TO: Distribution
FROM: Joan Archer
DATE: 24 July 75
RE: Multics Change Requests

Enclosed are copies of Multics Change Requests which were approved from 15 June through 30 June 75.

Multics Project internal working documentation. Not to be reproduced or distributed outside the Multics Project.
TITLE: Modification to NCP to fix bugs and add features

AUTHOR: D. Wells

- Coded in XPL/I
- Details in DETAILED PROPOSAL
- Planned for System MR
- Fixes Bug Number(s)
- Unreported
- Documented in MTR
- User/Operations-visible
- Interface change? yes no
- Incompatible change? yes x no
- Performance: Better x Same
- Replaces MCR 635

Summary:
The Network Control Program will be changed to use the IOAM as suitable for handling process terminations.
The NCP will be changed to handle access to the "connect" function in a standard manner (via a gate).
The sizes of the tables in the NCP will be increased so that they are not overflowed normally.
A possible bug which may have trapped processes in ring zero (causing notify timeouts) is fixed.
Tracing is added to the NCP.
A few debugging flags are added to help in tracing down some additional misbehavior.
The IPS signal "neti" will be added to the system to allow the user_telnet command (among others) to properly implement the "abort output" function.
A variety of small bugs (which only caused minor anomalies) are fixed.

Reasons:
The NCP does not currently close connections when a user process terminates, and does not shut the Network down when the Network Daemon process terminates.
The NCP currently determines whether or not a user may perform a connect to a foreign host by checking an ACL on a segment in the on-line system. This is non-standard and does not conform to normal usage of access control.
Some of the tables in the NCP are close to overflowing. This is primarily due to the large number of new hosts which have been added to the Network over the past few months.
A section of code which does not respect hardcore locking conventions has been located; this may be responsible for a few system shutdowns at MIT in the past few months.
The NCP has previously been debugged by detecting side effects; printer tracing has been added so that particular sequences of code may be traced to the printer.
A few bugs are known to exist but cannot be duplicated upon demand nor in tracing. Appropriately a few pieces of information are being kept in order to get more info about the problem.
The use of the "quit" IPS signal by the NCP has led to an inability to implement a number of standard Network functions. In particular, the abort output function of the user_telnet command can not be implemented. The primary reason that the "quit" signal can not be used is that the Network must deal with many connections, whereas the
TTYDIM and the message coordinator need only deal with one connection (each).

A number of small bugs (which unfortunately cause major problems for users) have been fixed and a number of allocation strategies have been altered in order to minimize any other bugs that may exist.

IMPLICATIONS:

The number of DST entries will have to be increased to support this function. These entries are wired down (though the usage the NCP imposes does not require this wiring) -- thus decreasing the size of the paging pool. All possible efforts to reduce the number of entries have been made, and only one entry per active process using the NCP is needed.

A new IPS signal is added. All system installed code will handle the new signal properly (except for the part of the on-line network software that knows the condition that the NCP signals, of course). A compatibility period will be required during the period bhat the NCP is installed; this change should be entirely transparent to any user of the Multics Network (and non-network users will not be affected at all).

A new gate will be added to ring-zero (together with some control functions); this means that the ring-1 data base which knows about non-privileged access to ring zero segments (as by meter gate) must be changed.

A compatibility period will be required while the Network Daemon is modified to properly set the access to the new connect gate at Network initialization.
TITLE: Move some Network Administration to ring one

AUTHOR: D. Wells, N. Federman

SUMMARY:
Most Network administrative functions and attachment functions will be moved to ring 1 from ring 0. All privileged Network functions will utilize ring 1 control. Maintenance of the Network host table is converted to a ring one system (from the current mechanism of library installation of a non-object library segment). Two new gates into ring 1 will be added to allow normal and privileged access to the ring one functions.

REASONS:
When the NCP was moved from ring one into ring zero previously, it was moved bodily. It has now become apparent that a number of functions would like to be in an administrative ring (e.g. ring one) because there are a number of restrictions in ring zero which cause problems (e.g., fixed max lengths of segments and fixed ASTE sizes). Also, the Network functions should eventually be merged into the new RCP package, which executes in ring one.

The maintenance of the network host table has proved to be a major hassle. Hosts are added to the Network fairly often, and the one to two month delay at MIT causes complaints from users (and the six month to a year delay at other sites is intolerable. Also, the existence of an immediately updatable data base allow easier installation of a program to periodically fetch the actual file of host names (which is kept at another network host) and automatically update the on-line host name table.

IMPLICATIONS:
Attachment and detachment and other control functions will be slightly slower; reading, writing, and status operations will not be altered.

Because some code is moving from ring zero to ring one, a three stage compatibility process is required.

Special access to the new privileged ring one gate is required at each Multics installation, but special access to the ring zero gates is no longer required.
DETAILED PROBSAL:

Two new gates will be added to ring one which precheck socket assignments and allow only limited access to sockets outside of a user's normal socket space. These gates will also contain mostly null functions for all other network function entries.

A mechanism to allow the Answering Service to properly communicate negotiated TELNET options and to allow transmission to the users process of type-ahead data will be provided; this mechanism will replace the current user-modes data field which is currently kept in ring zero data bases.

