Central Support
ON-LINE

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LOGON:

14/100 Support Plan Announced

The Series 14/100 is a new McDonnell Douglas Computer Systems Company product that allows the REALITY Operating System to run on a system with IBM PC AT architecture. It consists of a Motorola MC68020 co-processor board, system software diskettes, and documentation.

These components can convert your PC into a multi-function, multi-user system supporting up to eight terminal connections which are capable of switching and sharing data between the REALITY and MS-DOS environments. A more detailed description of the product was published in our last issue of *ON-LINE*. Your local dealer or VAR can provide you with product information.

McDonnell Douglas Field Service Company has designed their support program with flexibility in mind so that it can meet the needs of any 14/100 user. Software Support consists of two options: **Basic** and **Basic Plus** service. In addition to these packages, alternate options can be selected from our offering in order to tailor the support agreement to your particular needs.

The **Basic Service** Package consists of the following:

- 12 calls per year
- *ON-LINE* quarterly technical newsletter with 14/100 product specific information
- Access to a dial-in bulletin board
- Timely availability of patches

The **Basic Plus** Package consists of the same components listed above with an additional 12 calls per year (total of 24 calls) in addition to automatic distribution of new operating software releases and documentation.

Your support contract is not dependent upon the number of 14/100s you want to support under one contract. In order to achieve a flexible support structure, the program was designed with a modular building-block approach. Additional calls can be purchased in blocks of 12. "**Patch Paks**" (consisting of an additional newsletter, bulletin board access, and patches) can also be purchased as a supplement to the **Basic** or **Basic Plus** service.

A depot contract can be purchased for service on the co-processor board. If a user chooses not to purchase a support contract, assistance can be obtained on a Time and Materials basis for both software and hardware.

A brochure defining more specific 14/100 support options and charges is available. If you are interested in finding out more about this product please contact your dealer or VAR.

Since we have designed our new 14/100 product service offerings with your business needs in mind, we hope you will find them both cost-effective and versatile.

- Christine Harding

MARKETING

REALITY 4.3 Rev D Released

The new release for the REALITY 4.3 Operating System (Revision D) was officially production released on December 29th, 1988. Many enhancements have been incorporated into this Operating System release, which are detailed in the Implementation Advisory accompanying the Sysgen tape.

The enhancements fall into six main categories: DATA/BASIC, ENGLISH, EDITOR, PROC, RUNOFF, System Function Enhancements, TCL+, Item Locks, Multiple DATA/BASIC Compilers.

Of special note is the use of Item Locks rather than Group Locks. Additionally, TCL+ is a feature that enhances the user's TCL capability. Multiple account saves and restores are now available. Messages can be sent to specific ports.

To arrange for an upgrade to 4.3 Revision D, please contact your dealer or VAR.

- Bill Rice

ROS

Current OS Releases And Patches

The following table contains the most current Operating System (OS) revisions and patch levels for each supported system. If you do not have the current patch tape installed for your particular Operating System contact the following:

For Independent Sales Organization (ISO) customers, please contact your dealer.

For Branch customers, please contact your field engineer through Central Dispatch to schedule a time for installation.

Series	Release	Patches (PP = Paper Patches)
4700	4.3RevD	PP1-2
6000	2.3RevD	RevB Tape (Includes PP1-68) PP 79, 82, 84-86, 88-89, 91-92
	1.1RevD	RevB Tape
9000	5.3RevD	RevB Tape(IncludesPP1-65) PP 66-83
	1.3RevC	RevA Tape
18	6.0RevF	RevA Tape(IncludesPP1-47)

Enhancements with 2.3, 5.3 and 6.0

This is a brief summary of the new features and enhancements available on the 2.3, 5.3 and 6.0 Operating System releases.

A. Environmental Changes

- Due to system enhancements, FILE-SAVE and RESTORE are faster with the streaming 1/2" tape drive which now streams with minimal repositioning.
- Read and Update locks eliminate 'soft' Group Format Errors.
- The overflow handler and table have been completely rewritten. The TEMPORARY SPACE BLOCK & CHAIN are gone, the number of CONTIGUOUS entries has been increased to 59, and the CLAIM verb is orders of magnitude faster.
- The maximum logon workspace has increased to 256 frames.
- The primary workspace for each process has been increased from 32 to 64 frames.
- ABS frames have been increased to 2047.
- DENATIONALIZATION provides the ability to have all ERRMSGs, hard-coded system messages, sort order, and printer character translation to be in languages defined by the user on a port by port basis.

