TO: Distribution

FROM: M. S. Hodges

DATE: August 2, 1974

SUBJECT: Multics Change Requests

Enclosed are copies of Multics Change Requests which were
approved from July 16 - July 31, 1974.

MULTICS CHANGE REQUEST	MCR 601

	Page 1 of 2

TITLE: PROPER HANDLING OF REUSED ADDRESSES IN SALVAGER	STATUS	DAT
	Written	06/13
AUTHOR: A. Kobziar	Approved #	7/30
	Rejected	
SOURCE: (if external; e.g., "User", "Marketing")	Postponed #	6/18
	Withdrawn	
	Expires	1/30

CLASSIFICATION	JUSTIFICATION	
		Replaced by proposal MCR
☐ Incompatible Change	☐ Marketing Requirement	
☒ Extension	☒ Conformance to Standard	Implemented in System
☐ Restriction	☐ Increased Consistency	Objections/Comments:
☐ Performance Improvement	☐ Simplification	Needs internal Design Review.
☐ Reliability Improvement	☐ Generalization	
	☒ (Unreported)	**Interferes with current DELREC proposal; thi**
☐	☐ Bug Fix	**conflict will be fixed.**

Use these headings: REASONS, SUMMARY, IMPLICATIONS, and optionally
DETAILED PROPOSAL

REASONS: The salvager builds a new FSDCT by marking as used all file r
addresses encountered in its scan of the hierarchy. If it attempts to ma
an already used address, a reused address is detected. Since no method
determining the real owner exists, the page is zeroed (for the fir
claimant) and a null address is assigned in the file map of the secc
claimant. If the second claimant is a directory, it is rebuilt withc
referencing the reused page so no information is compromised. Two proble
exist with this scheme.

1) If the first claimant was a directory, zeroing the page is r
sufficiently secure as the salvager could have compacted the directory
the time it was salvaged. The information on that page could have moved
a previous page. Furthermore, when the system is booted, a directory wi
apage of zeros in the middle could cause another crash. It is fortunat
that no known instances of this have occurred.

2) If the second claimant was a directory, when that directory is rebui
and compacted, no attempt is made to "skip around" the null address pag
On the first reference during the copying back of the rebuilt version
the directory, page control will fill the null address with a free pa
from the salvager partition. (The Multics partition cannot be used becau
the FSDCT has not been completely validated yet.) Currently the salvag
detects this, marks the directory for deletion, and crashes with
operator message to re-salvage. No alternitive exists at this point sin
that page cannot be referenced in the on-line system.

SUMMARY: The solution for (2) is to add a directory growth capability to the salvager, in a manner similar to that used by the salvager to grow the FSDCT. This essentially replaces all salvager partition pages with free Multics partition pages. This will also allow future directory size increases, such as expanded hash tables.

The solution for (1) involves a separate mapping of directory addresses and a two pass salvager. The second pass just deletes all directories that were first claimants of a reused address.

IMPLICATIONS: Although reused addresses happen infrequently, the salvager will always create the seperate directory address map. This will be done in an alm proceedure so the increase in execution time is minimized. The maximum number of pages grown in a single salvage is limited by the number of free pages in the salvager partition.

DETAILED PROPOSAL: The following structure will appear at the end of salv_data$, and will be used for recording information about both directory reused addresses and growing directories.

```
        dcl 1 salv_data$addr_exch_map aligned ext,
            2 filled_slots fixed bin(35),
            2 te unaligned,        /* table entries */
              3 devadd bit(22),
              3 offset bit(10),
              3 dir_delete bit(1),
              3 pad bit(3);
```

1) The salvager will mark all directory addresses in a second template FSDCT.

2) Whenever the salvager detects a reused address where the first claimant was a directory, it will record that address in salv_data$addr_exch_map and set the dir_delete switch. As well as specifying which directory has to be deleted, dir_delete on indicates a second pass is required.

2) Whenever the salvager detects a file map modification, it will find out which page came from the salvager partition and record the location of that page's file map entry in salv_data$addr_exch_map.

3) At the end of the salvage (when the Multics partition map is known to be good) an address exchange takes place. The page from the salvager partition is brought into core, copied into a free Multics partition page, and the Multics address is recorded in the file map.