A new host table mechanism will be implemented; this new mechanism allows on-line, immediate updating of host information. The new host table allows space for recording information about the status of a host, information about the host (e.g., the operating system, functions supported), and also provides space for whether or not communication should be enabled with a particular host. Special care has been taken in the design of the data base to ensure that the data base remains consistent at all times (though assumptions have been made to the effect that no user will remain in the traffic control queues for periods in excess of 24 hours). This new host table will require a writable segment in the on-line libraries (much in the manner of the message segment meters).

FUTURE PLANS (Not to be approved at this time):

The host table will be automatically updated periodically by fetching the host name definition file from across the network by a daemon process.

The Network sockets will be assigned by the Resource Control Package.

Automatic copying of ring-zero NCP logs into the on-line system (though in a daemons directory) will be performed. This will allow us to keep track of Host status, record error reports from foreign hosts, and remember anomalies discovered by the local software.
Multics Change Request

TITLE: Changes to user_telnet and user_ftp commands

AUTHOR: D. M. Wells

STATUS: Written
DATE: 1975.06.05

 Objections/Comments: None

SUMMARY: Change user_telnet command (and install new user_ftp) to have a "simpler" user request interface.

REASONS:
Because the user_telnet command has its own request processor which includes parenthesis, bracket and quote processing, a number of users have become confused while using it; the general problem is that they expect that quote, bracket and parenthesis processing to be done by the Multics command processor in the "execute" command. Also, a number of requests are left over from a time when it was expected that the user_telnet command would handle multiple connections; these extra requests will be removed. (They are all able to be specified from control arguments.)

IMPLICATIONS:
Features are being removed -- thus, users must be informed ahead of time about this change.

DETAILED PROPOSAL:
The request language of the user_telnet and user_ftp commands will become the "simplified" request language documented in the NUS section for the user_telnet command. The "host", "socket", "connect" and "disconnect" requests will go away. A few new control arguments and requests will be introduced to allow the use of the current command processor as an option.

NOTE:
By replacing MCR 959, this MCR includes the installation of the user_ftp command.
# Install new default_error_handler

**AUTHOR:** R. Schoeman

- **Coded in:** PL/I, ALM, other
- **User/Operations-visible Interface change?** Yes, No
- **Incompatible change?** Yes, No
- **Performance:** Better, Same, Worse
- **Replaces MCR**
- **Expires:** 12/19/76
- **Written:** 06/09/75
- **Status:** A

**SUMMARY:**

Install a new default_error_handler which prints more specific error messages when a KEY, RECORD, or UNDEFINED condition is raised.

**REASONS:**

Too much information is discarded between plio2_runtime detecting an error during i/o and the message the user receives. Instead of the error handler printing out a message dependent only on the condition raised, it will now print out a message dependent both on the condition raised and on the status code returned to plio2.

**IMPLICATIONS:**

None.

**DETAILED PROPOSAL:**

All the necessary facilities including the specific oncode messages were already provided. The printing of them, however, had been intentionally suppressed.

The relevant modules are coded in PL/I and as a message table.
PROGRAM: Key Condition

1. oop:proc;
2. dcl p1 file;
3. open file(p1) output keyed record sequential;
4. dcl (a,b) char(1);
5. a="?";
6. write file(p1) from(a) keyfrom("g");
7. write file(p1) from(a) keyfrom("a");
8. close file(p1);
9. end;

OLD MESSAGE:

oop

Error: key condition by >udd>m>rhs>test>oop|115 occurred while doing I/O on file p1
key a either does not exist in file or could not be added because it already exists

system handler for error returns to command level
r 1155 2.858 13.230 185 level 2, 16

NEW MESSAGE:

oop

Error: key condition by >udd>m>rhs>test>oop|115 occurred while doing I/O on file p1
on key = a
Unable to add record to keyed sequential output file;
keys must be distinct and ascending.

system handler for error returns to command level
r
rdn
r 1131 3.545 31.656 418 level 3, 18

ral
PROGRAM:

1 ral:proc;
2 dcl afire file;
3 dcl s char(10), t char(8);
4 s="qqqqqqqqq";
5 open file(afire) output record;
6 write file(afire) from(s);
7 close file(afire);
8 open file(afire) record input;
9 read file(afire) into(t);
10 close file(afire);
11 end;

OLD MESSAGE:

ral

error: record condition by "ude>m>rhs>test>ral|140 occurred while doing I/O on file afire

Record read by 'read statement is not the same size as the target.

system handler for error returns to command level
r 115 0.611 8.122 106 level 3, 30

NEW MESSAGE:

error: record condition by "ude>m>rhs>test>ral|140 occurred while doing I/O on file afire"
"read into(XX)" record in data set larger than variable XX.
Type "start" to continue.

system handler for error returns to command level
r 1151 0.026 10.074 107 level 4, 30
TITLE: Install new bound_plio2_

AUTHOR: R. Schoeman

Summary:
Install a new bound_plio2_.

Reason:
It fixes 2 bugs (write on update files and some get data statements) and will allow the new default_error_handler_ (MCR 1213) to provide a more informative error message when the KEY, RECORD, or UNDEFINED condition is raised.