B. System Enhancements

- The ability to restore from PICK account-saves and file-saves has been added.
- The ERRMSG W(n) code causes the display of a message to pause for 'n' seconds before continuing to scroll.
- The Assembler Debugger has several new and enhanced commands.
- PORT-DESPOOL spools printer output to the terminal.
- The SAVE and SEL-RESTORE verbs have new syntax which allows an item list to be specified. It also works after SELECT, SSELECT, GET-LIST or FORM-LIST.
- SHOW-ITEM-LOCKS displays pending requests to set ITEM LOCKS.
- T-STATUS displays tape unit assignments.
- VERIFY-SAVE fully simulates :FILES except for updating disc. (This replaces the "Dummy" SEL-RESTORE used to verify file-save tapes.)

C. EDITOR Enhancements

- The following new options have been added:
  B - Browse mode (read-only Item Locks ignored)
  P - Direct all terminal I/O to printer
- The following new commands have been added:
  WR - Causes assembler-mode comment field to wrap
  XF - Negates all changes since last F or FS

D. DATA/BASIC

- Alphanumeric labels are now supported.
- Null lines may now be imbedded in DATA/BASIC source code for readability.
- Ellipsis (...) at the end of a statement indicates line continuation.
- The number of EXECUTION LOCKS has increased from 64 to 256.
- The GETMSG command has been added to retrieve messages installed in the system denationalization tables.
- The SYSTEM function has been enhanced to capture the current state of various system elements.
- The INPUT statement has been enhanced to allow entry of optional delimiters to terminate input and to specify timeout limits.

E. PROC

- The RI(n) command has been enhanced to allow 'n' to be an indirect reference.

F. SPOOLER

- The maximum number of print jobs has been increased to 600.
- The print job numbers are reused as soon as they are available.
- The SP-ASSIGN verb has several new or revised options.
- A leading form feed is not output to a printer.
- The SP-JOBS screen displays the number of frames printed.
- The SP-EDIT commands resemble the EDITOR commands.
- The SP-EDIT verb allows you to examine an open print job. You can also specify a series of print job numbers to be edited.
- The SP-EDIT (I) command allows the creation of a file item from a print job.
- The SP-DELETE verb allows you to delete a print job while it is printing. This is equivalent to SP-KILL.
- The SP-COPIES verb allows you to change the number of copies while a print job is printing.
- The SP-MOVEQ verb prompts you for the passwords of the jobs, not the password of the account that created the queue.
- The SP-LOOK verb has a columnar format and displays a print report number.
- The SP-EJECT verb no longer prompts for the form queue name.

Please refer to the Enhancements Manual (#1498 for 2.3, #1343 for 5.3) for a complete description of the syntax and functionality of the new features and enhancements.

- Cathy Acret

PERFORMANCE (PART 1)

This is the first of several articles about system performance which will appear in *ON-LINE*. It is hoped that this series will provide you with the fundamental concepts and procedures to "fine-tune" the performance of your system.

How to Reallocate Files

When a REALITY file is created, a specific number of contiguous frames are allocated for that file. These frames constitute a file's **primary space**. However, the file is not limited to these frames alone. When a file exceeds its primary space, the Operating System will attach additional frames as they are needed. These additional frames are referred to as **overflow**. Thus, a file can ultimately occupy both primary and overflow space.

However, file access time increases when a file has exceeded its primary space. This is because the overflow frames may be in random, non-contiguous locations depending on what frames were available from the overflow table. When an item contained in an overflow frame is needed, the primary frame will be searched first. If the item is not found, the search will then continue with the first overflow frame. The second overflow frame (if there is one) is searched next, and so on until the item is found. Searching for items in overflow frames will take longer because the group has more items through which to search and the additional disc seeks will greatly increase retrieval time.

The **file statistics report** is the most useful tool in maintaining an efficiently sized database. The major sections of this report contain general file information, particulars of data items, and file condition information.