4) If any dir_delete switches are on then invoke the salvager again in order to delete all matching directories by matching their addresses with the entries in the (reduced) addr_exch_map.

| MULTICS CHANGE REQUEST | MCR 614 |
| | Page 1 of 1 Page |

TITLE: Fix bug in copy_seg_	STATUS	DATE
	Written	6-18-
AUTHOR: Steve Herbst	Approved	7/16
	Rejected	
SOURCE: (if external) e.g., "User", "Marketing"	Postponed	6/25
	Withdrawn	
Dalton SQA	Expires	1/16

CLASSIFICATION	JUSTIFICATION	Replaced by proposal MCR _____
	Incompatible Change		Marketing Requirement	
	Extension		Conformance to Standard	Implemented in System _____
	Restriction		Increased Consistency	Objections/Comments:
	Performance Improvement		Simplification	
X	Reliability Improvement		Generalization	**Needs Design Review.**
		X	Bug Fix lib0029p	

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

REASONS: copy_seg_ correctly uses the current length of a segment to copy the segment, but to copy a component of a multi-segment file it uses the bit count. The bit count may be incorrect.

SUMMARY: Use the current length of each component to copy. Report any inconsistency between current length and bit count.

MULTICS CHANGE REQUEST

TITLE: adjust_bit_count on MSF's

AUTHOR: Steve Herbst

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

STATUS	DATE
Written	6-18-74
Approved #	7/16/74
Rejected	
Postponed #	6/25/74
Withdrawn	
Expires	1/16/75

CLASSIFICATION		JUSTIFICATION		Replaced by proposal MCR _____
	Incompatible Change		Marketing Requirement	Implemented in System _____
	Extension		Conformance to Standard	Objections/Comments:
	Restriction		Increased Consistency	
X	Performance Improvement		Simplification	Delayed for study to determine feasibility of relaxing definition of MSF.
	Reliability Improvement	X	Generalization	
			Bug Fix	

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

REASONS: adjust_bit_count should adjust the bit count of an MSF
            (number of components) and the bit counts of its components,
            consistent with the way msf_manager_$adjust works.

SUMMARY: Find out how many components, calculate the bit count of the
            last component, and call msf_manager_$adjust.

MULTICS CHANGE REQUEST

MCR ___623___

Page 1 of 1

TITLE: Report msf error with status command

AUTHOR: _____Steve Herbst_____

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

STATUS	DATE
Written	6-21
Approved ⌗	7/16/
Rejected	
Postponed ⌗	7/2/
Withdrawn	
Expires	1/16/

CLASSIFICATION		JUSTIFICATION		Replaced by proposal MCR _____
	Incompatible Change		Marketing Requirement	Implemented in System _____
	Extension		Conformance to Standard	Objections/Comments: .
	Restriction		Increased Consistency	Awaiting design review of MSF definitions a
X	Performance Improvement		Simplification	restrictions.
	Reliability Improvement	X	Generalization	
			Bug Fix	

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

REASONS: Status on a multi-segment file should inform you if the
msf indicator (bit count field) is different from the
actual number of components. Any directory having a bit
count different from zero is by definition a multi-segment
file, but if the above two numbers are different there is
a freak inconsistency in the MSF.

SUMMARY: When status finds the inconsistency in an MSF it prints the
line:
"Error: msf indicator has inconsistent value of xxxx."
immediately below the number of components.

IMPLICATIONS: There are at least 3 controversial requirements for a
multi-segment file -
1) The bit count on the directory is non-zero.
2) The length of all components except the last is
sys_info_$max_seg_size.
3) None of the components are links.

In effect, this MCR formalizes the first requirement, while
ignoring the other two.

MULTICS CHANGE REQUEST		MCR 654	
		Page __ __	
TITLE: Install new numeric formatting program arithmetic_to_ascii_		STATUS	DATE
		Written	740711
		Approved #	7/16/74
AUTHOR: Barry L. Wolman		Rejected	
SOURCE: (if external) e.g., "User", "Marketing"		Postponed	
		Withdrawn	
		Expires	1/16/75

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

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

REASONS: The numeric formatting program numeric_to_ascii_ cannot be conveniently used by a program such as debug that deals with a large number of different types of data, when the type of the datum is not known at compile-time. For example, debug (and other programs such as trace, probe, etc.) determine the type of the datum by looking in the run-time symbol table. The proposed procedure provides a more convenient interface to numeric_to_ascii_ to be used when the data type is determined dynamically.
Usage:

```
dcl arithmetic_to_ascii_ entry(ptr, fixed bin, bit(1) aligned, fixed bin,
     fixed bin, char(132) varying);
call arithmetic_to_ascii_(p, type, packed, prec, scale, ans);
```
where p is a ptr to the value to be converted, type is a Multics standard data type code, and ans is the converted value. type, packed, prec, and scale are obtained from a PL/I descriptor or from a run-time symbol table.

