Datashare/1000

Reference Manual

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HEWLETT PACKARD

PRINTING HISTORY

The Printing History below identifies the Edition of this Manual and any Updates that are included. Periodically, Update packages are distributed which contain replacement pages to be merged into the manual, including an updated copy of this Printing History page. Also, the update may contain write-in instructions.

Each reprinting of this manual will incorporate all past Updates, however, no new information will be added. Thus, the reprinted copy will be identical in content to prior printings of the same edition with its user-inserted update information. New editions of this manual will contain new information, as well as all Updates.

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Preface

This manual describes the Datashare/1000 Multi-Computer File Manager package that allows multiple computers to share disc cartridges. Since Datashare/1000 is an extension of the RTE-6/VM Operating System FMGR, features common to both are not repeated in this reference manual. For the most part, the extensions are transparent in both the single-computer and multi-computer applications. This manual will therefore only describe changes in user interface with FMGR commands and RTE-6/VM operating system utilities and library subroutines, and those utilities and subroutines provided specifically for Datashare/1000. Refer to the following RTE-6/VM manuals for details of the common features:

Terminal User's Reference Manual (92084-90004)
RTE-6/VM Quick Reference Guide (92084-90003
Programmer's Reference Manual (92084-90005)
System Manager's Reference Manual (92084-90009)
Technical Specifications (92084-90015)

This manual is organized as:

Chapter 1   introduces Datashare/1000. The functional configuration and hardware requirements are defined, and the new and extended commands, utilities and subroutines are described.

Chapter 2   describes the extensions to FMGR commands for use in a multi-computer environment.

Chapter 3   describes the new utilities, DCONV and DMALL, provided for Datashare/1000.

Chapter 4   describes the new subroutines, SIDGP and M.CPU, designed for Datashare/1000, and the extensions to existing subroutine FSTAT.

Chapter 5   details system generation requirements for Datashare/1000.

Appendix A   illustrates and defines the RTE-6/VM cartridge specification entry and the 16-word expansion used in a multi-computer environment.

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Chapter 1
General Information

Datashare/1000, the Multi-Computer File Management system, is an extension of the standard RTE-6/VM File Manager (FMGR) that allows up to four computers to share disc cartridges and the files that exist on the shared discs. All cartridges, with the exception of the system and auxiliary cartridges (LU 2 and LU 3), can be shared in a multi-computer environment. In a single-computer environment, the multi-computer features are not used and Datashare/1000 functions as the standard RTE-6/VM FMGR.

Functional Configuration

The multi-computer features are enabled by including a CPU specification in the 'CHANGE ENTS?' portion of the system generation. If an LU is going to be shared in a multi-computer environment, the cartridge-specification entry in the existing cartridge file directory for that LU is expanded from one to two 16-word entries to allow definition of the mount/dismount and lock/unlock status of the shared cartridges, and to identify the related session IDs. The directory-entry expansion is accomplished using the Datashare/1000 utility DCONV or, in systems that include a tape transport, using the RTE-6/VM utility set READT/WRITT. If the LU is not going to be shared in a multi-computer environment, the specification-entry conversion is not required.

LU 2 and LU 3 contain the system tracks. Since the track assignment table is kept in memory, conflicting use of the system tracks cannot be prevented. As a result, LU 2 and LU 3 cannot be shared. Since LU 2 contains the system cartridge list, this list also cannot be shared by other computers or even locally accessible to other computers. Each computer in the multi-computer system then must have a unique, unsharable cartridge list. As a result, mount/dismount operations performed by one computer cannot be posted to the cartridge lists of other computers in the system.

When a system is switched (the operating system is transferred from an external disc to the system disc following on-line generation), the switched-system cartridge list is cleared to indicate that only LU 2 is mounted. However, the unshared disc directories on each cartridge cannot be updated (cleared) by the system switch program SWTCH. Datashare/1000 includes a utility, DMALL, for this purpose. Following initial system boot, DMALL must be executed to clear any mount indicators left on the disc directories from the previous system.

In configuring a system for multi-computer use, the following requirements must be met:

1. Each sharing computer must be uniquely identified at system generation, using a number between 0 and 7.

2. All user and account ID numbers assigned when the accounts are initialized must be identical on all computers. This is best accomplished using the same answer file at all computers. Note that an account assigned at one computer must be identically assigned at all computers.

3. The controller lock can be used *ONLY* by D.RTR and cannot be used by any other programs.

4. Spool cartridges must be uniquely allocated for each computer in a multi-computer system; spool cartridges cannot be shared among computers.

When the configuration conditions are satisfied and the directory conversion and cartridge state update operations are completed, DATASHARE/1000 is transparent to the user.

FMGR Commands

The following FMGR commands have been extended for use with Datashare/1000 in a multi-computer environment. Refer to Chapter 2 for a detailed description of the extensions to the user interface.

AC	Allocate Cartridge
CL	List Cartridges
DC	Dismount Cartridge
DL	List Directory
IN	Initialize Cartridge
MC	Mount Cartridge
RP	Restore Program
RU	Run Program

Utilities

Two utilities, DCONV and DMALL, are provided for use with Datashare/1000 in a multi-computer environment. DCONV, the directory conversion utility, converts an existing cartridge specification entry to the 32-word entry required to define multi-computer use. DMALL updates the directory on each cartridge after restoration of LU 2, or after bootup of a switched system, to clear all mount bits left for cartridges that were mounted under the pre-switched system. Refer to Chapter 3 for a detailed description of these utilities.

Library Subroutines

One library subroutine, FSTAT, was extended for Datashare/1000, and two subroutines, SIDGP and M.CPU, are provided for use in a multi-computer environment. FSTAT returns the cartridge directory to a user buffer, and identifies the locking computer and the session number of the program owning the lock. SIDGP provides a straightforward method to identify session-monitor values: session/non-session mode, user ID, and group ID. M.CPU provides an indication when the multi-computer functions are enabled on a CPU. Refer to Chapter 4 for a detailed description of the library subroutines.

Software Requirements

Datashare/1000 requires the RTE-6/VM Operating System, revision 2226 or later.

Hardware Requirements

Datashare/1000 is compatible with any HP 1000 E or F Series computer system. The minimum hardware configuration for a multi-computer application is:

    2 HP 1000 E/F Systems (with options required to support RTE-6/VM)
    1 HP 79xxM/S Multi-Access Controller (MAC) disc and disc drive
    1 lHP 13037 disc controller
    1 HP 13178 multi-computer kit

Chapter 2
FMGR Commands

This chapter defines the actions of file manager commands extended for Datashare/1000. The information is intended to replace the corresponding command descriptions in the RTE-6/VM Terminal User's Reference Manual.

AC (Allocate Cartridge)

Allocates a cartridge to the session user from the spare cartridge pool. Before the cartridge is mounted to the system and the caller's session, any files residing on the allocated cartridge will be purged. The AC command is valid only when operating under session control.

> AC,crn,[p/g[,size[,id[,#dir tracks]]]]

crn   Cartridge Reference Number to be assigned to the allocated cartridge (1 to 32767 or two ASCII characters). Must be a unique CRN to the session, but need not be unique to the system. This parameter is required.

p/g   Private (p) or group (g) cartridge designation. (Cartridge is assigned to an individual user on the system, or to a functional group of users.) If this parameter is omitted, the default is to designate the cartridge as private.

size   Number of tracks needed on the allocated cartridge. If this parameter is omitted, the default is to allocate the first available cartridge in the spare cartridge pool.

id   ASCII identifier assigned to the cartridge; up to six characters. If this parameter is omitted, id DC00xx is assigned, where xx is the LU of the terminal from which the command is input.

#dir tracks   Number of directory tracks used by the file directory on the cartridge. If this parameter is omitted, one track is assumed.

EXAMPLES:

:AC,1000,G The first available cartridge in the spare cartridge pool is cleared, assigned 1000 as its CRN and mounted to the caller as a group cartridge.

:AC,DD,P The first available cartridge in the spare cartridge pool is cleared, assigned DD as its CRN and mounted to the caller as a private cartridge.

:AC,50,,75 Search the spare cartridge pool for a free cartridge with at least 75 tracks. The first one found is initialized by clearing its directory and assigning 50 as its CRN. By default, it is mounted as a private cartridge. If the cartridge has more than 75 tracks, the whole cartridge is made available.

COMMENTS:

The AC command is a convenient way to mount cartridges to a session since, unlike the MC command, it is not necessary to know the LU number assignment for any disc cartridge.

The AC command will search the spare cartridge pool for a free cartridge (one that is not mounted to any other user or group on any computer) large enough to accommodate the "size" requirement, if specified. If a suitable cartridge is found, it is given the specified cartridge reference number. All files on the cartridge are purged, an entry is added to the system cartridge list, and the cartridge is mounted to the user's session by creating an entry in the session control block (SCB).

If size is not specified in the AC command, the first available cartridge in the spare cartridge pool is cleared and mounted.

In both a single-computer and multi-computer environment, the file directory will *always* start on the last track of the cartridge (defined at system generation). If an available cartridge is larger than the requested size, the entire cartridge is made available.

If the cartridge reference number specified is already mounted in the system cartridge list with the caller's private or group ID but is not currently active, the specified cartridge is activated; a new cartridge is not allocated. A cartridge can be designated as inactive using the DC (Dismount Cartridge) command; refer to the DC command description for details.

In the session environment, there are certain restrictions that apply when mounting a cartridge:

1. Only a specified number of private and group cartridges can be mounted at one time to a user session control block (SCB). The number is assigned by the system manager and put into the user's account file entry. An attempt to mount more than the specified number of cartridges will result in a FMGR 063 error, EXCEEDING SESSION DISC LIMIT.

2. There must be room in the user's session switch table (SST) to post the LU number of the cartridge being mounted. Further, there cannot be another session LU currently in the SST that has the same session LU as the cartridge being posted. These conditions can result in FMGR 066, NO ROOM IN SST, or FMGR 065, CONFLICT IN SST DEFINITION, errors.