Implications:
None.

Detailed Proposal:
This change in bound_plio2_ will support the new messages from default_error_handler_. Without this change the error handler would not receive the key involved in the i/o operation when the error was detected during execution of a quick record i/o statement.
|---------------------|-------------------|------------------|------------------|-----|-----|----------|-----------------|----------|------------|----------|----------------|-----------|---------|-------------|-------------|

**TITLE:** Remove 2K limit on length of message in message segment

**AUTHOR:** Kenneth T. Pogran

**STATUS DATE**
- Written: 06/04/75
- Expires: 06/19/75

**SUMMARY:**
Remove limit of 2048 words on maximum size of a message placed in a Ring 1 message segment (either queue or mailbox)

**REASONS:**
Network mail is heavily used for the distribution of documents as well as brief missives. While the old Multics mail command imposed a limit of 1024 words of mail per message, the corresponding routine for receiving mail from the Network, ftp_mail, did not. The new mail command also imposes this 1024 word limit; the new ftp_mail does not. Unfortunately, the Ring 1 message segment primitives impose a limit of 2048 words on the size of a message placed in a message segment. Thus, the change to the new mail system has become an unfortunate "incompatible change" for those accustomed to receiving lengthy network mail. The ability to receive lengthy network mail has become, by now, a de facto requirement on Network hosts, and the brand new 2048-word limit has presented problems.

**IMPLICATIONS:**
1. Users who call Ring 1 primitives directly, instead of using the mail command, will be able to send lengthy mail.
2. Users will be able to receive lengthy mail from other Network hosts.
3. Longer messages can also be placed in "queue"-type message segments.

**DETAILED PROPOSAL:**
msg_data$max_message_size, in bound_mseg, will be changed from 2048 to 261120 (1024*255).

**NOTE:**
Submitted at MIT as an emergency fix.
TITLE: Change incacc error message
AUTHOR: S. Herbst

SUMMARY:

Change the error table message for incacc from

"incorrect access to directory containing entry"

to

"incorrect access to directory".

REASON:

Increased generality so that this error code can be used for any directory. There is at least one case where the current message is misleading because the accompanying pathname is that of a directory, not an entry in a directory.
TITLE: Fix and Update Binder

AUTHOR: M. Weaver

- Code in [ ] PL/I [ ] AIM [ ] other
- Planned for System MR
- Fixes Bug Number(s)
- Documented in MTB 187
- User/Operations-visible Interface change? [ ] yes [x] no
- Incompatible change? [ ] yes [x] no
- Performance: [ ] Better [x] Same
- Replaces MCR

Category (Check One)

| Lib. Maint. Tools |
| Sys. Maint. Tools |
| Sys. Anal. Tools |
| Sys. Prog. Tools |
| BOS |

Status

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Document (Specify One or More)

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Objections/Comments:

None (Reason)

Use these headings: Summary of Proposal, Reasons for Proposal, Implications, Detailed Proposal.

SUMMARY:

Fix binder bugs 008, 009, and 010. Update binder to use new object_info_structure and to generate a separate static section for a bound segment if all components with nonzero-length static have separate static. Change to check specifically for bound components and to issue an appropriate error message.

REASONS:

See attached list of bugs.
See MTB 187.
If an archive component is a bound segment, the binder currently puts out a string of confusing error messages.

IMPLICATIONS:

In a bound segment with a separate static section, references to a component's internal static cannot be pre-linked.

DETAILED PROPOSAL:

Must be installed after object_info_ and before compilers that produce separate static sections.
This file contains binder BUGS and PLANNED IMPROVEMENTS.

ull next free number

BUGS

010 /2.05.14 retain: non-existent_entry; causes fatal error message but binder binds anyway

009 /2.05.14 when binding more than 1 program with create-if-not-found links to the same target (e.g. FUKTRAU common), only 1 of which initializes the target, that component must be bound before the others

009 /2.05.14 binder blows up if bound_segment already exists without w access in a dir without m access
**TITLE:** Install a compare_object that handles separate_static  

**AUTHOR:** R. A. Barnes

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**Status**

- Coded in PL/I
- Planned for System MR
- Fixes Bug Number(s)
- Documented in MTB
- User/Operations-visible Interface change? Yes
- Incompatible change? No
- Performance: Better
- Replaces MCR

**Category (Check One)**

- Lib. Maint. Tools
- Sys. Anal. Tools
- Sys. Prog. Tools

**DATE**

- Written 6/12/75
- Expires 12/19/75

**DOCUMENTATION CHANGES**

- Document: Specify One or More
- Specified:
  - MFM (Vol. Sect.)
  - PLMS (AN #) 51
  - MOSN (Sect.)
  - MPAM (Sect.)
  - PLMS AN# 51

**Objections/Comments:**

- Info Segs compare_object.info
- None

Use these headings: Summary of Proposal, Reasons for Proposal, Implications, Detailed Proposal.

**Summary:** compare_object has been upgraded to compare object segments that have separate static sections. A new subroutine entry point, compare_object $ptr (see attached sheet), has been added to support comparison of segments given pointers and lengths. Many tools would prefer this interface.
Addition to compare_object Documentation

-causes the static section of the 2 segments to be
compared if they have separate static; otherwise the
linkage sections are compared.

