# Central Support ON-LINE

Published for System Software Users

McDonnell Douglas Field Service Company — Santa Ana, Ca. 92705

Volume 3 — Number 2 — 2nd Quarter 1990


## STAR POWER

### QUEUE-SETUP

In the last issue of *ON-LINE*, we explained how to customize the QUEUE-SETUP proc (in SYSPROG-PL) to create your spooler queues whenever the SYSTEM-SETUP proc is executed. In this issue, we would like to show you an additional idea for tailoring the QUEUE-SETUP proc. The recommendation is to add to the QUEUE-SETUP proc the ability to SP-PORTON your port printers after the queues are created. Following is a simple example showing both techniques:

```
SYSPROG-PL QUEUE-SETUP

HSP-CREATE QUEUE1 PORT 9
P
HSP-CREATE QUEUE2 PORT 10
P
MV %2 "9"
[PROCLIB SP-PORTON]
MV %2 "10"
[PROCLIB SP-PORTON]
RTN
```

When the proc is run, QUEUE1 will be created for port 9, and QUEUE2 will be created for port 10. These ports will then be logged on as despooling ports using the SP-PORTON utility in the PROCLIB file.

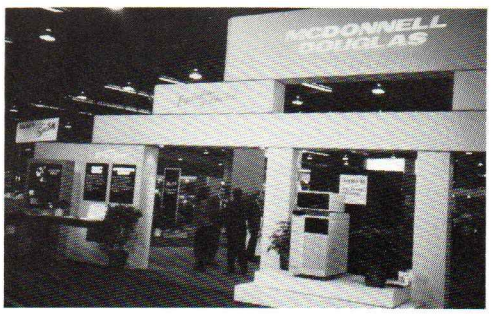
- Susie Seipel

## MARKETING

### MCDONNELL DOUGLAS FIELD SERVICE COMPANY ANNOUNCES TWO NEW PRODUCTS AT SPECTRUM® SHOW

McDonnell Douglas Field Service Company (MDFSCO) exhibited two new products for the North America market at International SPECTRUM '90 on April 11-13, 1990 in Anaheim, California.

In a significant announcement, MDFSCO expanded its Series 18 line of superminicomputers with the addition of an enhanced REALITY® based product -- 18/645 -- incorporating new technology which doubles the performance and interactive processing power while increasing memory capacity twofold.




McDonnell Douglas' expanded Series 18/645 Superminicomputer

The Series 18 family of superminicomputers was introduced in 1987. As with other Series 18 models, the Series 18/645 utilizes unique, modular architecture featuring three levels of intelligence that deliver faster CPU performance and predictably higher throughput at all configuration levels.

Part of the Series 18's ability to satisfy a large number of users comes from its modular I/O architecture. The Series 18/645, with up to 80MB of main memory, up to 9GB disc, and up to 1000 ports with 600 concurrent users, will be available for delivery in the fourth quarter of 1990.

In a radical departure from the company's traditional REALITY-based product line, MDFSCO also revealed its plans to move into the UNIX® market with the announcement of its new LX/2100 product at the SPECTRUM show.

LX/2100 combines the technology of the Sun® Microsystems SPARC® CPU with the UniREALITY® operating environment (UniREALITY is a joint development of McDonnell Douglas and UniData, Inc.). The combination of these two leading edge technologies results in the LX/2100, a high performance, multi-user, multi-environment computer system which offers exceptional system reliability and serviceability.

LX/2100

UniREALITY contributes the relational database management system (RDBMS) which allows REALITY or PICK® based applications to run on the Sun UNIX platform. This product also supports multiple versions of the REALITY operating environment on Sun's SPARC architecture. UniData's® SQL-based RDBMS also has significant applications development tools such as a 4 GL language capable of allowing customers to build their own applications quickly and efficiently.

LX/2100 has been designed as an "open ended" product, allowing for new technologies and new peripheral devices. Product evolution is made possible through the maximum use of open industry standards in hardware interfaces, peripheral device types, and system software.

Included in the minimum system is a single-board computer (SBC), a 5-1/4 inch 150MB cartridge drive, or optionally, an 8mm DVCR cartridge drive, a 5-1/4 inch fixed disc drive, an Ethernet interface, and a sixteen port terminal I/O interface.

The SBC design is based on the Reduced Instruction Set computer (RISC)® developed by Sun Microsystems and named "SPARC" (Scaleable Processor ARChitecture). The SBC is manufactured by Sun and is used in their highly successful SPARCstation 1 desktop workstation.

By exploiting the processing power in the workstation, the LX/2100 uses the CPU power to support transaction processing for multiple users in a shared system environment.

"We are extremely excited about this new strategic alliance with Sun Microsystems and UniData," said McDonnell Douglas Field Service Company President Bert Novak. "UniREALITY gives McDonnell Douglas an additional path to success by integrating the best aspects of the REALITY environment into emerging standards like Sun Microsystem's UNIX."

McDonnell Douglas Field Service Company recently assumed all sales and marketing responsibility for McDonnell Douglas computer products sold through geographic dealers and Value Added Resellers in the United States and Puerto Rico. "This sets our company apart as we are one of the few non manufacturers in the business capable of offering total sales, support, and field service to its customers," Novak said.

Although neither product will be available until fourth quarter 1990, anyone interested in one or both of these products can contact their dealer or VAR for more specific information.

