henry's overview of REALITY 7.1 features and enhancements. -ED.]

DATA/BASIC

The DATA/BASIC™ machine has been enhanced in a number of ways. SCALE is now a runtime operation, so that each variable may have its own scale (or precision), which may vary from 0 to 99 digits to the right of the decimal place. Variables are kept with only as many digits to the right of the decimal place as are actually needed, so that we don't spend a lot of time processing right side zeros.

Addition and subtraction take place with the scale of the larger scaled number or the current scale specification, whichever is less. Multiplication and division use the scale derived from the operation or the specified scale, whichever is less. This means that numbers stated as integers tend to stay as integers, which we exploit; that the absolute magnitude of numbers grows more slowly to the point that they need to be converted to string numbers; and that subroutines do not require the same scale as the calling routine. All of this makes subroutine libraries a tactical possibility at last.

DATA/BASIC Program Conversion

DATA/BASIC programs are now allowed to be any size, and to have any number of variables. This requires that the internal representation of things vary for the first time since 'the beginning.' Therefore, we supply an object code conversion routine which will transform any code compiled since REALITY 3.2 (or so) to 7.1 format and run on a 7.1 machine. If the 'dollar sign' item seems to be missing, we 'decatalog' things in the POINTER-FILE to the 'dollar sign' item, and then convert them to the 7.1 format.

Normally, all of the code on the machine will be converted to 7.1 format during the upgrade to 7.1, but we still support compilation for all machines from 4.2 REALITY forward. The BASIC verb either uses the current system 'default' compiler, or, if the C option is asserted, it prompts for the name of the compiler to be used.

Any of this code may be 'run' on the 7.1 machine. The load process will do a pre-7.1 to 7.1 object code conversion in the loading process. Code compiled for pre-7.1 is still limited to 3200 variables and 32k or 64k of object code, of course, to insure backwards compatibility.

A new option in the BASIC compiler (the 'R' option) allows compilation directly to executable object code. This code is stored in a 'double dollar sign' item in the same file with the source item and the 'dollar sign' item. It may be copied anywhere. It may then be run by the use of a cataloged object pointer, which specifies the file name where the program resides in attribute 6, and the name of the program to execute in attribute 7. This means that programs can be anywhere on the network.

In order to simplify handing options through to a BASIC program, the D and G options were removed from the options available to the RUN verb and catalog pointers, and the DEBUG verb created to enable the BASIC debugger. Simply use DEBUG instead of RUN or in front of the cataloged pointer, and the functionality of the D option will occur. The G option used to produce garbage collect statistics that were generally regarded as unuseful.

A few varied enhancements include the addition of multiple WHILE and UNTIL clauses within FOR and LOOP statements; a PAGE statement;

fractional times for the SLEEP statement; and FMT (for variable or input formatting), ROUND and TRUNC functions for numeric decimal handling.

Printer Independence

A further enhancement, with the Spooler, allows printer independence. This makes printer functions available to user routines, without knowing exactly which printer will be used at output time. The PTR function allows a command to be inserted into the open printfile which will be executed by the despooler process at output time. It will generate the actual command needed for the commanded function by the particular printer. Commands generally available include switching to bold face or italics, or changing font sets. Clearly, there will be some printers which can't do some things which other printers can. In this case, the command is removed from the output stream, and no change occurs.

Other Odds and Ends

ENGLISH® selection is enhanced by the "[...] ...] ..." selection value, where each of the right brackets,], means 'any number of characters', so that "[ABC]XYZ]" will select all strings where ABC precedes XYZ. More than two substrings can be specified.

On previous releases, PROC data structures occasionally tried to share areas of memory used by other processes. This resulted in a number of obscure bugs that were very difficult to reproduce. PROC has been modified so that data structures are now safe, and so that tighter syntax checking is performed. The number of file buffers has been increased to 18 and select registers to 10. The MV command may now include conversions, and IF S and IF # S test for the existence of a select list. All known PROC bugs have been fixed, as well as a few unknowns. PROC syntax has also been made more consistent. The primary evidence of this will occur when PROC suddenly stops ignoring certain coding errors and observes upon them. In general, PROC expects to see terminating delimiters on strings.