New Subroutine Documentation

Name: compare_object_$ptr

This function, given pointers and lengths of 2 object segments, compares
their text, definition, linkage, and static (if separate) sections and
returns "1"b if they are equal and "0"b if discrepancies exist.

Usage:

declare compare_object $ptr entry(ptr, fixed bin(24); ptr, fixed bin(24))
returns(bit(1) aligned);

result = compare_object $ptr(segl, lenl, seg2, len2);

1) segl  pointer to the first object segment(input)
2) lenl  length of the first object segment in bits(input)
3) seg2  pointer to the second object segment(input)
4) len2  length of the second object segment in bits(input)
5) result "1"b if segments are equivalent
       "0"b otherwise(output)

Note:

If either of the segments is not an object segment, if one of the segments
is a standard object segment while the other is not, or if one has separate
static and the other does not, the segments are considered unequal.
TITLE: Change set_acl's handling of bad ring brackets

AUTHOR: S. Herbst

SUMMARY: Change set_acl, etc. to report incorrect ring brackets when using the star convention.

REASONS: A previous change caused these commands to ignore the ring brackets error so that, for example, "sa **" means "set access on everything that is bracketed appropriately." This is a non-standard interpretation of **; usually if there is a problem with any entry an error message is printed. The inconvenience of occasional ring brackets messages is minimal.

IMPLICATION: sa ** in the user's home directory prints an error message for the ring 1 mailbox.
**TITLE:** Prevent lost notifies during process loading  

**AUTHOR:** R. Mullen

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**SUMMARY:** PXSS must validate events returned by wired_plm$load. If the event has already occurred, it will not be waited for.

**REASONS:** If the event is not valid then the user's process hangs for 90 seconds. Eventually a NOTIFY TIMEOUT occurs.

**IMPLICATIONS:** It is now understood how the notifies came to be lost, and that this validation will prevent their loss.
**VER. 3 1**

**MULTICS CHANGE REQUEST**

**TITLe:** Fix lex_string_ to handle break characters properly.

**AUTHOR:** Gary C. Dixon

**Planned for System:** MR 2.2

**Fixes Bug Number(s):** Unreported

**Documented In MTB:** not applicable

**Incompatible Change:** no

**User/Operations-visible Interface Change:** no

**Coded In (I)PL/I (L)ALM (O)other-see below

**Performance:** (B) better (S) same (W) worse

**DOCUMENTATION CHANGES (specify one or more)**

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<td>PLHs (AN#)</td>
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<td>None (reason)</td>
<td>No user-visible change, other than bug fix.</td>
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**OBJECTIONS/COMMENTS:**

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**SUMMARY:**

When the first character of a quote opening, comment opening, or statement delimiter is not also defined as a break character, a bug in lex_string_ causes it to be treated partially as a break character by treating any characters appearing before such a character as a separate token. For example, if /* is the comment opening delimiter but / is not a break character, and if ; and ; are break characters, then the statement:

```
Date: 03/05/75;
```

would be parsed as:

```
Date: 03 /05 /75 ;
```

Instead of as:

```
Date: 03/05/75;
```

**REASONS:**

This bug needs to be fixed so that cv_pmf will work in Multics System 2.2.

**IMPLICATIONS:**

The bug will be fixed, and cv_pmf will work properly.
**SUMMARY:**

This installation reflects many changes and improvements, specifically:

- **Graphic system** has been rewritten to use iox in place of ios in all places;
- System now implements and supports the use of multiple graphic I/O streams in a process;
- Graphic input is now performed reliably; as shown by documentation, it is an "addition" to the system capabilities;
- Include files were improved and consolidated;
- Support for imlac terminals was de-installed;
- Several restrictions on the depth of graphic structures were removed;
- A few performance improvements were installed;
- A number of small bugs were found and repaired.

**REASONS:**

Support for IMIAC terminals was de-installed because the support offered by the system applied to only one IMIAC console, owned by MIT Architecture, which was modified and looks like no other IMIAC currently in existence. The action serves to prevent potential users from overestimating the system's current support for these terminals.

Reasons for other actions seem obvious.

**IMPLICATIONS:** The graphic system is no longer usable from ios level. No known cases exist of users currently using it from this level. The system remains internally consistent in its use of iox.

**Detailed Proposal:** (pardon the previous past tense) Details may be found in the submitted copy of graphics_changes.info.
The remove_graphics command is used to terminate a session of working with the graphic system. It detaches graphic streams which were set up by setup_graphics.

Usage

```
remove_graphics [switch_1] ... [switch_N]
remove_graphics -all <OR> remove_graphics -a
remove_graphics
```

If given, the optional arguments "switch_1" to "switch_N" specify the streams to be detached. The second and third forms detach all graphic streams known to setup_graphics, including online streams.
Name: setup_graphics, sg

The setup_graphics command is used to attach and manipulate graphic I/O switches. Its simplest use is to inform the graphic system as to which type of graphic device is being used.

