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SECTION 1

INTRODUCTION

Multics Release 12.0 (MR12.0) is a complete release and assumes the prior installation of MR11.0. That is, the library tapes are self-supporting and do not require any other information to run Multics.

This document includes descriptions of features included in Multics Release MR12.0.

A separate document, Software Installation Bulletin (SIB), is supplied with the release tapes. The SIB describes the contents of the release tapes and include procedures for installation of MR12.0.

Additional documentation, including a list of bugs fixed in MR12.0, is provided with the release tapes, either as printable segments on the tape (in a special directory >doc>MR12.0), or as paper copy.

Following is a summary of the remainder of sections in this document.

Section 2
summarizes important highlights.

Section 3
describes significant software changes.

Section 4
describes incompatible changes.

Appendix A
contains a partial list of new commands, active functions, and subroutines.
Appendix B contains a list of Priced Software Products. These items are available only through contractual actions with a Honeywell sales representative.

Appendix C describes the associated documentation.
SECTION 2

HIGHLIGHTS OF MR12.0

This section contains a brief summary of the most important items in this release. Refer to Section 3 for a more detailed description.

A brief description of known bugs fixed in this release is available in the segment >doc>MR12.0>TRs_fixed_in_MR12.0.

HARDWARE SUPPORT

• Provides support for the Information Multiplexer Unit (IMU) and for Federal Information Processing Standards (FIPS) peripherals. [GET MORE INFORMATION FROM BILL FRINK]

SUPERVISOR

COMMUNICATIONS

ADMINISTRATIVE SOFTWARE

B2 SECURITY CERTIFICATION

• MR12.0 will not be recertified. Strict adherence to Configuration Management procedures developed in concert with the National Computer Security Center (NCSC) assure that MR12.0 remains as secure as MR11.0

MAINTAINABILITY FEATURES

• Provides Test and Diagnostic (T&D) support for the IMU and for FIPS devices. Provides a new subsystem for loading T&D test routines and firmware into the Multics Operating System.
PRICED SOFTWARE PRODUCTS

• Provides a native Multics C compiler conformant to the UNIX system V, release 2.0 C compiler.

• Provides Pascal, version 8.03, which includes bugfixes and implements new features.

• Enhances the support for personal computers to provide PC capability driver (IBM PC), background file transfer (IBM PC), and terminal emulator (IBM PC).

• Enhances Executive Mail, version 4.0, by providing new functions, improvements, and increased consistency with Executive Forum.

• Provides Executive Forum, version 2.0. This version offers additional menus and other enhancements.

• Installed Forum version 2.14 which includes new features and numerous bug fixes.

SOFTWARE CHANGE PROPOSALS

Multics Release 12.0 incorporates seventeen (19) SCPs:

• SCP 6250, allows a site to specify weekly cutoff periods for projects or users by modifying the PMF.

• SCP 6253, enhances the contents active function for selective inclusion or exclusion of lines from the return value.

• SCP 6258, modifies the LINUS set_scope request to be a settable parameter.

• SCP 6259, enhances the MRDS restructure_mrds_db subsystem.

• SCP 6265, allows wakeup interval for incremental volume dumper to be changed.

• SCP 6266, increases maximum value of wakeup interval for incremental volume dumper to 1440 minutes.

• SCP 6272, Increases the I/O Daemon's 136-character page width restriction to 200 characters.

• SCP 6276, modifies the read_mail list request to indicate whether a message has been read.

• SCP 6281, provides the save and display accept_messages options.
• SCP 6282, allows emacs to edit MSFs.
• SCP 6284, modifies the Fortran OPEN statement to allow extension of an existing file.
• SCP 6286, allows LINUS list_value request to be used as an active request.
• SCP 6287, allows LINUS open request to be used as an active request.
• SCP 6292, provides a subroutine interface for entering absentee requests.
• SCP 6296, enhances the dprint subroutine interface to return a request identifier (dprint_${request_id}).
• SCP 6297, allows a user to request the truncation of an absout segment prior to starting of the absentee job.
• SCP 6298, allows the use of the Pascal -interactive control argument in absentee mode.
• SCP 6168, allows reloading of Multics from disk following an initial boot of Bootload Command Environment (BCE) from tape.
• SCP 6196, extends the star convention and allows for many new combinations of "*" with character strings.
SECTION 3

CONTENTS OF MR12.0

HARDWARE SUPPORT

A- 1. This release supports the new Information Multiplexer Unit (IMU) I/O Subsystem including the controllers and devices enumerated below on Multics systems with DPS8/M CPU's. This release also supports systems having a mixture of IMU and IOM I/O subsystems. The IMU is not supported on systems with Level 68 or DPS68 CPU's.

A- 2. This release supports the new Peripheral Processing Unit (PPU) attached through either an IOM or IMU. The PPU supports a variety of configurations of the new low cost Disk Adapter Unit (DAU) and the single bucket buffered tape controller.

A- 3. The MSU3380 and MSU3381 FIPS disk drives are now supported by the Multics system. For file system IO these devices are divided into subvolumes, two for the MSU3380 and three for the MSU3381. Each subvolume is equivalent to a physical volume. For user IO, the entire device may be attached as one entity.

A- 4. The MTU8205, MTU8206, and MTU8208 tape drives are now supported by the Multics system. These devices are identified on the "prph tapX" card as model 8200.

Support Removal

B- 1. Support for the IBM1050, IBM2741, ARDS terminals and Bell 202ETX protocol was declared removed in the MR11.0 SRB. The 963 and 029 preaccess commands were not removed at that time but have been removed in this release. The cv_ttf and cv_cmos commands will no longer accept these devices.
Online Test and Diagnostics

C- 1. Enhanced online Test and Diagnostics to support test of all devices attached to an IMU subsystem. This testing includes peripheral tests for all current devices as well as the new FIPS disk and tape devices. Tolts testing will also include testing of the IMU channels via test pages for the Maintenance Channel Adaptor (MCA) of the IMU.

C- 2. Added a deck file manager subsystem for improved maintenance of the T&D Deck File. This facility will enable loading a deckfile from either tape (IFAD or 355 deckfile) or MCA diskette. It will also provide for editing/patching of octal and hex object decks as well as deleting files from the deck file.

COMMUNICATIONS SYSTEM SOFTWARE

D- 1. Added the -output_etb_mode attach description option to bisync_to control the use of an ETB or ETX at the end of each record. The attach description will cause a whole segment to be interpreted as a block of data. It may be required to send the block of data out using many records. With this change, an ETB and ETX will be used to terminate each record as controlled by the presence or absence, respectively, of this option.

D- 2. A number of new terminal types have been added to the TTF and a number of enhancements have been made to current ones.

New terminal types:

Anderson-Jacobson 520 CRT: AJ520 (79 chars/24 lines) and AJ520_132 (132 chars/24 lines).