NOTE

> If an account in one group is linked to an account in another group, all users in both groups must be careful not to use duplicate CRNs when allocating (AC) or mounting (MC) cartridges.

3. If a CRN is assigned to a cartridge mounted to the user session as a private cartridge, a group cartridge with the same CRN cannot be mounted to the session. An attempt to do so will cause a FMGR 012 error, DUPLICATE DISC LABEL OR LU. A user also cannot mount to the session a private or group cartridge with the same CRN as a system cartridge.

CL (Cartridge List)

Displays the list of mounted cartridges. In a multi-computer environment, identifies both the computer and session to which the cartridge is mounted. No command parameters are required.

:CL   List all cartridges accessible on local computer.

:CLAL   List all cartridges in local computer system cartridge list.

EXAMPLES:

```
:CL
  LU  LAST TRACK    CR    LOCK   P/G/S

  35     00202      JT   FMG58    P
  31     00202    01000           G
  02     00202    00002           S
  10     00202    00050           S

:CLAL
  LU  LAST TRACK    CR    LOCK   P/G/S   USER/GROUP

  02     00202    00002  FMG85    S      MANAGER.SYS
  10     00202    00050           S      MANAGER.SYS
  32     00202    01000           G      ACCTG
  39     00202    02000
  31     00202    01000           G      MANUF
  35     00202      JT   1.073    P      LEON.OL
  33     00202    01000           G      QA
  38     00202    00016           P      WONG.RD
                                         TURNBLL.TP
  40     00202    05000           P      NAOMI.RD
```

COMMENTS:

The cartridge list issued to the list device (the user terminal) contains the following information:

LU   Logical unit number of the cartridge.

LAST TRACK   Last track assigned to FMP on cartridge.

CR   Cartridge reference number.

LOCK   Blank if not locked. If locked by a program on this computer, the program name. If locked by a program on another computer in a multi-computer environment, "n.sss", where n is the computer number and sss is the session on the computer.

P/G/S   Indicates a cartridge mounted as private, group, or system. If blank, indicates a non-session cartridge.

USER/GROUP   User or group to whom cartridge is mounted. If blank, indicates a non-session cartridge.

The CL command lists only those cartridges mounted to the session or non-session user, the user's group, or the system. With the CLAL command, all cartridges mounted to all users of the system, including non-session users, are listed. (LU 39 in the CLAL call example is a non-session cartridge, since the P/G/S column is blank.) If the session monitor software modules are not included in the system, the CL and CLAL commands produce the same lists.

Some cartridges may be shared between session users by linking user accounts. (In the CLAL call example, LU 38 is shared by and, except for the system manager, accessible only to users WONG.RD and TURNBLL.TP.) When either of these users logs on, LU 38 will be mounted to the session as a private cartridge. For more details on account linking, refer to the RTE-6/VM System Manager's Manual.

Be aware that in a Datashare/1000 multi-computer configuration, cartridges mounted to an account on one computer are *not* automatically mounted to the same account on the other computers. The Mount Cartridge (MC) command can be used at each computer to mount a cartridge to those computers.

In the CLAL example, cartridge JT (LU 35) is locked by a program running under session 73 on computer 1 (1.073 entered in LOCK column).

DC (Dismount Cartridge)

Logically removes a disc cartridge from a user's environment. In session mode, the inactive bit is set in the Session Control Block (SCB) entry for the cartridge. In non-session mode, the cartridge entry is deleted from the system cartridge list. Optionally (in session mode only), you can release the cartridge resource back to the system. In a multi-computer environment, DC returns an error if an attempt is made to dismount a downed cartridge.

DC,cartridge [,RR]

where

cartridge is the cartridge identifier, a positive or alphanumeric CRN assigned to the cartridge or a negative LU associated with the cartridge.

RR Release Resource. An optional parameter for session users only; this parameter is ignored in non-session mode. Specifying RR deletes the cartridge entry in the system cartridge list. If the cartridge originally came from the spare cartridge pool, it is returned.

WARNING

If the cartridge being dismounted originally came from the spare cartridge pool, ensure that the cartridge does not contain any files that need to be saved before you return the resource to the pool using the RR parameter. If the cartridge is later mounted with the AC command or with the READT utility, all previous files on that cartridge will be lost.

If LU 2 is dismounted out of session, it is taken off the cartridge list and thus not available to session users. The System Manager must do a "DC,−2,RR" to remount it as a system cartridge.

EXAMPLE:

In the following example, CL/CLAL are run in conjunction with the DC command to check the current status of the cartridges.

```
:CL
   LU    LAST TRACK      CR       LOCK    P/G/S
   35     00202          JT               P
   31     00202        01000              G
   02     00202        00002              S
   10     00202        00050              S
```

```
:DC,JT      set inactive bit in cartridge entry in user's Session Control Block (SCB).

DISC CRN JT LU 35 INACTIVE
```

```
:CL
   LU    LAST TRACK      CR       LOCK    P/G/S
   31     00202        01000              G
   02     00202        00002              S
   10     00202        00050              S
```

Cartridge JT (LU 35) is no longer in the user's operating environment, but is still mounted to the user in the system cartridge list.

```
:CLAL
   LU    LAST TRACK      CR       LOCK    P/G/S    USER/GROUP
   02     00202        00002              S        MANAGER.SYS
   10     00202        00050              S        MANAGER.SYS
   32     00202        01000              G        ACCTG
   31     00202        01000              G        MANUF
   35     00202          JT               P        LEON.OL
   33     00202        01000              G        QA
   38     00202        00016              P        WONG.RD
```

Cartridge JT is still mounted to user LEON.OL, but has been set inactive by the DC,JT command.

```
:MC,35      Resets inactive bit, mounts cartridge to user's operating environment.
            (Note that the MC Command requires that the cartridge be specified by
            its LU.)
```

```
:CL
   LU    LAST TRACK      CR       LOCK    P/G/S
   35     00202          JT               P
   31     00202        01000              G
   02     00202        00002              S
   10     00202        00050              S
```

To return the cartridge to the system, the RR option (release resource) must be specified.

```
:DC,JT,RR
DISC CRN JT LU 35 DISMOUNTED FROM SYSTEM (POOL)
:CLAL
   LU    LAST TRACK      CR       LOCK    P/G/S    USER/GROUP
   02     00202        00002              S        MANAGER.SYS
   10     00202        00050              S        MANAGER.SYS
   32     00202        01000              G        ACCTG
   31     00202        01000              G        MANUF
   33     00202        01000              G        QA
   38     00202        00016              P        WONG.RD
   39     00202        02000
```

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Cartridge 35 is no longer mounted to LEON.OL. It has been returned to the system and is now available to any user.

COMMENTS:

If an attempt is made to dismount a downed LU from the system, a FMGR-107 error (DISC ERROR; ONLY CARTRIDGE LIST UPDATED) will result. The LU is removed from the cartridge list, but the directory itself is not updated; it will continue to show the LU as mounted and not down. The LU must be returned to UP status before it can be dismounted.

When a session user (not the System Manager) dismounts a cartridge using the DC command, FMGR checks to see whether the specified cartridge is mounted as a private or group cartridge within the user's Session Control Block (SCB). If it is not, a FMGR 054 error (DISC NOT MOUNTED) results. Only the System Manager can dismount any cartridge in the system if the cartridge has a corresponding entry in the Session Switch Table (SST) for the manager's account.

If the session user does not specify the RR option in the DC command, the cartridge will not be returned to the system. An inactive bit is set in the cartridge entry in the user's SCB to logically remove it from the user's operating environment. The cartridge would then be omitted from any file search operation that occurs when a cartridge is not specified.

If the RR option is used, FMGR checks to see whether the cartridge specified is mounted as a private or group cartridge within the user's SCB. If the cartridge is mounted as P or G, FMGR removes its entry from the user's SCB and then checks to see whether the cartridge can be removed from the system cartridge directory. If one or more users have the cartridge mounted to a session, the cartridge is dismounted but not removed from the system cartridge list. If no user has it currently mounted, the cartridge is dismounted and its entry is removed from the system cartridge list. If a file is open and the user tries to dismount a cartridge, a FMGR-008 error (FILE OPEN OR LOCK REJECTED) is returned and the cartridge is not dismounted.

When a non-session user does a dismount cartridge operation using the DC command, FMGR checks the list of non-session cartridges for the specified cartridge to be dismounted. If the cartridge specified is not a non-session cartridge, a FMGR 054 error (DISC NOT MOUNTED) results. If it is a non-session cartridge, its entry in the system cartridge list is removed. Note that the FMGR 054 error also is returned if you attempt to dismount a cartridge mounted to another user or group.

LU 2 and LU 3 (if used) cannot be removed from the system cartridge directory. A command DC,2,RR will remove the current entry for LU 2, but it will also put a new entry for LU 2 at the bottom of the directory. This safeguards against dismounting system disc LU 2 or auxiliary disc LU 3. Note that when an entry for LU 2 or LU 3 is put back into the cartridge directory, the ID of the user issuing the DC command is used in the cartridge directory entry (i.e., System Manager or non-session user). This is how LU 2 or LU 3 can be made system type or non-session type cartridges.

DL (Directory List)

Provides a list of all FMP files on a specified cartridge, a list of all FMP files on all cartridges within the user's operating environment or, optionally, a list of files with common namr characteristics. In a multi-computer environment, identifies the computer at which a program is open and indicates the exclusive, non-exclusive open status of the program.

        DL [,cartridge [,master security]]

        DL [,namr [,master security]]

where

cartridge	cartridge identifier: positive for CRN, negative for LU number. If omitted or zero, the directories of all cartridges available to the user are listed.
master security	code assigned to system at initialization. If correctly specified, the directory list includes the file security code and track and sector address for each file.
namr	file descriptor: must not be an LU number. Omitted subparameters default to zero. Dashes can be used as place holders in the namr to allow more flexibility.