Usage

```
setup_graphics -control_args-
  sg -control_args-
```

"-control_args-" consists of some combination of the following control arguments:

- **-table gdt_name, -tb gdt_name**
  causes the graphic device table named "gdt_name" to be associated with the graphic switches set up on this invocation of the command. This option must appear in the command line, as it serves to describe the device in use.

- **-from switchname [mode_spec], -fm switchname [mode_spec]**
  specifies the graphic switches to be attached. More than one set of "-from" control arguments may be given to the command. The optional "mode_spec" argument specifies one of the opening modes defined by the I/O system (iox_). If any "mode_spec" arguments are not supplied, "stream_input_output" will be assumed. If no "-from" options appear in an invocation of the command, the assumed default is: "-from graphic_output stream_output -from graphic_input stream_input".

- **-to switch_name**
  specifies the target switch name to which all the switches mentioned in "-from" options are to be attached, though graphic_dim_. If this option is not given in the command line, the assumed default is: "-to tty_i/o -online".

- **-online**
  specifies that the switch "user_i/o", as well as all the switches mentioned in "-from" options, is to be channelled through the graphic_dim_. This is the normal mode of operation for online (i.e., teletype-like) devices.

Examples:

A user sitting at a Tektronix 4014 terminal can prime the graphic system to use his device by issuing:

```
setup_graphics -tb tek_4014
```

A user wishing to use an offline CalComp 915/1036 plotter with the graphic system can express this with the command:

```
setup_graphics -tb calcomp_915 -to offline_graphics-
```

Features for Upwards-Compatibility:
If the first argument to setup_graphics does not begin with the character "-", it is assumed to be a GDT name. If setup_graphics is invoked in this way, it will automatically invoke remove_graphics before proceeding to attach the switches. This will cause all known graphic switches to be detached prior to the new attachments being made. This is for compatibility with previous releases. It is expected that this feature will go away after users have had enough time to acclimate themselves to the new argument format.

The "-stream" and "-switch" control arguments are synonymous to "-to". These control arguments are also expected to go away after an acclimatization period.
**TITLE:** Graphic Editor for Multics Graphics System  
**AUTHOR:** C. DV Tavares

- **Coded in** □ PL/I □ ALM □ other- □ explain in DETAILED PROPOSAL  
- **Planned for** System MR 2.2  
- **Fixes Bug Number(s)** □ 355  
- **Documented in** MTB  
- **User/Operations-visible** Interface change? □ yes □ no  
- **Incompatible change?** □ yes □ no  
- **Performance:** □ Better □ Same □ Worse □ Addition  
- **Replaces MCR** □ YES □ NO

**Category (Check One):**  
- □ Lib. Maint. Tools  
- □ Sys. Anal. Tools  
- □ Sys. Prog. Tools  
- □ Other  

**DOCUMENTATION CHANGES**  
- □ Specify One or More  
- □ Document

**USE THESE HEADINGS:** SUMMARY, REASONS, IMPLICATIONS, DETAILED PROPOSAL (Optional)

**SUMMARY:** This MCR implements the graphic editor, as described in MTB 175 with a few minor additions. Specifically, these additions are implementation of the "input" command (which was documented as "not yet implemented"), and addition of capabilities for handling the "color" graphic element.

**REASONS:**  
Users may now create, store, edit, and manipulate graphic structures through a reasonable interactive interface, rather than having to create and compile programs to perform these operations on simple test cases, or, for that matter, on large applications. The reasons are outlined more specifically in the MTB, if this is necessary.

**IMPLICATIONS:**  
This is an additional graphic system capability, located in a separate bound segment, whose bundling status should be logically associated with that of the rest of the graphic system.

**DETAILED PROPOSAL:**  
Four modules are to be added to the system. They are: graphic_editor, the command interface, which handles and dispatches on user input lines; ge_parse_, which performs actual terminal or file input and parses tokens in the command lines, as well as performing macro expansions; ge_eval_, which interprets the tokens and performs assignments, evaluations, and tuple formations, as well as (by performing these) creating and editing graphic structures; and ge_interpret_, which interprets graphic structures and prints them out to the user in various interpretable forms. These four modules are to be located in bound_graphic_editor_.
The graphic_editor is an interactive tool which may be used to create and edit graphic structures. It is capable of storing these structures into, and retrieving them from, permanent graphic segments (PGS's).

Usage:

```
graphic_editor [seg1] [seg2] ... [segn]
```

1) `segj` (optional) is a pathname specifying a segment to be read into the graphic editor. This segment must have a suffix of "ge". If the suffix is not explicitly stated in the command line, it will be assumed. This segment may contain a list of editor commands or assignments, in the same format as they might have been typed into the editor interactively. The segments will be interpreted by the editor in the order specified.

Requests fall into two categories: commands and assignments. In general, commands may be terminated with either a semicolon (";") or a newline. Assignments (due to their ability to be quite lengthy) may be terminated only with a semicolon. Sometimes one of more of the arguments of a command may be an assignment. In these cases, only the semicolon is accepted as a terminator.

A complete specification of the assignment language and descriptions of complex operations is too lengthy to place into an info file. The interested user may find this information in the MPM Graphics Users' Supplement.

