DATE: October 31, 1973
TO: Distribution
FROM: M. S. Hodges
SUBJECT: Multics Change Requests

Attached are copies of all Multics Change Requests which were approved from October 16 - October 31, 1973.
TITLE: Updating the ARPA Network Host Table

AUTHOR: R. Kanodia

SOURCE: (if external) e.g., "User", "Marketing"

CLASSIFICATION | JUSTIFICATION | Replaced by proposal MCR
--- | --- | ---
Incompatible Change | Marketing Requirement | Implemented in System
X Extension | Conformance to Standard | Objections/Comments:
Restriction | Increased Consistency |
Performance Improvement | Simplification |
Reliability Improvement | Generalization |
Bug Fix |

Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS: There are several new hosts in the ARPA Network and the table containing symbolic host names needs updating. Change host_table.
MULTICS CHANGE REQUEST

<table>
<thead>
<tr>
<th>TITLE:</th>
<th>Performance Improvement and Bug Fixes in IMP DIM.</th>
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<tbody>
<tr>
<td>AUTHOR:</td>
<td>Raj Kanodia</td>
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<tr>
<td>SOURCE:</td>
<td>(if external) e.g., &quot;User&quot;, &quot;Marketing&quot;</td>
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Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

**REASONS:**

1. Incorrect reporting of status on operator's console in some cases.
   - Change imp_status.pl1 and imp_status_driver.ioc.
2. Bug in analyzing IOM Central and User Fault Status.
   - Fix imp_status.pl1 and imp_status_driver.ioc.
   - Fix imp_input_processor.pl1.
4. Bug in Imp_read prevents reading of more than one message in one call
   - The next revision of the NCP (Network Control Programs) will begin using this feature to improve performance.
   - Change imp_read.pl1.
5. Currently Host number of the Multics site is built into the NCP. This will cause problems when switching over to the new IMP. It is proposed that the host number be derived from the PRPH cards specifying IMP channels, and stored in the IMP DIM data segs from where the NCP can pick it up.
   - Change imp_data.nlm and imp_dcm_init.pl1

**IMPLICATIONS:**

A MOSN on the changes to configuration cards must be issued.
### MULTICS CHANGE REQUEST

**TITLE:** Fix minor bug in rename `_pats_`

**AUTHOR:** T.H. VanVleck

**SOURCE:** (if external) e.g., "User", "Marketing"

**CLASSIFICATION**

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**REASONS:** The program "rename `_pats_" encounters an out-of-bounds copying a put with more than 1350 users.

**SUMMARY:** Change calculation of put length in rename `_pnt_`: one-line fix.

**IMPLICATIONS:** None
**Title:** Fix error in message routing DIM  

**Author:** T. H. VanVleck

**Source:** (if external) e.g., "User", "Marketing"

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**Use these headings:** REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

**Reasons:** An error in the message routing DIM caused the initializer process to loop in certain circumstances after an unexpected error in the initializer. This caused ERF's 299 and 300, both of which required a system crash.

**Summary:** A missing "else" clause in mrd_util caused the reset write function to loop if output messages from more than one source appeared in a message routing segment. (This situation is possible in the initializer.) The unclaimed signal handler in system control issues an abort call when a fault occurs.

Because this bug was crashing the system, the fix has been emergency-installed at 1900 on 10/5/73.

**Implications:** None.
MULTICS CHANGE REQUEST

TITLE: REMOVE BULK STORE DEPENDENT CODE FROM EMERGENCY SHUTDOWN

AUTHOR: N.J. Morris

SOURCE: (if external) e.g., "User", "Marketing"

CLASSIFICATION | JUSTIFICATION | Replaced by proposal MCR
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Incompatible Change | Marketing Requirement | Implemented in System
Extension | Conformance to Standard |
Restriction | Increased Consistency |
Performance Improvement | Simplification |
Reliability Improvement | Generalization |

Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS: Device dependent code was placed in the emergency shutdown module. This code was designed to reset a hung Bulk Store. Emergency shutdown already has a call for resetting all page control devices. The Bulk Store DIM should take advantage of this call to reset the Bulk Store. All Bulk Store dependent code should be in the bulk DIM. It is a bad precedent to scatter device-dependent all over the system.
**MULTICS CHANGE REQUEST**

**TITLE:** FIX BUG IN FDUMP

**AUTHOR:** N. I. Morris

**SOURCE:** (if external) e.g., "User", "Marketing"

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Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

**REASONS:**

A problem was found in FDUMP which caused the appending package to overlay FDUMP's literals. This had been causing wrong processes to be dumped.
TITLE: Fix to DN355  

AUTHOR: R. B. Snyder  

SOURCE: (if external) e.g., "User", "Marketing"  

CLASSIFICATION | JUSTIFICATION | Replaced by proposal MCR
---|---|---
Incompatible Change | Marketing Requirement | Implemented in System 20.12b
Extension | Conformance to Standard |  
Restriction | Increased Consistency |  
Performance Improvement | Simplification |  
Reliability Improvement | Generalization |  
| Bug Fix |  

Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS: A bug in dm355 which has been crashing the system has been fixed.

SUMMARY: Connects which were placed in the 6180 connect queue were not being dequeued for a given channel when it was desired to stop all activity for that channel (a so called "STOP_CHANNEL" operation).

IMPLICATIONS: None
TITLE: copy_fdump not to access data beyond end of dump partition

AUTHOR: R. Mullen

SOURCE: (if external) e.g., "User", "Marketing"

CLASSIFICATION | JUSTIFICATION | Replaced by proposal MCR
--- | --- | ---
Incompatible Change | Marketing Requirement | Implemented in System 21.0
Extension | Conformance to Standard | Objections/Comments:
Restriction | Increased Consistency |
Performance Improvement | Simplification |
Reliability Improvement | Generalization |
X |

Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS: data beyond end of part dump may be privileged in some way. In any case it will certainly not be of any use to the dump analysis. copy_fdump now just looks at the length of the dump as set in the dump header by BOS. This length can exceed the size of part dump.