SUMMARY: The new procedure converts the value from the type specified by the caller to the form expected by numeric_to_ascii_ and calls numeric_to_ascii_ to do the formatting. numeric_to_ascii_ is called twice if the specified type is complex.

IMPLICATION: Code that current appears (or would have to appear) in many places can be centralized.

MULTICS CHANGE REQUEST

MCR 653

Page ___ of ___

TITLE: Fix bug in pll_operators_	STATUS	DATE
	Written	74071
AUTHOR: Barry L. Wolman	Approved #	2/16
	Rejected	
SOURCE: (if external) e.g., "User", "Marketing"	Postponed	
	Withdrawn	
	Expires	2/16

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	
		x Bug Fix	

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

REASONS: When a function that returns a char(*) or bit(*) value is called, the type field in the descriptor of the return value never gets set by either the caller or the function. This causes a problem when the result of such a function is passed as an argument in a call of ioa_; formline_ looks at the type field of the descriptor and usually finds trash. This did not use to be a problem since the old version of formline_ did not look at the descriptor type field when it expected a character string. Since there are potentially a large number of programs that have this compiler bug, the easiest way to fix the problem is to change the operator in pll_operators_ that is used to implement the return from such procedures so that it stores the proper value in the type field.

SUMMARY: Change pll_operators_ as described. This fix installed as emergency fix at MIT.

IMPLICATIONS: This fix can be removed if the compiler is changed to properly initialize the field AND if we recompile existing programs that would be affected by this bug.

MULTICS CHANGE REQUEST

	MCR 655
	Page 1 of 1

TITLE: Change to punch_MIT_deck

AUTHOR: J. L. Homan

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

STATUS	DATE
Written	7-11-74
Approved	# 7/16/74
Rejected	
Postponed	
Withdrawn	
Expires	1/16/75

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	
		X	Bug Fix unreported	

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

REASONS: Currently only account number 10782 is assigned the
             object code 001 (for outside transfer accounts).
             All accounts from 10000-11149 and 11700-13299
             should be assigned object code 001.

IMPLICATIONS: Cards sent to MIT accounting office will be
             corrected by this change.

MULTICS CHANGE REQUEST		MCR 657	
		Page 1 of 1	
TITLE: Bug fix to "restart" command in I/O Daemon		STATUS	DATE
		Written	7-15-
		Approved	7/23
AUTHOR: Robert S. Coren		Rejected	
SOURCE: (if external) e.g., "User", "Marketing"		Postponed	
		Withdrawn	
		Expires	1/23

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	
		X	Bug Fix 312	

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

REASONS: A "restart" command to the I/O daemon causes all requests performed on the specified device to be restarted. If the device has been used recently in a different device class, this causes requests to be repeated unnecessarily and undesirably.

SUMMARY: Have coordinator check before dispatching a request for restart that it was originally processed by the device class to which the restart applies.

IMPLICATIONS: Attempts to restart for a given device class will only apply to requests originally performed by that class.

MULTICS CHANGE REQUEST		MCR 658
		Page 1 of 1

TITLE: Fix to the "CRECHO" bug	STATUS	DATE
	Written	7-16-74
AUTHOR: R.B. Snyder	Approved H	7/23/74
	Rejected	
SOURCE: (if external) e.g., "User", "Marketing"	Postponed	
	Withdrawn	
	Expires	1/23/75

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

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

REASONS: The CRECHO bug is that about 10% of the time, the carriage return is not echoed in response to a line feed.

SUMMARY: The bug fix is known and will involve change to tty_ctl.

IMPLICATIONS: None

MULTICS CHANGE REQUEST

TITLE: Fix Bug in BOS FDUMP Mechanism

AUTHOR: Noel I. Morris

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

CRF Operations

STATUS	DATE
Written	7/
Approved	# 7/2
Rejected	
Postponed	
Withdrawn	
Expires	1/23

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	
		▣	Unreported Bug Fix	

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

REASONS:
Due to a bug in the Dump partition handling programs in BOS, an FD355 dump
taken after an FDUMP will wipe out some of the information saved in the
FDUMP.

Summary:
The dump partition handling programs in BOS will be repaired.