A list of defined system symbols (known graphic elements) follows. (The list of editor commandswill be found after the list of system symbols.)

### Defined System Symbols

#### Positional Elements

All positional elements take arguments of the form "x y z". If any of these arguments are not supplied, it will be assumed to be zero. It is possible to supply no arguments, only "x", only "x y", or all of "x y z". No other combinations (e.g. "x z") are parsable.

```
>->
setposition (sps)
setpoint (spt)
vector (vec)
shift (sft)
point (pnt)
```

#### Modal Elements

In general, non-numeric values for mode settings may be any string which is used in the include file...
"graphic_enames.incl.pl1" to describe that particular mode. Values shown here represent the strings currently recognized.

>--- intensity (int)
Argument: Integer; 0 through 7, or "off" (0), "on" (7), or "full" (7).

>--- linetype (lin)
Argument: Integer; 1 through 5, or:
"solid" (0)
"dashed" (1)
"dotted" (2)
"dash_dotted" (3)
"long_dashed" (4)

>--- blink (blk)
Arguments may be any from the following correspondence list:
"steady" 0
"blinking" 1

>--- sensitivity (sns)
Arguments may be any from the following correspondence list:
"insensitive" 0
"sensitive" 1

>--- color
Arguments (up to three) must be of the form:
</color_spec> [<intensity>]

The <color_spec> may be "red", "blue", or "green". Intensities may be any integer from 0 to 63. If a <color_spec> is not followed by an intensity, 63 will be assumed.

Mapping Elements

>--- rotation (rot)
Arguments: "x_rotation y_rotation z_rotation" in floating or integer degrees.

>--- scaling (scl)
Arguments: "x_scale y_scale z_scale" in integer or floating notation.

Miscellaneous Elements

>--- null
No arguments. This element represents the "zero node". It is a placeholder, or a graphic no-op.

>--- text "string" [position]
"string" [position]
The second form of the text string is implicitly understood. If the first (explicit) form is used, the string need not be enclosed in quotes. The optional argument [position] specifies the string alignment. The argument may be either an integer or a string, from the following correspondence list:
upper_left ul 1
creates a datablock containing the element <element>.

A list of editor commands follows.

Commands

<---- display <exprn>
   di <exprn>
causes the screen to be erased and the graphic structure specified to be displayed. If the argument is a tuple, no erase is performed between each element of the tuple. The tuple is first collected into an implicit array, but is displayed one element at a time. This means that the current graphic position will revert to (0, 0, 0) before displaying each new element.

<---- list [control_args]
   ls [control_args]
will list selected symbol tables. Any number of control arguments may be specified. The following control arguments are allowed:

-commands -com list the editor commands and their abbreviations.
-system -sys list the available system symbols and their abbreviations.
-macros -mc list the defined macros.
-symbols -sym list the user symbols.
-all -a list all of the above.

If no control arguments are given, "-symbols -macros" is assumed, with the listing of macros suppressed if there are none.

<---- execute <command_line>
   exec <command_line>
causes the <command_line> to be passed to the command processor.

<---- show <exprn>
causes an abbreviated description of the tuple <exprn> to be printed to the user's terminal.

<---- replay <exprn>
like show, except that the entire graphic subtree inferior to the
chosen node is described in assignment notation, along with nested assignments where appropriate. This command allows a user to "replay" a graphic structure in a form acceptable as input to the graphic_editor.

```plaintext
>--- remove <symbol1> [symbol2] ... [symbolp]
causes those elements named to be removed from the table of known user symbols.
```

```plaintext
>--- use [pathname]
causes the permanent graphic segment (PGS) specified by [pathname] to be loaded into the WGS. This allows the editor to use a previously-constructed set of graphic structures.
```

```plaintext
>--- save [pathname]
causes the contents of the WGS to be saved in a PGS specified by [pathname]. If [pathname] is not supplied, graphic_editor will use the pathname which was last supplied to a "use" or "save" command.
```

```plaintext
>--- get [mode] [(pathname)] <sym1> [sym2] ... [symq]
gets the structures (or macros) named <sym1> ... [symq] from the PGS specified by [(pathname)]. (The "pathname", if it is given, must be within parentheses.) The [mode] argument determines what action is taken on attempts to redefine an existing name:
- safe leave the old symbol as is and print an error message.
- force redefine the symbol and all subsidiary symbols.
- replace_only redefine the symbol. If subsidiary symbols are duplicated in the WGS, use the copies in the WGS. For any subsidiary symbols not so duplicated, create null (empty) symbols.
- replace_all redefine the symbol. If subsidiary symbols are duplicated in the WGS, use the copies in the WGS. For any subsidiary symbols which do not exist in the WGS, use the ones in the PGS.
```

```plaintext
If [mode] is not specified, "-safe" will be assumed. The [mode] and [(pathname)] arguments, if present, may occur in either order, but must precede any symbol names.
```

```plaintext
>--- put [mode] [(pathname)] <sym1> [sym2] ... [symq]
stores the structures (or macros) named <sym1> ... [symq] into the PGS specified by [(pathname)]. The [mode] argument determines what action is taken on attempts to redefine existing names. Allowable modes are the same as for "get", and are analogous.
```

```plaintext
>--- read [pathname]
```
causes the file specified by <pathname> to be interpreted as a
set of editor commands. If the suffix ".ge" is not explicitly
provided in <pathname>, it will be assumed.