Human Designed Systems Concept 108: CONCEPT108 (also named CONCEPT_AVT and CONCEPT_GVT).

Cii-Bull ANSI CRTs DKU7001, DKU7002 and DKU7102.


Heath CRTs: HEATH19_ANSI and Z100.

Apple MacIntosh Kermit VT102 emulator: MACKERMIT.

Nippon Electric Model 5525 Spinwriter: NEC5525_OSR_10C6L, NEC5525_OSR_10C6L_CONSOLE and NEC5525_OSR_12C6L.
Nippon Electric Model 7710 as receive only printer: NEC7710_PRINTER_OSR.

Netronics Smarterm-80: SMARTERM.

TAB Products Company TAB 132/15: TAB_80C and TAB_132C.

Tektronix 4027: TEK4027.

Tektronix 4107 in ANSI mode: TEK4107_ANSI_80C (also named TEK4107_ANSI), TEK4107_ANSI_132C, TEK4107_ANSI_80C_OFLOW (also named TEK4107_ANSI_OFLOW) and TEK4107_ANSI_132C_OFLOW.

Teleray Model 7: TELERAY7

Texas Instruments Model 765: TI765.

TTE 415.

VersaTerm (an Apple MacIntosh terminal emulator) Version 2.20: VERSATERM220 (also named VERSATERM), VERSATERM220_OFLOW (also named VERSATERM_OFLOW), VERSATERM220_132C (also named VERSATERM_132C), VERSATERM220_132C_OFLOW (also named VERSATERM_132C_OFLOW). Includes answerback definitions.

Versaterm Version 2.10 or less: VERSATERM210. Includes answerback definition.

Honeywell VIPs: VIP7300, VIP7303, VIP7813, VIP7814 and VIP7823. Includes answerback definitions.

Digital Equipment Model VT-220: VT220_80C (also named VT220), VT220_80C_OFLOW (also named VT220_OFLOW), VT220_132C, and VT220_132C_OFLOW. Includes answerback definitions.

Added WSTERM terminal type for support of PC terminal emulator for PC support.

Wyse Technology WY50: WY50_80C, WY50_80C_OFLOW, WY50_132C and WY50_132C_OFLOW.

Xerox 820: XEROX820.

Modified support for the following terminal types:

HEATH19 initial string enhanced.

Constant tab delays modified for LA120.

NEC5525_OBA_12C6L initial string enhanced.

Added a "clear tab stops" to initial string of
NEC5525-0SR_12C6L.

Removed "clear terminal" from initial string of VIP7201.
Corrcted function key definitions for CLEAR and FORMAT keys on VIP7x03.

Removed support for the following terminal types:

Support for the IBM1050, IBM2741, ARDS terminals and Bell 202ETX protocol was declared removed in the MR11.0 SRB. The TTF was not updated at the time. The terminal type entries have been removed from the TTF in this release.

D- 3. Users of IBM3270 multiplexers must use the mode "raw3270io" instead of "raw3270" to effect the full set of 3270 features.

D- 4. Incompatibly changed the event message information which is set by tty when sending a wakeup to be structured as described in net_event_message.incl.pl1.

D- 5. The structure used by the undocumented hcs_$_tty_order subroutine for the set_echo_break_table and get_echo_break_table control requests (as defined in mcs_echo_neg.incl.pl1) has been changed incompatibly in order to allow echo negotiation to work with characters above 1770. Specifically, the dimension of the pit array named break has been changed from (0:127) to (0:255). The new structure is version 2.

OPERATING SYSTEM SOFTWARE

BOS

E- 1. BOS is not supported for MR12. BOS commands not supported by BCE functions are: BOSTAP, CARDS, CORE, DMP355, FD355, FMT, LOADDM, MPCD, NLABEL, PROMPT, QUIET, READY, TAPED, TST3BT, TSTCHN, and TTY.

BCE

F- 1. Added the save and restore commands to BCE. They are replacing the current function of the BOS commands SAVE and RESTOR.

F- 2. Added the copy_disk command to bce to replace the BOS SAVE COPY functions.
F- 3. Modified the BCE fwload request to be capable of loading firmware into crossbarred DISK MPCs. Noncrossbarred DISK MPCs can be loaded by using the BCE reinitialize request.

F- 4. Added the lock_mca and unlock_mca BCE commands. It is recommended that Maintenance Channel Adaptors (MCAs) on all system IMUs be placed on the Multidrop interface with the master console configured in the Multics configuration deck as either "on" or "alt". The MCA number assigned by the rocker switches on the MCA should be the same as the IMU number it is in. See the System Maintenance Procedures (SMP) manual and the System Console WIPC66LD Installation Manual, Order Number 58010084, for additional information.

Configuration Parameters

G- 1. The model field of the iom card has changed. The value of "nsa" is being changed to "iom" for IOMs. If the iom card defines an IMU then the model is "imu".

Security

H- 1. MR12.0 will not be recertified. Strict adherence to Configuration Management procedures developed in concert with the National Computer Security Center (NCSC) assure that MR12.0 remains as secure as MR11.0

H- 2. Added (display set edit) process_audit_flags commands to allow manipulation of the security auditing flags in a privileged process. Permanent setting of flags should be accomplished by placing the appropriate PNT/SAT entries with the new_user and edit_proj commands.

ADMINISTRATIVE SOFTWARE

Accounting

I- 1. Administrators may now set weekly cutoff periods for projects or users on projects. The keyword 'weekly' may be placed in the PMF for the project or user, the PMF re-converted with cv_pmf, and the new PDT installed. Sites which have specially modified software for accounting should examine how weekly cutoffs will affect their modifications. The modified modules are cv_pmf, act_ctl, adjust_cutoff, print_pdt, and proj_usage_report.
Answering Service

J-1. Added the -process_id, -pid, control argument to the operator who, and privileged as who, command. When this control argument is specified, the process_ids will be displayed along with any other information normally returned. Added the -connected control argument to list those interactive processes currently connected to the system.

MAINTENANCE SOFTWARE

K-1. Deleted the undocumented library maintenance commands object_submission_test, source_submission_test, acceptance_test, and abs_control.

K-2. Added the -io_command, -ioc, control argument to io_error_summary to display the I/O command being executed when an abnormal status occurs. The command will be displayed in octal, in parenthesis, prior to the interpreted status.

K-3. Added the -fill and -no_fill control arguments to the update_seg initiate operation to control filling of the -log operation.

K-4. Added -desc as the short name for the -descriptor control argument accepted by the library_cleanup, library_descriptor, library_fetch, library_info, library_map, library_pathname, and library_print commands.

Added -comp as the short name for the -components control argument accepted by the library_fetch, library_info, library_map, and library_print commands.

Added short names of -bc for -bit_count, -cont for -container, -iacl for -initial_acl, -lev for -level, -ml for -max_length, and -uid for -unique_id control arguments accepted by the library_info, library_map, and library_print command.