Managing the system has been made easier in a number of areas. The WHERE and WHERE-PROCs verbs include more information. CLAIM now sorts the linked frames, so that one or two CLAIMs get back everything which is coming back. The links fields in the DUMP verb are more complete; and the LINKS verb is more complete than that. Almost all of the frames in the machine, and all of the linked frames include owner identification and typing. There are a number of options available for the WORKSPACE verb to allow different views of the workspaces tables.

The dictionary of the STAT-FILE includes several self-documenting macros which supply a number of different views of the contents of the machine, most of which will save a lot of paper. The dictionary also includes a data definition item which will recommend a modulo for a file. The system includes 140 prime numbers, at 10 percent intervals, which are the recommended moduli. There are three programs in SYS-BASLIB named PERFORMANCE.MONITOR 1, 2 and 3, which allow a naive, but intuitive and quick, view of where the system resources are going. The system error log file now collects a much wider range of errors than ever before.

This release builds on 7.0, extending the network connectivity and system reliability already a hallmark of that release.

- Henry Eggers
  Manager Operating System Development
  McDonnell Douglas Information Systems International

PGM

DATE and TIME Conversion Programs

Working in Novadyne Headquarters, we sometimes take for granted some of the 'nifty' utilities that have found their way onto our Series 18's. We are reminded of this whenever we find ourselves working on 'stock' systems and keep getting ERRMSG [3], VERB?

In fact, there are many TCL verbs, PROCs and other useful utilities found on the REALITY® SYS-GEN that originated on our internal production systems. Many of these utilities were developed as troubleshooting aids for/by the Central Support Analysts to assist them in addressing operating system problems. Others have been developed by our MIS department. Novadyne's close working relationship with McDonnell Douglas has facilitated the migration of many of these utilities onto the REALITY SYS-GEN.

The programs presented in this issue are useful utilities that have not yet been incorporated in the SYS-GEN. The first two are programs for converting dates to internal format and vise versa. One is written in PROC and the other in DATA/BASIC™. They both accomplish the same thing; you get to choose which version to use. The third program, is a DATA/BASIC utility for converting times between internal and external formats.

As with all programs and PROCs, we recommend that you only put a pointer in the Master Dictionary (MD); not the entire program. This keeps the MD from becoming unnecessarily cluttered.

DATE

```
001    PQN
002    C DATE CONVERSION ROUTINE
003    C SHH*840614
004    10 IF # %2 T ""\T "INPUT DATE",+\IBP:%2\IF # %2 X-TCL-
005    IF %2 # (0N)](2N/2N/2N)](2N-2N-2N)](2N.2N.2N) MV %2 ""\T B,""\T "FORMAT MUST
         BE MM/DD/YY, MM-DD-YY OR NUMERIC..." \G 10
006    T U,U\IF %2 = (0N) T (20),%2: D:
007    IF %2 = (2N/2N/2N) T (21),%2; D2/;
008    IF %2 = (2N-2N-2N) T (21),%2; D2-;
009    MV %2 ""\G 10
```

NOTE:] = <CTRL>] \ = <CTRL> \

CD

```
001 *  THIS PROGRAM WILL CONVERT DATE TO OPPOSITE FORMAT BASED ON INPUT
002 10 PRINT "VALUE TO BE CONVERTED":;INPUT DATA
003    IF DATA="" THEN STOP
004    NUM.DATA=NUM(DATA)
005    IF NUM.DATA THEN PRINT "EXTERNAL": ELSE PRINT "INTERNAL":
006    PRINT " FORMAT IS ":
007    IF NUM.DATA THEN PRINT OCONV(DATA,"D2/"):"  ":OCONV(DATA,"D")
         ELSE PRINT ICONV(DATA ,"D")
008    GO 10
009    END
```

CTM

```
001 *  THIS PROGRAM WILL CONVERT TIME TO OPPOSITE FORMAT BASED ON INPUT
002 10 PRINT "VALUE TO BE CONVERTED":;INPUT DATA
003    IF DATA = " " THEN STOP
004    NUM.DATA=NUM(DATA)
005    IF NUM.DATA THEN PRINT "EXTERNAL": ELSE PRINT "INTERNAL":
006    PRINT " FORMAT IS ":
007    IF NUM.DATA THEN PRINT OCONV(DATA,"MTS):"  ":OCONV(DATA,"MT")
         ELSE PRINT ICONV(DATA,"MT")
008    GO 10
009    END
```

You may have noticed that the two DATA/BASIC programs are identical except for the comments and the conversion codes used on line 007 of each program. The Copy Processor will save you a few key strokes if you wish to add both programs to your system. When entering these programs, be very careful not to omit or add spaces. Pay particular attention to the lines that wrap.