---
quit
is used to exit from the editor.

---
restart
will re-initialize the editor, the working graphic segment,
and all associated symbol tables.

---
help
?
directs the user to relevant documentation.

---
macro <name> [arg1] ... [argn] = <exprn>
macro show <name1> ... [namep]
macro replay <name1> ... [namep]
The first form defines a macro with name <name>, and arguments
[arg1] ... [argn]. The other forms do for macros what "show" and
"replay" do for symbols.

---
input (<device_name>) <sym1> ... <symp>
requests that one or more "what" inputs be requested from device
(<device_name>). The device names currently recognized are:
"any"
"joystick"
"keyboard"
"lightpen"
"mouse"
"pen_tablet"
"terminal_program"
"trackball"
TITLE: Emergency change to pl1's handling of
fixed(decimal_constant...)

AUTHOR: R. A. Barnes

SUMMARY: pl1's handling of fixed(decimal_integer_constant...) will be temporarily changed so that a binary result will be (incorrectly) generated and a warning issued.

REASONS: In the last release of pl1, a longstanding bug was fixed in which fixed(decimal_integer_constant...) erroneously produced a binary result instead of the correct decimal result. Unfortunately, many Ring 0 programs use constructs such as bit(fixed(7,3),3) which now produce calls to any_to_any_ which cannot be allowed.

IMPLICATIONS: Programs which compiled without warning before, may now get warnings. The bug will be temporarily unfixed.

DETAILED PROPOSAL:

1. An emergency installation has been submitted in which the compiler produces a binary result for fixed(decimal_integer_constant...), but warns the user that the compiler will soon be changed to produce a decimal result for that construct and suggests that he/she use the binary builtin.

2. The next regularly installed compiler will produce a decimal result for the construct and issue a warning suggesting that binary be used.
# Multics Change Request

## TITLE:
Fix zeroing El91 reused addresses bug in Salvager

## AUTHOR:
A. Kobziar

## STATUS
Coded in: PL/I
Planned for System MR
Fixes Bug Number(s): unreported
Documented in MTB
User/Operations-visible Interface change?
Incompatible change?
Performance: Better
Replaces MCR

## Category (Check One)
- Lib. Maint. Tools
- Sys. Anal. Tools
- Sys. Prog. Tools
- Documentary
- Specify One or More

## DOCUMENTATION CHANGES
- MPM (Vol, Sect.)
- PLMS (AN #)
- MOSN (Sect.)
- MPAM (Sect.)
- MSAM (Sect.)

## Objections/Comments:
Info Segs
Other (Name)
None (Reason) Bug fix

## SUMMARY:
Add a new segment to the salvager header, "reused_addr_seg", to be used in zeroing the contents of reused addresses. Change salv_check_map.pll to use this seg rather than salv_temp_dir.

## REASONS:
If reused addresses occur on a device other than the one containing the salvager partition, the second call to pc$cleanup will crash the salvager with a "out of El91" error, as the salvager does not have the second device in its fsdct. Rather than save and restor the did and first page address of salv_temp_dir, the more visible approach of using an appropriately named window segment was chosen.
TITLE: Fix message segment deletion bug
AUTHOR: Jerry A. Stern

Summary: Fix a bug in the procedure mseg that causes a message segment not to be unlocked after an unsuccessful attempt to delete it.

Reasons: An attempt to delete a message segment may be denied by ring 0 for reasons such as safety switch on, no modify permission on parent directory, etc. In these cases, the message segment is not unlocked as it should be. The next attempt to lock the message segment will force the message segment salvager to be called.

Detailed Proposal: Change mseg to unlock a message segment after an unsuccessful deletion attempt.
TITLE: Fix ec bug erroneously complaining about unbalanced brackets in &if construct

AUTHOR: S. Webber

SUMMARY:
Fix bug in abs_io which erroneously complained about unbalanced brackets in &if clauses.

REASONS:
Fix bug.
**TITLE:** Fix index_set active function  

**AUTHOR:** S. Herbst  

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<tr>
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<td>Expires</td>
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**Objections/Comments:**

**SUMMARY:**

Fix index_set to work correctly for any number such that the resulting character string will fit into the return argument.

**REASON:**

There is no documented limit on the size of the argument but index_set currently complains if the number is greater than 300 and produces a storage condition for arguments less than 300 and greater than 228.
TITLE: Change segs to return null string instead of ""

AUTHOR: S. Herbst

- Coded in: [ ] PL/I [ ] ALM [ ] Other
- Planned for System MR
- Fixes Bug Number(s)
- Documented in MTR
- User/Operations-visible
- Interface change? [X] Yes [ ] No
- Incompatible change? [X] Yes [ ] No
- Performance: [ ] Worse [X] Better [ ] Same
- Replaces MCR

PROPOSAL:

Change segs and related active functions to return null string rather than "" (i.e., a pair of literal quotes) when no match is found for a starname.