OPERATOR INTERFACE SOFTWARE

L-1. Modified the bound_dumper subroutine, hierarchy dumper, to allow the operator to retype a mistyped tape label, or to enter quit in response to the tape label query to signal the intent that the current invocation of the dumper is to be abandoned. Also, modified bound_dumper to abort the invocation of the dumper in case of unrecoverable tape errors, tape mount denials, or if the operator gives quit as a tape label.
USER SOFTWARE

Languages

M- 1. Changed the binder to only resolve links internally based on the names of the components and any synonyms given in the bindfile.

M- 2. Modified ALM to support double word constants for octal and decimal numbers. The 'even' pseudo-op should precede the use of the 'oct' or 'dec' pseudo-op when defining double word constants to ensure that labels will refer to the appropriate location. Double word constants will be identified by having a trailing capital L. Example: '1234567891234L'.

M- 3. Added the ext_entry pseudo-operation to ALM to provide support for the Multics C Compiler and Runtime Facility. Added the dec_unal and oct_unal pseudo-operations to define unaligned constants.

M- 4. Modified the oct and dec pseudo-operations to no longer automatically align double precision constants on double word boundaries.

Commands

N- 1. Modified the set_fortran_common, date_compiled, and print_link_info commands to support object multisegment files.

N- 2. Modified the salvage_dir command to no longer require the message_path argument. If not supplied, output will be displayed on the terminal.

N- 3. Modified the validate_info_seg command to no longer accept the -output_file (-of), -brief (-bf), -long (-lg), -force (-fc), -no_force (-nfc), -fill (-fi), and -no_fill (-nfi) control arguments. Added the -names (-nm) and -no_names (-nmm) control arguments to determine whether or not vis will change the names on the info segment to match the names used in the info segment.
N- 4. Extended the do command to allow use of &0, &r0, &q0, or &control_string (equivalent to &q0) to insert the unexpanded controls string into the result string. Because the meaning of &r&n and &q&n become ambiguous when no arguments are given (when &n = 0), the do command was incompatibly changed to make those forms an error; use &rf&n and &qf&n instead.

The behavior of requoting constructs like &r1 was changed so that when such constructs are consecutive with no intervening space no spurious quotes are created.

Added the -abort_line and -no_abort_line control arguments to affect subsystem behavior. The default is -abort_line so that the standard behavior is unchanged. With -abort_line, an error in a request line invoked by "do" will abort not only the request line invoked by "do" but also the request line invoking the "do" command. Extended the "do" command to allow control arguments to precede the control string. The control arguments apply only to that invocation of the "do" command.

N- 5. Added the new commands/active functions execute_string, exs and substitute_arguments, sbag to separate "do's" string execution function from its argument substitution function.

Added the new requests execute_string, exs, and substitute_arguments, sbag, to ssu_request tables $standard_requests, which is likely to be used by SSU subsystems developed at sites. Subsystem maintainers should be made aware that local documentation should be updated to include the new requests, or if the subsystem explicitly replaces or disables the "do" request, that their request tables may need to be updated.

Added the -control_string, -cs, control argument to the execute_string command and active function and the substitute_arguments command. The substitute_arguments active function does not attach special meaning to control arguments and will not be changed.

N- 6. Modified the -repeat control argument of memo to no longer repeatedly apply new maturity date intervals until it catches up with the present. It will now apply only to the next interval that matures in the future.

Modified memo so that the default memo segment will be in the users home directory rather than the default working directory.

N- 7. Added the object_segments and nonobject_segments commands to return only the names of object, or nonobject, segments. Similarly, object_msf and nonobject multisegment files. The object_files and nonobject files return names of object or nonobject segments and msfs.
N-8. Added keywords to the exists command/active function to return true if there are any object/non-object files in the specified directory matching the specified star name, respectively. The keywords are object_segments (obseg), object_msf (obmsf), object_file (obfile), nonobject_segment (nobseg), nonobject_msf (nobmsf), nonobject_file (nobfile).

N-9. Added the -on, -off, -profile, -escape control arguments to the abbrev command. The -on control argument enables abbreviation expansion while -off disables expansion. The -profile control argument changes the pathname of the profile segment. The -escape control argument changes the abbrev escape character.

N-10. Modified the enter_abs_request command to accept non-positional arguments, to allow the -argument as well as -arguments control argument as the long forms of -ag, and to accept multisegment files as absout output. The -truncate and -extend arguments have been added to the enter_abs_request command, to effect the truncation of the absentee Request's absout file when the request is run. Type "help ear" for usage.

N-11. For list_abs_requests -long, the new indicators of 'absentee restarted' and 'absout truncation' will be displayed if it is a segment, and may be used as keyword arguments to the user command.

N-12. Two new keywords have been added to the 'user' program, 'absentee restarted', to indicate the absentee job is being restarted due to a system crash, and the keyword 'absout truncation', to indicate the absentee request has the truncate absout indicator set, each returning 'true' or 'false' depending on the value of the respective indicator.

N-13. Modified general ready to accept the -fr short name for the -frame control argument.

N-14. Modified the help command to allow "List of" sections to have multiple consecutive list item lines starting in the left margin. Item descriptions are no longer required, but if present, must be indented three spaces.

Modified the -brief control argument for the help command to always return some information, even for general info (gi) segments.
N-15. Installed the history_comment, hcom, command and active function to manage software change documentation in source programs.

N-16. Changed the -version control argument for the display_subsystem_usage command to accept starnames. This will allow a user to obtain usage information on minor versions of a subsystem with one invocation.

N-17. Multiple -field control arguments to the sort_seg and sort_strings commands now aggregate rather than override each other.

N-18. Added the -from, -to, -match, and -exclude control arguments to the contents command/active function to allow selective inclusion or exclusion of lines in or from output.

N-19. Changed the indent command to implement the format_pl1 convention for specifying comments which are to be changed. Comments beginning with /****A will be copied directly into the indented source without modification.

N-20. Added the reverse_substr command/active function to count characters from right to left. The returned string has its characters in the same order as the input string.

N-21. Added -force, -no_force, -input_tabs, and -no_output_tabs control arguments to the canonicalize command. The canonicalize command will no longer delete nonprinting characters. It will no longer overwite input segments unless the -force control argument is used, or the user replies yes to a query. The -tabs control argument has been changed to -output_tabs. The old name will be retained for at least one release.
N-22. Changed add_pnotice to not automatically apply default copyrights. Added the -default_copyright (-dc) and -default_trade_secret (-dts) arguments to allow specifying of default pnotices.

Changed add_pnotice to issue an error message if there are no existing pnotices in the software and if no arguments are specified, i.e., -nm, -dts, or -dc.

Changed add_pnotice to accept the -long and -brief arguments. -brief displays nothing. -long is the default and it displays the primary name, without the "pnotice" suffix, of the pnotice that was added.