SUMMARY: It is proposed that copy_fdump use a length which is the minimum of the length set by BOS and 1024 * number of records in part_dump (as picked up from the config deck). Also it shall not make up ptw's for the abs_seg which point beyond end of part dump.

IMPLICATIONS: No change to operations interface. This is the more urgent as the conversion of copy_fdump to output 256k segments would cause this problem to occur more frequently.
TITLE: fix printer chain images in BOS

AUTHOR: N. I. Morris

SOURCE: (if external) e.g., "User", "Marketing"

CLASSIFICATION | JUSTIFICATION | Replaced by proposal MCR
-----------------|---------------|---------------------
Incompatible     | Marketing     | Implemented in System
Change           | Requirement   |                     
Extension        | Conformance to Standard | Objections/Comments: X
Restriction       | Increased     |                     
Performance      | Consistency   |                     
X                |               |                     
Improve          | Simplification|                     
Reliability      | Generalization|                     
Improve          | Bug Fix       |                     

Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS: BOS has an error in the printer chain image tables. This change will fix the error.

IMPLICATIONS: Change the documentation of prph card.
# MULTICS CHANGE REQUEST

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Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

**REASONS:** The system trace routine must be modified to be able to write tapes on MTS 400 or MTS 500 drives. In addition, tape tracing is being expanded to switch between two tapes (1 & 2) rather than writing only to 1 tape (g) with manual switching.

**SUMMARY:** Trace has been modified to use a DCW list which is compatible for both types of tapes. It has also been changed to recognize end of tape status and to write 8 EOF's on the tape & rewind it & switch to the alternate drive. Finally, code has been added to prevent trace from looping forever in the case of lost status.

**IMPLICATIONS:** SPS documentation will be changed to indicate the changes to the tape capability. Also, an MSB will be written to give more immediate notification to users (of the development machine).
TITLE: qedx changes

AUTHOR: M. A. Meer

SOURCE: (if external) e.g., "User", "Marketing"

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Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS: fix (change to version 2 for 256k)
fix bug in substitute
extend for use on network in normal way
allow use of abbreviated names for reading message on quit and reinvocation (consistency with edm)

SUMMARY: Version 2
fix bug
see attached sheet

IMPLICATIONS: The network can use qedx in the normal way.
Allow use of abbreviated names for reading in segments.

DETAILED PROPOSAL: See attached sheet
The qedx command has been changed in the following ways:

1) It has been converted to version 2 PL1;
2) It is usable on the network with its special symbols (\c, \v, \f, \r);
3) The handling of \c in the substitute request(s) has been fixed so that the syntax \s/\c\v/\x/ substitutes \x for \c.
4) If a user QUITs out of qed and invokes qedx in the same process, the user will get a message that pending work will be lost if he continues and will be asked if he wishes to continue. If the user continues, then the qedx temporary storage in his process directory will be truncated and its previous contents will be lost.
5) A new feature has been added which allows multiple input arguments.

The new feature allowing multiple input arguments takes all arguments after the first and appends them line by line to the buffer (args). The first argument as before is the name of a qedx macro (see qedx in the man). For example the command line

```
qedx r x.pl1 /zilch/ d w q
```

will cause qedx to look for the segment r.xedx and place the contents of that segment in buffer (exec). The rest of the arguments x.pl1, /zilch/, d, w, and q will be appended to buffer (args). The buffer (args) will end up as shown below.

```
x.pl1 /zilch/
dwq
```

The current buffer is then changed to 0, the usual current buffer, and the commands in buffer (exec) are executed.

The additional argument feature allows users to write a macro which will read in a segment whose path name is given on the command line. This allows the expansion of abbreviated path names. The macro \r \p(args)\ is such a macro.

If this is the macro in r.qedx in the example above then the effect of this macro is to read in the segment x.pl1, search for /zilch/, delete that line, write the segment back to x.pl1 and quit.

Ingenious users will find other uses for this feature.
**MULTICS CHANGE REQUEST**

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**REASONS:**

1) The currently installed copy does not work, since it attempts to update a nonexistent online MSL.
   These calls to msl primitives will be removed.

2) Calls to archive to update backup include file archives in >ldd>include>source will be removed so that these archives may be deleted, conserving disk space.

3) The storage strategy for backup (replaced or deleted) include files would be changed to conform with all other online system backup procedures: i.e. the old include file will be renamed to a unique pathname and retained in >ldd>include until it is deleted by cleanup. Currently these old include files are archived into >ldd>old. Additional names will be transformed to name.1...name.n, as are the additional names on other replaced or deleted library segments. This will solve an existing problem which occurs when the online installer creates a backup archive and leaves it with insufficient access for subsequent updates to be made by the online installer.

4) New acl primitives will be used to replace the old forms.
MULTICS CHANGE REQUEST

TITLE: Modification of cleanup to handle >doc >iml info_segs. Preparation of cleanup to work with extended star/equals convention.

AUTHOR: A. Scherer

SOURCE: (if external) e.g., "User", "Marketing"

CLASSIFICATION | JUSTIFICATION | Replaced by proposal MCR
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X Incompatible Change | Marketing Requirement | Implemented in System
X Extension | Conformance to Standard | Objections/Comments:
Restriction | Increased Consistency | 
Performance Improvement | Simplification | 
Reliability Improvement | Generalization | 
Bug Fix | 

Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS:

1) Since the directory >doc >iml info_segs was created, and is already in use, the cleanup library utility must be modified to delete old copies of into files from directory.