- Pat Dwight

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# ROS

## Current OS Releases And Patches

The following table contains the most current Operating System (OS) revisions and patch levels for each supported system. McDonnell Douglas Field Service Company has assumed responsibility of installing all patch tapes for Dealer/VAR and branch customers.

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 PP1 175) |
| | 1.1RevD | RevB Tape |
| 9000 | 5.3RevD | RevD Tape (Includes PP1-157) |
| | 1.3RevC | RevA Tape |
| 18 | 6.0RevF | RevB Tape (Includes PP1-114) |

Please note: Patch Tape Rev D for M9000 Release 5.3RevD is now available.

- Mike Bingman

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## PERFORMANCE

### The Disc Subsystem

In the last *ON-LINE* "Performance" article we looked at the effect that the disc and processor components could have on the response time of the system. In this issue we will take a deeper look into the disc subsystem.

In the previous performance article we used the equation

Response time = Process time / (1-Load)

to illustrate the degradation that would occur for any system resource as the load upon it increased. This equation can be used to show how the disc subsystem would behave should we change any of its characteristics. We will use the following parameters: 'Process Time' is expressed by nTd, where n is the number of disc I/Os required for a given task or transaction. Td is the disc response time for a single I/O; since this is so close to being the same as the seek time for a disc, we will treat them as being the same. 'Load' is expressed by nRTd, where R is the number of these given tasks performed in a second.

The most obvious change we can make is to reduce the number of disc I/Os we need for the given task. Fig.1 plots the disc degradation curves for four different values of 'n', showing how the disc subsystem will degrade significantly as the number of disc I/Os per transaction or task is increased.

**Disc subsystem performance for different task disc demands**

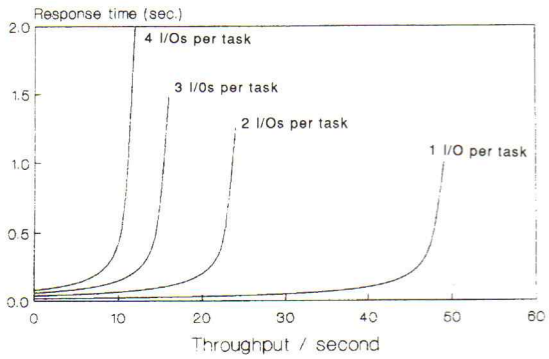



Fig. 1

From an operations standpoint, this is probably the easiest and cheapest of the disc performance problems to rectify.

In an effort to reduce disc I/Os the first area to be studied is file size. As can be seen from Fig.1, there is a drastic reduction in the number of tasks that can be processed when two I/Os per task are required compared to one I/O per task. If we have a file with most groups having one overflow frame, processing the file will require two rather than one disc access per group. Should you have any doubt about correct file sizing, consult ON-LINE volume 2, number 1.

The other areas that can be examined are much more subjective. They involve determining if the frequency of disc requests by your application programs can be reduced or if batch processes are being used inappropriately. These kinds of operations often involve reading an entire file when only extracting a few items. This kind of processing should be looked into closely to see if a cross reference file or another method of database access may prove more efficient. A high frequency of disc writes during intensive processing can be an indication of insufficient main memory. Disc I/O statistics can be obtained using the DISCIO verb. This topic will be discussed in a later article. Also, your SET-WRITES value may be set incorrectly; for more information on SET- WRITES please refer to ON-LINE volume 2, Number 2.

Having made all practical adjustments, the system may still have a disc bottleneck that significantly affects processing. At this point we should look at another factor in the degradation equation given above: disc access time. Although disc access times vary between different types of disc drives, we will use an average seek time of 20 milliseconds. If it were possible to reduce disc access times, we could achieve much greater throughput of the disc subsystem. Fig. 2 demonstrates the dramatic increase in throughput based on average seek times of 20ms and 10ms.

**Disc performance with different speed disc subsystems**

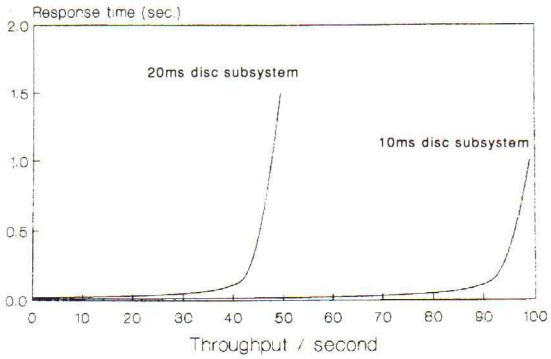



Fig.2

Given this, the next step is to determine how best to reduce the disc access time. The first and simplest method is to save and restore the system. This has the effect of moving the data down into lower frames; since these frames reside nearer the edge of the disc, the disc head does not have to travel as far to retrieve the data. The second method to achieve an overall reduction in disc access time is to allow the system to perform more than one access at a time. These are called overlapped seeks.

As an example, suppose the system needs to get two frames from the disc subsystem and that the system has one disc drive. Obviously, the disc cannot do more than one access at once. As each I/O will take 20ms, the average I/O time per access is 20ms. Now suppose that there are two drives. The first access will take 20ms. Fifty percent (probability 0.5) of the time the second access will go to the same drive as the first, assuming the access is for random frames; therefore, the time for the two I/Os will be 40ms. Fifty percent of the time the second access will be for the second drive and the system will do this in parallel to the first.

The total time for these two I/Os will then be 20ms as both were done simultaneously. Therefore, the average access time for the disc subsystem will be [(40 * 0.5) + (20 * 0.5)] / 2 = 15ms per I/O. This is a drastic reduction from the 20ms with one drive. As more drives are added, the lower the aggregate access time becomes; however with more I/Os being added to the queue, the less probability each successive one has of starting an overlapped seek.