If you have your own utilities that have been developed to assist in day-to-day operations and would like to share them with other users, please submit them to the Editor, *ON-LINE*. We will evaluate all entries and publish those which we feel will benefit the user base at large. Depending on response, we may even have a contest for the best utility submitted.

- Steve Gill

Corrections

Several misprints were discovered in last issue's PGM article on "MSGing on 7.0". The cause of the misprints was actually a bug in our WORDMATE™ to Ventura Publisher® conversion process. The bug caused anything

occurring inside < and > to be completely stripped out. As a result, the following lines from the two programs referenced were printed incompletely. Here are the corrected lines to those programs. Our sincerest apologies for any inconveniences this may have caused. - ED

```
CREATE-FILE PORT,MSG 11 (I)
```

GMSG

```
053    READ DEVICES.FILE REC FROM DEVICES.FILE,DEVICES.LIST<D> THEN
054    DEVICES.LIST<D,2>=DEVICES.FILE.REC<2>:DEVICES.FILE.REC<3>
060    WHILE NUM(PORTS.LIST<N>) AND PORTS.LIST<N> NE "" DO
062    READ PORTS.FILE.REC FROM PORTS.FILE,PORTS.LIST <N> THEN
063    IF PORTS.FILE.REC<10> = 2 AND PORTS.LIST<N> # 0 AND PORTS.LIST <N> #
         SYSTEM(18) THEN
068    UNTIL CTRLCHAN = DEVICES.LIST<D,2> DO REPEAT
071    PORT.DATA=DEVICES.LIST<D,1>:AM:PORTS.LIST<N>:AM:MSG
072    SEND PORT.DATA TO MSG.SESSION THEN PRINT "MSG SENT ":PORTS.LIST<N>
         ELSE PRINT "FAILED TO SEND MESSAGE"
```

GMSG.SERVER

```
007    READU MSG FROM PORTS .MSG.FILE,PORT.DATA<2> LOCKED STOP ELSE STOP
010    MSG=CHANGE(MSG,"@P",PORT.DATA<2>)
```

A minor bug was also discovered in the disk analysis utility previously published in the ROS column in Volume 3 Number 3 (3rd Quarter 1990).

In that original article, Line 016 reads as follows:

```
016 ANS=ANS[25,3]
```

This makes an assumption that the additional workspace allocated for an account is 100 frames or greater. If the number of additional frames is *less* than 100 (i.e. 99 or less) then this code will cause the system to generate the following error message:

```
LINE 17 [B16] NON-NUMERIC DATA WHEN NUMERIC REQUIRED; ZERO USED!
```

This message arises because the variable ANS is set up to be a three character field and when workspace frames of 99 or less are seen by the program they include a leading null as part of the data. To correct this, Line 016 should be replaced as follows:

```
016 ANS=TRIM(ANS[25,3])
```

The TRIM function will trim the leading null from the string.

SERIES 7000

Disk Full Messages

On the Series 7000 there are two system messages which are easily confused--"Disk File Full" and "Disk Full".

"Disk File Full" refers to one particular file which has exceeded its parameters. The message is displayed on the terminal which keyed the record that caused the file to be full. Each subsequent record to that file will cause this message to be displayed. When this occurs and the file is a datafile (not a batch), the file can be copied to another name, the original file deleted and recreated with larger parameters. Then the temporary file can be copied to the original name.

In a Data Entry environment, when this message is displayed, the KEYEVENTS file is usually full. This should be cleared using the *ELOG* command. Do not delete this file at any time, as data entry will not function without it. If the file is a batch, you must close the batch and continue with a new one. If batch balancing is being used, the totals must be adjusted accordingly. A batchfile will hold approximately 3000 eighty-character records. There is no way to circumvent this restriction. User departments who submit their own batches should be made aware of this restriction. This will avoid the confusion when batches must be divided into smaller batches.