General file information is contained in the columns headed FILE, BASE, SEPARATION, and MODULO. The report is organized by accounts. The **FILE** column identifies files as either dictionary files or as data files. A data file is identified by the "*DL/ID" which is appended to the file name. Most files occur in pairs: a dictionary and the associated data section. The **BASE** column identifies the base frame of the file. The **SEPARATION** and **MODULO** columns define the major physical aspects of the files. It is these values that are changed to optimize storage.

Information about data items is contained in the columns headed ITEMS, SIZE, MX/GP, MN/GP, and FRAMES. The **ITEMS** column reports the number of items in the appropriate file section. The **SIZE** column contains the aggregate size of the data items in bytes. The **MX/GP** column displays the maximum number of items in any of the groups; the **MN/GP** column displays the minimum. The **FRAMES** column contains the total number of frames currently occupied by the file in question.

File condition information is contained in the columns headed 25%, 50%, 100%, 125%, 150%, 200%, >200% and GFE. The numbers in the columns headed **25%**, **50%**, and **100%** indicate the amount of primary space actually used for data storage. The values indicate the number of groups filled to these capacities. The numbers in the columns **125%** to **> 200%** show how many groups have filled their primary space and use overflow. The **GFE** column will report the number of groups with format errors.

When considering whether or not to resize a file, it is most useful to review the file condition section. It is here that the file's primary and overflow space utilization is highlighted.

For example, this is a sample report of a file with modulo 7:

25%	50%	75%	100%	125%	150%	200%	>200%
1	2	3	1	0	0	0	0

The report indicates that all the data in this file is contained within the primary space.

1 group is between 0% and 25% full.
2 groups are between 25% and 50% full.
3 groups are between 50% and 75% full.
1 group is between 75% and 100% full.

Another example of a file with modulo 7:

25%	50%	75%	100%	125%	150%	200%	>200%
0	0	0	0	1	1	4	1

So much has been added to this file that every group in the file has exceeded its primary space. This condition is referred to as **going into overflow** in the following way:

1 group is 125% full - 1 overflow frame between 0% and 25% full.
1 group is 150% full - 1 overflow frame between 25% and 50% full.
4 groups are 200% full - 4 overflow frames between 75% and 100% full.
1 group is >200% full - more than one overflow frame full.

The first example indicates a file which needs no attention. The second example, however, indicates a file which has grown to over double its initial size. The size of the second file should be recalculated to obtain a profile similar to the first.

Having determined that a file requires resizing, the new modulo and separation should be calculated from the following information:

Modulo *is the number of groups in a file.* As a general rule, use the following guidelines.

The modulo should be the smaller of either:

1) The number of bytes of data divided by the frame size. (The number of bytes per frame is 1000 for release 6.0 and above and 500 bytes for all other releases).
2) The number of items.
When choosing a modulo it is typically best to round upwards to a prime number. Statistically, a prime number modulo will provide the most even hashing of items across all groups.

Separation *is the number of contiguous frames of disc space allocated per group.* The maximum value is 127. The choice of separation should be made based on the following:

1) The number should be large enough to ensure that most of the items (contained within any group of frames in the file) will occupy contiguous frames on the disc. An average sized item in the group should fit within the number of frames specified by the separation.
2) The number should be small enough to use disc space efficiently, i.e., do not waste frames that will not be used.
One formula to use in determining the separation is the following:
Average item size divided by frame size equals separation. The result should then be rounded-up to the nearest whole number (i.e., 0.4 = 1.0, 1.6 = 2, etc.).

The **recommended method of reallocating files** is to use the File Restore. This will reallocate any or all files and is the most convenient method. In order to do this, certain steps must be taken prior to the save from which the restore is to be performed.

The new file size specifications (new modulo and separation) must be placed in attribute 13 of the file definition item and/or the DL/ID. The file definition item is the master dictionary entry that defines the file; the DL/ID item is contained in the DICTionary of the file. Enter the new size, including the parentheses, as shown here:

(new modulo,new separation)

Binary files such as POINTER-FILE will have a 'B' already present on attribute 13 and this should not be deleted.

Files will not be reallocated if attribute 13 is blank or if a File-Restore is done with the 'R' option.

Once the new modulos and separations have been entered for every file to be reallocated, a File-Save and then a File-Restore (from the just-completed File-Save tape) must be done. At restore time, a file's current modulo and separation parameters are compared with the reallocation parameters on attribute 13. If they are different, the file is created at the size indicated on attribute 13.