Fig. 3 below graphs the effective response time per access for an increasing number of drives. This is shown for queue depths of two, three, and four to illustrate the effect of disc subsystem I/O queue length. Although the probability calculations are too complex to be shown in detail, this graph demonstrates the effect on access times gained by adding drives.

**Disc subsystem response with multipule drives**

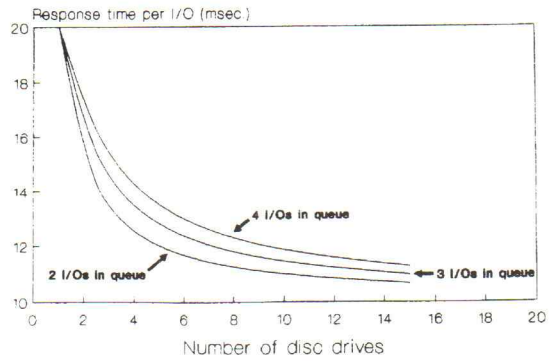



Fig.3

In reality there is another component, the disc controller. It is not possible to add 15 drives to the same disc controller as the disc controller itself would then be a bottleneck. For maximum system utilization, it is best to connect only two disc drives to any one disc controller. This ensures that the throughput or "bandwidth" of the controller does not degrade the disc subsystem, and thus prevent the queue of any one controller from growing to unmanageable proportions.

- Will Edwards

# THINK TANK

## THAT MARVELOUS DATA/BASIC ™

Derision! That's what I'm greeted with anytime I mention to the unenlightened what the main programming language is on our system. "BASIC!", they say, "How archaic!" Now I've resolved to always stress it as **"DATA/BAS-ic."**

DATA/BASIC is a real freedom machine with fewer restrictions than most other programming languages. String variables need not start with "$". It will uncomplainingly "PRINT 1 + (2:STR(0,3))", not caring that you've just added a number and a string; a feat other languages won't allow, considering you're adding apples and oranges.

Herein lies the user-friendliness--the user need not be concerned at all about types in order to make the computer do what is desired. "Types? I types on my keyboard," you may be saying. No, we're talking "kinds", here.

Computers are rather imbecilic in their comprehension of life and the universe. Remember the old joke about "How do you keep a (fill in your favorite down-trodden group) busy? Give him a card that says 'See other side' on both sides!" Well, the joke is really true if you fill in the blank with "computer."

The Central Processing Unit cannot properly add a string to a number, even though the string may be "1". They are two different "types" of data. But DATA/BASIC is programmed to bend over backwards in an attempt to "do what you meant and not what you said." Therefore, it automatically converts variables and even constants into the proper format (type) for the operation at hand. But few things in life are free.

There is always a brokerage fee for conversions. Hence, FOR I = 1 TO 50 ... NEXT I, will run faster than FOR I = 1 TO "50" ... NEXT I, since the string "50" has to be converted to a number 50 times. X = X : "2" is faster than X = X : 2 since concatenation requires string, not numeric, data.

Thus it can be seen that, though DATA/BASIC is not a "strongly typed" language like Pascal, which derives some performance enhancement by DEMANDING you only give it the particular type suitable for a particular function, it will provide better performance by being presented with data in the most easily digestible form.

X = X : '' will convert a number to a string. X = X + 0 will convert a string to a number. Both of these take a certain small amount of time, which may be worth the expense if that particular value of X is going to be referenced many times in only one way, string or mathematical.

On another note, it came to my attention recently that some people think the "RETURN" key generates CHAR(255). They come to this conclusion by pressing only the "RETURN" key at the prompt of the following program:

```
INPUT X
PRINT SEQ(X)
END
```

So, they have in their programs:

```
IF X = CHAR(255) THEN
  * code to handle RETURN only
END
```

This works. . . until they upgrade to 7.0, which allows variables to have embedded CHAR(255)s. LEN(X) is the key to the matter. What CHAR value generates a character with a length of zero instead of one? Logically none, though prior to 7.0, because of system limitations, CHAR(255) appeared to. But if you tried to insert CHAR(255) in the middle of the string "ABCD", "C" and "D" would be lost. Theoretically you should be able to insert an infinite number of null strings there without changing "ABCD" at all.

PRINT LEN(X) after entering only "RETURN" will print 0. Their program will work properly (and more efficiently) on current releases and 7.0 as:

```
IF X = "" THEN
  * code to handle RETURN only
END
```

Another area ripe for a hint on program efficiency is PERFORM .... CAPTURING JUNK, where the only purpose of the CAPTURING clause is to keep the PERFORMed terminal output from displaying. The system goes to a lot of time and effort to save the screen output for nothing.

On 7.0, you may now accomplish the same thing very efficiently by "PERFORM ... CAPTURING NULL", NULL telling the system to simply ignore any terminal output instructions.

There is a less elegant way to accomplish the same thing. Remember the bothersome "P" verb? The one you always accidentally execute when you've edited a list of items and were "P"ing in the editor to see what was there, then exiting and "P"ing again to see what was in the next? You had a nice rhythm going and all of a sudden found yourself at TCL with

```
:P
:
```

in front of you. The system seems to have gone catatonic. Typing garbage and return, you don't see even so much as "[3] VERB?", just more colons. "P<RETURN>" makes everything right again.

Some people are so prone to this they delete the verb.