The "Disk Full" message occurs when the system disk is completely full. At this point, there is no room on the system to do anything. You cannot delete anything and all terminals will be locked. However, the Series 7000 system has a built-in failsafe. At a predetermined percentage (usually 90 percent) an audible alarm buzzes. This is a warning only. If you choose to ignore it, the system will allow you to key until the whole disk is full.

To avoid this problem, when the alarm sounds you should either delete old data or archive it to tape and then delete it. If your system console is in a room other than where people are keying, be sure to check periodically for the alarm.

Keeping your system free of outdated files and releasing batches as soon as you have file-saved them will avoid the possibility of getting the "Disk Full" message. It will also make your system run faster. A clean disk makes it easier to find seldom used files.

• Ann Connelly

COMMS

Current COMMS Releases

Shown below is a Product/Release matrix describing the current releaseS of software for the various communications products.

Any software fixes which may be required will only be produced for the most current release.

If you plan to upgrade your system to the next hardware system or operating system release, contact your local dealer or analyst to make sure you have the required communications software prior to the upgrade. If in doubt, have your dealer or analyst contact the Novadyne Computer Systems, Inc. Communications Support Group at (800) 678-3399.

COMMS PRODUCT RELEASE	Series 4700	Series 6000	Series 9000	Series 14	Series 18
MCC 3.1 (Rev 4)	N/A	1.1	N/A	N/A	N/A
MCC (2.3) 3.1 (Rev 5)	N/A	2.3	N/A	N/A	N/A
MCC (6.0) 3.1 (Rev 3)	N/A	N/A	N/A	N/A	6.0
MCC (7.0) 4.1 (Rev 4)	N/A	7.0	N/A	N/A	7.0
HSCC (SNA) 2.0 (Rev 5)	N/A	7.0	N/A	N/A	7.0
SLAN (Ethernet)	N/A	7.0	N/A	N/A	7.0
XCC (X.25) 2.1 (Rev 1)	N/A	7.0	N/A	N/A	7.0
FTU 1.2 (Rev I)	4.3	1.1, 2.3	1.3, 5.3	2.3	6.0
FTU 1.3 (Rev G)	N/A	7.0	N/A	N/A	7.0
M3800 (2780) 1.3 (A)	4.3	N/A	1.3, 5.3	N/A	N/A
M3800 (SNA) 5.3 (A)	4.3	2.3	1.3, 5.3	N/A	N/A
5750 (TCL COMMS) Rev 2	N/A	N/A	1.3, 5.3	N/A	N/A
2602 BISYNC	4.3	N/A	N/A	N/A	N/A

NOTES:

The MCC software for 7.0 systems consists of two tapes: 1) MCC software in INSTALL format; 2) 2780-TERMLIB-BASE in ACCOUNT-SAVE format.

The S-LAN software is included on the 7.0 SYS-GEN tape. The software requires a "Virtual Port License" available from your dealer or VAR.

In addition to the software tape, X.25 also requires a "Virtual Port License" available from your dealer or VAR.

5750 Communications Software no longer resides on the SYS-GEN tapes. If you require this software, have your dealer or VAR contact the Novadyne Computer Systems, Inc. Communications Support Group.

2602 Bisync runs only on Series 4700 systems. The software is included on the Series 4700 4.3 SYS-GEN tape.

• Richard Yeh

APPS

Too Many Rulers Fill Up Your Disk

Each WORDMATE™ ruler is comprised of at least 80 bytes. If you are using WORDMATE with the View turned off, you may be inadvertently inserting redundant rulers in your documents. A ruler is inserted anytime you hit the ESC key while in the EDIT mode (unless the cursor is positioned on an existing ruler). Unnecessary rulers eat up disk space and extend File-Save times. In large documents, you

may even risk exceeding the maximum item size (except on Release 7.0).

A good way to avoid redundant rulers is to work with the View turned *on*. If you find yourself in the Ruler mode and don't want to be there or don't want another ruler inserted, use the 'X' key (not ESC) to remove the ruler. To remove unwanted rulers already inserted in a document, turn the View on and use the 'K' key (delete line) in the EDIT mode.