EXAMPLES:

Example 1.

```
:DL,2          List all FMP files on cartridge 2.

CR=00002
 ILAB=SYSTEM NXTR= 00101 NXSEC=40 #SEC/TR=096 LAST TR=00255 #DR TR=01

   NAME     TYPE    SIZE/LU     OPEN TO

   +@CCT! 00001 00057 BLKS LOGON LGOFF
   WELCOM 00004 00001 BLKS
   "WELCO 00004 00002 BLKS
   "DEV   00004 00002 BLKS     1 .-
     .
     .
     .
   "LCHEL 00004 00003*BLKS            DEMO -
     .
     .
     .
   "HELLO 00004 00003 BLKS
```

Example 2.

        :dl,45,XX   List all FMP files on cartridge 45, master security code XX

```
CR= 00045
 ILAB=PROJ   NXTR= 00084 NXSEC=072 #SEC/TR=128 LAST TR=00280 #DR TR=01

 NAME    TYPE    SIZE/LU    SCODE TRACK SEC  OPEN TO

 MICRO  00004 00012 BLKS   00000 00000 000    1.
 &HDR   00004 00002 BLKS      SM 00000 024
 LGTAT  00003 00330 BLKS      KK 00000 028
 COMPL  00004 00021 BLKS   00000 00005 048    0.   1.
          .
          .
          .
 $SPEC  00005 00023 BLKS      PC 00005 090
 "LDREC 00004 00031 BLKS   00000 00006 008
          .
          .
          .
 PASN6V 00003 00024 BLKS  -31107 00032 004
 PASNXL 00003 00026 BLKS   00000 00032 052
```

Command	Description
:DL,A	List all files whose name is A.
:DL,A-----	List all files whose name starts with A.
:DL,--A--A:-5:2	List all files whose third and sixth name characters are A and whose security code is −5 or +5 and which are on cartridge 2.
:DL,------:::1	List all files of length 1.
:DL,------:::::16	List all files with record length 16.

COMMENTS:

The DL,namr formats shown above allow more flexibility when specifying directory entries to be listed. When these formats are used, the following conditions must be met before a given file entry will be listed:

1. The file name must match the name portion of <namr>, except that any dashes in <namr> will "match" any character.

2. Zero as a subparameter matches any actual subparameter. If a non-zero subparameter is specified, it must match the file's actual parameter.

3. The standard security code match is used; i.e., −n matches either +n or −n, but +n matches only +n.

The directory list is provided in two formats: a short list and a long list. Both lists have the same header information describing the cartridge itself; they differ in the file information provided. The long list (example 2) includes a file security code for each file and the track and sector address for the file. To obtain the long list, you must correctly enter the system master security code in the command runstring.

For session users, only the directories of those cartridges mounted to the user (P), the user's group (G), or the system (S) are listed. For non-session users, only the directories of non-session cartridges and system cartridges are listed.

The asterisk preceding the word BLKS in the directory listing (file "LCHEL in example 1) is printed if the file size is in multiples of 128 blocks. In the example, the file size for "LCHEL is three 128-block multiples.

The OPEN TO column contains an entry if the file is open. If the file is open in shared mode, up to seven programs may have the file open. For programs on one computer, the program name will be printed (file +@CCT! in example 1 is shared by programs LOGON and LGOFF on this computer).

In a Datashare/1000 multi-computer system, open flags for programs on other computers will cause the computer number to be printed. File MICRO in example 2 has been opened non-exclusively by a program on computer 1. If a file is exclusively opened, a minus sign will be appended to the program name or computer number. File "DEV in example 1 has been opened exclusively by a program on computer 1, as shown by the 1.− entry in the OPEN TO columns.

IN (Initialize Cartridge)

Except for the system cartridges of a new system, the initialize command cannot be applied to a cartridge without a directory. When the IN command is used on uninitialized LU 2 or LU 3, or when initialization causes files to be purged, IN will create a standard specification entry in a uni-computer system or an expanded specification entry if the Datashare/1000 multi-computer features are enabled. (Refer to Appendix A for details of the cartridge specification entry format.)

In a multi-computer system, the unsharable flag (SY field, word 0) is set in the cartridge specification extension for LU 2 and LU 3 to prevent other computers from mounting these cartridges.

When used to alter an existing cartridge directory, IN preserves the multi-computer mount flag in the cartridge specification entry extension. However, IN will not change the cartridge reference number field in the directory if the cartridge is mounted to more than one computer. An attempt to do so will result in a FMGR-051 error, CANNOT CHANGE CRN ON MULTIPLY-MOUNTED CARTRIDGE.

MC (Mount Cartridge)

Makes an unmounted cartridge available to a user. When used in a multi-computer environment, MC sets a flag in the cartridge specification entry to prevent a cartridge from being mounted by a user on another computer in the system.

    MC,lu [,p/g [,size [,id [,#dir tracks [,label]]]]]

where

lu	logical unit number of cartridge to be mounted; can be positive or negative. If operating under session control, cartridge must first be in user's session switch table (SST).
p/g	Private, group, or non-session cartridge designation. When operating under session control, enter P for private cartridge or G for group cartridge; the default is to private. When operating non-session, this parameter is meaningless, but a comma *must* be entered as a placeholder if other optional parameters are specified.
size	The number of tracks to be used on the cartridge. The first track is always 0 and the last track is equal to cartridge size−1.

NOTE

The following optional parameters are applicable only if there is not a valid directory on the first directory track. If a valid directory is present, these parameters are ignored if specified.

id	ASCII identifier assigned to the cartridge, up to six ASCII characters. When defaulted, the id is DC00xx, where xx is the LU number of the terminal from which the MC command is entered.
#dir tracks	Number of directory tracks used by the file directory on the cartridge. The default is one track.
label	CRN to be assigned to the cartridge being mounted. Applies only to cartridges that do not have a valid directory at the specified track. If the cartridge has a CRN associated with it, this parameter is ignored (to change the CRN of an LU, refer to the IN command description).

EXAMPLES:

`:MC,-39,G`	Operating under session, mount LU 39 as a group cartridge.
`:MC,40`	Operating non-session, mount LU 40.
`:MC,-41,,202,DATA,2,1250`	Operating non-session, mount LU 41, with 202 tracks, identify as "DATA", reserve 2 directory tracks, assign CRN #1250. Cartridge does not have a valid directory on track 201. Note comma used as a placeholder for the p/g parameter.

COMMENTS:

The MC command will initialize the cartridge only if there is not a valid directory on the first directory track. This depends on the size parameter (if specified). For example, for a cartridge (LU 41) that is defined in the track map table to have 203 tracks, an MC,−41 would require a valid directory on track 202. An MC,−41,,100 would require a valid directory on track 99. If the cartridge has a valid directory, the id, #dir tracks, and label parameters are ignored.

If the cartridge does not have a valid directory, MC will attempt to initialize the cartridge. The label parameter must be specified for the cartridge to be mounted and initialized; if it is not, an error is issued and MC terminates. The other parameters can be defaulted.

CAUTION

In a multi-computer system the size and label parameters, if not carefully specified, could result in a cartridge being mounted differently to two separate computers. That is, if cartridge LU 41 is mounted by one computer as above (with a valid directory on track 202), and an MC command of the form MC,−41,JT,100 is issued from another computer in the system, MC will only check the specified last track; it will not check for the directory at track 202 and will not find a valid directory at track 99. In this case, since the label was specified in the command call, MC will initialize the cartridge directory on track 99 and mount LU 41 to the second computer as CRN JT. This could result in the destruction of data as the cartridge is accessed by the two separate computers.

If MC is used to mount a cartridge with a single-computer cartridge specification entry (non-extended entry) on a multi-computer system, and the cartridge is not presently mounted on any computer, it is mounted and the MC field in the cartridge specification entry is set to prevent the cartridge from being mounted by any other computer.

Once mounted, the files on the cartridge may be used exclusively by the mounting computer. The directory conversion utility (DCONV) also can be used to rebuild the directory in the expanded entry format, which will allow the cartridge to be simultaneously mounted by multiple computers. (Refer to Chapter 3 for a description of DCONV.)

If a single-computer cartridge specification entry exists on the cartridge and the cartridge is presently mounted on some other computer, the mount request will result in a FMGR-034 error, DISC ALREADY MOUNTED. In this case, either dismount the cartridge from the other computer or run DCONV from the computer that has mounted the cartridge. DCONV will rebuild the directory and thus allow multiple mounts.

If a single-computer cartridge specification entry exists on the cartridge in a multi-computer environment, and the cartridge is not mounted, DCONV can be run from any computer in the system to rebuild the directory for multiple mounts.

If a cartridge has been dismounted by all computers in a system, the first computer to mount it with MC will clear any open flags that exist on the cartridge. When a mounted cartridge is mounted by other computers in the system, only those open flags that belonged to programs on the mounting computer will be cleared.

Session Environment Restrictions

In the session environment, there are certain restrictions that apply when mounting a cartridge.

1. Each user may only have a specified number of private and group cartridge mounted to the user session control block (SCB) at one time. The number is assigned by the system manager and put into each user account file entry. If an attempt is made to mount more than the specified number of cartridges, a FMGR 063 error, EXCEEDING SESSION DISC LIMIT, will occur.

2. There must be sufficient room in the session switch table (SST) to post the LU number of the cartridge being mounted. Also, there cannot be another session LU currently in the SST that has the same LU as the cartridge being posted. These conditions can cause FMGR 066 error, NO ROOM IN SST, or FMGR 065, CONFLICT IN SST DEFINITION.

3. If a user has assigned a CRN to a private cartridge mounted to the session, a group cartridge that has the same CRN assignment cannot be mounted to the session. An attempt to do so will result in a FMGR 012 error, DUPLICATE DISC LABEL OR LU. A cartridge with the same CRN as a system cartridge also may not be mounted to a session as a group or private cartridge. The FMGR 012 error also will occur if an attempt is made to mount an already mounted cartridge in either a single- or multi-computer environment.

If an account in one group is linked to an account in another group, all users in both groups must be careful not to duplicate CRNs when allocating (AC) or mounting (MC) cartridges.

RP (Restore Program) and RU (Run Program)

Extensions to the RP and RU commands are transparent; however, the following should be noted in using these commands in a multi-computer environment.