Changed the pnotice templates to use a generic year indicator, <yr>, in place of a specific date; consequently, all template names no longer include the year. All sites are responsible for ensuring that their own pnotices meet this requirement. Use list_pnotice_names -check -all to get a listing of the valid template names and those template names that have to be changed to follow the new rules.

Data Management

O- 1. Removed the undocumented get_tuples_by_spec, get_tuple_array_by_spec, get_tuples_and_ids, and get_tuple_array_and_ids entrypoints from the relation_manager_subroutine.

Date/Time Software

P- 1. Incompatibly changed some of the time zones defined in time_info_cds. The following changes were made:

delete zone 'AHST' (GMT-10, Alaska-Hawaii Standard Time)
add zone 'HST' (GMT-10, Hawaiian Standard Time)
add zone 'HDT' (GMT -9, Hawaiian Daylight Time)
add zone 'YDT' (GMT -8, Yukon Daylight Time)
add zone 'NDT' (GMT-2.5, Newfoundland Daylight Time)
delete zone 'NZT' (GMT+12, New Zealand Daylight Time)
add zone 'NZST' (GMT+12, New Zealand Standard Time)
add zone 'NZDT' (GMT+13, New Zealand Daylight Time)

P- 2. Added the debug keyword to set_time_default and print_time_defaults commands to enable the debugging facilities of the date/time software. See set_time_default.info for details.

Extended Entry Software

Q- 1.

Contents of MR12.0
Mail/Message Facility

R- 1. Added -message_status and -no_message_status control arguments to the delete_message command to control printing of "All messages have been deleted" when the command deletes the last message in the mailbox.

R- 2. Changed the message_status command to work as an active function returning a command string which will set the current message acceptance state.

R- 3. Added the -acknowledge_if_deferred, -no_update_destination, and -update_destination control arguments to the send_message command.

R- 4. Changed mail system to send Version 4 messages. Refer to MAIL FORMAT VERSION 4 in the include file mail_format.incl.plT. Private software which sends or reads mail must be changed to send and accept version 4 messages.

Preaccess Commands

S- 1.

Process Environment

T- 1. Added a new link type with a type of 5 and a class of 6. This new link is called a *heap link and references to variables defined in a user controlled area called the heap.

T- 2. Added the list_heap_variables, lhv, command to return the heap variables allocated at the current heap execution level.

T- 3. Defined a new type of IPC event channel, the asynchronous event call channel. A wakeup sent on this type of channel causes an IPS wkp_signal to also be sent to the destination process. The wkp_signal handler will cause any call handlers for async event channels, which have pending wakeups, to be run. This type of event channel is especially useful for applications which interpret data in one process and then want to notify another process of some important event. Normally, the interpreting process would send an IPC wakeup. However, the destination process will only receive the wakeup when it goes blocked. If the information should interrupt the destination process, regardless of its blocking state, the new async event channel should be used. Also, a new entry in ipc_, create_event_channel, has been added to allow the creation of wait, call, and async call channels.
Subroutines

U- 1. Modified the dynamic linking mechanism to support executable Multi-segment Files. Added the object_lib subroutine library to support Object MSFs as well as standard single segment objects. The initiate entrypoint initiates an executable binary with a given refname, forcing the refname if required. The get_def_target entrypoint searches an object segment for a given definition and returns a pointer to the definition target. The get_component_info entrypoint returns pointers and object_info for object segments or MSFs.

U- 2. Added a series of entry points to manage operations in heap_style allocation areas. These entry points are grouped into the new heap_manager subroutine located in bound_heap_manager.

U- 3. External pointers can now be initialized to nonconstant values via list_init. The calling sequence for list_init and entry points in set_ext_variable have been altered. All routines that use system_link_names.incl.pl would be recompiled due to a change to the variable_node structure. The name_size field in the variable_node has also been redefined as fixed bin(21) rather than fixed bin.

U- 4. Deleted the set_ext_variable_$allocate entry point. Any program using this entry point should be changed to use set_ext_variable.

U- 5. Added absentee_restarted and absout_truncation entrypoints to user_info. Both require one argument, bit (1) aligned, to return the value of the respective PIT bit value.
U- 6. Added the find_char subroutine to provide an efficient
mechanism for doing PL/1 search and verify operations when the
search/verify characters are unknown at compile time. Type
"help find_char_" for details.

Renamed the undocumented tct subroutine to have a new name,
find_char. Site specific programs which called tct should be
changed to call an entrypoint in the new find_char subroutine
according to the table below:

<table>
<thead>
<tr>
<th>tct ENTRYPOINT NAME</th>
<th>NEW NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>tct_reverse</td>
<td>find_char_first_in_table</td>
</tr>
<tr>
<td>tct_translate</td>
<td>find_char_translate_first_in_table</td>
</tr>
<tr>
<td>tct_reverse_translate</td>
<td>find_char_translate_last_in_table</td>
</tr>
<tr>
<td>tct_search</td>
<td>find_char_first_in_list</td>
</tr>
<tr>
<td>tct_reverse_search</td>
<td>find_char_last_in_list</td>
</tr>
<tr>
<td>tct_verify</td>
<td>find_char_first_not_in_list</td>
</tr>
<tr>
<td>tct_reverse_verify</td>
<td>find_char_last_not_in_list</td>
</tr>
<tr>
<td>tct_not_ascii</td>
<td>find_char_not_ascii_table</td>
</tr>
</tbody>
</table>

Note that the replacement entrypoints for tct_reverse,
tct_reverse_translate, tct_reverse_search, and
 tct_reverse_verify return a standard PL/1 character index
(character position from the left end of the string), whereas
the tct_entrypoints used to return a character position from
the right end of the string. Also, the tct_quote_search table
has been deleted.

U- 7. Added the find_bit subroutine to efficiently search for the
first or last on bit ("1"b) or off bit ("0"b) in a long bit
string. This routine uses a more efficient algorithm than PL/1
for performing these specialized bit string search operations.
Type "help find_bit_" for details.

U- 8. Added the alm subroutine interface to the ALM assembler.
Added a new pseudo-operation called init_link to allow users to
join to the definition section of the object. Added support for
references to *heap links.

U- 9. Modified the rcp_priv $attach gate entry used for T&D and MPC
attachments to check for proper discretionary access on the
device ACS segments in >sc1>rcp as is done when using
rcp $attach. The rcp_admin_ and rcp_sys_gate entries are the
only ones allowed to bypass ACS segment discretionary access
checking.
U-10. Extended the Multics Star Convention. Starnames can now contain multiple doublestars, and components can contain multiple stars. See starname.31.info for a more complete description of the extension.

Modified the match_star_name subroutine to implement the extended Multics Star Convention. The match_star_name subroutine can now match names longer than 32 characters and names containing null components, although these are not permitted for file names. See match_star_names.31.info for a complete description of the subroutine.