- Steve Gill

Deleting Text

Here's a tip for deleting large passages of text from your WORDMATE™ documents, letters, etc. Rather than using the 'Y' 'K' or ';' commands (which delete a sentence, line or paragraph at a time), use the Cut feature to delete large passages, even whole pages at a time. To prevent your MAST- PASTE-FILE from filling up, use the same Paste name each time so it overwrites the previous text.

- Steve Gill

Current Application Overlays

The following matrix provides the release level of Application Overlays required by each supported Series and OS. It is important that you know which Overlay you should obtain prior to a planned upgrade . For example, if you are upgrading a Series 9000 from 5.1 to 5.3, which uses REALCALC™, then you will need to obtain the corresponding Overlay release (REALCALC 2.1C) before upgrading.

ApplicationOverlay	Series 4700	Series 6000	Series 9000	Series 18	Series 14
A*L*L 1.1	4.3	1.1	1.3	N/A	N/A
A*L*L 1.2	N/A	2.3,2.4	5.3	6.0	2.3 D.4
(Paper Patches 1-59					
A*L*L 1.3E		7.0		7.0	
(Block Tape 1)					
PCmicroREALITY 2.1	4.3	2.3	1.3,5.3	6.0	N/A
REALCALC 2.1C	4.3	1.1,2.3,2.4	1.3,5.3	6.0	2.3 D.4
REALCALC 2.1E		7.0		7.0	
REALGRAPH 1.0C	4.3	1.1,2.3,2.4	1.3,5.3	6.0	2.3 D.4
REALGRAPH 1.0D		7.0		7.0	
REALLINK 2.0	4.3	1.1	1.3	N/A	N/A
REALLINK 2.1 Rev. 4	N/A	2.3,2.4	5.3	6.0	N/A
REALLINK 2.1 Rev. 6		7.0		7.0	
REALISM DEVELOPER 1.0A	N/A	2.3,2.4	5.3	6.0	2.3 D.4
SHELL 1.0A	N/A	2.3	5.3	6.0	2.3 D.4
REALISM 1.0 Rev. 2		7.0		7.0	
REALITY Integrated Office2.3	4.3	1.1,2.3,2.4	1.3,5.3	6.0	N/A
(Overload Patch Tape Rev B -- 2.3, 5.3 and 6.0 O/S only)					
REALITY Integrated Office 2.3 Rev. B		7.0		7.0	
WORDLINK 1.4C	N/A	2.3,2.4	1.3,5.3	6.0	N/A
WORDMATE 2.1C	4.3	1.1,2.3,2.4	1.3,5.3	6.0	2.3 D.4
(Overload Patch Tape Rev A and Paper Patches 1-7)					
(Overload Patch Tape Rev B -- 2.3, 5.3 and 6.0 O/S only)					
WORDMATE 2.1E		7.0		7.0	
TRANSACTION LOGGING 1.2	N/A	2.3,2.4	5.3	6.0	N/A

- Janet Altman

Q&A

Dear Editor:

I have noticed in past issues of *ON-LINE* that some of your ENGLISH® examples use single quotes and some use double quotes. Is there a reason or doesn't it matter?

Joanne Miller
Coordinator, Administrative Computing
Haverford College

Dear Joanne:

If you check the examples referenced, you should find that single quotes are used when specifying *item-ids* and double quotes are used when specifying *attributes*. Although this is how it is documented, you may have found that you can get away with using double quotes when specifying item-ids in some cases. (Trying to use single quotes for data attributes seems to fail consistently.) This is because ENGLISH is fairly forgiving in this respect; however, the more complex an ENGLISH statement, the greater the likelihood that something will malfunction if you are not using the quotes properly.

In order to guarantee consistent and reliable results, we recommend sticking with the documented method.

In appreciation for taking the time to write, we will be sending you a Novadyne T-shirt and cap.

- Steve Gill

CUSTOMER ED.

Recession Fighter! 50 Percent Off

Here in Customer Education, we are well aware of the economic problems companies are experiencing. To help lessen the strain on the company budget, we are offering a 50 percent discount on a special Introduction to REALITY® course, scheduled for the week of August 10 (see schedule). This is our regular 4 1/2-day course, nothing left out. 100 percent for 50 percent of the cost, but this class will be limited to 10 students. The course will help your users become more proficient when working with the REALITY Operating System. Often users learn "OJT", as they say. This creates "holes" in their knowledge, holes that can cause undue problems. Many times, our students are dismayed to find out that there are easier ways to accomplish their tasks, ways that they could have been using all along, if only they had known!