2) It is necessary to insert (but comment out at present) the change for cleanup to look for backup segments named "!??????????????" instead of "!************" when cleaning up the libraries. Approval is requested for this change so that it may be "turned on" whenever the next phase of star/equals goes in.
MULTICS CHANGE REQUEST

TITLE: Increase the max length, current length and records used fields of a directory entry to 18 bits

AUTHOR: E. Stone

SOURCE: (if external) e.g., "User", "Marketing"

CLASSIFICATION	JUSTIFICATION	REPLACED BY PROPOSAL MCR

X Incompatible Change	X Marketing Requirement	Implemented in System 21.0

X Extension	X Conformance to Standard

Restriction	Increased Consistency

Performance Improvement	Simplification

Reliability Improvement	X Generalization

Bug Fix

Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS:

Currently the max length of 14 bits and the current length/records used of 12 bits are 1 bit too small to allow 256k segments.

IMPLICATIONS: The system changes are mechanical for the most part, but a special salvager must be run before this change is installed.

These changes are coded, submitted and approved for installation.

It is planned to install this change with that of MCR-012.
TITLE: Increase the time record product field of a directory header to 2 words.

AUTHOR: Eleanor Stone

SOURCE: (if external) e.g., "User", "Marketing"

CLASSIFICATION | JUSTIFICATION | Replaced by proposal MCR
--- | --- | ---
| Incompatible Change | Marketing Requirement | Implemented in System 21.0
| Extension | Conformance to Standard | Objections/Comments:
| Restriction | Increased Consistency |
| Performance Improvement | Simplification |
| Reliability Improvement | Generalization |
| Bug Fix |

Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS: Currently updating the time record product can cause a system crash. This can occur for a large directory containing frequently used segments when the time record product has not been reset to zero for an extended period. This is a potential problem for sites that do not wish to run a program such as "the crank" very often.

IMPLICATIONS: This change involves introducing 3 new entries into ring 0 which will eventually replace 3 existing entries (hcs-$quota-get, hphcs-$quota-reload and hphcs-$quota-get-reset). Documentation has been submitted for these.

The system changes are mechanical, but a special salvager must be run before this change is installed.

This change is coded, submitted and approved for installation.

It is planned to install this change with that of MCR 012.
**MULTICS CHANGE REQUEST**

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<th>Fix bugs in privileged_mode_ut and wire_stack</th>
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**REASONS:**

Full implementation of 256k segments.

**SUMMARY:**

Temp wire 3 pages of ring_0 stack rather than 2.

In testing 256k system it was found that this fix was necessary due to increased stack requirements of some procedures.
## MULTICS CHANGE REQUEST

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**REASONS:**
Allow full implementation of 256k segments.

**SUMMARY:**
Remove restrictions in printer dims which prevented printing segments greater than 64k.

These changes have been tested and are scheduled for installation.
MULTICS CHANGE REQUEST

TITLE: correct restrictions in area package which prevent creation of 256k areas

AUTHOR: E. Stone

SOURCE: (if external) e.g., "User", "Marketing"

CLASSIFICATION | JUSTIFICATION | Replaced by proposal MCR
--- | --- | ---
Incompatible Change | Marketing Requirement | Implemented in System
X Extension | Conformance to Standard | Objections/Comments:
Restriction | Increased Consistency | 
Performance Improvement | Simplification | 
Reliability Improvement | Generalization | 
X Bug Fix | 

Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS: Allow full implementation of 256k segments.

SUMMARY: Fix bugs in area package which disallowed 256k areas. These changes have been coded and tested.

IMPLICATIONS: These changes must be installed in the system that offers 256k segments to users.
MULTICS CHANGE REQUEST

**TITLE:** Convert V1/PLl modules in hardcore to V2/PL1

**AUTHOR:** E. Stone

**SOURCE:** (if external) e.g., "User", "Marketing"

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**CLASSIFICATION** | **JUSTIFICATION** | **Replaced by proposal MCR**
---|---|---
Incompatible Change | Marketing Requirement | Implemented in System
Extension | Conformance to Standard | Objections/Comments:
Restriction | Increased Consistency | 
Performance Improvement | Simplification | 
Reliability Improvement | Generalization | 
| Bug Fix | 

**REASONS:**

Version 1 PL/l will not be supported in the future.

The operator segment may be removed eventually from the system tape and placed in system_library_languages.

**SUMMARY:**

First convert the wired procedures so that the operator segment may be unwired. Then convert the rest, since there are more than 100 modules in Version 1, this may take some time. It is planned to distribute this task among members of the Multics Development Unit and other programmers who are using the development machine.

---

**CLASSIFICATION**

**JUSTIFICATION**

**Replaced by proposal MCR**

---

**STATUS** | **DATE**
---|---
Written | 10/12/73
Approved | 10/22/73
Rejected | 
Postponed | 
Withdrawn | 
Expires |
MULTICS CHANGE REQUEST

TITLE: Offer 256k segments

AUTHOR: Eleanor Stone

SOURCE: (if external) e.g., "User", "Marketing"

CLASSIFICATION | JUSTIFICATION | Replaced by proposal MCR
-----------------|---------------|-------------------------------
Incompatible Change | Marketing Requirement | Implemented in System
Extension | Conformance to Standard | Objections/Comments:
Restriction | Increased Consistency |
Performance Improvement | Simplification |
Reliability Improvement | Generalization |
Bug Fix |

Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS: There has been a demand for segments larger than 64k.

The support of GOOS on Multics requires 256k. There will be less use of multi-segment files and hence a performance improvement.

IMPLICATIONS:

Support of 64k multi-segment file components will be continued for 2 months, but should be removed before the standard product is released.

There may be a problem in the conversion of a single-segment file to a multi-segment file as an additional 256k must be available to perform the copy; the error code error_table and badmove is returned if the quota was not sufficiently large. On the other hand the use of multi-segment files will decrease drastically.

The max length of an outer ring stack will be set to 64k.

Version 1 PL/I programs will not work for manipulating segments greater than 64k.
MULTICS CHANGE REQUEST

TITLE: Cleanup gate entries

AUTHOR: Eleanor Stone

STATUS

DATE

Written 10/12/73

Approved 10/23/73

Rejected

Postponed

Withdrawn

Expires

CLASSIFICATION

JUSTIFICATION

Replaced by proposal MCR

Incompatible Change

Marketing Requirement

Implemented in System

Extension

Conformance to Standard

Objections/Comments:

Restriction

Increased Consistency

Performance Improvement

X Simplification

Reliability Improvement

Generalization

Bug Fix

Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS: Cleanliness.