MULTICS CHANGE REQUEST	MCR 660

	STATUS	DATE
TITLE: Improve consistency of msa_manager_.		
	Written	07/10/74
AUTHOR: P. B. Kelley	Approved #	7/23/74
	Rejected	
SOURCE: (if external; e.g., "User", "Marketing") local	Postponed	
	Withdrawn	7/23/75
	Expires	

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

Use these headings: REASONS, SUMMARY, IMPLICATIONS, and optionally
                     DETAILED PROPOSAL

Reasons:
     The program msa_manager_ creates MSA's (Multi-Segment Areas)
and maintains these MSA's which it creates.   Unfortunately, the
entry $initiate (which initiates MSA's for use) will, if told to,
initiate any segment or MSF as if it were an MSA.   In the course
of initiating an MSA, msa_manager_ initializes stored data in the
MSA header.   Thus if a segment were not an MSA to begin with,
msa_manager_ overwrites data within the segment to make it one.

Summary:
     Modify msa_manager_$initiate to verify that the segment
being initiated was in fact created by msa_manager_ and report an
error if not.

MULTICS CHANGE REQUEST

TITLE:	Study the problems associated with "small" process, build a prototype	STATUS	DATE
		Written	7-16-
AUTHOR: John Gintell, Steve Webber, Susan Barr		Approved	7/23
		Rejected	
SOURCE: (if external) e.g., "User", "Marketing"		Postponed	
		Withdrawn	
		Expires	7/23

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

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

REASONS: It is costly to use Multics to perform what are
            inexpensive items in a more conventional computer system.
            This fact is a marketing deterrent since users who need the
            capability of Multics can justify it only if they can do
            conventional computing in a cost-effective manner.

SUMMARY: It is thought that the major cause of expensive performance
            on Multics is due to excessive paging. A number of ideas
            have been generated to reduce the amount of pages referenced
            for limited processes. These ideas will be explored and
            special versions of appropriate programs will be made so
            that these ideas can be tested and measured. These special
            versions can then be considered for incorporation in the
            standard system. This study will result in a demonstrable
            prototype modification to standard Multics. A report
            summarizing the results and recommendations will be prepared

IMPLICATIONS: This study will have a number of implications on future
            development; the details will have to be determined. A
            consideration is whether each modification should be
            developed so that the process can automatically upgrade
            itself to a more general one or whether there is some fixed
            "barrier" that will have to be explicitly crossed.

DETAILED PROPOSAL:

The following ideas need study and evaluation:

1) Combine a special process overseer with the necessary programs to support a limited subsystem. The very limited process overseer built by John Gintell and the Student Basic system built by PDO will be used as a starting point. Limited function replacements for some of the procedures called will be considered in order to reduce working sets and program size. Obvious candidates for replacement include the command processor, the signalling mechanism, and the I/O system.

2) Combine the User Ring Stack, LOT, and Combined Linkage segment into one page.

3) Use a very small KST (1 page); perhaps place it in the PDS.

4) Investigate the wiring down of necessary code.

5) Develop a swapping scheme in page control for the per-process data.

6) Bind together all needed programs.

7) Use an improved version of the ring 0 TTY DIM.

8) Look for other possible changes and simplifications that reduce the perprocess working set and eliminate calls to supervisory functions.

MULTICS CHANGE REQUEST

MCR _____ 663
Page 1 of 1

TITLE:	Fix bugs in stu_	STATUS	DATE
		Written	7-16-
AUTHOR: Jeffrey M. Broughton		Approved # 7/23	
		Rejected	
SOURCE: (if external) e.g., "User", "Marketing"		Postponed	
		Withdrawn	
		Expires	1/23

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	
X	Reliability Improvement		Generalization	
		X	Bug Fix unreported	

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

REASONS: Bugs are such that:

1)   "a.b.c" and "b.a.c" are considered to be names for the
     same variable;

2)   a null block pointer is returned for all partially
     qualified references, and

3)   n + 1 source lines are returned when n (n>1) are
     requested.

SUMMARY: Fix the bugs.

IMPLICATIONS: None

| MULTICS CHANGE REQUEST | MCR   664 |
| | Page 1 of 1 |

TITLE: Add runtime routine to stu_ to convert pointer to offset	STATUS	DATE
	Written	7-16-74
	Approved	7/23/74
AUTHOR: Jeffrey M. Broughton	Rejected	
SOURCE: (if external) e.g., "User", "Marketing"	Postponed	
	Withdrawn	
	Expires	1/23/75

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

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

REASONS: Currently, there is a routine to convert an offset to a
            pointer using the default area, but there is not one to
            go in the other direction. It is needed to assign pointer
            to offset variables.

SUMMARY: Implement routine to perform conversion.