In a uni-computer system, ID segments may contain pointers directly to program files (type 6) on any cartridge. Because of the need to check for ID segment pointers by the purge command, ID segment pointers cannot point to shared cartridges in a multi-computer configuration.

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Since LU 2 and LU 3 cannot be shared, ID segments may point to program files on these cartridges; for all other cartridges, the program file will be copied onto system tracks and the ID segment will be constructed to point to this copy.

A problem can occur with programs that use T5IDM to dynamically restore segments. When a program is restored from a cartridge other than LU 2 or LU 3 in a multi-computer system, it is copied onto system tracks on LU 2 or LU 3. After the copy operation, the system will think that the program was restored from LU 2 or LU 3. When T5IDM is scheduled to restore a segment, it only searches the cartridge that contains the program tracks of the main program (i.e. LU 2 or LU 3, not the original cartridge). Thus, T5IDM may not find the segment, or may find a segment of the same name that belongs to another program. Non-segmented programs can be safely stored on any cartridge.

This problem can be avoided by storing any segmented programs that use T5IDM on LU 2 or LU 3, using the FMGR SP command. A better solution would be to size LU 2 and LU 3 as large as possible at system generation so that type 6 files can be stored there initially, thus avoiding the delays incurred by copying from disc to system tracks.

Chapter 3
Utilities

This chapter describes the utilities DMALL and DCONV, provided for use with Datashare/1000. DMALL updates each cartridge directory after the initial bootup of a switched system to clear the mount bits for any cartridges that were mounted on the pre-switched system. DCONV converts the existing cartridge specification entry in the file directory to the extended format required for Datashare/1000 multi-computer use.

Note that in systems that include a tape drive, the disc directory conversion also can be accomplished by using the RTE-6/VM utility set WRITT/READT to first save the cartridge to tape and then restore it to disc. If the multi-computer features have been enabled, READT will automatically convert the cartridge specification entry to the expanded Datashare/1000 format as part of the restoration process to disc. (Refer to the RTE-6/VM Utility Programs Reference Manual for a description of the WRITT/READT utilities.)

Directory Conversion Utility DCONV

The directory conversion utility DCONV provides a convenient, one-step method for converting existing cartridge specification entries to the extended 32-word entry required for cartridges used in a multi-computer environment. The multi-computer functions must be enabled before DCONV can be used.

Running DCONV

Call DCONV with the runstring

    :RU,DCONV,crn [:track]{,crn [:track] . . .,crn [:track]}

where
> **crn**   is either a positive CRN or a negative LU number. (The user must have write access to the cartridge specified.)

> **track**   is the cartridge size. This parameter is valid only when the cartridge is specified as a negative LU, AND the cartridge is not mounted, AND the directory is not on the last track of the cartridge. The default is track = last directory track + 1).

Multiple cartridges can be specified in the runstring, up to a maximum of 80 characters. If the crn parameter specifies an unmounted negative LU, the cartridge is mounted and the track parameter is used to locate the directory. The cartridge specification entry is converted and the cartridge then dismounted. If the crn parameter is specified in the form +crn, and it does not correspond to a mounted cartridge LU, DCONV returns an error and exits.

If the crn is already mounted and the directory is full, DCONV will attempt to add a track to the directory to create the extended cartridge specification entry. If the last file track is in use, DCONV will report the unsuccessful attempt with the following message and then exit; the cartridge specification entry will not be changed:

DCONV: nn NOT ENOUGH SPACE

where nn is the −LU or +CRN of the cartridge. If this error occurs, packing the cartridge (FMGR PK command) may reclaim sufficient space to allow expansion of the directory on the last file track. Another method is to use the FMGR copy command (CO) to copy the cartridge onto a larger cartridge. The original cartridge then can be cleared, converted, and reused.

After each directory conversion, DCONV issues the message

DCONV: xx SUCCESSFULLY CONVERTED

where xx identifies the cartridge whose directory was successfully converted.

Error Messages

DCONV can generate any of the following error messages, where xx is the −LU or +CRN of the cartridge at which the error was was encountered. In all cases the named cartridge LU directory is not converted; DCONV must be rerun.

DCONV: xx DISC ERROR

DCONV: xx INTERNAL BUFFER TOO SMALL

The buffer declared in the RTE library ($UTLIB) is too small for DCONV. Consult your local HP representative.

DCONV: xx NO POOL TRACKS

The system tracks may be in use by another program, or insufficient tracks were specified. Wait until the system tracks are released, or change the number of tracks available. Consult the System Manager.

DCONV: xx LOCKED

DCONV: xx NOT MOUNTED

DCONV: xx ERROR FMGR yy

The listed FMGR error has occurred. When the FMGR prompt (:) appears, enter HE to display the full error message definition.

Dismount Cartridge Utility DMALL

Because system cartridge LU 2 (and auxiliary cartridge LU 3, if used) cannot be shared in a multi-computer environment, each computer in the system has a unique unsharable cartridge list. As a result, cartridge mount/dismount and lock/unlock actions taken by one computer are not posted to the cartridge lists of other computers in the multi-computer group. This information is placed only in the cartridge specification entry and extension of each cartridge.

When a system is switched, SWTCH clears the system cartridge list (with the exception of LU 2), but cannot clear the mount bits on each cartridge. Therefore, the new system cartridge list will indicate that only LU 2 is mounted, while the individual cartridge directories will contain the mount status of the cartridge in the pre-switched system. The cartridge list and the individual cartridge directories also will contain inconsistent information when LU 2 is physically restored. In this case, the cartridge list will reflect the status of the backed-up system, and the cartridge directories will show the current mount states.

The utility DMALL is provided to place the cartridge list and cartridge directories in a consistent state. DMALL will clear the cartridge list with the exception of LU 2, and will clear any mount bits set in the individual cartridge directories. The switched (or restored) system cartridge list and each directory list then will consistently indicate that only LU 2 is mounted. If LU 3 also is included in the cartridge list, it is not cleared; the status in this case will indicate that LU 2 AND LU 3 are mounted.

DMALL must be run immediately after the first boot of the switched or restored system - THERE CANNOT BE ANY OTHER ACTIVITY ON THE SYSTEM WHILE DMALL IS RUNNING. The utility must be run in non-session mode to assure that DMALL has access to all cartridges since, in session mode, it would be restricted to only those cartridges accessible to the session.

Running DMALL

Call DMALL with the runstring

    RU,DMALL [,cpu]

The default for the cpu parameter is to the number of the switched system as defined by the $CPU# entered in the RP section of the system generation. This parameter is not required if the pre-switched and switched computers have the same number. (Note that this is the recommended practice.) If, however, the computer numbers of the pre-switched and switched systems are different, the computer number of the *PRE-SWITCHED* system must be given in the runstring.

DMALL checks the mount/dismount status contained in the cartridge specification entry and, if the entry indicates that the cartridoe was mounted in the pre-switched system (the mount flag is set), updates the entry to dismount the cartridge.

Error Messages

DMALL can generate the following error messages during execution. If the error is defined as fatal, the condition encountered is such that no cartridge directories could be updated. Non-fatal errors allow DMALL to continue updating; only the cartridge at which the error was encountered could not be updated. In general, conditions encountered by DMALL are errors that are external to the utility. The stated error condition should be remedied and DMALL rerun in all cases.

DMALL 01:
DMALL must be run non-session

(Fatal) If DMALL is run in a session environment, it is limited by the user's session switch table (SST) and thus does not have access to all cartridges for updating the directory.

DMALL 02:
Computer number must be an integer between 0 and 7, inclusive

(Fatal) A maximum of four computers may function in the multi-computer environment. The numbers must be within the range of 0 and 7, and are assigned at system generation. Rerun DMALL, specifying a computer number within the allowed range.

DMALL 03:
Disc error on LU xx; DISC NOT UPDATED

(Non-fatal) An error was encountered when trying to access the named cartridge LU directory. The directory for that cartridge is not updated.

DMALL 04:
Resource number not allocated; NO DISCS UPDATED

(Fatal) DMALL encountered an error in trying to allocate a resource number.

DMALL 05:
Resource number deallocate error

(Non-fatal) DMALL encountered an error when trying to deallocate the resource number. Note that this does *not* mean that the directories could not be updated.

DMALL 06:
Disc controller lock failed; LU xx NOT UPDATED

(Non-fatal) DMALL could not access the controller lock when trying to update the named cartridge LU.

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DMALL 07:
Disc controller unlock failed

(Non-fatal) The controller could not be unlocked after the cartridge directory updates.

DMALL 08:
Resource number lock error; LU xx NOT UPDATED

(Non-fatal) DMALL could not lock the resource number. The named cartridge LU directory could not be updated.

DMALL 09:
EQT lock error; LU xx NOT UPDATED

(Non-fatal) DMALL could not lock the EQT. The named cartridge LU directory could not be updated.

DMALL 10:
EQT unlock error

(Non-fatal) DMALL could not unlock the EQT after the cartridge directory update.

DMALL 11:
This is a uni-computer system; no updates necessary

(Fatal) User attempted to run DMALL in a single-computer system. The directory update is not required in this environment.

DMALL 12:
Cartridge List Not Cleared; NO DISCS UPDATED

(Fatal) Internal error. See the System Manager.

Chapter 4
FMP Library Subroutines

This chapter describes the FMP library subroutine FSTAT as extended for use in the Datashare/1000 multi-computer environment. Two subroutines, SIDGP and M.CPU, have been added to the library for Datashare/1000 and are also described here. SIDGP provides access to commonly needed session monitor values, and M.CPU gives an indication of the multi-computer enable status.

FSTAT

FMP routine FSTAT returns the cartridge directory to a user buffer. Additional parameters have been added to the FSTAT call to specify the desired format and the size of the buffer being supplied. The caller may also specify if all cartridges, or just private, group, and system cartridges, are to be reported.