SUMMARY: Remove obsolete entries from hcs_ and hphcs_. Delete absentee_test_ which
is not used.

Move the entries that backup uses to set dates in a branch to hphcs_ and
change backup to call these. Delete hcs_ set.dates which was announced
to users about a year ago.

IMPLICATIONS:

There may be some problems at MIT with the removal of hcs_ set.dates;
however this is an access violation in my view.
TITLE: Complete directory control access modifications

AUTHOR: Eleanor Stone

SOURCE: (if external) e.g., "User", "Marketing"

CLASSIFICATION JUSTIFICATION

| Incompatible Change | X Marketing Requirement | Replaced by proposal MCR |
| Extension | X Conformance to Standard |
| Restriction | X Increased Consistency |
| Performance Improvement | Simplification |
| Reliability Improvement | Generalization |
| | Bug Fix |

Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS: See MCB-969 and MSB-111

SUMMARY: 1) Remove CACls.
2) Remove access requirement of write permission to delete a non-directory segment.
3) Enforce directory ring brackets.
4) Remove append permission of non-directory segments. Write permission will allow the user to grow the segment up to its max length.
5) Control the length of a non-directory segment by its max length. Read permission will allow the user to read the segment up to its max length.

IMPLICATIONS:

These changes have been announced for over a year.

For a time all primitives returning access modes will return append permission if the user has write permission for purposes of compatibility.
# MULTICS CHANGE REQUEST

**TITLE:** Fix bugs in FDUMP  

**AUTHOR:** N. I. Morris  

**SOURCE:** (if external) e.g., "User", "Marketing"  

**CLASSIFICATION** | **JUSTIFICATION** | **REPLACED BY PROPOSAL MCR**  
---|---|---  
Incompatible Change | X Marketing Requirement | Implemented in System  
Extension | Conformance to Standard |  
Restriction | Increased Consistency |  
Performance Improvement | Simplification |  
Reliability Improvement | Generalization |  
| X Bug Fix | |  

Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

**REASONS:** FDUMP has several bugs:

1) It overlays and destroys some of its literals.  
2) It dies trying to dump 256k segments.

**SUMMARY:**  

FDUMP will be fixed. The PROC and APND subroutines are also being fixed to avoid overlaying literals. An extension to the PROC subroutine will also be made at this time to allow dumping a short dump of all processes.
**MULTICS CHANGE REQUEST**

**TITLE:** trace_init  

**AUTHOR:** M. J. Grady  

**SOURCE:** (if external) e.g., "User", "Marketing"  

**CLASSIFICATION** | **JUSTIFICATION** | **REASONS:** fix bug in trace_init to cause prt300 buffer images to be loaded correctly.  
---|---|---
Incompatible Change | Marketing Requirement | Implemented in System  
Extension | Conformance to Standard | Objections/Comments:  
Restriction | Increased Consistency |  
Performance Improvement | Simplification |  
Reliability Improvement | Generalization |  
Improvement | X Bug Fix |  

**SUMMARY:** fix code in trace_init to turn on continue bit in the psw supplied to the iom_manager. Also, improve code through use of iom dcew include files.
MULTICS CHANGE REQUEST

TITLE: Change measure of time spent looping on the page table lock

AUTHOR: Steve Webber

SOURCE: (if external) e.g., "User", "Marketing"

CLASSIFICATION | JUSTIFICATION | Replaced by proposal MCR
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Incompatible Change | Marketing Requirement | Implemented in System
Extension | Conformance to Standard | Objections/Comments:
Restriction | Increased Consistency | 
Performance Improvement | Simplification | 
Reliability Improvement | Generalization | 

Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS: It is proposed that a clock reading be done before and after looping on the global page table lock to determine the amount of system time spent looping on the lock.

SUMMARY: The following programs—which currently keep track only of the number of loops while trying to lock—should be changed.

    page_fault
    privileged_mode_ut
    dsul90_control
    bulk_store_control

IMPLICATIONS: The command (tool) which measures interference of the global page table lock should be updated.
TITLE: Remove reused addr (and other) traps from page control

AUTHOR: Steve Webber

SOURCE: (if external) e.g., "User", "Marketing"

CLASSIFICATION | JUSTIFICATION | Replaced by proposal MCR
--- | --- | ---
Incompatible Change | Marketing Requirement | Implemented in System
Extension | Conformance to Standard | Objections/Comments:
Restriction | Increased Consistency |
Performance Improvement | Simplification |
Reliability Improvement | Generalization |

Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS: Several traps were placed in the system to find various hardware and software bugs. It is proposed that those traps which turned out to be useless be removed.

SUMMARY: The code should be removed from the following programs:

pc
dpage_fault
pd_util
privileged_mode_util
init_sst

IMPLICATIONS: The MOSN describing the contents of the DEBG card must be brought up to date.
**MULTICS CHANGE REQUEST**

**TITLE:** Change memory reconfiguration code to check for parity errors in use being removed

**AUTHOR:** Steve Webber

**SOURCE:** (if external) e.g., "User", "Marketing"

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Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAIL PROPOSAL (Optional)

**REASONS:** One of the reasons for performing memory reconfiguration is that a memory may be getting many parity errors. With the current design it is possible that one of these parity errors could be run into by the memory reconfiguration code in such a way that the system cannot recover. It is proposed that the memory reconfiguration code be extended to check for parity errors in any block of core which is being copies from a memory being deleted.

**SUMMARY:** The program privileged mode ut should be modified to call an already existing subroutine which checks, reports and removes any parity errors in a region of core.