When restoring a file to a newly sized file, the **Restore will run slower.** This is because the item segments on the File-Save tape contain the group into which the item hashes, making a normal restore faster since each item-Id will not have to go through the hashing algorithm. When the Restore is reallocating the file, the group number on the tape for a particular item is no longer valid, requiring the group number for the item to be recalculated.

Other system performance topics scheduled for future issues include selecting Item-Id formats, using the PERFORM statement, setting up the Logon Workspace Table efficiently, discussing SETWRITES and TIMESLICE concepts, and many more. If you have comments or questions related to system performance that you would like discussed in this series, please address your question to the Editor, *ON-LINE.*

- Central Support

Read/Update Locks on 2.3, 5.3 & 6.0: What, Why & How

One of the advantages of the REALITY Operating System is variable-length file structure. This means that only the space occupied by data within a file is actually used by that file. The disadvantage of this and similar techniques used within the Operating System is that the start and end of any item cannot be determined by any algorithm and resides in no fixed place. This can be a problem because if while a process is examining a group of items and another process moves the group by updating it, then the group's data structure will appear to be invalid although no real error exists. Within file I/O, this is known as a soft GFE.

Accordingly, it is necessary to design a method of flagging virtual space on the system as being locked so that no update is allowed if that group is being examined, and conversely, no examination is allowed if an update is in progress. To a limited extent, this had previously been accomplished at an applications level by the use of group locks. However, this method would be too slow and imprecise for use within the Operating System. The solution that is now implemented is two-fold: **Item Locks** and **Read/Update Locks.**

Item Locks will lock the item rather than the group. This ensures database integrity by the use of the DATA/BASIC commands READU, MATREADU, et al., and their PROC equivalents. Read/Update Locks, as stated previously, are a method of locking an area of virtual space. The Operating System constructs tables to determine which frames are currently being accessed and in which of the two modes. Therefore, it is now possible in the multi-user environment to have various functions and activities--such as ENGLISH, the EDITOR, COPY, FILE-SAVE, TIPH, Denationalization, POINTER-FILE update, and communications protocols--concurrently manipulate the same data without losing the integrity of the data structures involved.

The Read/Update Locking mechanism does increase the system overhead to some degree. Prior to Read/Update Locks, increasing the number of users on a system increased the possibility of database inconsistencies. Because of this increased capacity, we can no longer assume that the virtual system will run without having data violated. Consequently, McDonnell Douglas chose to implement Read/Update Locks in its newest releases to preserve data integrity.

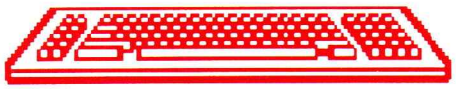
- Will Edwards

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 1-46)	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
REALISM	N/A	2.3	5.3	6.0
REALLINK 2.0	4.3	1.1,2.3	1.3,5.3	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)	4.3	1.1,2.3	1.3,5.3	6.0
TRANSACTION LOGGING 1.2	N/A	2.3	5.3	6.0



REALLINK Verbs from Proc

When calling a TCL verb from a Proc, one usually moves it into the primary output buffer by using the 'H' command and then executing what is in the primary output buffer by using the 'P' command. Calling a REALLINK verb from a Proc, however, will be executed differently because the REALLINK verb is itself a Proc. Therefore, if one invokes a REALLINK verb via the 'H' and 'P' commands, the input buffers will be cleared because Proc invokes a new context.

The appropriate way to call REALLINK verbs is to load any parameters needed by the command into the appropriate input buffers and then call the REALLINK PROC in the RL.PROCS file. An example follows of how you would execute the WSHOST command from a Proc:

```
TRANSFER
001 PQN
002 MV %2 "HOSTFILE"
003 MV %3 "HOSTITEM"
004 MV %4 "DOS.FILE"
005 MV %5 "FILTER.NAME"
006 [RL.PROCS WS-HOST]
EOI 006
```

This will load the host file name, the host item name, the DOS file name, and if needed, the filter name. Control will then be passed to the WS-HOST Proc which will transfer the contents of the input buffers to the secondary output buffer. The above example will allow WS-HOST to execute without prompting for input.