IMPLICATIONS: None

MULTICS CHANGE REQUEST

MCR 666
Page 1 of 1

TITLE: Error in tty_read

AUTHOR: R.B. Snyder

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

local

STATUS	DATE
Written	7-16-
Approved	# 7/23
Rejected	
Postponed	
Withdrawn	
Expires	1/23

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

Replaced by proposal MCR _____

Implemented in System _____

Objections/Comments:

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

REASONS: tty_read treats trailing escaped characters with values
             >177(8) as white space

SUMMARY: tty_read will be changed to fix this bug

IMPLICATIONS: None

MULTICS CHANGE REQUEST

MCR	667
Page	1 of 1

TITLE: Move on units in status_ primitive from internal procedures to containing block

AUTHOR: E. Stone

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

STATUS	DATE
Written	7-17-74
Approved	H 7/23/74
Rejected	
Postponed	
Withdrawn	
Expires	1/23/74

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

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

REASONS: In a recent submission of the status_ primitive, calls to establish_cleanup_proc_ in internal procedures were changed casually to on cleanup statement. This has several undesirable effects.

1) The internal procedures were made non-quick.

2) The cleanup handler was in force only for the duration of the internal procedure. This was not the original intent of enabling the handler.

3) A non-local go-to from the internal procedure invoked the cleanup procedure and caused a system crash if status was requested of the root.

SUMMARY: Establish the cleanup handler in the parent block. This has been submitted as an emergency fix.

MULTICS CHANGE REQUEST

	MCR 668
	Page 1 of 1

TITLE: Fix bug in I/O Coordinator "test" mode	STATUS	DATE
	Written	7-17-
AUTHOR: Robert S. Coren	Approved H	7/23
	Rejected	
SOURCE: (if external) e.g., "User", "Marketing"	Postponed	
	Withdrawn	
	Expires	7/23

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	
	X	Unreported Bug Fix	

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

REASONS: Bug was introduced under MCR 399 whereby I/O Coordinator
     in "test" mode can get segment faults during initialization.
     (Regular mode works only because data bases always happen to
     have the same segment numbers as last time.)

SUMMARY: Make free_oldest_request_$cleanup get segment number of
     request area explicitly.

IMPLICATIONS: "test" mode will work properly, possible future problems
     with regular daemon will be avoided.

MULTICS CHANGE REQUEST

MCR	669
Page 1 of 1	

TITLE: Prevent I/O Daemon from deleting modified files

AUTHOR: Robert S. Coren

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

STATUS	DATE
Written	7-17-74
Approved	7/23/74
Rejected	
Postponed	
Withdrawn	
Expires	1/23/75

CLASSIFICATION	JUSTIFICATION	
Incompatible Change	Marketing Requirement	Replaced by proposal MCR _____
Extension	Conformance to Standard	Implemented in System _____
Restriction	Increased Consistency	Objections/Comments:
Performance Improvement	Simplification	
Reliability Improvement	Generalization	
	X Bug Fix 268	

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

REASONS: With delay time used before file deletion, the I/O daemon sometimes deletes files that have been modified after they were printed.

SUMMARY: At deletion time, call hcs_$status_ to get date-time-modified; if it is greater than the time the request was completed, don't delete the file.

IMPLICATIONS: Files will not be deleted if modified after printing.

MULTICS CHANGE REQUEST

	MCR 670
	Page 1 of 1

TITLE: Refine I/O Coordinator's algorithm for dropping queues

AUTHOR: Robert S. Coren

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

STATUS	DATE
Written	7-17-
Approved #	7/23/
Rejected	
Postponed	
Withdrawn	
Expires	1/23/

CLASSIFICATION		JUSTIFICATION		
	Incompatible Change		Marketing Requirement	Replaced by proposal MCR _____
	Extension		Conformance to Standard	Implemented in System _____
	Restriction		**Increased Consistency**	Objections/Comments: .
	Performance Improvement		Simplification	
	Reliability Improvement		Generalization	
		X	Bug Fix 300	

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

REASONS: Recent modification to I/O coordinator was made (MCR 495, part 1) to stop processing a queue if an attempt to delete a request produced an error. This results in a queue being dropped if a user cancels a request while it is being performed.

SUMMARY: Have save_request_ check for the code error_table_$no_messa and not drop the queue in this case.

IMPLICATIONS: Queues will no longer be dropped unnecessarily.

| MULTICS CHANGE REQUEST | | MCR __671__ | -|

	STATUS	DATE
TITLE: Fix unreported bug in get_library_segment which occurs when source segment has a two-character name	Written	07/18/74
AUTHOR: A. J. Scherer	Approved	7-30-77
	Rejected	
SOURCE: (if external; e.g., "User", "Marketing")	Postponed	
	Withdrawn	
	Expires	1-30-75

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

Use these headings: REASONS, SUMMARY, IMPLICATIONS, and optionally
DETAILED PROPOSAL

REASON:
:ve Herbst reported a bug in get_library_segment as follows:
; subtracts a length of 8 from the length of the segment name before finding
whether it was archived or not. Thus, for the segment if.pl1 (or any other
:-character source segment), a negative length is used in a substr, causing an
! on the user's stack.