**IMPLICATIONS:** None.
### MULTICS CHANGE REQUEST

**Title:** Remove pre-page commands and the hard core interface.

**Author:** Steve Webber

**Source:** (if external) e.g., "User", "Marketing"

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**Use these headings:** REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

### REASONS:
Since the Multics system no longer pre-pages pages at process load time it is proposed that the mechanism which controls this activity be removed from the system—it doesn't do anything now anyway.

### SUMMARY:
The commands

- `pre_page_on`
- `pre_page_off`
- `pre_page_size`

and the hardcore interface

- `hcs_$pre_page_info`

should be deleted.

### IMPLICATIONS:
Users should be given warning and the `hcs_entry` should be retained (as a null program) for a while.
TITLE: Change page Multi-level removal algorithm to make pages recently faulted upon appear recently used.

AUTHOR: Steve Webber

SOURCE: (if external) e.g., "User", "Marketing"

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REASONS:
Due to a flaw in the page multi-level removal algorithm all read only pages placed on the paging device are removed using a FIFO removal algorithm rather than a LRU algorithm. It is proposed that the LRU mechanism be used.

SUMMARY: A simple change to page_fault to add a rethread subroutine call.

IMPLICATIONS: None.
MULTICS CHANGE REQUEST

TITLE: Simplification of performance test analysis

AUTHOR: R. A. Roach

SOURCE: (if external) e.g., "User", "Marketing"

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REASONS: It was desired to include total cpu time and total page faults on the summary of the performance test. The old method used xrdy (uninstalled) and produced at best only roughly approximate data and a worse incorrect data due to shift changes.

SUMMARY: Since the event id is only 72 bits, the new data can not be included with the virtual time and memory units previously passed. Therefore the plan is to have the controlling process assign an index to each of the test processes and to have them use this index as an index into a usage array in which they can store their usage data. This index would be passed in the event id (instead of VCPU & MU). Output summaries would be changed to print this data both as an average and total. Also the elapsed time would be changed to outputted both as seconds and minutes. Individual summaries would be printed by acceptance_test $ terminate.

modules changed: abs_control.pl 1 and acceptance_test.pl 1

IMPLICATIONS: Format of output changes, but since it is only used by one person currently, the effect is minimal.
**TITLE:** fix bugs in plot

**AUTHOR:** R. A. Roach (for J. C. Klensin)

**SOURCE:** (if external) e.g., "User", "Marketing"

**User**

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**REASONS:** Fix bug where combination of points and vectors does not work.

**SUMMARY:** Minor fix but needed application of bin BIF to avoid decimal operations in addition to fixing above bug.

**IMPLICATIONS:** Should be none.
**MULTICS CHANGE REQUEST**

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<th>TITLE:</th>
<th>Improve tln output</th>
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**Objections/Comments:**

Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

**REASONS:**
The current tty lines (tln) overlays the dialup count (by the console id) if the line is currently attached. This causes the loss of information which is needed to analyze usage of the various ports.

**SUMMARY:**
In the output, move the console id from the count area to after the user name and project name. e.g.

TTY001  TTY37  261  5  8  5  Wolman.Multics (GE2)

**IMPLICATIONS:**
Format of output does change, but since this is a tool used by only a very few programmers, the effect should be minimal.
### TITLE:
Convert Network IOSIM "changemode" call to not require a trailing period.

### AUTHOR:
D. Wells

### SOURCE:
(if external) e.g., "User", "Marketing"

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### REASONS:
Because the TTYDIM IOSIM no longer requires a trailing period in a changemode call, users are beginning to assume that no IOSIM requires the trailing period. When users switch to logging in over the Network, their programs no longer function properly (if they have not included a trailing period in changemode calls).

The normal use of a changemode by users is to set "rawo" mode in order to send device specific graphic codes to their local terminal.

### IMPLICATIONS
For correct usage of the various Network protocols (i.e., if the user does not send proscribed sequences), this change is completely upwards compatible.
**MULTICS CHANGE REQUEST**

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Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

**REASONS:** Currently maps and error files are attached at several different points and in several different modules in the backup system. It is proposed to consolidate and simplify this code by creating a single routine to do this online file attachment.

**SUMMARY:** A single routine in the backup_util module will be called to do all map and error file attachment.

**IMPLICATION:** This would probably simplify any future changes and make current code more readable.

**DETAILED PROPOSAL:** An entry will be written in backup_util which will be called by reload and backup_map to create and attach files using names passed in by the caller.

**STATUS:** Not yet coded.
**TITLE:** Backup: Additional options for catchup_dump and dumper test runs

**AUTHOR:** M. A. Meer

**SOURCE:** (if external) e.g., "User", "Marketing"

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**REASONS:**
1) Allow user to finish dump after catchup_dump is complete.
2) Allow user or system programmer to make a dumper test run without outputting onto tape or setting dates. All other functions are performed.

**SUMMARY:** Modify start_dump, backup_dump_recurse and backup_output to recognize flags set by user and act upon them.

**IMPLICATIONS:** Makes testing of dumper or pretesting of dumper run more complete.

**DETAILED PROPOSAL:**
1) When the no_output flag is recognized by the backup_output routine it simply returns without invoking any system tape output modules. When the flag is recognized by backup dump recurse the date time dumped variables are not reset.
2) start_dump terminates a catchup_dump when it finds the no_conti? flag on.

**STATUS:** This has been coded and tested.
MULTICS CHANGE REQUEST

TITLE: Listing tape system: 7 or 9 track tape designation
   more detailed comparison in merging

AUTHOR: M. A. Meer

SOURCE: (if external) e.g., "User", "Marketing"

CLASSIFICATION     JUSTIFICATION
Incompatible Change    Marketing Requirement
                     Implemented in System
Extension              Conformance to Standard
Restriction X          Increased Consistency
Performance Improvement Simplification
Reliability Improvement X Generalization
                      Bug Fix

Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS: 1) Allow the user to specify 7 or 9 track tape input and output.
          2) Allow a better ordering and elimination in merging the files.