U-11. Added the check_star_name subroutine for flexible validation of starnames, entynames, and pathnames. The old entrypoints check_star_name_entry and check_star_name_path are obsolete and should not be used in new programs. They will be retained indefinitely for compatibility. See check_star_name.31.info for a complete description of the subroutine.

U-12. Changed the error_table $badstar message to "Invalid syntax in starname." The new codes error_table_bad_file_name and error_table_null_name_component have been added to diagnose errors that were formerly lumped together with error_table_badstar's old definition, "Illegal entry name."

U-13. Added the request_id entrypoint to the dprint subroutine to return, in an argument provided by the caller, the fixed bin(71) message identifier of the request being enqueued.

U-14. Changed set_lock $lock and set_lock $unlock to set up condition handlers for no_write_permission and not in write_bracket returning error_table_no_w_permission. It is recommended that set_lock be used as follows for applications where efficiency is important:

if ^stacq (lock_word, static_var_initialized_to_lock_id, ""b) then call set_lock $lock (lock_word, wait_time, code);
else code = 0;

if ^stacq (lock_word, ""b, static_var_initialized_to_lock_id) then call set_lock $unlock (lock_word, code);
else code = 0;

U-15. Added the get_block_data_info entrypoint to area_info to allow a caller to step through an area and look at each block whether allocated or free.

U-16. Changed the discard IO module to accept all opening modes and operations rather than only output type modes and operations.

U-17. Modified the print_data subroutine to make it externally callable. This subroutine takes the output of the PL/1 put data statement and formats it into a more readable form.
U-18. Added the get_command_name and get_command_name_rel
entrypoints to the cu_subroutine to allow access to the command
name given on the command line. These entrypoints were added in
support of the C compiler and runtime.

U-19. Added the enter_abs_request_subroutine to add a request to
create an absentee process.

U-20. Modified command_query_subroutine to accept case insensitive
user responses to a yes or no question.

U-21. Modified cv_ptr_ to allow the use of archive component
pathnames.

Tape Software

V- 1. It is now possible to reconstruct tape_archive tables from the
tape volume set. See the documentation for the tape_archive
reconstruct operation.

PRICED SOFTWARE PRODUCTS

Basic
W- 1.

COMPOSE
X- 1.

EMACS

Y- 1. Incompatibly changed emacs to allow editing of multisegment
files. The changes required to implement this were extensive.
Users who have written extensions that call undocumented
functions in the module e_multics_files_.lisp will probably
have to recode them because this module was redesigned.
Y- 2. Modified emacs to be more cautious when writing the buffer into an existing file: ^X^S, save-same-file, and ^X^W, write-file, with no pathname will query if the file has been modified since it was last read into the buffer. ^X^W with a pathname will query if the file already exists. The queries are skipped, and the old behavior retained, if the commands are given a numeric argument or if the options save-same-file-check-dtcm or write-file-overwrite are turned on. The save-same-file-check-dtcm option is on by default and must be off to suppress the check. ^X^F, find-file, will query the user if it finds the specified file already in a buffer where the file has been modified since it was last read into the buffer. This query may be prevented, and the old behavior retained, by turning the option find-file-check-dtcm off. ^X^I, insert-file, will set the mark at the beginning of the inserted text.

Y- 3. Modified Emacs fill-mode and speedtype so that CR and TAB now cause the line to be filled or the word to be expanded, respectively, as is already done by space and punctuation characters.

Y- 4. Added support for VersaTerm (tm), version 12.6e, a terminal emulator for the Apple Macintosh personal computer. The Emacs ctl versaterm supports VersaTerm(tm) version 2.20 and higher. The Emacs ctl versaterm210 supports VersaTerm(tm) versions 2.10 and lower. The difference between the two ctls is that versaterm210 does not support proper scrolling or 132 column mode.

Y- 5. Added a history comment emacs extension to allow adding history comments while within the emacs editor. To add a history comment, type: ESC-X add-hoom CR.

Executive Forum

Z- 1. Added the "Personalize Exec Forum" and "Attend Meeting" menu to Executive Forum, version 2.0.
Executive Mail

a- 1. New features have been added to the Executive Mail Facility, version 4.0, in three categories: new functions, improvements to existing functions and changes to menus.

New Functions: Ability to read mail in other mailboxes, new options for selecting messages, an option to include the original in a reply, the ability to file the original before the reply, and more printing options.

Improvements to Existing Functions: consistent behavior for Send, Forward and Reply, creation of a new profile segment if required, messages marked for deletion are not deleted on cleanup conditions, more informative help menu, and clearer messages and screen presentations.


FORTRAN

b- 1. Installed Fortran, version 12.0b, which provides new features and enhancements.

b- 2. Changed Fortran to return error_table$noentry instead of fortran_io_error$status_field_error when non-existent files are opened with status="old".

b- 3. Changed the meaning of Fortran's "external" statement in ansi66 mode. The compiler now processes "external" declarations of built-in functions in ansi66 mode according to the ANSI-66 (X3.9-1966) standard. Built-in functions which appear in an "external" statement are required by the standard to refer to Fortran built-in functions rather than user supplied functions.

b- 4. Added the -la_auto, -la_static, -vla_auto, -vla_static, and -very_large_common control arguments to FORTRAN to enable the selection of individual storage classes to be large arrays or very large arrays. Added the append option to the status specifier in OPEN statements to allow the file to be positioned to the end of the file when opened. Changed control argument syntax to allow either -severity N or -severityN format. Increased the number of items allowed in a FORMAT statement from 512 to 1023. Increased the maximum character string size from 256 to 512.
Forum

c- 1. Installed Forum version 2.14 which includes new features and numerous bug fixes.

c- 2. Added the rechain and unchain requests and forum_$rechain entrypoint to the forum subsystem to allow meeting chairman to correct transaction chains.

c- 3. Changed the forum_info structure to accept a version 2 structure which does not return the removal_count field. This speeds up the call. The information may be obtained with the forum_$list_users gate.

c- 4. The list of changed meetings created by the check_meetings request is now available to user applications.

c- 5. Added the before_ref, bref, transaction specifier which refers to all transactions preceding the current one in the current chain.

c- 6. Added the -trailer_format control argument to the forum command and the write and print requests to specify the format of the trailer line to be returned.

c- 7. Added the -before control argument to the list_meetings request.

c- 8. Added the -exclude and -from control arguments to the check_meetings request.

c- 9. Added the -brief and -long control arguments to the add_meeting and remove_meeting requests.

c- 10. Added the -current_meeting control argument to the remove_meeting request.

c- 11. Added the -count control argument to the next_meeting request.

c- 12. Added the -no_header control argument to the write request.

c- 13. Added the -no_notify control argument and last_seen sort type to the list_users request.

c- 14. Added the forum_$previous_transaction and forum_$next_transaction gates to find unexpunged transactions.

c- 15. Deleted the forum_chairman_gate. User programs that call entries in this gate should be changed to call the corresponding entrypoint in the forum_gate.