MARY:
ert a line to make sure that a negative length will not result.
s change has been merged with Steve Herbst's pending change (MCR 628).


```
Error:  out_of_bounds at get_library_segment$gls|2536
(>t>bound_lib_utility_)
referencing stack_4|214030 (in process dir)
Attempt to access beyond end of segment.
```

MULTICS CHANGE REQUEST	MCR 672
	Page 1 of 1

TITLE: Backup bugfixes	STATUS	DATE
	Written	7-21-
AUTHOR: R. Mullen	Approved	7-30-
	Rejected	
SOURCE: (if external) e.g., "User", "Marketing"	Postponed	
	Withdrawn	
	Expires	1-30-

CLASSIFICATION		JUSTIFICATION		Replaced by proposal MCR _____
	Incompatible Change		Marketing Requirement	Implemented in System _____
	Extension		Performance to Standard	Objections/Comments:
	Restriction		Increased Consistency ·	
X	Performance Improvement		Simplification	
X	Reliability Improvement		Generalization	
			lib 0014p	
		X	Bug Fix lib0184c	

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

REASONS:

1) The command wakeup_dump is used to restart backup if backup has lost an alarm. However, if no alarm has been lost backup will begin running on a double cycle of wakeup alarms.

2) The subroutine sort_branches overruns a sort_stack array in certain cases. The results of continued execution are undefined.

3) backup_dump_recurse copies 19000 words of "information" pertaining to each branch dumped, when only 19 words are required.

SUMMARY:

1) At entry to wakeup_dump alarms will be reset, ending the previous cycle if any.

2) There is a known fix for the sorting bug.

3) Backup should copy only one element of an array rather than the whole array.

MULTICS CHANGE REQUEST

MCR	673
Page 1 of 1	

TITLE:	New backup record types	STATUS	DATE

		STATUS	DATE
TITLE: New backup record types		Written	7-21-74
		Approved	7-30-74
AUTHOR: R. Mullen		Rejected	
SOURCE: (if external) e.g., "User", "Marketing"		Postponed	
		Withdrawn	
		Expires	1-30-75

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

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

REASONS: In order for the call_limiter and security attributes of a
directory entry to be backed up, a new backup_record_type must
be defined. Before backup can begin producing such records
the reloader must be prepared to accept them.

SUMMARY: This MCR proposes that a version of the reloader be installed
which treats the new type records the same as it treats the
current type records. That is, no attempt will be made to reload
call_limiter or security attributes initially.

IMPLICATIONS: Backup can begin dumping these attributes as soon as they
are available from ring_zero. The reloader will not reject the
new type records, but will ignore the new fields until such time
as the logic of their reloading is fully determined.

Version 2
7009

TITLE: Backup to call new hcs_ entries	STATUS	DATE
	Written	7-22-
AUTHOR: R. Mullen	Approved	7-30
	Rejected	
SOURCE: (if external) e.g., "User", "Marketing"	Postponed	
	Withdrawn	
	Expires	1-30

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

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

REASONS:
It is proposed that backup call the new hardcore entries hcs_$status_for_backup and hcs_$list_inacl_all which efficiently return information needed by backup.

In addition backup should write all information (includir call_limiter and security attributes) returned by status_for_backı on the backup tapes.

SUMMARY:
These changes will provide a more complete and efficient backup system.

| MULTICS CHANGE REQUEST | MCR 675 |
| | Page 1 of 1 |

TITLE: Change grab_tape_drive so it ignores the process limit if the user is privileged	STATUS	DATE
	Written	7-22-74
AUTHOR: Susan Barr	Approved	7-30-74
	Rejected	
SOURCE: (if external) e.g., "User", "Marketing"	Postponed	
	Withdrawn	
	Expires	1-30-75

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

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

REASONS: 1) Change error messages to use "grab_tape_drive" instead of "gtd".

2) Change the abbreviation of "-long" to "-lg" instead of "-ln".

3) Grab_tape_drive checks the process limit on the number of tape drives in all cases. It should ignore this limit if the user is privileged.

SUMMARY: (3) Add code to see if the caller has "e" access on "hphcs_" (i.e. is priviliged). If the caller is privileged then the process limit is ignored.