- Bryan Glassick

How Important Are Rulers & Tabs

Correctly formatting a WORDMATE document begins with setting up your rulers properly, particularly with setting up tabs for subsequent use during input. Although it may not seem initially to be of importance, the advantage of using tabs will be realized with both document input and output.

During input, the benefit of using tabs is that one keystroke rather than multiple spaces will position the cursor for input. Not only do multiple spaces require more input time, they unnecessarily take up disc space when the document is filed and written to disc.

During output to the printer, the benefit of using tabs will be the prevention of a possible Crossing Frame Limit abort at 1260.nn (where nn is the location within the 1260 frame). This abort can be caused when multiple spaces are used to either input text where a tab should have been set or to create blank lines where a carriage return should have been used.

The section entitled **Changing Ruler Format** in the *WORDMATE User's Training Manual* is very informative and should be referenced if you are not familiar with making ruler modifications.

- Linda Denney

Saving Data During a WORDMATE Abort

If an abort occurs while inputting or editing an item in WORDMATE, any changes made since the last "S to Save" of the item may be lost. If you have SYS2 privileges, you may be able to save the updates you have made by entering at the debug prompt (!):

G1111.7

This will then return you to the edit mode in WORDMATE and the cursor will be positioned below the debug prompt. At this point, you should type 'F' to file the item. The status line will reappear and prompt to 'Type I to File, S to Save or D to Delete'. Entering 'I' will file the changes which were made prior to receiving the abort.

- Linda Denney

Using WORDMATE functions in REALITY Integrated Office

In order to utilize WORDMATE 2.1 Rev. C functions within REALITY Integrated Office 2.3 (Rev A), the item WORDMATE.FLAG in the the OA account's file CONTROL-FILE must be changed from '0' to '1'. The change from '0' to '1' will cause the default to change from WORDMATE 1.4 Rev. D to WORDMATE 2.1 Rev. C.

PROC DOC

Indirect References Revealed

The purpose of an indirect reference is to allow the same instruction to operate on different pieces of data.

Suppose you wanted to find the first null attribute of an item. You could solve the problem in DATA/BASIC by reading the item into a variable (REC is used in the example) and then...

```
    X=DCOUNT(REC,CHAR(254))
    FOR I=1 TO X
    IF REC<I>='' THEN GOTO FOUND.IT
    NEXT I
FOUND.IT:
    CRT "FIRST NULL ATTRIBUTE IS ":I
```

The variable 'I', which is used as an index into the dynamic array REC, is the indirect reference. The problem could have been solved in PROC as well. Assume the item had been read into file buffer one (&1). Then we could...

```
    MV %1 "0"
10  S1
    +1
    IF &1.%1 G 10
    T "FIRST NULL ATTRIBUTE IS ",%1
```

In this case, '%1' (input buffer one) was the indirect reference. It was initialized to 0. The '+1' adds a constant of one to the currently active input

buffer, which is '%1' due to the previous 'S1'. Thus, the first time through the loop, '%1' is equal to 1. The way you resolve the indirect reference '&1.%1' is from right to left. First, determine the value of '%1'--which is now 1. Then make a mental substitution to resolve the indirect reference. If '%1' is equal to 1, then '&1.%1' is functionally equivalent to '&1.1'. If there was something in '&1.1', then the 'G 10' would be executed. This would then increment '%1' again (now = 2) and test the next position in file buffer one ('&1.2'), etc., until a null position is found.

Here's another example to illustrate the point...

```
MV &1 "Spring","Summer","Fall","Winter"
T "Enter season as a number (1 through 4)",+
IP:&5
IFN &5 = 1]2]3]4 T "Season is ",&&5
```

(NOTE: The brackets ']' on the last line are VALUE MARKS (X'FD') made by keying <ctrl>]).

The indirect reference '%%5' is parsed from right to left. First determine what's in '%5'. Suppose a '3' had been entered in response to the request for input ('IP:%5'). If so, then '%%5' is simply a way of referencing '%3', which contains the text string 'Fall'.

If you remember that indirect references are parsed from right to left, then you should have no problem resolving them. Once you understand the power and versatility they afford you, you'll even want to start using them in your own PROCS!

SERIES 7000

Writing in KeyBASIC

The first part of this article was published in the last *ON-LINE* issue.