SUMMARY: 1) While keeping 9 track as the default, allow users to specify 7 track tapes as input or output. This is an extension to the input and output options and the tape attachment routing.
          2) An extension is made to the merge routine to compare date created when all other fields are the same.

IMPLICATIONS: 1) Allows wider use of tapes, i.e., 7 track handlers
                2) Allows more correct merging

DETAILED PROPOSAL: Change the argument handling module
                   Change the tape attachment routine

STATUS: THIS HAS BEEN CODED AND TESTED.
TITLE: qedx: restriction on write with no pathname

AUTHOR: M. A. Meer

SOURCE: (if external) e.g., "User", "Marketing"

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REASONS: When users read in more than one segment for editing, they sometimes get confused as to which segment is written into when write is given with no pathname. This leads to the accidental destruction of some files.

SUMMARY: If more than one segment is read in for editing then the use of write with no pathname results in the message "no pathname given" and no write is carried out. Note: THIS CHANGE IS IN ADDITION TO THOSE PROPOSED IN MCR-085.

IMPLICATIONS: 1) Some qedx macros may stop working
2) Some users who usually read edit and write repeatedly in one invocation of qedx may be inconvenienced. (A new command to set up some pathname as default for both read and write could solve the latter difficulty but that would constitute a new proposal.)

DETAILED PROPOSAL: If the first read is to enter the qedx macro given as an argument when qedx is invoked then the pathname count is zeroed. On the next read the pathname count (length) is saved but on any subsequent read it is zeroed.

If the pathname count is zero then the "no pathname given" message is output control is returned to the qedx command processor.
### MULTICS CHANGE REQUEST

| TITLE: | Provide "fast" gate entries into the hardcore |
| STATUS | | | |
| DATE | Written 10/17/73 |
| | Approved 10/23/73 |
| | Rejected |
| | Postponed |
| | Withdrawn |
| | Expires |

| AUTHOR: | S. Webber |
| SOURCE: | (if external) e.g., "User", "Marketing" |

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Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

### REASONS:

Certain hardcore gate entries do much unnecessary and time consuming work. Other entries do some (but not as much) unnecessary work. It is proposed to clean up these entries by removing the unnecessary code.

Note: The most important entries that are of interest are the virtual cpu_time_ and cpu_time_and_paging_ entries which are used to meter user ring programs.

### SUMMARY:

The system macro file (gate macros in > tools) must be modified to generate the new code sequences and all hardcore gates must then be expanded and assembled.

### IMPLICATIONS:

The program (tool) meter_gate must be changed to expect the new format.
This installation provides the Network Daemon with an exec_com for performing debugging, maintenance, and administrative functions not coded into its operating programs (network-exec). Initially, only a Network data base dump facility is provided.

DESCRIPTION:

The exec_com provides three major "entry points":

net_dump  This exec_com takes a snapshot of Network data bases, labeling the snapshot with the current date and time. It may be used by Network system programmers, as well as by the Network Daemon.

process_net_dump  This exec_com turns the "snapshot" segments into a printable, ASCII segment, and deletes the snapshot segments. It is primarily intended to be used by Network system programmers, or by operations, but may be used in the Network Daemon process under special circumstances (and then only at the direction of Network system programmers).

delete_net_dump  This exec_com deletes all segments associated with a particular network dump.

In addition, net_dump makes use of a "subroutine" exec_com, net_dump_subr, also contained in network_exec.ec
MULTICS CHANGE REQUEST

TITLE: Add new order to teletype DIMS, e.g. tw_, ntw_, gl15_

AUTHOR: M. Grady, P. Green, R. Coren

SOURCE: (if external) e.g., "User", "Marketing"

CLASSIFICATION

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Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS:

It is presently not possible to "poll" user_i/o, i.e., issue a read call and get control back whether or not anything was in the read buffers. In other words, "tw_" - type DIMs always go blocked waiting for input if none is ready.

Both APL and the new I/O daemon need the ability to see if anything has been typed without going blocked. In addition, the I/O daemon would like a wakeup if and when data is finally available.

SUMMARY:

Add a new order call which checks to see if any input is available, and if so, returns a bit which indicates that the user may call ios$_read and be assured of the immediate return of data. If no data is available the order will return an event channel which the user may block on to wait for input.

IMPLICATIONS:

The user of this order should be cautious of the "window" between calls to the order and ios$_read. If the calling program loses control after a call to the order, someone else may take his data and when control is regained he will block in ios$_read. This should pose no problem for either APL or the I/O daemon, which protect themselves from unwanted user interruption. Note also that if the user blocks on the event channel supplied by the order, a call to the order should be made after a wakeup to assure that data is really present before calling ios$_read.
DETAILED PROPOSAL:

The new order will be called "read_status" and will use the order info_ptr to point to a user supplied structure which will contain the result of the order call.

Usage

call ios$_$order(stream, "read_status", info_ptr, status);

where:

1) stream is the I/O stream, as usual. (Input)
2) "read_status" is the order name. (Input)
3) info_ptr is a pointer to the following information structure. (Input)

   dcl 1 info_structure aligned,
   2 ev_chan fixed bin(71),
   2 input_available bit(1),

where:

   ev_chan is the event channel the user may block on to wait for input. (Output)

   input_available is set to "1"b if data is available, i.e. if a call to
   ios$_$read is made it will not cause the process to block. (Output)

4) status is standard I/O system status. (Output)

The implementation of this order call will require changes in the following DIMs: tw_, ntw_, and g115_. Note that the change to tw_ will also require some changes to the ring 0 tty_dim.
MULTICS CHANGE REQUEST

TITLE: Removal of active mode of salvaging

AUTHOR: A. Kobziar

SOURCE: (if external) e.g., "User", "Marketing"

CLASSIFICATION

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| Marketing Requirement | Conformance to Standard | Increased Consistency | Simplification | Generalization | |}

Replaced by proposal MCR 117

Incompatible Extension

Objections/Comments:

In future all changes must be more explicitly described. (Even style "improvements".)

Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS: A recent change to salvager not to enter active mode was overlooked with the installation of 21.0.

SUMMARY: Salvager has been changed to enter regular mode instead of active and some auditing suggestions have also been entered.
# MULTICS Change Request

**Title:** Bug fix to ring_l_lock

**Author:** P. Haber

**Source:** (if external) e.g., "User", "Marketing"

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**Reasons:**
Process may lock message segment in ring_l, then lose eligibility, tying up i/o daemon or absentee facility.

**Summary:**
Change locking procedure to give calling process guaranteed eligibility while message segment is locked.

**Implications:**
"seglock" errors from the message segment facility should disappear.

**Detailed Proposal:**
Put in call to admin_gate$ guaranteed_eligibility (on off) in ring_l_lock.
TITLE: Change definition of entry sequence

AUTHOR: B. Wolman

SOURCE: (if external) e.g., "User", "Marketing"

CLASSIFICATION | JUSTIFICATION | Replaced by proposal MCR
--- | --- | ---
Incompatible Change | Marketing Requirement | Implemented in System
Extension | Conformance to Standard | Objections/Comments:
Restriction | Increased Consistency |
Performance Improvement | X Simplification |
Reliability Improvement | Generalization |
Improvement | Bug Fix |

Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS: In order to support the ability to call from basic programs to programs compiled by PL/I or Fortran or AIL, the basic runtime system must be able to quickly and reliably determine from the entry sequence if program was compiled by basic.

DETAILED PROPOSAL: Change declaration of entry_sequence to
del 1 entry_sequence aligned,
2 def_relp bit (18) unal,
2 basic bit (1) unal,
2 pad bit (17) unal;

This change is upward compatible and is correctly handled by current binder. No changes are required to any programs currently installed.

IMPLICATIONS: Other language processors may want to reserve bits in the unused area. Documentation on standard object segment will have to be updated.
# MULTICS CHANGE REQUEST

<table>
<thead>
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<th>TITLE:</th>
<th>Install new PL1_operators</th>
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<tbody>
<tr>
<td>AUTHOR:</td>
<td>B. Wolman</td>
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<tr>
<td>STATUS</td>
<td>Written 10/25/73, Approved 10/30/73</td>
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Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

**REASONS:** New version of PL1_operators containing large number of performance improvements and bug fixes. We cannot gain confidence in EIS instruction set without using this operator segment; this version of operators is required by EIS PL/1.

**SUMMARY:** changes -- use EIS instruction wherever possible

- bug fixes -- 1) return char (*) and char (*) varying work - bug #769
- signal stringrange correctly identifying source of signal (also stringsize, size, subscript range)
- round float code corrected
- fixed point mod operations give correct results - bug #790
- binary mult operators detect fixed overflow - bug #771
- mod (x, 0) gives $x$ instead of zero divide fault

- additions -- New operators for
  1) real & complex decimal arithmetic
  2) conversion
  3) scaled fixed pt divide & mod
  4) math operators

**IMPLICATIONS:** 1) Some string operations will run 5 - 15 times faster.
2) Some programs will start getting correct results because of bug fixes.
3) We may discover new EIS problems.
TITLE: Install do command/active function

AUTHOR: B. Wolman

SOURCE: (if external) e.g., "User", "Marketing"

CLASSIFICATION | JUSTIFICATION | Replaced by proposal MCR
-----------------|---------------|---------------------------
Incompatible     | Marketing Requirement | Implemented in System
Change           |                |                           |
X Extension       | Conformance to Standard | Objections/Comments:     |
Restriction       | Increased Consistency |
Performance       | Simplification    |
Improvement       |                |
Reliability       | Generalization   |
Improvement       | Bug Fix          |

REASONS: Install a widely used tool which is required by Library Maintenance protocol.

PROPOSAL: This version of do is a combination of the changes made by Max Smith and Gary Dixon. This proposal replaces MCR-052 of 9/25/73. This version is currently used by me.
Identification

do
Execute one-line exec-coms
B. L. Wolman & M. G. Smith
30 October 1973

Purpose

The purpose of the "do" command is to expand a command string given as its first argument by replacing the parameter designators "&1"..."&9" found in it with the actual arguments supplied following the string. The resultant expanded string is then passed to the Multics command processor, via "cu_&cp", for execution. Options exist to print the expanded command line, to suppress its execution, or to pass it back as the value of an active function.

Usage

do "command string in quotes" arg1 arg2 arg3...

Each instance of the parameter designator "&i" (where "i" is "1"..."9") found in the "command string in quotes" is replaced by the corresponding actual argument "argi". If any "argi" is not supplied, then each instance of "&i" in the command string is replaced by the null string. Each instance of the unique-name designator "&l" found in the command string is replaced by a 15-character identifier unique to the particular invocation of the "do" command. Finally, each instance of the pair "&&" is replaced by a single "&". Any other ampersand discovered in the command string causes an error message to be printed and the expansion to be terminated. Any argument supplied but not mentioned in a parameter designator is ignored.

Upon completion of substitutions, the resultant expanded string is passed to "cu_&cp" for execution as a Multics command. If the user has invoked the abbreviation processor "ab" in his process, the abbreviation processor will be invoked by "cu_&cp" to expand any abbreviations in the string before it goes to the command processor proper.
Usage as an Active Function

If "do" is called as an active function

[do "string in quotes" arg1 arg2 arg3...]

then, instead of executing the resultant expanded string, "do" passes it back as the value of the active function.

Modes

The "do" command has three modes, the "long/brief" mode, the "nogo/go" mode, and the "absentee/interactive" mode. These modes are kept in internal-static and are thus remembered from call to call within one's process. The modes are set by calls upon "do" of the form

```
do -mode
```

where "-mode" is one of "-long", "-lg", "-brief", "-bf", "-nogo", "-go", "-absentee", or "-interactive".