It can be used in the following manner. Instead of:

```
PERFORM X CAPTURING JUNK
```

try:

```
DATA X
PERFORM "P"
```

but don't let anybody delete your "P" verb!

• John Denney

# PGM

## GENERATING A LITERAL '<' IN THE PROC OUTPUT BUFFER

If you have ever tried to write a PROC to drive the PH- START utility, then you may have encountered the following problem. The character '<' is used by both PH-START and PROC to symbolize a carriage return. How then, does one pass a literal '<' to PH-START from PROC without PROC translating the '<' to a carriage return before PH-START has a chance to 'see it'? The answer is to first load the '<' into an input buffer and then transfer it to the output buffer with the 'A' command. For example...

```
001 PQN
002 MV %1 "<"
003 HPH-START
004 STON
005 Htaskid<
006 Hline#<
007 Hoptions<
008 Haccountname<
009 Hpassword<
010 Hcommand1<
011 Hcommand2<
012 A1
013 H<
014 Hcommand4<
015 Hcommand.etc<
016 H<
017 P
```

The effect of lines 002, 012 and 013 is a literal '<' being passed to PH-START, which will in turn issue a carriage return as 'command3'.

If you desire to accomplish the same thing in PQ PROC, then...

* Change line 001 to PQ
* Substitute the following two lines in lieu of line 002

  S1
  IH<

• Sandy Herring

# 14/100

## Series 14/100 Installation Hints

The open bus architecture of the PC/AT allows many Add-In boards to peacefully coexist within the system. There are limitations, however, when the 14/100 Coprocessor and recommended peripheral boards are added.

Add-In boards communicate through hardware interrupts and have an I/O Port address on the bus. There are 16 hardware interrupts assigned to the PC/AT and their clones. Most are reserved for internal operations, but the available interrupts and the ones most commonly in contention are listed below.

The following example is the recommended standard Series 14/100 hardware interrupt scheme that the current REALITY Operating System Release 2.3D will support.

| Board | Intrpt | I/O Port Address | DMA channel |
|---|---|---|---|
| Coprocessor | 2 | 300h | n/a |
| 1/4" 60Mb Tape Cntrlr | 5 | 338h | 3 |
| Eight Way | 7 | 100h | n/a |
| COM 1 | 4 | 3f8h | n/a |
| COM 2 | 3 | 2f8h | n/a |

The Coprocessor hardware interrupt and base I/O port address *cannot* be altered when running internal diagnostics. Any existing board using interrupt 2 or I/O port address 300h must yield to the Coprocessor.

Interrupt sharing, a feature in DOS where 2 Asynch ports may share one interrupt, is currently not supported on the REALITY side of the Series 14/100.

If you have existing boards, check the vendor's hardware documentation to see what interrupts they are capable of using before inserting the coprocessor. A bus mouse, for example, can be reconfigured using interrupts 2,3,4 or 5, while some internal modems may be changed from 3 to 4 only.

I/O Port address conflicts can be resolved through software via the 14/100 "Configuration Menu." Within this menu, the assignments of each REALITY-supported board may be relocated via the device drivers except for the Coprocessor, COM 1, and COM 2. The Com ports are sensed through the BIOS (Basic Input/Output System).

The PC/AT also has available 3 DMA (Direct Memory Access) lines (1 to 3) for devices like the tape controller, which moves data from one place to another more efficiently than under control of the microprocessor. The DMA channel may also be altered with the configuration menu.

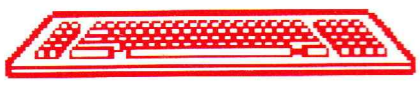
• Ray Van Sluis

# APPS

## Current Application Overlays

The following matrix provides you with 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.

| Application Overlay | Series 4700 | Series 6000 | Series 9000 | Series 18 |
|---|---|---|---|---|
| A*L*L 1.1 | 4.3 | 1.1 | 1.3 | N/A |
| A*L*L 1.2 (Paper Patches 1-59) | N/A | 2.3 | 5.3 | 6.0 |
| PCmicroREALITY 2.0B | N/A | 1.1 | N/A | N/A |
| PCmicroREALITY 2.1 | 4.3 | 2.3 | 1.3,5.3 | 6.0 |
| REALCALC 2.1C | 4.3 | 1.1,2.3 | 1.3,5.3 | 6.0 |
| REALGRAPH 1.0C | 4.3 | 1.1,2.3 | 1.3,5.3 | 6.0 |
| REALLINK 2.0 | 4.3 | 1.1,2.3 | 1.3,5.3 | 6.0 |
| REALISM/DEVELOPER 1.0A | N/A | 2.3 | 5.3 | 6.0 |
| REALITY Integrated Office 2.3 | 4.3 | 1.1,2.3 | 1.3,5.3 | 6.0 |
| WORDLINK 1.4 | N/A | 1.1 | N/A | N/A |
| WORDLINK 1.4C | N/A | 2.3 | 1.3,5.3 | 6.0 |
| WORDMATE 2.1C (Overload Patch Tape Rev A and Paper Patches 1-7) **(Overload Patch Tape Rev B -- 2.3, 5.3 and 6.0 operating systems only)** | 4.3 | 1.1,2.3 | 1.3,5.3 | 6.0 |
| TRANSACTION LOGGING 1.2 | N/A | 2.3 | 5.3 | 6.0 |



• Janet Altman

## WordMate 2.1RevC Overload Rev B Availability

The WordMate 2.1RevC Overload Rev B has been Production Released and provides HP Laser Jet Series II printer support on the **2.3, 5.3** and **6.0** operating systems.