The following suggestions are offered for your consideration when designing and writing KeyBASIC programs:

- Always try to use the string search functions and operators rather than writing time-consuming search loops. These are: CHARFREQ, FIELD, FLDINDEX, INDEX, INFIELD, INFIX, KFLD, MATCH, PREFIX, SFIELD, SUFFIX.
- Since you can only have 12 files open in a program at any given time (one subprogram counts as one file), files that are no longer required should be closed as soon as possible. Leaving redundant files open wastes available memory.
- If a number of indexed files are being used, and each record within these files has a unique key, it is possible to combine the into one, saving on the number of files open.
- Repeatedly opening and closing files has an impact on performance by slowing the system down. * Make tape block writes as large as possible to save time during execution.
- Avoid using array variables unnecessarily, especially 2-dimensional arrays. It takes time for the system to check the subscripts.
- Reuse variables whenever possible. Be careful, make sure the variable will contain the correct data when it is accessed. Always use the same variable with FOR and NEXT loops. For example, use 'I' for main loops and 'J' for nested loops.
- When a variable is no longer being used, assign it a null value so the space it is using is returned for future use.
- Execute a single PRINT per line. Assemble the print line first and then print. This saves execution time.

- Helen James

They Do It With Mirrors

If when operating a **Sovereign Mirror system** you receive the message that the system has dropped into "simplex" and you cannot determine the reason for this, please keep the following information in mind.

If your disk drive goes offline for more than 20 seconds, the system will send a "Disk offline" message to the screen. However, this message will be immediately followed by a message such as "Dropping into simplex". Please be sure to make a note of all messages received at your terminal since this will assist your Field Engineer in troubleshooting the problem.

- Randy Jordan

FOR THE RECORD

The beginning of the final paragraph on page 4 of the ROS article entitled Dynamic vs. Dimensioned Arrays in Volume 1, Issue 3, should have read as follows:

For example, if the item is stored as a dynamic array, the expression ITEM<3,3,2> access the *second* subvalue in the *third* value in the third attribute.

COMMS

Current COMMS Releases

The following matrix details 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 MDCSC system to the next hardware system or operating system release, please 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.

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 4)	N/A	2.3	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	1.2, 1.3, 5.1, 5.3	2.3	N/A
FTU 1.3 (Rev C)	4.3	2.3	1.3, 5.3	2.3	6.0, 7.0
M3800 (2780) 2.1 (YA)	4.2	N/A	1.2, 5.1	N/A	N/A
M3800 (2780) 1.3 (A)	4.3	N/A	1.3, 5.3	N/A	N/A
M3800 (SNA) 2.1 (YA)	4.2	N/A	1.2, 5.1	N/A	N/A
M3800 (SNA) 5.3 (A)	4.3	N/A	1.3, 5.3	N/A	N/A
5750 COMMS	4.2	N/A	1.2, 5.1	N/A	N/A
TCL (5750) COMMS (REV2)	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 resides on the Sysgen tapes. If the software is not on the tape, it may be retrieved from a previous Sysgen tape.

TCL-COMMS software is run on the 5750 Communications Terminal, in lieu of the 5750 software described above.

2602 Bisync runs only on 4700 systems. The software is included on the Sysgen tape.

- Richard Yeh

Conditioning TelCo Lines

Conditioning is usually not required on dedicated (leased) telephone lines used with MDCSC data communication equipment.

Through the integration of microprocessors into modem technology over the past decade, the modem itself has been enabled to compensate for telephone line electrical characteristics, which had been previously dealt with through conditioning (fine-tuning) of the line.

Most modern modems, designed in the last two or three years, have been developed to work on **unconditioned** lines. This is especially true with the synchronous modems in the MDCSC M3600 Series. The more expensive and harder-to-get conditioned lines are no longer required for typical data communications installations.

- Steve Moore

Multiplexers (Part 2)

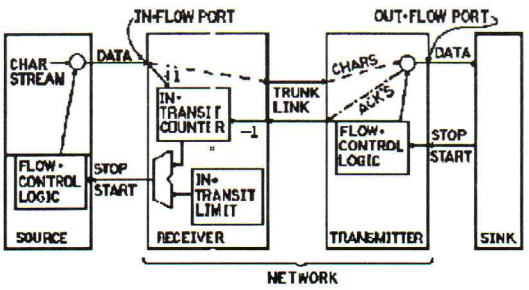
In the previous issue, we covered some general principles which govern the operation of statistical multiplexors. In this issue we will address more specific characteristics of the **M31XX series of multiplexors.** A glossary of terms follows this article to further clarify certain words that may not be familiar to the reader.