FSTAT Calling Sequence

Call FSTAT with the sequence

    CALL FSTAT (ISTAT,ILEN,IFORM,IOP,IADD,MC)

In the calling sequence, the underlined parameters are optional. If, however, selected parameters are used within the optional parameter group, their positions must be maintained with commas as placeholders. As an example, if you wish to specify the IFORM and MC parameters only, the call sequence must be of the form

    CALL FSTAT (ISTAT,,IFORM,,,MC)

The FSTAT parameters are

    ISTAT   is the buffer into which the directory will be read.

    ILEN   is the length of the user buffer. Default is 125 words.

    IFORM   is an optional parameter that selects the format of the cartridge list to be written into the ISTAT buffer:

        If omitted or "0", format 1 is used.

        If non-zero, the directory is written into the buffer in format 2 or 3:

            If MC is omitted or "0", format 2 (a copy of the actual cartridge list) is returned.

            If MC is "1", format 3 is returned. This format includes multi-computer cartridge lock information.

IOP   is an optional parameter that selects cartridges whose information is returned in ISTAT.

If omitted or "0" under session control, the only returns are those private and group cartridges mounted to the session, followed by system cartridges.

If "1" under session control, all cartridges mounted on the system are returned in the order they appear in the cartridge list.

If "2" under session control, all cartridges available to the session are returned in the order they would be searched by D.RTR.

If not under session control, this parameter has no meaning. System and non-session cartridges are reported in the order they appear in the cartridge list.

IADD   is set nonzero if not all of the cartridge list could be returned in ISTAT.

MC   is the parameter used in a multi-computer environment to select format 3 for the information reported in ISTAT. This parameter is only meaningful when IFORM is non-zero.

If "0" or omitted, IFORM selects either format 1 or 2.

If "1" (*and* IFORM is non-zero), selects format 3. Note that format 3 is identical to format 2 when used in a single-computer environment.

ISTAT Return Formats

A four-word entry is reported in ISTAT for each cartridge. Indexed from 1 (FORTRAN default), ISTAT(1-4) describes the first cartridge, ISTAT(5-8) describes the second, etc.

Format 1

Format 1 only reports locks made by *local* programs. Cartridges can be reported as not locked when they actually may be locked by programs on other computers.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
logical unit number															
last track															
CRN															
lock word															
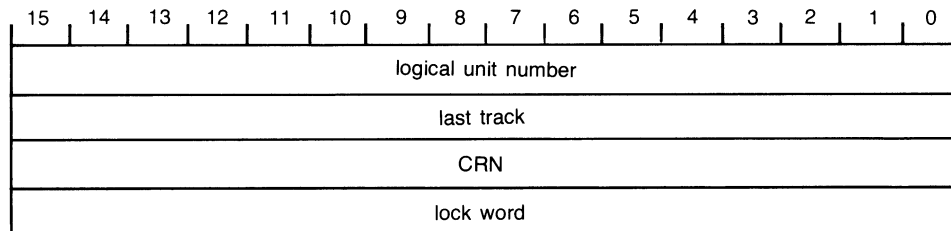
lock word   =   "0" if not locked by program on local computer, or
            =   ID segment address of local locking program

Format 2

Format 2 only reports locks made by *local* programs; cartridges can be reported as not locked when they actually may be locked by programs on other computers.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
lock								logical unit							
last track															
crn															
/////////					session ID										

```
lock word   =   "0" if not locked locally, or
            =   keyword index for ID segment of local locking program.
```

Format 3

Format 3 is used in a multi-computer environment to report the lock status of a cartridge. When a cartridge is locked by a different cpu, this format identifies the computer number and the ID of the session that owns the lock.

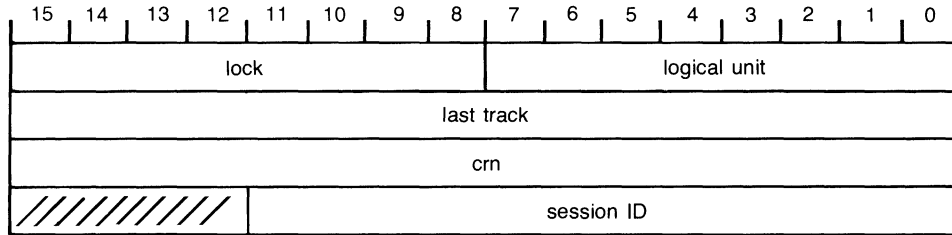| 15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
lock								logical unit							
last track															
crn															
M	C				session ID										
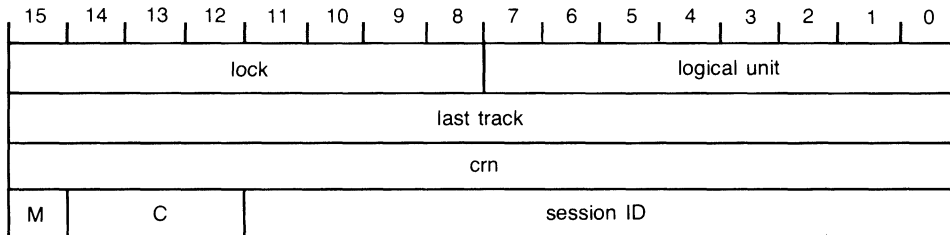
```
M     =   "0" All fields match the format 2 definitions. This mode is
          used for unlocked cartridges, or cartridges locked by local
          programs. C (computer number) is zero.
M     =   "1" The lock word describes a lock made by a program on
          another computer. In this case C is the computer number and
          session ID is the terminal LU number of the session running
          the program that owns the lock.
```

SIDGP

This subroutine simplifies access to commonly needed session monitor values: session/non-session mode, user ID, and group ID. The calling sequence for SIDGP is:

    CALL SIDGP(SESSN,USER,GROUP)

SESSN returns "−1" (true) if in session mode, or "0" (false) if not in session mode.

USER in session mode, returns user ID, else returns "0".

GROUP in session mode, returns group ID, else returns octal 7777.

M.CPU

This subroutine indicates whether or not multi-computer features are enabled on a computer. The calling sequence for M.CPU is:

    MC = M.CPU(IDUM)

    MC = "−1" (true) if multi-computer functions enabled;
           "0"   (false) if not enabled, or if force-loaded systems other than RTE-6/VM.

Chapter 5
Software Installation

This chapter provides instructions for installing Datashare/1000 in an RTE-6/VM system (revision 2226 or later). In summary, Datashare/1000 provides all of the capabilities of the file manager (FMGR) in a multi-computer application. Datashare/1000 is transparent in use; all commands accepted by the RTE-6/VM FMGR are accepted by the multi-computer file manager. When used in a single-computer environment, Datashare/1000 is identical to the RTE-6/VM file manager package.

System Generation

To enable the multi-computer functions, include a

> $CPU#,RP,cpu no.

statement in the 'CHANGE ENTS?' section of the system generation. The number entered must be a unique integer value within the range of 0 and 7. To avoid any chance of confusion, it is recommended that this number be the same as that of the pre-switched system.

At system generation, relocate the following modules:

REL,%BMPG1	*Multi-computer FMGR
REL,%BMPG2	*Multi-computer Directory Manager
REL,%BMPG3	*Multi-computer File Management Package (FMP)
REL,%DMALL	*Cartridge Status-Update Utility DMALL
REL,$DSHAR	*Datashare Library

Note that the multi-computer File Manager modules replace the File Manager modules provided with the RTE-6/VM software package.

If Datasafe/1000 is to be generated in with the Datashare/1000 system, $RECAP (part no. 91745-12001), the RECAP library in Datasafe/1000, should be relocated in place of $DSHAR.

The following modules may be generated in, or may be loaded on-line with LOADR:

%DCONV	*Cartridge Specification Entry Expansion Utility
%READT	*Restore Cartridge Utility READT

The %READT utility module need be loaded/generated only if you intend to perform the disc directory conversion using the RTE-6/VM magnetic tape save and restore utilities.

User Accounts

In a multi-computer environment, user account assignments must be created in the same order on all computers. This can be accomplished at system generation by using the same ACCTS answer file (but not the same ACCTS output file) at each computer. Refer to the RTE-6/VM System Manager's Reference Manual for details of the ACCTS file.

Cartridge Status Update

Immediately after the initial boot of the newly switched system, run DMALL to update the status of the cartridge directories to dismount any cartridges that had been mounted to the pre-switched system. (Refer to Chapter 3 for details of the utility DMALL.)

There must not be any other activity on the computer when DMALL is running. In order to gain access to all cartridges, DMALL must be run in a non-session environment.

Call DMALL with the runstring

    RU,DMALL[,cpu]

where cpu is the pre-switched computer number. Since the default is to the switched system computer number, this parameter is not required if the pre-switched and switched computer numbers are the same. It is strongly recommended that you use the same number for both the pre-switched and switched computers.