If the "long/brief" mode is "long", then the expanded command string is printed on the stream "error_output" before it is executed or passed back. If the "long/brief" mode is "brief", then the string is not printed. The default for this mode is "brief".

If the "nogo/go" mode is "nogo", then the expanded command string is not passed to the command processor for execution. If the "nogo/go" mode is "go", then the expanded string is passed to "cu$_cp" for execution, unless "do" was invoked as an active function. If "do" is invoked as an active function, then the "nogo/go" mode is ignored. The default for this mode is "go".

If the "absentee/interactive" mode is "absentee", then "do" established itself as a default signal handler during the execution of the expanded command string. This is mainly of use in an absentee environment, in which any invocation of the standard default handler terminates the process. When "do" is the default signal handler, any signal caught by "do" merely terminates execution of the command string, not the process. Four signals, however, are not caught by "do" but are passed on for their standard Multics treatment: they are "command_error", "command_query_error", "command_question", and "record_quota_overflow". If the "absentee/interactive" mode is "interactive", then "do" does not catch any signals. The default for this mode is "interactive".
Quote-doubling and Requoting

In addition to the parameter designators "&1"..."&9", the "do" command also recognizes two more sets of parameter designators. They are "&qi"..."&q9", to request quote-doubling in the actual argument as it is substituted into the expanded string, and "&ri"..."&r9", to request that the actual argument be requoted as well as have its quotes doubled during substitution.

Quote-doubling can be described as follows. Each parameter designator in the input string to be expanded is found nested a certain level deep in quotes. If a designator is found to be not within quotes, then its quote-level is zero; if it is found between a single pair of quotes, then its quote-level is one; and so on. If the parameter designator "&qi" is found nested to quote-level L, then, as "argi" is substituted into the expanded string, each quote character found in "argi" is multiplied by 2**L during insertion. This permits the quote character to survive the quote-stripping action to which the command processor will subsequently subject the expanded string. If "&qi" is not located between quotes, or if "argi" contains no quotes, then the substitutions performed for "&qi" and for "&i" are identical.

If the parameter designator "&ri" is specified, then the substituted argument "argi" is placed between an additional level of quotes before having its quotes doubled. More precisely, if the parameter designator "&ri" is found nested to quote-level L, then 2**L quotes are inserted into the expanded string, "argi" is substituted into the expanded string with each of its quotes multiplied by 2**L, and then 2**L more quotes are placed following it. If argument "argi" is not supplied, then nothing is placed in the expanded string; this provides a way to distinguish between arguments which are not supplied and arguments which are supplied but null. If argument "argi" is present, then the expansions of "&ri" and of "&qi" written between an additional level of quotes are identical.

Accessing More than 9 Arguments

In addition to the normal parameter designators in which the argument to be substituted is specified by a single digit, "do" also allows the designators &d...d, &p(d...d), and &q(d...d) where d...d denotes a string of decimal digits. An error message will be printed and the expansion will be terminated if any character other than "0"..."9" is found between the parentheses.
Examples

The "do" command is particularly useful when used in conjunction with the abbreviation processor "abbrev".

Consider the following abbreviations:

- **ADOPLI**: do "fo &1;list;ioa_ ~t;pl1 &1;co"
- **AUTHOR**: do "ioa_$nnl &1;status -author &1"
- **AX**: do "if is &1 -then "df &1"
- **FO**: do "AX &1;fo &1"
- **P**: do "pl1 &1 list &2 &3"
- **PFX**: do "&1 &3 &2&3"

The command

```
ADOPLI alpha
```

will expand to

```
fo alpha.list;ioa_ ~t;pl1 alpha;co
```

The command line

```
AUTHOR beta
```

will print the author of segment beta.

The command line

```
FO gamma
```

will expand to

```
AX gamma;fo gamma
```

which will be expanded to

```
if is gamma -then df gamma;fo gamma
```

This shows how "do" may be used at several levels and how abbreviations may be used within abbreviations.

The command line

```
P alpha
```

will generate the expansion

```
pl1 alpha list
```

while the command line

```
P alpha table
```

will expand to

```
pl1 alpha list table
```

This shows how references to unsupplied arguments get deleted.

The utility of the abbreviation PFX is left as an exercise for the reader.
MULTICS CHANGE REQUEST

TITLE: bcpl_library bug fix

AUTHOR: R F Mabee

SOURCE: (if external) e.g., "User", "Marketing"

CLASSIFICATION | JUSTIFICATION | Replaced by proposal MCR
--- | --- | ---
Incompatible Change | Marketing Requirement | Implemented in System
Extension | Conformance to Standard | Objections/Comments:
Restriction | Increased Consistency |
Performance | Simplification |
Reliability Improvement | Generalization |
X | Bug Fix |

Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS:

repair bug in ordering character strings.

SUMMARY:

Character string comparisons in runoff and the BCPL compiler are not in strict alphabetic collating order. Replacement of bcpl_strings_ in bound_bcpl_library_ will fix this.

IMPLICATIONS:

Compiler cross-references and runoff indices will be correctly sorted.
MULTICS CHANGE REQUEST

TITLE: runoff bug fix

AUTHOR: R F Mabee

SOURCE: (if external) e.g., "User", "Marketing"

CLASSIFICATION | JUSTIFICATION | Replaced by proposal MCR
----------------|--------------|---------------------------------
Incompatible    | Marketing Requirement | Implemented in System
Change          | Conformance to Standard | Objections/Comments:
Extension       | Increased Consistency | X Bug Fix
Restriction     | Simplification | X Bug Fix
Performance Improvement | Generalization | X Bug Fix
Reliability Improvement | X Bug Fix

Reasos:
repair bug in footnoting.

Summary:
In some cases a footnote is unnecessarily split across pages. Installation of this change to runoff_mr3 should prevent such errors. Also, runoff_mr4 is replaced, to set a flag governing date conversion.

Implications:
Some runoff documents will have the page breaks in different places in the text, so that footnotes can fit all on the first page.