The M3125 is a multipoint multiplexor while the M3110 and M3120 are point-to-point. The maximum supported trunk speed is 19,200 bps. Depending on the model, a mux can support from 8 to 32 asynchronous ports. The M3110/M3120 is configured as a master linked to a slave multiplexor at the remote end. It uses this link as a full duplex, synchronous data channel. The link conforms to the standard set forth in the DDCMP (Digital Equipment Corp. link level protocol) specification.

The M3125 has a single link with one to fifteen M3110/M3120 slave muxes. In a multipoint network, each slave mux has a unique address determined by a switch on the mux processor. Each slave mux also uses a special cable which allows proper address selection: cable CT0113 for M3120 and cable CT0213 for M3110.

Let us examine how **flow-control** is implemented and how the fine tuning of the network parameters affects network performance. Figure 1 below shows a block diagram of the flow control model for a M31XX.

Figure 1



At the left is a source of data (generally a computer system) entering the mux at the IN.FLOW interface. The large box next to the Source is the receiving portion (master mux) of the network. (Note: Networks generally encompass both multi-

plexors, modems, transmission links, etc.). The Receiver is linked to the transmitter portion (slave mux) of the network. This is in turn connected to the Sink (generally a CRT or a printer). Each mux has a finite buffer space which is dynamically allocated for each port depending upon its configuration.

For simplification, let us consider the traffic in only one direction, from the Source to the Sink. There are two situations which can activate the flow-control mechanism.

First, if a specific Sink device is unable to accept data as quickly as the Source device is transmitting it (e.g., printer out of paper), it will send either an X-OFF character to the adjacent mux interface (the transmitter in Figure 1) or it will drop the DTR signal. This eventually will cause the associated port on the computer to stop sending data. The other ports on the multiplexors will not be affected since only a specific channel invoked the flow control.

Second, the synchronous channel between the multiplexors (typically a 9600 bps telephone line) has a finite capacity to carry information. When that capacity is exceeded, the additional characters are accumulated in the buffer. When the total available buffer in the muxes falls below the flow-control threshold, the Receiver will send a STOP event (X-OFF) to each source port whenever another character arrives at the Receiver. The available buffer is referred to as Free Space. When the Free Space again reaches a reasonable level, because the data stored there has been sent to the destination, the sources will be started again. If the buffer space continues to fall below the global flow control threshold, the mux is forced into load shedding.

When traffic exceeds network capacity, network inputs must be regulated so as to reduce total load to an acceptable level. This input regulation, provided by the flow-control procedures, helps us control data admission to the network so that the resources are efficiently utilized. It also prevents severe performace degradation and possible deadlocks.

A **network** is a pool of resources. Each user must acquire a subset of these resources in proper sequence to accomplish the task of transferring data from source to destination. If the competition for the resources is unrestricted and uncontrolled, you may encounter inefficiency, unfairness and congestion.

A typical example of inefficiency results from unnecessary acquisition of buffer resources. In the M31XX muxes, the following parameters are used to balance the network:

FLOW CONTROL
IN.TRANSIT.LIMIT
HANGUP TIMER
REP TIMER
POLL TIMER (for multidrop only)
REPOLL TIMER (for multidrop only)

IN.TRANSIT.LIMIT is used as a tuning parameter for adjusting network performance. Lowering the IN.TRANSIT.LIMIT value will decrease the effective character trasfer rate, whereas raising it will increase it. This is used to tilt the network to serve interactive users preferentially over line printers or other deferrable data streams.

The IN.TRANSIT.LIMIT parameter is also related to the port speed (FORMAT.CODE) and the maximum roundtrip delay as follows:

$$\text{Max Roundtrip Delay} = \frac{\text{IN.TRANSIT.LIMIT}}{\text{FORMAT.CODE}}$$

As long as the round-trip delay through the network is below the maximum value, data will flow through the network without creating START and STOP events from the source. In a case, such as satellite circuit links, where the round-trip delay will be much longer than the conventional Telco lines, explicit values for this port parameter should be used.