Contact Central Dispatch, (800) 678-3399, or call your local Dealer/VAR to have the patch tape installed on your system.

- Janet Altman

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## dBASE® - Converting to REALITY File Format

The following article outlines a method for converting data stored in DBASE III format to **REALITY®** format since there is currently no dBASE filter available in **REALLINK® .**

Let's discuss what is needed for this conversion. You will need a PC with data stored under dBASE. You will also need a **REALITY** host and a connection between the PC and the host. The last thing required is **REALLINK** loaded onto the PC and the host.

Now let's talk about the conversion. First you use the dBASE "COPY" command to convert the dBASE format to Comma Delimited ASCII format. This can be done by entering the command:

```
COPY TO NEWFILE TYPE DELIMITED WITH ","
```

You now have a file on the PC called "NEWFILE" with its data in Comma Delimited ASCII format. Next we take that file and upload it via **REALLINK** using the "WS-HOST" command. This can be done by:

1. Bringing up REALLINK on the PC.
2. Getting onto the host account that has been REALLINK-enabled.
3. Creating a destination file to hold the data from the DOS file.
4. Entering the command:

**WS-HOST** <return>
Host File Name : **REALITY.FILE** <return>
Host Item Name : **RECORD1** <return>
DOS File Name : **NEWFILE** <return>
Filter Name : **FLT-UP** <return>

One word of caution: you may want to change the filter's line number five to a number lower than 32,267, such as 31,000, just to be sure that you don't lose any characters because of the record boundary.

If the DOS file is larger than 31,000 characters then it will create additional records called "RECORD1.xxxx" where "xxxx" is an incremented number starting with "0001". That means if four records are created they will be called "RECORD1", "RECORD1.0001", "RECORD1.0002" and "RECORD1.0003".

If you edit the file you will see the data has several attributes. Each attribute is a "record" of the dBASE file. The attributes are divided into fields separated by commas. Here is an example of what a name and address file would look like after conversion:

```
RECORD1
001 ,,,Very Big Company, 100 Main Street, NY, NY,
10001, 212-111- 2222, John Doe
002 ,,,Small Company, 222 Center Street, NY, NY,
10001, 212-555- 1212, Sally Smith
003 ,,,Specialty Company, 5 Side Street, NY, NY,
10001, 212-555- 0101, Jim Deal
```

All you need now is a BASIC program to merge the data into your own database and you are done!

- Frank Di Carlo

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# COMMS

## Current COMMS Releases

Shown below is a Product/Release matrix describing the current release 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 McDonnell Douglas computer system to the next hardware system or Operating System release, contact your local dealer or VAR to make sure you have the required communications software prior to the upgrade. If in doubt, have your dealer or analyst contact the McDonnell Douglas Field Service 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 |
| 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 | N/A | 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:

5750 Communications Software no longer resides on the Sys-Gen tapes. If you require this software, then have your dealer or VAR contact the Mc-Donnell Douglas Field Service 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

## SNA PART 4

In earlier parts of this series we covered the **SNA** architecture of six layers and the three network addressable units (NAUs) PU, LU & SSCP.

We will now introduce the last of the basic **SNA** concepts before putting all the pieces together. (We recommend reviewing the earlier parts of this series to maintain continuity: Vol. 2, No. 2, Pg.10; Vol. 2, No. 3, Pg.10; Vol.2, No. 4, Pg.12).

In **SNA**, a *node* is defined as a physical point containing one or more network components. Each node contains both path control network components and network addressable units. A node corresponds to a physical device and thus contains a physical unit (PU) to represent that device to the network. If the node contains application programs or terminal devices that offer users access to the network, the node also contains one or more logical units (LUs) corresponding to the capabilities of those programs or terminals.

An **SNA** node is contained within a device and consists only of the position of the hardware, software, and microcode that specifically implements **SNA** functions.

**SNA** node types are divided into two categories: Subarea nodes and Peripheral nodes.

**Subarea Nodes:**

A subarea node communicates with its own peripheral nodes and also with other subarea nodes in the network. There are two types of subarea nodes.

* Node type 5 - A type 5 node contains SSCP which resides within IBM® communication software. A type 5 node is typically contained within a general purpose computer, such as IBM 30XX, 4300, 8100, System/36 or System/38, and is often called a *host node.*
* Node type 4 - A type 4 node is typically contained within a communication controller such as an IBM 3705, 3725, or 3745 and is also known as a communication *controller node*.

**Peripheral Nodes:**

A peripheral node communicates directly with the subarea node to which it is attached. In order for a peripheral node to communicate with other nodes in the network, it must do so through its subarea node. These nodes, often known as *cluster controllers*, are implemented in a wide variety of systems and terminals, including the IBM 3270 family, 5250 workstations, and 3730 distributed office systems.

There are two types of peripheral nodes:

* Node Type 2 - Type 2 nodes have greater capabilities than type 1 nodes and are typically user programmable. Most of IBM's newer terminals are type 2 nodes.

**NOTE:** Most companies providing access to a **SNA** network emulate this node type.

* Node Type 1 - Type 1 nodes have fewer capabilities than type 2 nodes and are typically not user-programmable. Type 1 nodes are generally implemented in older and less powerful terminals and controllers such as IBM 6670, 3767, 5250 and 3790.