Software Modules

The following modules constitute the Datashare/1000 software;

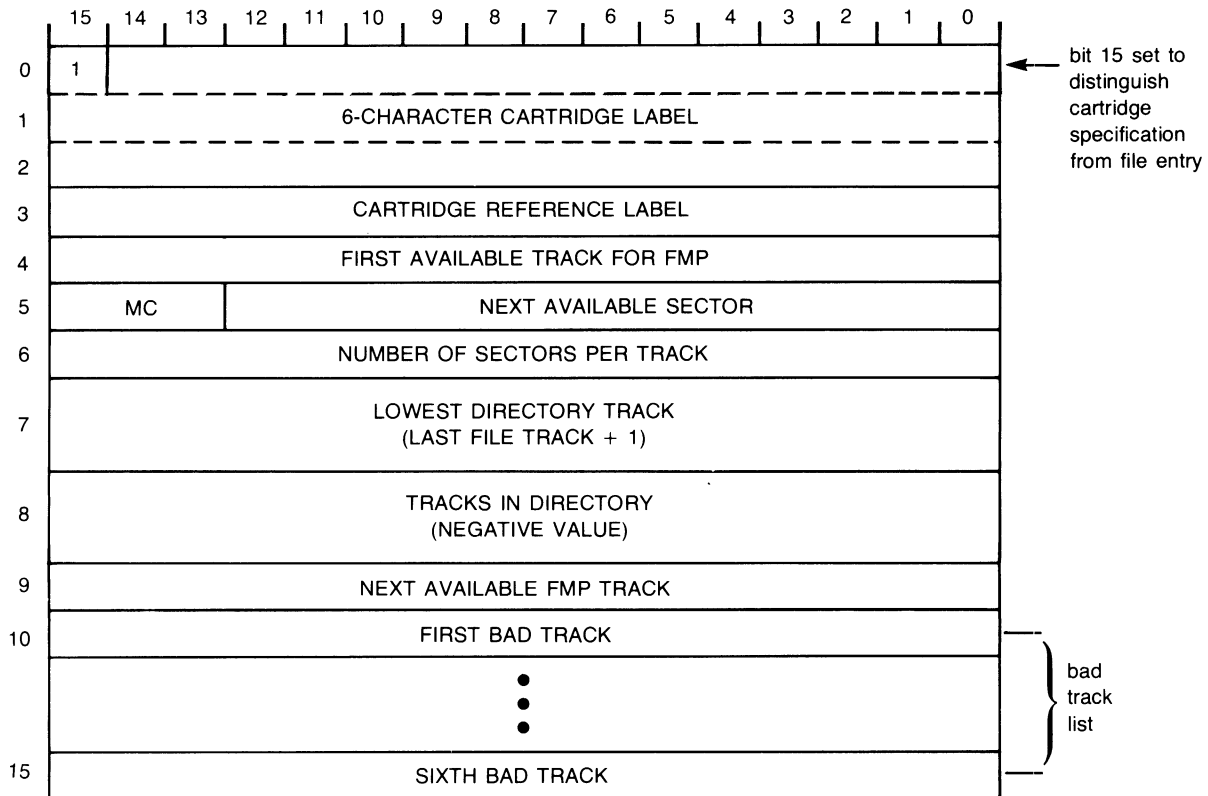| Module	Part No.	
%BMPG1	91747-12001	Multi-computer FMGR
%BMPG2	91747-12002	Multi-computer Directory Manager
%BMPG3	91747-12003	Multi-computer FMP
%DMALL	91747-16002	DMALL Utility
%DCONV	91747-16001	DCONV Utility
#DCONV	91747-17001	DCONV Loader
$DSHAR	91747-12004	Datashare Library

Appendix A
Cartridge Specification
Entry Format

The File Directory starts in sector 0 of the last track on all cartridge LUs. The first entry in each File Directory is the specification entry for the cartridge itself. For Datashare/1000, the cartridge specification entry has been expanded with a 16-word extension.

Cartridge Specification Entry

The first entry is identical to earlier formats, except that the MC field (bits 15-12 of word 5) is used to identify the mount/dismount status of a cartridge not in the expanded Datashare/1000 format. This prevents simultaneous mounting of the cartridge by more than one user. When the cartridge is dismounted, this field is "0"; when the cartridge is dismounted, this field is "0"; when the cartridge is mounted, bit 15 is set to "1" and bits 14-12 contain the number of the computer that has mounted the cartridge. The format of the entry is:

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
0	1																← bit 15 set to distinguish cartridge specification from file entry
1				6-CHARACTER CARTRIDGE LABEL												
2																
3				CARTRIDGE REFERENCE LABEL												
4				FIRST AVAILABLE TRACK FOR FMP												
5	MC			NEXT AVAILABLE SECTOR											
6				NUMBER OF SECTORS PER TRACK												
7				LOWEST DIRECTORY TRACK (LAST FILE TRACK + 1)												
8				TRACKS IN DIRECTORY (NEGATIVE VALUE)												
9				NEXT AVAILABLE FMP TRACK												
10				FIRST BAD TRACK												
				•												
				•													bad track list
				•												
15				SIXTH BAD TRACK												

Cartridge Specification Extension

The MOUNT BITS field in word 0 of the cartridge specification extension identifies those computers that have currently mounted the cartridge. The high-order bit corresponds to computer 3 and the low-order bit to computer 0 (a bit value of "1" indicates mounted). When the cartridge is dismounted, the bit for the dismounted cartridge is set to "0".

The SY field in word 0 is used to mark unsharable cartridges (SY=1 for unsharable, SY=0 for sharable). This field is always set to "1" for the system and auxiliary cartridgee (LU 2 and LU 3), which can never be shared.

The SESSION ID field in word 2 is a copy of the same field from the cartridge list, and is meaningless when the cartridge is dismounted. When the cartridge is first mounted, the appropriate session identification is placed in this field. The session ID is used to prevent illegal mounting of the cartridge by a different user/group.

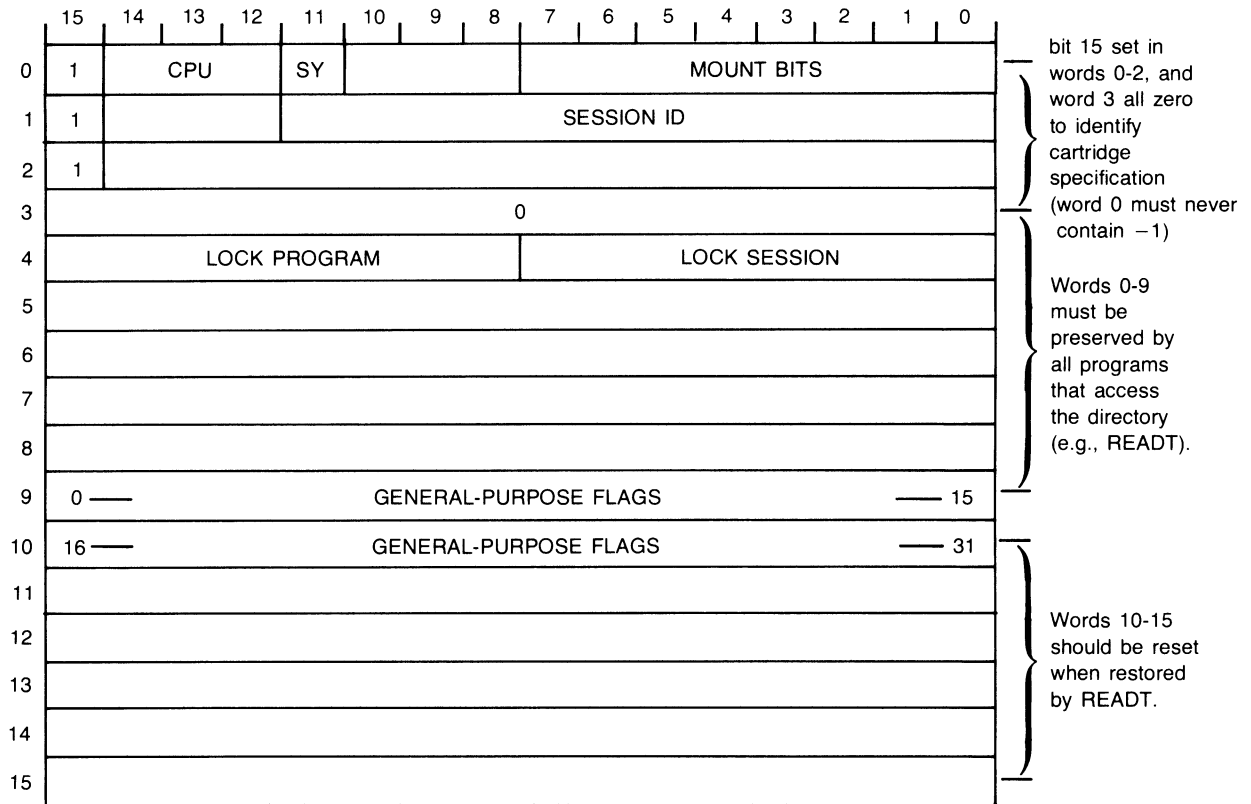Word 4 indicates the lock status of the cartridge (0 = unlocked). If locked, the LOCK PROGRAM field duplicates the lock information from the cartridge list, and the LOCK SESSION field contains the session number. The computer running the locking program is identified in the CPU field of word 0.

The general-purpose flags in words 9 and 10 are reserved as follows:

0-7,
24-31   Customer use

8-15,
16-23   HP products

The format of the extended entry is:

Word	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	1	CPU			SY				MOUNT BITS							
1	1				SESSION ID											
2	1															
3	0															
4	LOCK PROGRAM								LOCK SESSION							
5																
6																
7																
8																
9	0 ──				GENERAL-PURPOSE FLAGS										── 15	
10	16 ──				GENERAL-PURPOSE FLAGS										── 31	
11																
12																
13																
14																
15																

bit 15 set in words 0-2, and word 3 all zero to identify cartridge specification (word 0 must never contain −1)

Words 0-9 must be preserved by all programs that access the directory (e.g., READT).

Words 10-15 should be reset when restored by READT.