In a multipoint network, distance between drops and the type of transmission lines contribute to the transmission delay. POLL TIMER and REPOLL TIMER parameters are calculated using special formulas. However, it is beyond the scope of this article to address these parameters.

Proper network configuration is crucial to optimize the network performance. This article should make the M31XX user cognizant of the complexity involved in balancing even a "simple" network.

- Niki Jhaveri

Multiplexer Glossary

DDCMP:	Digital Data Communications Message Protocol
IN TRANSIT LIMIT:	The number of characters that can be in transit between two muxes before an acknowledgement is received.
LOAD SHEDDING:	A condition when a mux begins to discard characters received from the asynchronous ports to protect itself against a buffer overflow and deadly embrace conditions.
MUX:	An abbreviated synonym for "MUltipleXor"; STAT-MUX is synonymous for "STATistical MUltipleXor"
POLL TIMER:	The number of tenths of a second to allow a slave mux to respond to a poll.
REP TIMER:	The number of tenths of a second between DDCMP REP messages. Also the maximum time between polls of working slaves.

REPOLL TIMER:	The number of tenths of a second to delay between polls of an unresponsive slave mux. Also the time between polling non-responding slaves. (A slave is considered non-responding if it misses two polls in a row.)
SINK:	The destination of the user data.
SOURCE:	The source from which the user data originates.

STAR POWER

GFEs, SHUTDOWN & Emergency Flush

Central Support is still receiving numerous calls about fixing GFEs. In most cases, the GFEs have occurred as a consequence of rebooting the system without first flushing memory to disc. This can cause data corruption in the form of Group Format Errors (GFEs) as well as possible corruption of system tables, such as overflow, logon workspace tables, etc. Generally, the system operator has the choice of performing a preventive SHUTDOWN (or Emergency Flush) prior to rebooting the system.

This topic has been previously discussed in this column. Please refer to the first two issues of *ONLINE* for a more detailed consideration. However, since you may not have access to those prior issues, I will describe briefly the recommended procedure.

Usually the system operator will decide to reboot the system with a COLDSTART during or following specific situations. These might include trying to recover from a power failure, having replaced or added new hardware, or attempting to clear hung ports. Some of these situations will be planned, while others will be due to emergency conditions.

For those planned occasions, such as changing hardware or trying to clear ports, the system operator can "prepare" the system for rebooting. This is done by performing a SHUTDOWN from the SYSPROG account. The SHUTDOWN process will allow an orderly shutdown of the system. This includes flushing data from memory to disc, denying LOGONs, and notifying users that the system is about to be shut down. Please refer to the Programmer's Reference Manual for more specific instructions on using SHUTDOWN.

Occasionally, unplanned events occur that will require the system to be rebooted. These occasions become emergencies when you cannot access the system from the console (Port 0). Essentially, you cannot communicate with your system without starting the reboot procedure. This also means that the system may not have written the data in memory out to disc. If you reboot now, you run a risk of data corruption.

To reduce this possibility, you should call Central Support and request assistance in performing an "Emergency Flush". An analyst will help you to access the system, determine its condition, and instruct you on how to recover it--or at least flush memory. **In some cases, the system may be recoverable without rebooting.**

Please note: If you are in doubt whether you should perform a SHUTDOWN or need an Emergency Flush, please call Central Support. This is especially important if you have noticed system problems immediately before an unplanned system shutdown.

- L.W. Abel

FEEDBACK

"...REALISM seems like a very complete, well-thought-out package. Some missing submenus will require reorienting, but the online documentation, quite tight security and especially the secured TCL (XTCL) are major enhancements to Reality's services.

Even more impressive is that the product appears to be fast and largely self-contained. Because of this, non-technical users will be able to take on tasks such as user management and even installation of new programs and processes into existing applications. Even new applications can be set up largely by non-technical users. The automatic passing of all delegable privileges will go a long way towards encouraging this self-reponsibility, which will help make large systems easy to manage.

In short, I'm impressed..."

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IN QUEUE

In our next issue, we will highlight another article in our series about enhancing your system's peformance. Other topics will feature trouble-shooting tips, using system utilities, and the latest information about operating system and application releases. As always, your comments, questions and suggestions are welcomed.

GooFiEs

What the CPU sees after you reboot the system without doing a SHUTDOWN (or Flush) first!

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