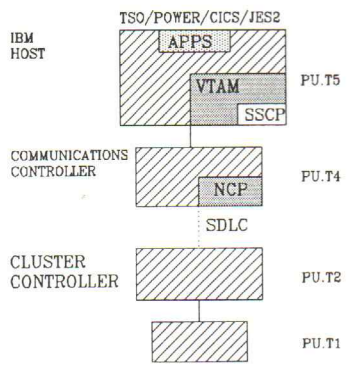
**Physical Unit Type:**

An **SNA** node always contains one physical unit which represents a device and its resources to the network. A physical unit is given the same type designation as its corresponding node type. Thus there are four types of physical units (PUs):

* Physical unit type 5 (PUT5) - Host
* Physical unit type 4 (PUT4) - Communication Controller
* Physical unit type 2 (PUT2) - Cluster Controller
* Physical unit type 1 (PUT1) - Terminal

**NOTE:** PU type 3 existed only in the original **SNA** architecture but was never developed.

The diagram is the architectural depiction of the **SNA** hierarchy in terms of physical unit types and the corresponding IBM hardware.



The architectural definitions of the various physical unit types have been enhanced as **SNA** has evolved. A newer version known as physical unit type 2.1 (PUT2.1) implements the most comprehensive set of functions.

**Logical Unit Type:**

As discussed earlier, a *logical unit* (LU) provides an entry port or plug to the **SNA** network. It is not a *physical* port but a *logical* one. **SNA** defines several logical unit types. Each one provides transmission capabilities and a set of services that are related to a particular type of user. The following LU types supported are identified by numbers 0 through 7 (there is no type 5 LU):

| | | |
|---|---|---|
| | LUT0 | open |
| * | LUT1 | Host application and a remote batch terminal e.g. telewriter/printer. |
| * | LUT2 | Host Application and an IBM 3270 display terminal (interactive). |
| * | LUT3 | Host application and a printer in the 3270 information display system. |
| | LUT4 | Host application and an SNA word processing device or two terminals. |
| | LUT5 | Undefined |
| | LUT6 | Inter-system communication. |
| * | LUT6.2 | Advanced program-to-program communication (APPC). |
| | LUT7 | Host application and IBM 5250 display terminal. |

* Supported by McDonnell Douglas

**NOTE:** The PUT2.1 is used in conjunction with LUT6.2 in implementing advance program-to-program communication (APPC) facilities.

In order to exchange information, two NAUs must establish a connection. A temporary logical connection between NAUs for an exchange of messages, in accordance with ground rules agreed to for that exchange, is called a *session*. These ground rules are reflected in the set of SNA functions that are devoted to that session.

An example of this is the case of a bank official, "Jim" in New York, using a McDonnell Douglas Series 18 computer with a terminal emulating PUT2. He initiates a session with the application program TSO residing in the IBM host in California. This session supports LUT2 (i.e., IBM 3270 interactive functions) for new accounts. Jim processes a series of new-account transactions over an extended period of time. He might then terminate that session and initiate a second session dealing with a loan or investment application. Another series of transactions may proceed within that second session.

A new session is not always required in this situation. In some cases, an application sub-system such as IMS or CICS provides access to multiple application programs without requiring the establishment of a new session. In that case, the single session is between the LU supporting IMS or CICS in California and the LUT2 supporting Jim in New York. There is no need to end the first session before starting the second session. It is also possible to establish multiple interactive sessions with IBM applications from a single McDonnell Douglas Series 18 computer.

- Niki Jhaveri

# ENVIRONMENT

## Environmental Factors

This new column will address the various environmental factors that can affect a data processing installation. Environmental factors are anything external to the data processing equipment itself, yet have an impact on its proper operation. Examples of some environmental factors are temperature, humidity, power, floor covering, cabling, airborne particles (dust,chemicals), etc.

The primary issue that prompted this feature is power. An entire section could be devoted to power alone, and very likely, many of the articles appearing in this space will deal with some aspect of power. One question that we are frequently asked is, "Why does power seem to have become so important recently?" There are several appropriate responses to this question, but basically power is no more or no less important than it has ever been. The real issue is *clean* power.

Since its birth, a primary emphasis in the computer industry has been speed, performance, throughput; how to get more out of the fixed number of minutes and hours in a day. The computer industry may be one of the few industries that can legitimately be accused of cheating "Father Time." While the number of minutes and hours in a day are fixed, the number of machine cycles are theoretically infinite, limited only by the current state of technology.

The problem with making most things go faster is that they tend to become unstable and more sensitive to outside disturbances. For example, the faster a car is driven, the more critical small bumps become. The faster a jet flies, the more sensitive it is to air currents.

Computers are not exempt from this postulate either. There are many ways to make computers "go faster", but the most effective is to shorten the cycle time required to execute an instruction. This usually means making the internal clock run faster, thereby

compressing more machine cycles into each second. This in turn translates into more instructions executed each second, or more MIPS (Millions of Instructions Per Second).

In the case of computers, the problem with increasing clock speed is that *all* the circuitry of the CPU becomes much more sensitive to noisy or unclean power. Voltage transients or "glitches" that may have gone undetected in previous generations of computers, now may be interpretted as interrupts, invalid instructions, or other undesirable signals. Today's state-of-the-art CPUs may even be affected by radiated energy from radio transmitters, radar stations, or other sources of electro-magnetic interference.