Contents of MR12.0 3-19 SRB12.0
Logical Inquiry Update System (LINUS)

d- 1. Changed the default wait time for the LINUS, version 4.5, set_scope request to be a settable parameter in linus_data$lock_wait_time.

d- 2. The LINUS keywords select, from, where, union, inter, differ, dup, and unique are now replaceable with other keywords. To take advantage of this new feature, edit the source of linus_lila_tokens.cds to contain the new keywords, and then use the resulting linus_lila_tokens instead of the Honeywell provided linus_lila_tokens.

d- 3. The linus assign_values del_scope, list_scope, list_values, open, and set_scope requests may now be used as active requests. A new active_request, opened_database, has been provided.

Megacalc

e- 1. Installed Megacalc version 4.0a which contains numerous bug fixes.

MRDS

f- 1. Added the create_domain, create_attribute, delete_domain, delete_attribute, rename_domain, rename_attribute, rename_relation requests to the restructure mrds_db subsystem, version 2.0. In addition, rmdb is able to create empty databases, the display_data_model request and display_mrds_dm command have been modified. See the MRDS manual, Order Number AW53, or the rmdb subsystem info segments for further details.

MRPG

g- 1.

PASCAL

h- 1. Added Pascal version 8.03 which incorporates bugfixes and provides new features.

h- 2. Added the pascal_cross_reference command to separately check compiled modules, object modules, for identical variables having unlike declarations.

h- 3. Added the pascal_display command to display the execution stack and the values of symbolic variables declared in the active Pascal procedures.
h- 4. Modified Pascal to be in closer conformance to the ISO Pascal standard definition by including more precise goto usage control, checking for unallowed definitions, and dynamic verification of function assignments.

h- 5. Enhanced support for inter-language calls through the passing of parameter descriptors, and their values, when a Pascal program calls a PL/1 or Fortran procedure.

h- 6. Enhanced support of I/O processing to include immediate output if I/O module is not vfile_, add end_of_line if not present, process I/O buffer content when closing I/O, and provide dynamic initializing of files even if MAIN program is not called.

h- 7. Provides full support of string variables and types.

Personal Computer Support Facility

i- 1. Multics Online Work Station Environment (MOWSE) provides the means for cooperating processes on Multics and an IBM PC, or compatible, to communicate with each other and to exchange requests for information or processing. MOWSE is designed in such a way that, given the limitations of the operating systems under which it operates, these processes may be active in the background while other foreground activities, not necessarily related to MOWSE, take place.

i- 2. MOWSE does not assume that one of the processes is dominant over the other, or that certain functionality is only available on one of the machines. Every attempt has been made during the design to ensure that the same functionality, in terms of MOWSE requests, exists on both machines. Naturally, the manner in which this functionality is delivered to, or requested by, a process depends on the operating system that governs the process.

i- 3. The functionality of Background File Transfer (BFT) exists equally on both machines, so transfer operations can be initiated from both the local and the remote machine (either the personal computer or Multics).

i- 4. BFT maintains a store queue and fetch queue on each system. These queues are independent and contain no redundant information. The queues contain only the requests that were initiated on that machine. Due to the separate queues, cancellation of a remote queue entry will not be allowed. Each queue will hold one request on each the PC and Multics.
i- 5. All external input to the BFT program will occur through a single MOWSE entrypoint. On Multics this MOWSE entrypoint will be called via Multics entrypoints which formulate the requests to BFT and provide a more Multics-like interface.

i- 6. If either the computer or the network crashes a recovery may be attempted. Recovery after a crash will attempt to retransmit the remaining portion of the file that was being transferred at the time of the crash. The transfer recovery is performed by a simple byte count to adjust the pointer in the source file to the same location as the last received byte in the destination file.
SECTION 4

INCOMPATIBLE CHANGES

ADMINISTRATIVE SOFTWARE

A- 1.
A- 2.

MAINTENANCE SOFTWARE

B- 1.

COMMUNICATIONS SYSTEM SOFTWARE

C- 1. Incompatibly changed the event message information which is set by tty when sending a wakeup to be structured as described in net_event_message.incl.pl1.

C- 2. The structure used by the undocumented hcs_tty control orders set_echo_break_table and get_echo_break_table and defined in mcs_echo_neg.incl.pl1 has been changed incompatibly in order to allow echo negotiation to work with characters above 1770. Specifically, the dimension of the pit array named break has been changed from (0:127) to (0:255). The new structure is version 2. Version 1 structures will be rejected by ring 0.
USER SOFTWARE

Commands

D- 1. Extended the do command to allow use of &0, &r0, &q0, or &control_string (equivalent to &q0) to insert the unexpanded control string into the control string. Because the meaning of &r&n and &q&n become ambiguous when no arguments are given (when &n = 0), the do command was incompatibly changed to make those forms an error; use &rf&n and &qf&n instead.

The behavior of requoting constructs like &r1 was changed so that when such constructs are consecutive with no intervening space, no spurious quotes are created.

Added the -abort line and -no abort line control arguments to affect subsystem behavior. The default is -abort line so that the standard behavior is unchanged. With -abort line, an error in a request line invoked by do will abort not only the request line invoked by do but also the request line invoking the do command. Extended the do command to allow control arguments to precede the control string. The control arguments apply only to that invocation of the do command.

Date/Time Software

E- 1. Incompatibly changed some of the time zones defined in time_info.cds.

SECURITY

F- 1.

USER ENVIRONMENT

Date/Time Software

G- 1.

Subroutines

H- 1.
EMACS

I- 1. Incompatibly changed emacs to allow editing of multisegment files. The changes required to implement this were extensive. Users who have written extensions that call undocumented functions in the module e_multics_files_.lisp will probably have to recode them. as the module was redesigned.
APPENDIX A

COMMANDS AND SUBROUTINES

This is a partial listing of new commands and subroutines for MR12. A brief description of the command and subroutine functionality is included. Refer to info segments or the appropriate manuals for more information.