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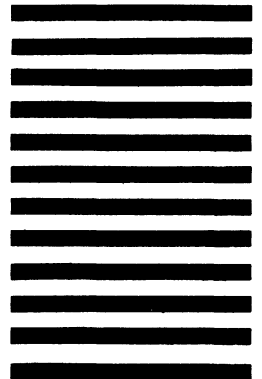
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CM,CS,E

Yokogawa-Hewlett-Packard Ltd.
Mito Mitsui Building
4-73, San-no-maru, 1-chome
MITO, Ibaragi 310
Tel: (0292) 25-7470
CM,CS,E

Yokogawa-Hewlett-Packard Ltd.
Sumitomo Seimei Bldg.
11-2 Shimo-sasajima-cho
Nakamura-ku
NAGOYA, Aichi 450
Tel: (052) 581-1850
CM,CS,E,MS

Yokogawa-Hewlett-Packard Ltd.
Chuo Bldg., 4th Floor
5-4-20 Nishinakajima, 5-chome
Yodogawa-ku, Osaka-shi
OSAKA, 532
Tel: (06) 304-6021
Telex: YHPOSA 523-3624
A,CM,CP,E,MP,P*

Yokogawa-Hewlett-Packard Ltd.
29-21 Takaido-Higashi 3-chome
Suginami-ku TOKYO 168
Tel: (03) 331-6111
Telex: 232-2024 YHPTOK
A,CM,CP,E,MP,P*

JORDAN

Mouasher Cousins Company
P.O. Box 1387
AMMAN
Tel: 24907, 39907
Telex: 21456 SABCO JO
E,M,P

KOREA

Samsung Electronics
4759 Shinkil, 6 Dong
Youngdeungpo-Ku,
SEOUL
Tel: 8334311, 8334312
Telex: SAMSAN 27364
A,C,E,M,P

KUWAIT

Al-Khalidya Trading & Contracting
P.O. Box 830 Safat
KUWAIT
Tel: 42-4910, 41-1726
Telex: 2481 Areeg kt
A,E,M

Photo & Cine Equipment
P.O. Box 270 Safat
KUWAIT
Tel: 42-2846, 42-3801
Telex: 2247 Matin
P

LUXEMBOURG

Hewlett-Packard Belgium S.A./N.V.
Blvd de la Woluwe, 100
Woluwedal
B-1200 **BRUSSELS**
Tel: (02) 762-32-00
Telex: 23-494 paloben bru
A,CM,CP,E,MP,P

MALAYSIA

Hewlett-Packard Sales (Malaysia)
Sdn. Bhd.
Suite 2.21/2.22
Bangunan Angkasa Raya
Jalan Ampang
KUALA LUMPUR
Tel: 483544
Telex: MA31011
A,CP,E,M,P*

Protel Engineering
Lot 319, Satok Rd.
P.O. Box 1917
KUCHING, SARAWAK
Tel: 535-44
Telex: MA 70904 Promal
Cable: Proteleng
A,E,M

MEXICO

Hewlett-Packard Mexicana, S.A. de C.V.
Avenida Periferico Sur No. 6501
Tepepan, Xochimilco
MEXICO CITY 23, D.F.
Tel: (905) 676-4600
Telex: 017-74-507
A,CP,E,MS,P

Hewlett-Packard Mexicana, S.A. de C.V.
Rio Volga 600
Colonia del Valle
MONTERREY, N.L.
Tel: 78-42-93, 78-42-40, 78-42-41
Telex: 038-410
CS

MOROCCO

Dolbeau
81 rue Karatchi
CASABLANCA
Tel: 3041-82, 3068-38
Telex: 23051, 22822
E

Gerep
2 rue d'Agadir
Boite Postale 156
CASABLANCA
Tel: 272093, 272095
Telex: 23 739
P

NETHERLANDS

Hewlett-Packard Nederland B.V.
Van Heuven Goedhartlaan 121
NL 1181KK AMSTELVEEN
P.O. Box 667
NL1080 AR AMSTELVEEN
Tel: (20) 47-20-21
Telex: 13 216
A,CM,CP,E,MP,P

Hewlett-Packard Nederland B.V.
Bongerd 2
NL 2906VK CAPPELLE, A/D Ijssel
P.O. Box 41
NL2900 AA CAPELLE, Ijssel
Tel: (10) 51-64-44
Telex: 21261 HEPAC NL
A,CM,CP

NEW ZEALAND

Hewlett-Packard (N.Z.) Ltd.
169 Manukau Road
P.O. Box 26-189
Epsom, AUCKLAND
Tel: 68-7159
Cable: HEWPACK Auckland
CM,CS,E,P*

Hewlett-Packard (N.Z.) Ltd.
4-12 Cruickshank Street
P.O. Box 9443
Kilbirnie, WELLINGTON 3
Tel: 877-199
Cable: HEWPACK Wellington
CM,CP,E,P

Northrop Instruments & Systems Ltd.
Eden House, 44 Khyber Pass Road
P.O. Box 9682
Newmarket, AUCKLAND
Tel: 794-091
A,M

Northrop Instruments & Systems Ltd.
Terrace House, 4 Oxford Terrace
P.O. Box 8388
CHRISTCHURCH
Tel: 64-165
A,M

Northrop Instruments & Systems Ltd.
Sturdee House
85-87 Ghuznee Street
P.O. Box 2406
WELLINGTON
Tel: 850-091
Telex: NZ 3380
A,M

NIGERIA

The Electronics Instrumentations Ltd.
N6B/S70 Oyo Road
Oluseun House
P.M.B. 5402
IBADAN
Tel: 461577
Telex: 31231 TEIL NG
A,E,M,P

The Electronics Instrumentations Ltd.
144 Agege Motor Road, Mushin
P.O. Box 6645
Mushin, LAGOS
A,E,M,P

NORTHERN IRELAND

Cardiac Services Company
95A Finaghy Road South
BELFAST BT 10 0BY
Tel: (0232) 625-566
Telex: 747626
M

NORWAY

Hewlett-Packard Norge A/S
Folke Bernadottesvei 50
P.O. Box 3558
N-5033 FYLLINGSDALEN (BERGEN)
Tel: (05) 16-55-40
Telex: 16621 hpnas n
CM,CS,E

Hewlett-Packard Norge A/S
Oesterndalen 18
P.O. Box 34
N-1345 OESTERAAS
Tel: (02) 17-11-80
Telex: 16621 hpnas n
A*,CM,CP,E,MS,P

OMAN

Khimji Ramdas
P.O. Box 19
MUSCAT
Tel: 72-22-17, 72-22-25
Telex: 3289 BROKER MB MUSCAT
P

PAKISTAN

Mushko & Company Ltd.
10, Bazar Road
Sector G-6/4
ISLAMABAD
Tel: 28624
Cable: FEMUS Rawalpindi
A,E,M

Mushko & Company Ltd.
Oosman Chambers
Abdullah Haroon Road
KARACHI 0302
Tel: 511027, 512927
Telex: 2894 MUSHKO PW
Cable: COOPERATOR Karachi
A,E,M,P*

PANAMA

Electrónico Balboa, S.A.
Apartado 4929
Panama 5
Calle Samuel Lewis
Edificio "Alfa" No. 2
CIUDAD DE PANAMA
Tel: 64-2700
Telex: 3480380
Cable: ELECTRON Panama
A,CM,E,M,P

Foto Internacional, S.A.
P.O. Box 2068
Free Zone of Colon
COLON 3
Tel: 45-2333
Telex: 3485126
Cable: IMPORT COLON/Panama
P

PERU

Cómpania Electro Médica S.A.
Los Flamencos 145, San Isidro
Casilla 1030
LIMA 1
Tel: 41-4325
Telex: Pub. Booth 25424 SISIDRO
Cable: ELMED Lima
A,CM,E,M,P

PHILIPPINES

The Online Advanced Systems Corporation
Rico House, Amorsolo Cor. Herrera Street
Legaspi Village, Makati
P.O. Box 1510
Metro MANILA
Tel: 85-35-81, 85-34-91, 85-32-21
Telex: 3274 ONLINE
A,C,E,M

Electronic Specialists and Proponents Inc.
690-B Epifanio de los Santos Avenue
Cubao, QUEZON CITY
P.O. Box 2649 Manila
Tel: 98-96-81, 98-96-82, 98-96-83
Telex: 742-40287
P

POLAND

Buro Informasji Technicznej
Hewlett-Packard
Ul Stawki 2, 6P
PL00-950 WARSZAWA
Tel: 39-59-62, 39-67-43
Telex: 812453 hepa pl

SALES & SUPPORT OFFICES
Arranged alphabetically by country

PORTUGAL
Telectra-Empresa Técnica de Equipmentos Eléctricos S.a.r.l.
Rua Rodrigo da Fonseca 103
P.O. Box 2531
P-LISBON 1
Tel: (19) 68-60-72
Telex: 12598
A,C,E,P

Mundinter
Intercambio Mundial de Comércio S.a.r.l
P.O. Box 2761
Avenida Antonio Augusto de Aguiar 138
P-LISBON
Tel: (19) 53-21-31, 53-21-37
Telex: 16691 munter p
M

PUERTO RICO
Hewlett-Packard Puerto Rico
P.O. Box 4407
CAROLINA, Puerto Rico 00630
Calle 272 Edificio 203
Urb. Country Club
RIO PIEDRAS, Puerto Rico 00924
Tel: (809) 762-7255
Telex: 345 0514
A,CP

QATAR
Nasser Trading & Contracting
P.O. Box 1563
DOHA
Tel: 22170
Telex: 4439 NASSER
M

Scitecharabia
P.O. Box 2750
!'DOHA
Tel: 329515
Telex: 4806 CMPARB
P

ROMANIA
Hewlett-Packard Reprezentanta
Boulevard Nicolae Balcescu 16
BUCURESTI
Tel: 130725
Telex: 10440

SAUDI ARABIA
Modern Electronic Establishment
P.O. Box 193
AL-KHOBAR
Tel: 44-678, 44-813
Telex: 670136
Cable: ELECTA AL-KHOBAR
C,E,M,P

Modern Electronic Establishment
P.O. Box 1228, Baghdadiah Street
JEDDAH
Tel: 27-798
Telex: 401035
Cable: ELECTA JEDDAH
C,E,M,P

Modern Electronic Establishment
P.O. Box 2728
RIYADH
Tel: 62-596, 66-232
Telex: 202049
C,E,M,P

SCOTLAND
Hewlett-Packard Ltd.
Royal Bank Buildings
Swan Street
BRECHIN, Angus, Scotland
Tel: 3101, 3102
CM,CS

Hewlett-Packard Ltd.
SOUTH QUEENSFERRY
West Lothian, EH30 9TG
GB-Scotland
Tel: (031) 3311000
Telex: 72682
A,CM,E,M

SINGAPORE
Hewlett-Packard Singapore (Pty.) Ltd.
P.O. Box 58 Alexandra Post Office
SINGAPORE, 9115
6th Floor, Inchcape House
450-452 Alexandra Road
SINGAPORE 0511
Tel: 631788
Telex: HPSGSO RS 34209
Cable: HEWPACK, Singapore
A,CP,E,MS,P