Another recent advent in the computer industry has been in power supply design. Most contemporary hardware manufacturers have opted for the higher efficiency and reduced weight and cost of switch mode power supplies (SMPs). The trade-off is that without the large power transformers characteristic of the old linear power supplies, many voltage transients that may previously have been reduced to harmless levels, now ride right on through SMPs and into the CPU and peripheral circuitry.

So, on one hand we have an increased sensitivity to noise in modern data processing equipment and on the other hand, we have a population increasing its demand for additional power from the power utilities. As a result, the power that is available may not be suitable to reliably operate today's computers.

Short of building your own power plant, your options are rather limited. The type of power disturbances that your area or installation is subject to will determine what type of power conditioning equipment is necessary. Some areas have relatively clean power with infrequent interruption of service. If you are located in such an area, be thankful but be aware that it could change at any time. As power grids become saturated with users, brownouts and other undesirable disturbances become more common.

Areas that are prone to impulses, surges, or other types of noise may be corrected by installating a power conditioner. As a rule power conditioners *remove* undesirable components from the utility power. For all practical purposes they do nothing to correct sags, brown-outs, phase shifts, or total loss of power.

An uninterruptible power supply (**UPS**) is in many cases the best solution for correcting the latter class of problems described above.

The second part of this article is intended to assist anyone who may be considering the purchase of a UPS.

• Steve Gill

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## Choosing A UPS For Your System

As already discussed, electrical power is not clean and is getting worse as we demand more from our declining resources. A power conditioner may satisfy your operational needs, or you may require a system that allows full, online, 24 hours a day back-up and support for your computer.

An **Uninterruptible Power Supply (UPS)**, unlike a power conditioner, is designed to allow a system to operate even when outside power is removed. This period of operation can extend from a few minutes to several days depending on the user's requirements.

An *online* **UPS** is a simple device that changes AC voltage to DC and then back to AC. A battery backup is connected at the point it changes the DC voltage back to AC and will supply power to the system during power failures. A *standby* or *passive* **UPS** is one that passes utility power to the load as long as power is available. When the utility power is interrupted, the batteries kick in and are used to generate the AC power.

Any **UPS** that does not change the AC sine wave to DC voltage and then back to an AC sine wave should be avoided because it most likely does not provide any substantial conditioning during normal operation. It should also contain a low impedance transformer that will operate efficiently with switched mode power supplies. High impedance transformers (such as ferroresonant devices) may, in worst case situations, cause damage to switched mode power supplies and should be avoided. The **UPS** must also be capable of operating in a by-pass mode for emergencies.

The battery in a **UPS** supplies DC voltage that maintains uninterrupted power so that an orderly shutdown of the system may be performed. The size and number of batteries determine the length of time a system can be supported. In extreme cases a motor generator is added that will power up during a powerfail and support the system during extended periods of power loss. This does not eliminate a battery backup: it only reduces the size.

When choosing a **UPS**, one should allow for additional growth by insuring the unit can be expanded without having to be replaced. The unit should also be capable of conditioning the power. It should have an audible and visual alarm or a connection for the same to alert the user to power events. Since they do contain acids and require periodic inspection, the types of batteries and maintenance and storage requirements are important.

Many systems will recover without loss of data from short term power losses if the power goes down and comes back up. Unfortunately, many power interruptions are not so accommodating. You may experience many power outages during a single event which can cause the loss or corruption of data. Power conditioning alone will not prevent this; a **UPS** will.

Selecting the correct **UPS** for a given system is difficult because each site requirement is different. A **UPS** may support only the system, or in addition to the system it may support all communications equipment including the phone system, terminals, printers, and possibly the air conditioner. Our objective is to thoroughly arm the user with information so that they may choose the correct **UPS** for their operational requirements.

Below are questions that should be asked when considering a **UPS** unit.

1. What equipment will be protected by the UPS?

| | | |
|---|---|---|
| System ___ | Power consumption (total) | ___KVA |
| Terminals ___ | Power consumption (total) | ___KVA |
| Comms. ___ | Power consumption (total) | ___KVA |
| (modems) | | |
| (multiplexors) | | |
| (network processors) | | |
| Lighting ___ | Power consumption (total) | ___KVA |
| Additional ___ | Power consumption (total) | ___KVA |
| Total Power Consumption | | ___KVA |

2. How often are you going to have to rely on this equipment for support? Batteries usually require 24 hours to fully recharge. The following questions help to determine battery requirements.

   Do you have:

   Frequent, short (10 minutes) power fails? ___
   Infrequent, short power fails? ___
   Infrequent, long (30 minutes) power fails? ___
   Infrequent, extended power fails? ___

3. How important is it to maintain operational status, and for how long, during a loss of power? (Telephone circuits are often operational during local power failures. The phone just never rings.)

   Operation must be maintained:

   Only long enough to shutdown ___
   To allow operation during short losses ___
   To allow extended operation during a power fail not exceeding 30 minutes ___
   To support full operation during extended emergency power losses ___

When asking about a **UPS**, be sure to consider the following:

1. Is the unit fully on-line, as opposed to standby or passive? Does it take AC in, change it to DC, and give you an AC sine wave out? ___
2. Does it utilize a low impedance transformer, rather than a ferroresonant type? (Ferroresonant transformers are incompatible with switch mode power supplies.) ___
3. Is it expandable to meet possible changes to your power requirements? ___
4. Is it capable of operating in by-pass mode during emergency or maintenance periods (Directly from outside power)? ___
5. Does it contain some type of alarm system to notify the user of power events or provide connections for these devices? ___

This is by no means a complete list of the issues to consider when evaluating a UPS. Our intention is to prompt you to consider both present and future factors when selecting a **UPS.**

- Gary Monroe

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**Editor's Note:**

McDonnell Douglas Computer Systems Company's engineering department has concluded a thorough evaluation of several manufacturer's UPS products. One manufacturer which met, and in many cases exceeded all specifications outlined in this article was Exide Electronics of Raleigh, North Carolina. Watch for additional information on Exide products in future issues of *ON-LINE*.