NEW COMMANDS

attach_mowse,
atm
  establishes the MOWSE environment on Multics by attaching the MOWSE_io switch and initializing the protocol.

backup_file_transfer,
bft
  transfers files in blocks of the max data length allowed for the MOWSE communications protocol.

detach_mowse,
dtm
  deinitializes the MOWSE IPC protocol communications and detach the MOWSE_io switch.

copy_disk
  a BCE command to replace the BOS SAVE COPY functions.

display_process_audit_flags
  a privileged process command to display the current state of process security audit control flags.

edit_process_audit_flags
  a privileged process command to turn on or off only those security audit control flags specified.
execute_string,

exs
substitutes arguments into a control string. The expanded control string is then passed to the command processor or the subsystem request processor for execution.

history_comment,
hcom
adds, checks, displays, formats and updates software change history comments within a given source module.

list_heap_variables,
lhv
prints information concerning heap variables. Only variables at the specified execution level(s) are printed. The default information is the location and size of each specified variable. A level description is printed for each execution level specified. The heap variables will be displayed starting at the lowest execution level specified.

lock_mca
a BCE command to lock, or disable, input to the MCA from the console.

nonobject_files,
nobfiles
returns the entrynames or absolute pathnames of files that are not executable object files and that match one or more star names.

nonobject_msfs,
nobmsfs
returns the entrynames or absolute pathnames of multisegment files that are not object multisegment files and that match one or more star names.

nonobject_segments,
nobseg
returns the names of non-object segments only.

object_files,
obfiles
returns the entrynames or absolute pathnames of files that are executable object files and that match one or more star names.

object_msfs,
obmsfs
returns the entrynames or absolute pathnames of multisegment files that are executable object msfs and that match one or more star names.
object_segments,
  obseg
    returns the names of object segments only.

pascal_cross_reference,
pascal_cref
  separately checks object modules for identical variables having
  unlike declarations.

pascal_display
  displays the execution stack and values of symbolic variables
  declared in active Pascal procedures.

restore
  a BCE command to replace the BOS RESTOR function.

reverse_substr
  counts characters from right to left. The returned string has
  its characters in the same order as the input string.

save
  a BCE command to replace the BOS SAVE function.

set_process_audit_flags
  a privileged process command to turn on specified flags and turn
  off all others.

substitute_arguments,
substitute_args,
sbag

unlock_mca
  a BCE command to unlock, or enable, input to the MCA from the
  console.

NEW SUBROUTINES

alm
  provides a subroutine level interface to the alm assembler.

check_star_name
  provides flexible validation of starnames, entrynames, and
  pathnames.

cu$_get_command_name
  returns a command name used on the command line for the callers
  argument list.

cu$_get_command_name_rel
  returns a command name on the command line for the passed
  argument list.
enter_abs_request
   adds a request to create an absentee process.

find_bit
   searches efficiently for the first or last on or off bit in a long bit string.

heap_manager
   controls operations for the users heap.

object_lib
   supports standard single and MSF objects for initiation, definition searches, and info extraction.

print_data
   formats output of a PL/1 put data statement into readable form.
## APPENDIX B

MULTICS PRICED SOFTWARE PRODUCTS

<table>
<thead>
<tr>
<th>PRODUCT NUMBER</th>
<th>TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SGS 6800</td>
<td>Multics Operating System EXEC (see Note 1 below)</td>
</tr>
<tr>
<td>SGS 6801</td>
<td>GCOS (III) Timesharing Environment Facility</td>
</tr>
<tr>
<td>SGS 6802</td>
<td>Transaction Processing Tools</td>
</tr>
<tr>
<td>SGS 6803</td>
<td>FAST/DFAST (Fast Access System for Timesharing)</td>
</tr>
<tr>
<td>SGS 6804</td>
<td>GCOS (III) Batch Environment Facility (see Note 1)</td>
</tr>
</tbody>
</table>

## OPERATING SYSTEM SOFTWARE EXTENSIONS

| SGC6823   | Inter Multics File Transfer Facility                                 |
| SGE6800   | Multics System Software Extensions (see Note 4)                      |
| SGE6802   | Remote Job Entry Facility                                           |

## COMMUNICATIONS SOFTWARE

| SGC6800   | Multics Communications System (Multics CS)                          |
| SGC6801   | Autocall Support Option to Multics CS                               |
| SGC6802   | 3270 Support Option to Multics CS                                   |
| SGC6803   | Basic Bisync Support Option to Multics CS                            |
| SGC6804   | G115 Support Option to Multics CS                                   |
| SGC6805   | File Transfer Facility                                              |
| SGC6807   | Multics HASP Facility                                               |
| SGC6822   | Multics Communications Support for X.25                             |
| SGC6827   | Personal Computer Support Facility                                  |
| SGC6828   | Multics Online Workstation Environment                              |
### PROGRAMMING LANGUAGE SOFTWARE

<table>
<thead>
<tr>
<th>Software Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SGL6801</td>
<td>FORTRAN Compiler and Runtime Facility</td>
</tr>
<tr>
<td>SGL6802</td>
<td>Basic Compiler and Runtime Facility</td>
</tr>
<tr>
<td>SGL6803</td>
<td>COBOL-74 Compiler and Runtime Facility</td>
</tr>
<tr>
<td>SGL6805</td>
<td>MRPG (Report Generator) Facility.</td>
</tr>
<tr>
<td>SGL6806</td>
<td>APL (Version 5.02)</td>
</tr>
<tr>
<td>SGL6807</td>
<td>Pascal Compiler and Runtime Facility</td>
</tr>
<tr>
<td>SGL6808</td>
<td>C Compiler and Runtime</td>
</tr>
</tbody>
</table>

### OPERATING SYSTEM UTILITIES AND TOOLS

<table>
<thead>
<tr>
<th>Software Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SGD6806</td>
<td>Executive Mail System</td>
</tr>
<tr>
<td>SGD6807</td>
<td>Format Document Facility</td>
</tr>
<tr>
<td>SGU6800</td>
<td>WORDPRO Comprehensive Facility</td>
</tr>
<tr>
<td>SGU6801</td>
<td>SORT/MERGE Facility</td>
</tr>
<tr>
<td>SGU6803</td>
<td>LISTER Facility</td>
</tr>
<tr>
<td>SGU6804</td>
<td>SPEEDTYPE Facility</td>
</tr>
<tr>
<td>SGU6805</td>
<td>Dictionary Tools</td>
</tr>
<tr>
<td>SGU6807</td>
<td>Extended Mail Facility</td>
</tr>
<tr>
<td>SGU6820</td>
<td>Compose Facility</td>
</tr>
<tr>
<td>SGU6833</td>
<td>TED (Text Editor)</td>
</tr>
<tr>
<td>SGU6834</td>
<td>Emacs Text Processing Facility</td>
</tr>
<tr>
<td>SGU6835</td>
<td>Offline Page Printing System Support Facility</td>
</tr>
</tbody>
</table>

### DATA MANAGEMENT SOFTWARE

<table>
<thead>
<tr>
<th>Software Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SGC6824</td>
<td>Multics Forum Facility</td>
</tr>
<tr>
<td>SGD6800</td>
<td>MRDS (Multics Relational Data Store)</td>
</tr>
<tr>
<td>SGD6801</td>
<td>LINUS (Logical Inquiry and Update System)</td>
</tr>
<tr>
<td>SGC6826</td>
<td>Multics Executive Forum Facility</td>
</tr>
</tbody>
</table>