REASON:

([segs starname]) should be a null iteration set when there is no match for starname. Currently, however, it is an iteration with one element, "". There is no good reason for returning the string "".

IMPLICATIONS:

This is a minor incompatible change that may affect the use of segs, etc., by exec_coms. See attached changes notice.
For pending_changes_info:

The following star name active functions have been changed to return null string instead of the string "" when no match is found for a star name:

branches, nonlinks
directories, dirs
files
links
nondirectories, nondirs
nonsegments, nonsegs
segments, segs
**Title:** Upgrade online_dump for sst_names

**Author:** B. Greenberg

---

**Category (Check One):**
- Lib. Maint. Tools
- Sys. Anal. Tools
- Sys. Prog. Tools

**Category:**
- Planned for System MR 3
- Fixes Bug Number(s): 355
- Documented in MTB
- User/Operations-visible
- Planned for System MR 3
- System MR 3
- Performance: Better
- Interface change? Yes
- Incompatible change? No
- Status: Written 06.19.75
- Expires 12.24.75

**Documentation Changes:**
- Document Specified One or More
  - Salvager
  - Ring Zero
  - Ring One
  - SysDaemon/Admin.
  - MOSN (Sect.)
  - MSAM (Sect.)

**Objections/Comments:**
- Info Segs
- Other (Name)
- None (Reason)

---

**Use these headings:**
- Summary of Proposal
- Reasons for Proposal
- Implications
- Detailed Proposal

---

**Summary:**

Remove dependency of online_dump on KST, and use SST name table.

**Reasons:**

Very shortly, pathnames of directories will no longer be available in the KST. online_dump, which is used to print fdumps, currently uses these pathnames.

**Implications:**

Full pathnames of segments as opposed to reference names, or nothing will be printed in FDUMPS.

**Detailed Proposal:**

Make online_dump use new subroutine, get_ast_name_, to compute pathnames of active segments. This interface will be accessible in tools (see writing).

**Note:** This version of online_dump must be installed any time after BOS 1-44, and before the pathname associative memory.
Name: get\_ast\_name_  

dcl get\_ast\_name\_entry  

(ptr, ptr, ptr, char(*));  

Use: call get\_ast\_name\_ (astep, sstp, sstup, retstring);  

astep is a pointer to an AST entry for which a pathname is sought (Input)  

sstp is a pointer to the copy of the SST segment in which the AST entry pointed to by astep exists. (Input)  

sstup is a pointer to the corresponding copy at the SST name table. (Input)  

retstring is the pathname of the segment whose AST entry is pointed to by astep. (Output)
TITLE: Fix page control bugs

STATUS DATE
AUTHOR: B. Greenberg

Objections/Comments:

Use these headings: Summary of Proposal, Reasons for Proposal, Implications, Detailed Proposal.

PROPOSAL:

Fix old and new page control bugs.

REASONS:

Four known problems have been observed and found.

IMPLICATIONS:

Better reliability.

DETAILED PROPOSAL:

1. (Ancient bug) Shutdown sometimes leaves segments "active", due to Paging Device flush bug. Wired-shutdown should stop page-multilevel activity before flushing the Paging Device.

2. (New bug) Deconfiguring the entire paging device fails. page_fault$allocate_pd should check pd_using.

3. (New bug) Quota can be depleted by deactivating segments containing unmodified zero in-core pages. pc$cleanup should account for such pages.

4. (New bug) Pages faulted in from disk, and modified before potential eviction, are not updated to the paging device at write_page time. This causes an excess of disk traffic.
**TITLE:** Improve check_sst  

**AUTHOR:** B. Greenberg

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**STATUS DATE**

- Written: 06.19.75
- Expires: 06/24/75

**Objections/Comments:**

- Info Segs
- Other (Name): None
- Reason: None

**Use these headings:** Summary of Proposal, Reasons for Proposal, Implications, Detailed Proposal.

**SUMMARY:**

Update check_sst to 25-5 page control, fix bugs, improve same.

**REASONS:**

The hardcore debugging tool check_sst, used to analyze page control problems, has some dependencies on pre-25-5 page control and some minor protocol errors. Fix all this, display more and better checks, and more meters.

**IMPLICATIONS:**

None.

**DETAILED PROPOSAL:**

n/a
TITLE: Delete no_old_alm option from binder  

AUTHOR: M. Weaver

SUMMARY:
Delete undocumented control argument -no_old_alm and undocumented bindfile keyword No_Old_Alm from binder. Refuse to bind "old" alm segments.

REASONS:
"Old" alm segments have never been produced on the 6180. The no_old_alm option was used as a check before moving from the 645.

IMPLICATIONS:
There may still be some old alm segments; these will have to be reassembled before being rebound. (The system itself probably doesn't have any old alm segments.)

DETAILED PROPOSAL:
This will be done in conjunction with MCR 1222.
add to binder_changes.info

6/21/75

The following changes have been installed:

- binder bugs 8, 9, and 10 have been fixed,

- the binder now refuses to bind nonstandard alm segments and no longer accepts the control argument -no_old_alm or the bindfile keyword No_OLD_Alm,

- components with separate static sections can now be bound; the bound segment will have a separate static section only if all nonzero length static sections are separate.