• Joan McWilliams

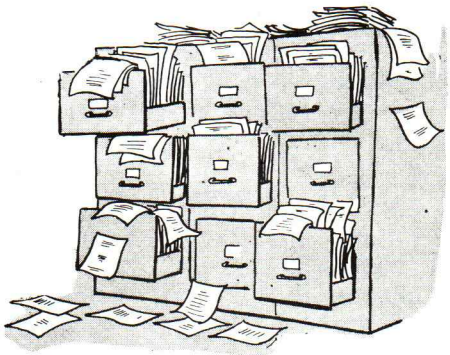
CUSTOMER EDUCATION SCHEDULE

		JUL				AUG					SEP				OCT				NOV				
	COURSES OFFERED	6	13	20	27	3	10	17	24	31	7	14	21	28	5	12	19	26	2	9	16	23	30
Novadyne	INTRO TO REALITY O/S 4 1/2 Days $1000/Person				SA		SA 50%										SA						DA
	7.0 ROS SYSTEM ADMIN. 4 Days $800/Person	SA 7														SA							
	INTRO TO DATA/BASIC 4 1/2 Days $1000/Person												SA										
	PROC PROGRAMMING 3 Days $600/Person					SA								SA									
	ROS SYSTEM ADMIN. 4 Days $800/Person		DA												SA								
	UNIDATA 4 1/2 Days $1000/Person													SA									
	UNIX 4 1/2 Days $1000/Person			SA						SA								SA					
	SUN O/S 4 1/2 Days $1000/Person							SA					SA							SA			
	SUN SYS. MGR. 4 1/2 Days $1000/Person								SA												SA		
	UNIVERSE 4 1/2 DAYS $1000/Person		SA									SA							SA				
Discovery	INTRO TO PICK/REALITY 4 1/2 Days $900/Person		DC					CI						DC					CH		BO		
	ADVANCED PICK/REALITY 4 Days $900/Person						DC												DC				
	ACCELERATED PICK/REALITY 4 1/2 Days $1000/Person					DC										AT							
	SYSTEM INTERNALS 4 Days $995/Person														DC								
	INTRO TO DATA/BASIC 4 Days $900/Person				DC								TA							DC			
	ADVANCED DATA/BASIC 4 Days $900/Person																	TA					DC
	ACCEL. DATA/BASIC 5 Days $1000/Person			BO								DC											
	ASSEMBLER PROGRAMMING 4 Days $950/Person									DC													
	INTRODUCTION TO UNIX 5 Days $1300/Person			DC											CI						DC		
	UNIX SYSTEM ADMIN. 5 Days $1000/Person								DC									DC					
	UNIX SHELL PROGRAMMING 3 Days 800/Person												DC										

LOCATION CODES: AT = ATLANTA; BO = BOSTON; CH = CHICAGO; CI = CINCINNATI; DA = DALLAS; DC = WASHINGTON, DC; SA = SANTA ANA, CA; TA = TAMPA

NOTES: All classes begin on Monday unless otherwise indicated. The following courses are available upon request: ALL 1.2, PCmicro-REALITY, REALCALC, REALGRAPH, REALISM (Shell and Developer), REALLINK, REALITY Integrated Office, WORDMATE, Series7000 Reformatting and Quickstarts, Series 7000 Basic Programming, Data Communications, and Advanced DATA/BASIC. Please call Joan McWilliams at (714) 566-2199 for more information.

GooFiEs



What your disk system looks like when the files are missized

Technical Operations

ON-LINE

Published for System Software Users

Steve Gill, Editor
Ann Connelly, Assistant Editor
Will Edwards, Technical Advisor
Pat Dwight, Production Consultant
Joanie Lanham, Production

Please write to the Editor, *ON-LINE*, 1700 East St. Andrew Place, Santa Ana, CA 92705-6560.

Novadyne Computer Systems, Inc.
1700 East St. Andrew Place
Santa Ana, CA 92705-6560

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