### APPLICATIONS SOFTWARE

<table>
<thead>
<tr>
<th>Software Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGS6801</td>
<td>Timesharing Library (see Note 3)</td>
</tr>
<tr>
<td>AGS6802</td>
<td>ISTAT (Interactive Statistics) (see Note 3)</td>
</tr>
<tr>
<td>AGS6803</td>
<td>Graphics Facility</td>
</tr>
<tr>
<td>AGS6805</td>
<td>SCICONIC Mathematical Programming Package</td>
</tr>
<tr>
<td>AGS6806</td>
<td>SCICONIC Matrix Generator Facility</td>
</tr>
<tr>
<td>SGH6801</td>
<td>Simplified Computing and Filing Facility</td>
</tr>
<tr>
<td>SGH6802</td>
<td>TEXTO Document Management System and LOGOTEL User Interface for TEXTO</td>
</tr>
<tr>
<td>SGH6804</td>
<td>MegaCalc Spread Sheet Package</td>
</tr>
</tbody>
</table>

**Notes:**

1. Licensed for use without separate charge to users acquiring a central processor system from Honeywell.

Priced Software B-2

SRB12.0
2. Class II - Maintained only.
3. Class III - Unsupported.
4. Required for normal Multics operation and to support any additional separately priced software products.
APPENDIX C

DOCUMENTATION CHANGES

CURRENT MULTICS DOCUMENTATION STATUS

A complete list of manuals (including current availability status) is provided in >doc>info>manuals.info as part of MR12.0. Subsequent to this release a SiteSA may obtain an updated list of available manuals at >doc>info>manuals.info on System M.

MR12.0 Documentation

The following new and updated publications support MR12.

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Document Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AG92-06A</td>
<td>Multics Commands and Active Functions</td>
</tr>
<tr>
<td>AG93-05A</td>
<td>Multics Subroutines and I/O Modules</td>
</tr>
<tr>
<td>AK51-02A</td>
<td>Multics Project Administrator's Guide</td>
</tr>
<tr>
<td>AM81-04</td>
<td>Multics System Maintenance Procedures</td>
</tr>
<tr>
<td>AT58-03D</td>
<td>Multics FORTRAN Manual</td>
</tr>
<tr>
<td>AU77-03B</td>
<td>Multics Online Test and Diagnostics Ref Manual</td>
</tr>
<tr>
<td>AW53-04D</td>
<td>Multics Relational Data Store Reference Manual</td>
</tr>
<tr>
<td>AZ49-03A</td>
<td>Logical Inquiry and Update System Ref Manual</td>
</tr>
<tr>
<td>CC70-01D</td>
<td>Multics FORTRAN User's Guide</td>
</tr>
<tr>
<td>CH23-02A</td>
<td>Multics Extended Mail System User's Guide</td>
</tr>
<tr>
<td>CH27-00F</td>
<td>Emacs Text Editor User's Guide</td>
</tr>
<tr>
<td>CX20-06</td>
<td>Fundamentals of Multics Executive Mail</td>
</tr>
<tr>
<td>DX71-01</td>
<td>Fundamentals of Multics Executive Forum</td>
</tr>
<tr>
<td>GB61-01A</td>
<td>Operator's Guide to Multics</td>
</tr>
<tr>
<td>GB62-00A</td>
<td>Multics Pascal User's Guide</td>
</tr>
<tr>
<td>GB64-00A</td>
<td>Multics Admin, Maint, and Operations Commands</td>
</tr>
<tr>
<td>GB66-00</td>
<td>Multics On-Line Work Station Env User's Guide</td>
</tr>
<tr>
<td>HH07-00</td>
<td>Multics C Compiler User's Guide</td>
</tr>
<tr>
<td>HM28-00</td>
<td>Multics On-Line Work Station Env Appl Prog Manual</td>
</tr>
</tbody>
</table>
The following manuals are NO LONGER AVAILABLE for ordering purposes:

Transaction Processing Ref Manual (last update CC96-01)
Remote Batch Facility (Lev 68 to Lev 6) (last update CG18-00)

For the convenience of new user sites, a complete list of Multics manuals, is provided below. For information about how to order manuals, type "help order_manuals," on your system.

AG90 Introduction to Programming on Multics
AG91 Multics Programmer's Reference Manual
AG92 Multics Commands and Active Functions
AG93 Multics Subroutines and Input/Output Modules
AG94 Multics PL/I Language Specification
AK50 Multics System Administration Procedures
AK51 Multics Project Administrator's Guide
AK95 Multics APL User's Guide
AL39 Multics Processor Manual
AM81 Multics System Maintenance Procedures
AM82 Multics BASIC
AM83 Multics PL/I Reference Manual
AN05 Multics GCOS Environment Simulator
AN50 Guide to Multics Manuals
AS40 Multics Graphics System
AS43 Multics COBOL User's Guide
AS44 Multics COBOL Reference Manual
AT58 Multics FORTRAN Manual
AT59 Multics DFAST Subsystem User's Guide
AU25 Multics FAST Subsystem Reference Guide
AU77 Multics Online Test and Diagnostics Reference Manual
AW17 Multics Commands and Active Functions Quick Ref Guide
AW32 Multics SORT/MERGE
AW53 Multics Relational Data Store Reference Manual
AZ49 Multics Logical Inquiry and Update System Ref Manual
AZ98 Multics WORDPRO Reference Manual
CC69 Multics Report Program Generator Reference Manual
CC70 Multics FORTRAN User's Guide
CC75 Multics Communications Administration
CG40 Multics qedx Text Editor User's Guide
CH23 Multics Extended Mail System User's Guide
CH24 New User's Introduction to Multics--Part I
CH25 New User's Introduction to Multics--Part II
CH27 Emacs Text Editor User's Guide
CJ52 Multics Emacs Extension Writer's Guide
CP31 Level 68 Introduction to Emacs Text Editor
CP50 Multics Text Editor (Ted) Reference Manual
CP51 Multics Menu Creation Facilities
CX20 Fundamentals of Multics Executive Mail
CX72 Executive Mail Editing Operations (Reference Card)

Documentation Changes C-2 SRB12.0
CY73  Inter-Multics File Transfer Facility Reference Guide
CY74  Multics Forum Interactive Meeting System User's Guide
DJ18  Guide to Multics WORDPRO for New Users
DU06  Fundamentals of Multics Forum Interactive Meeting System
DW19  Multics MegaCalc User's Guide
DX71  Fundamentals of Multics Executive Forum
GB58  Multics Common Commands
GB60  Multics HASP Service and Utility Manual
GB61  Operator's Guide to Multics
GB62  Multics Pascal User's Guide
GB64  Multics Administration, Maintenance, and Operations Cmds
GB65  Multics/Personal Computer File Transmission Facilities
GB66  Multics On-Line Work Station Env User's Guide
GL71  Multics Simplified Computing and Filing Facility
GN08  Multics Emacs Reference Card
HH07  Multics C Compiler User's Guide
HM28  Multics On-Line Work Station Env Appl Prog Manual