MULTICS CHANGE REQUEST

		MCR 676
		Page 1 of 1

TITLE: Bug in ii	STATUS	DATE
	Written	7-22-
AUTHOR: R.B. Snyder	Approved	7-30-
	Rejected	
SOURCE: (if external) e.g., "User", "Marketing"	Postponed	
local	Withdrawn	
	Expires	1-30

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	
X	Reliability Improvement		Generalization	
		X	Bug Fix unreported	

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

REASONS: ii incorrectly lays down its stack frame on the prds.

SUMMARY: ii will be changed to put its stack frame at the place
            pointed to by stack_begin_ptr in the stack header on the
            prds.

IMPLICATIONS: Dumps will be easier to read.

MULTICS CHANGE REQUEST

	MCR 677
	Page 1 of 1

TITLE: **New iox_$position type value**

AUTHOR: **Bill Silver**

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

STATUS	DATE
Written	7-22-74
Approved	7-30-74
Rejected	
Postponed	
Withdrawn	
Expires	1-30-75

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

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

REASONS: This new position type value is needed to perform positioning on truly unstructured files. When reading a file with iox_$get_chars, positioning to the next new line character is not useful. Character positioning on unstructured tape files would permit meaningful error recovery.

SUMMARY: A new type value of 2 would tell the I/O module to skip the number of characters specified by the "number" argument in the iox_$position call. The "number" argument can be plus or minus for forward or backward skipping.

IMPLICATIONS: All I/O modules which support unstructured files will have to be changed to support this new type of positioning.

MULTICS CHANGE REQUEST

TITLE: Fix bug in queue_mseg_

AUTHOR: Steve Herbst

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

STATUS	DATE
Written	7-22
Approved	7-30
Rejected	
Postponed	
Withdrawn	
Expires	1-30

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

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

REASONS: queue_mseg_ calls ring 1 primitives with its parameter
      arguments, after making certain checks on them. The value of
      the ring 4 variable that an argument refers to can be changed
      between the time the check is made and the time of the call.

SUMMARY: Keep internal copies of all arguments, both input and
      output, and of acl's in the case of acl entries.

MULTICS CHANGE REQUEST		STATUS	
		Written	7/23/
TITLE: Modification for enforcing the Access Isolation Mechanism with respect to Interprocess Communication		Approved	7-30-74
		Rejected	
AUTHOR: Douglas H. Hunt			
SOURCE: (if external) e.g., "User", "Marketing"		Postponed	
		Withdrawn	
		Expires	1-30-75

CLASSIFICATION		JUSTIFICATION		Replaced by proposal MCR _____
	Incompatible Change	X	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: These are some of the modifications necessary to add the Access Isolation Mechanism to Multics.

Summary: 1) Modify the PL/I and ALM include files for the APT entry, replacing the obsolete "x_paging_measure" with the access authorization field.

2) Add several lines to the code for "wakeup" in pxss, in order to enforce the Access Isolation Mechanism rules on IPC messages. Also, add a new error code indicating a "send-down" attempt.

3) Add to the procedure hc_ipc the facility to call auditing primitives, to log a send-down attempt. Also, add a new "send-down" error code to the set of error codes now returned by hc_ipc.

4) Add a new "send-down" message to the error table.

5) Change the PL/I program "get_process_usage" so that it will not return a value for "x_paging_measure".

Implications: The Access Isolation Mechanism can be used to enforce administrative control over IPC. On systems which do not use Access Isolation Mechanism, the first four changes above will have no noticeable effect.

MULTICS CHANGE REQUEST		MCR 681	
		Page 1 of 1 Pages	
TITLE: Implement Security Attributes in Salvager		STATUS	DATE
		Written	7-24-
		Approved	7-30-
AUTHOR: A. Kobziar		Rejected	
SOURCE: (if external) e.g., "User", "Marketing"		Postponed	
		Withdrawn	
		Expires	7-30-

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

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

REASONS: This is the third MCR which covers the changes necessary
      to the storage system in order to implement the access isolation
      mechanism, and covers the changes to the salvager.

SUMMARY: Change salvage_directory and salvage_entry to check the
      access_class field in each branch with respect to the value in
      the parent directory. If the value does not conform to the rules
      specified in MTB-081 and MTB-101, then set security out-of-service
      on in the branch of the parent directory.

IMPLICATIONS: A privileged process, such as that of the system security
      administrator, must turn the out-of-service off before unprivilege
      (normal) users can use that directory subtree.

FMT command description

FMT <u>address extent</u> -<u>keywords</u>-

    Formats a disk area or a portion of a disk area for its use
    by Multics. The <u>address extent</u> must be present and must
    specify a single disk area or portion of a disk area.
    See "Secondary Storage Device Addressing" later in this section
    for a description of <u>address extent</u>.