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# Q & A

Q: Why was the 'D' option (disc diagnostics) removed from the bootstrap of the 5.3 Sys-Gen?
Bill Dudley, Gulf Printing

A: The 'D' option, or disk diagnostics, has traditionally been included as a boot option on REALITY and Series 9000 Sys-Gen tapes. In the past, this was done as a convenience to McDonnell Douglas. In mid 1987, when 5.3 was being engineered, disc technology and the actual disc drives being considered for the Series 9000 product were undergoing considerable change. Engineering determined that it would be risky putting the Formatter on 5.3 since it was subject to change at any given time. It would also mean having to re-release the Sys-Gen any time a change was made to the diagnostic. It was agreed by all groups involved that this would be impractical and was, therefore, deleted from the Sys-Gen.

- Steve Gill

# CUSTOMER ED.

## MCDONNELL DOUGLAS FIELD SERVICE COMPANY AND DISCOVERY CONSULTANT SERVICES ANNOUNCE AGREEMENT

McDonnell Douglas Field Service Company and Discovery Consultant Services of Reston, Virginia have announced an agreement whereby Discovery is designated an authorized provider of instruction on the REALITY operating system. Discovery founder and owner, Marcie Gebauer, is a noted computer industry educator who has more than seven years teaching experience in the PICK/REALITY community. Discovery offers classes in Atlanta, Boston, Washington, D.C. and Tampa. McDonnell Douglas Field Service Company has training facilities in Dallas and at its corporate headquarters in Santa Ana, California. There are also plans for two additional facilities, in Chicago and St. Louis. Together the two companies will be able to offer a wide variety of classes throughout the United States. For information regarding the schedule of classes below and/or to enroll in one of the classes please contact the Registrar at (714)566-5100.

- Jim Lau

## CUSTOMER EDUCATION SCHEDULE

| | | JUNE | | | | JULY | | | | | AUG. | | | | SEPT. | | | | OCT. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | COURSES OFFERED | 4 | 11 | 18 | 25 | 2 | 9 | 16 | 23 | 30 | 6 | 13 | 20 | 27 | 3 | 10 | 17 | 24 | 1 | 8 | 15 | 22 | 29 |
| MCDONNELL DOUGLAS | INTRO TO REALITY O/S<br>5 Days $1000/Person | | | | | | | SA | | | | | | | | | | | | | SA | | |
| | REALITY O/S 7.0<br>4 Days $800/Person | | | | | | | | | | | | DA | | | | | | | | | | |
| | INTRO TO DATA/BASIC<br>5 Days $1000/Person | | SA | | | | | | | | | | | | | SA | | | | | | | |
| | ADVANCED DATA/BASIC<br>5 Days $1000/Person | | | | | | | | SA | | | | | | | | | | | | | SA | |
| | PROC PROGRAMMING<br>3 Days $600/Person | SA<br>6-8 | | | | | | | | | | | | | SA<br>5-7 | | | | | | | | |
| | SYSTEM TROUBLESHOOTING<br>5 Days $1000/Person | | | | | | | | | | | DA | | | | | | | | | | | |
| | REALISM SHELL<br>4 Days $800/Person | | | | | | | | | | | | | | | SA | | | | | | | |
| | REALISM DEVELOPER<br>4 Days $800/Person | | | | | | | | | | | | | | | | | | | | | SA | |
| DISCOVERY | INTRO TO PICK/REALITY<br>4 1/2 Days $800/Person | | | | | | | | | DC | | | | | | | | | | | TA | | |
| | ADVANCED PICK/REALITY<br>4 Days $800/Person | | TA | | | | | | | | | | | | | | | DC | | | | | |
| | ACCELERATED PICK/REALITY<br>4 Days $800/Person | | | | | | | | | | | | DC | | | | | | | | | | |
| | SYSTEM INTERNALS<br>4 Days $900/Person | | | | DC | | | | | | | | | | | | | | | | | | |
| | APPLICATION PROGRAMMING<br>4 Days $800/Person | | | | | | | AT | | | | | | | | | | | DC | | | | |
| | ADVANCED APP. PROGRAMMING<br>4 Days $800/Person | | | | | | | | | | | | | | | AT | | | | | | | |
| | ACCEL. APP. PROGRAMMING<br>5 Days $900/Person | | | | | | | | | | | BO | | | | | | | | | | | |
| | ASSEMBLER PROGRAMMING<br>4 Days $950/Person | | | | | | | | DC | | | | | | | | | | | | | | |

LOCATION CODES: AT = ATLANTA, GA; BO = BOSTON, MA; DA = DALLAS, TX; DC = WASHINGTON, DC; SA = SANTA ANA, CA; TA = TAMPA, FL.

NOTES: All classes begin on Monday unless otherwise indicated. The following courses are available upon request: ALL 1.2, PCmicroREALITY, REALCALC, REALGRAPH, REALLINK, REALITY Integrated Office, WORDMATE, M7000 Reformatting and Quickstarts, M7000 Basic Programming and Data Communications. Please call Jim Lau at (714) 566-5086 for more information.

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