    If no <u>keywords</u> are present, the track headers are first read to
    look for defective tracks. All tracks are then formatted as
    good or defective.

    The following <u>keywords</u> may be placed after the <u>address extent</u>.

        CHECK   The track headers are read to look for defective
                      tracks. Good tracks are not reformatted unless
                      Record 0 of the track contains incorrect data.

        CLEAR   Defective tracks are formatted as good tracks.

        DEFECT All tracks within the <u>address extent</u> are formatted
                      as defective.

    The addresses of defective tracks are printed unless the DEFECT
    <u>keyword</u> is used.

MULTICS CHANGE REQUEST		MCR 682
		Page of

TITLE: Update BOS FMT command	STATUS	DATE
	Written	7/25/7
AUTHOR: David Kayden	Approved	7-30-
	Rejected	
SOURCE: (if external) e.g., "User", "Marketing"	Postponed	
	Withdrawn	
	Expires	1-30-

CLASSIFICATION		JUSTIFICATION		Replaced by proposal MCR _____
	Incompatible Change	X	Marketing Requirement	Implemented in System _____
X	Extension		Conformance to Standard	Objections/Comments:
	Restriction	X	Increased Consistency	
	Performance Improvement		Simplification	
X	Reliability Improvement	X	Generalization	
		X	Bug Fix #117	

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

REASONS: The FMT command will not format any disk type currently supported by Multics. It also formats all tracks without checking for defective tracks. The DELREC command provides a method of deallocating these tracks if they are reported to the operator. Improved disk reliability would result from reporting and deallocating these tracks.

SUMMARY: Implement format checking and formatting of DSU181's, DSU190's, and DSU191's. Provide command options to control formatting. Default action will be to check and format all tracks within the address extent specified. Command options would allow checking format data only, forcing tracks to be formatted defective, and forcing tracks to be formatted as good.

IMPLICATIONS: BOS can be used to format all disk units except the BOS disk.

DETAILED PROPOSAL: See attached Multics Operator's Handbook draft.

MULTICS CHANGE REQUEST	MCR ___684___

TITLE: Improve submission testing programs	STATUS	DATE
	Written	07/23/74
AUTHOR: Arlene J. Scherer	Approved	7-30-74
	Rejected	
SOURCE: (If external; e.g., "User", "Marketing")	Postponed	
	Withdrawn	
	Expires	7-30-75

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

Use these headings: REASONS, SUMMARY, IMPLICATIONS, and optionally
                     DETAILED PROPOSAL

REASON:

Part One: Add a command_error condition handler for calls to archive; eliminate a lot of extraneous code in the archive extraction routines to check for errors before extracting the component.

Part Two: Clean up code by eliminating superfluous variables.

Part Three: Change interface so that original path of source or object segments (or bindfile) can be passed to source_test_ and object_test_ for printing in the output file; then it will be possible to look at it and know where the segments were extracted or copied from.

Part Four: Add a "-sys" argument so that another system or subsystem library can be used instead of the standard Multics libraries (by request of Chris Tavares for the Air Force.).

SUMMARY: Modify submission_test to accept the "-sys" argument followed by a pathname. Modify submission_test, object_test_, and source_test_ interfaces to pass the path of the submitter's directory or archive. Add the condition-handling routine for archive errors to del_file_.

MULTICS CHANGE REQUEST	MCR 685

TITLE: Improve submission tests to use now-working -rename feature of get_library_segment.	STATUS	DATE
	Written	05/24/
AUTHOR: Arlene J. Scherer	Approved	7-30-
	Rejected	
SOURCE: (if external; e.g., "User", "Marketing")	Postponed	
	Withdrawn	
	Expires	1-30-;

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

Use these headings: REASONS, SUMMARY, IMPLICATIONS, and optionally
DETAILED PROPOSAL

REASON:
  Since the -rename option in gls will now work with archiv
  extractions, the submission testing programs can now be recoded t(
  eliminate the folderol of renaming the submitter's new copy, copyir
  in the library copy for comparison, and then deleting the library cop
  and renaming the original back, all of which requires several specia
  condition handlers to see to it that the NEW copies of segments ar
  left in) the submitting directory and not the library copies. All c
  this can be simplified by renaming the LIBRARY copies of thing
  instead.

SUMMARY:
  source_test_ and object_test_ modified as described above. del_file
  'modified to remove unnecessary handlers (the submitted segment wil
  now always have the right name).