SOUTH AFRICA
Hewlett-Packard South Africa (Pty.) Ltd.
P.O. Box 120
Howard Place
Pine Park Center, Forest Drive, Pinelands
CAPE PROVINCE 7450
Tel: 53-7955, 53-7956, 53-7957
Telex: 57-0006
A,CM,CS,E,MS,P

Hewlett-Packard South Africa (Pty.) Ltd.
P.O. Box 37066
Overport
DURBAN 4067
Tel: 28-4178, 28-4179, 28-4110
CM,CS

Hewlett-Packard South Africa (Pty.) Ltd.
P.O. Box 33345
Glenstantia 0010 **TRANSVAAL**
1st Floor East
Constantia Park Ridge Shopping Centre
Constantia Park
PRETORIA Tel: 98-1126 or 98-1220
Telex: 32163
C,E

Hewlett-Packard South Africa (Pty.) Ltd.
Daphny Street
Private Bag Wendywood
SANDTON 2144
Tel: 802-5111, 802-5125
Telex: 89-84782
Cable: HEWPACK Johannesburg
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SPAIN
Hewlett-Packard Española S.A.
c/Entenza, 321
E-**BARCELONA** 29
Tel: (3) 322-24-51, 321-73-54
Telex: 52603 hpbee
A,CM,CP,E,MS,P

Hewlett-Packard Española S.A.
c/San Vicente S/N
Edificio Albia II,7 B
E-**BILBAO** 1
Tel: (944) 423-8306, 423-8206
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Hewlett-Packard Española S.A.
Calle Jerez 3
E-**MADRID** 16
Tel: 458-2600
Telex: 23515 hpe
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Hewlett-Packard Española S.A.
Colonia Mirasierra
Edificio Juban
c/o Costa Brava 13, 2.
E-**MADRID** 34
Tel: 734-8061, 734-1162
CM,CP

Hewlett-Packard Española S.A.
Av Ramón y Cajal 1-9
Edificio Sevilla 1,
E-**SEVILLA** 5
Tel: 64-44-54, 64-44-58
Telex: 72933
A,CM,CS,MS,P

Hewlett-Packard Española S.A.
C/Ramon Gordillo, 1 (Entlo.3)
E-**VALENCIA** 10
Tel: 361-1354, 361-1358
CM,CS,P

SWEDEN
Hewlett-Packard Sverige AB
Enighetsvägen 3, Fack
P.O. Box 20502
S-16120 **BROMMA**
Tel: (08) 730-0550
Telex: (854) 10721 MESSAGES
Cable: MEASUREMENTS
STOCKHOLM
A,CM,CP,E,MS,P

Hewlett-Packard Sverige AB
Sunnanvagen 14K
S-22226 LUND
Tel: (46) 13-69-79
Telex: (854) 10721 (via BROMMA office)
CM,CS

Hewlett-Packard Sverige AB
Vastra Vintergatan 9
S-70344 OREBRO
Tel: (19) 10-48-80
Telex: (854) 10721 (via BROMMA office)
CM,CS

Hewlett-Packard Sverige AB
Frötallisgatan 30
S-42132 VÄSTRA-FRÖLUNDA
Tel: (031) 49-09-50
Telex: (854) 10721 (via BROMMA office)
CM,CS,E,P

SWITZERLAND
Hewlett-Packard (Schweiz) AG
Clarastrasse 12
CH-4058 BASLE
Tel: (61) 33-59-20
A,CM

Hewlett-Packard (Schweiz) AG
47 Avenue Blanc
CH-1202 GENEVA
Tel: (022) 32-30-05, 32-48-00
CM,CP

Hewlett-Packard (Schweiz) AG
29 Chemin Château Bloc
CH-1219 LE LIGNON-Geneva
Tel: (022) 96-03-22
Telex: 27333 hpag ch
Cable: HEWPACKAG Geneva
A,CM,E,MS,P

Hewlett-Packard (Schweiz) AG
Zürcherstrasse 20
Allmend 2
CH-8967 WIDEN
Tel: (57) 50-111
Telex: 59933 hpag ch
Cable: HPAG CH
A,CM,CP,E,MS,P

SYRIA
General Electronic Inc.
Nuri Basha-Ahnat Ebn Kays Street
P.O. Box 5781
DAMASCUS
Tel: 33-24-87
Telex: 11215 ITIKAL
Cable: ELECTROBOR DAMASCUS
E

Sawah & Co.
Place Azmé
Boite Postale 2308
DAMASCUS
Tel: 16-367, 19-697, 14-268
Telex: 11304 SATACO SY
Cable: SAWAH, DAMASCUS
M

TAIWAN
Hewlett-Packard Far East Ltd.
Kaohsiung Branch
68-2, Chung Cheng 3rd Road
Shin Shin, Chu
KAOHSIUNG
Tel: 24-2318, 26-3253
CS,E,MS,P

Hewlett-Packard Far East Ltd.
Taiwan Branch
5th Floor
205 Tun Hwa North Road
TAIPEI
Tel:(02) 751-0404
Cable:HEWPACK Taipei
A,CP,E,MS,P

Hewlett-Packard Far East Ltd.
Taichung Branch
#33, Cheng Yih Street
10th Floor, Room 5
TAICHUNG
Tel: 289274

Ing Lih Trading Co.
3rd Floor 18, Po-la Road
TAIPEI
Tel:
Telex:
Cable: INGLIH TAIPEI
A

THAILAND
UNIMESA Co. Ltd.
Elcom Research Building
2538 Sukhumvit Ave.
Bangchak, BANGKOK
Tel: 393-2387, 393-0338
Telex: TH81160, 82938, 81038
Cable: UNIMESA Bangkok
A,C,E,M

Bangkok Business Equipment Ltd.
5/5-6 Dejo Road
BANGKOK
Tel: 234-8670, 234-8671, 234-8672
Cable: BUSIQUIPT Bangkok
P

TRINIDAD & TOBAGO
Caribbean Telecoms Ltd.
P.O. Box 732
50/A Jerningham Avenue
PORT-OF-SPAIN
Tel: 624-4213, 624-4214
A,CM,E,M,P

TUNISIA
Tunisie Electronique
31 Avenue de la Liberte
TUNIS
Tel: 280-144
E,P

Corema
1 ter. Av. de Carthage
TUNIS
Tel: 253-821
Telex: 12319 CABAM TN
M

TURKEY
Teknim Company Ltd.
Riza Sah Pehievi
Caddesi No. 7
Kavaklidere, ANKARA
Tel: 275800
Telex: 42155
E

EMA, Muhendislik Kollektif Sirketi
Mediha Eldem
Sokak 41/6
Yüksel Caddesi, ANKARA
Tel: 17-56-22
Cable: Ematrade
M

UNITED ARAB EMIRATES
Emitac Ltd.
P.O. Box 1641
SHARJAH
Tel: 354121, 354123
Telex: 68136
E,M,P,C

UNITED KINGDOM
see: GREAT BRITAIN
NORTHERN IRELAND
SCOTLAND

UNITED STATES

Alabama
Hewlett-Packard Co.
700 Century Park South
Suite 128
BIRMINGHAM, AL 35226
Tel: (205) 822-6802
CM,CS,MP

Hewlett-Packard Co.
P.O. Box 4207
8290 Whitesburg Drive, S.E.
HUNTSVILLE, AL 35802
Tel: (205) 881-4591
CM,CP,E,M*

Alaska
Hewlett-Packard Co.
1577 "C" Street, Suite 252
ANCHORAGE, AK 99510
Tel: (206) 454-3971
CM,CS**

Arizona
Hewlett-Packard Co.
2336 East Magnolia Street
PHOENIX, AZ 85034
Tel: (602) 273-8000
A,CM,CP,E,MS

Hewlett-Packard Co.
2424 East Aragon Road
TUCSON, AZ 85702
Tel: (602) 889-4631
CM,CS,E,MS**

Arkansas
Hewlett-Packard Co.
P.O. Box 5646
Brady Station
LITTLE ROCK, AR 72215
Tel: (501) 376-1844, (501) 664-8773
CM,MS

UNITED STATES (Cont.)

California
Hewlett-Packard Co.
7621 Canoga Avenue
CANOGA PARK, CA 91304
Tel: (213) 702-8300
A,CM,CP,E,P

Hewlett-Packard Co.
1579 W. Shaw Avenue
FRESNO, CA 93771
Tel: (209) 224-0582
CM,MS

Hewlett-Packard Co.
1430 East Orangethorpe
FULLERTON, CA 92631
Tel: (714) 870-1000
CM,CP,E,MP

Hewlett-Packard Co.
5400 W. Rosecrans Boulevard
LAWNDALE, CA 90260
P.O. Box 92105
LOS ANGELES, CA 90009
Tel: (213) 970-7500
CM,CP,MP

Hewlett-Packard Co.
3939 Lankershim Blvd.
NORTH HOLLYWOOD, CA 91604
Tel: (213) 877-1282
Regional Headquarters

Hewlett-Packard Co.
3200 Hillview Avenue
PALO ALTO, CA 94304
Tel: (415) 857-8000
CM,CP,E

Hewlett-Packard Co.
646 W. North Market Boulevard
SACRAMENTO, CA 95834
Tel: (916) 929-7222
A*,CM,CP,E,MS

Hewlett-Packard Co.
9606 Aero Drive
P.O. Box 23333
SAN DIEGO, CA 92123
Tel: (714) 279-3200
CM,CP,E,MP

Hewlett-Packard Co.
3003 Scott Boulevard
SANTA CLARA, CA 95050
Tel: (408) 988-7000
A,CM,CP,E,MP

Hewlett-Packard Co.
454 Carlton Court
SO. SAN FRANCISCO, CA 94080
Tel: (415) 877-0772
CM,CP

Colorado
Hewlett-Packard Co.
24 Inverness Place, East
ENGLEWOOD, CO 80112
Tel: (303) 771-3455
A,CM,CP,E,MS

Connecticut
Hewlett-Packard Co.
47 Barnes Industrial Road South
P.O. Box 5007
WALLINGFORD, CT 06492
Tel: (203) 265-7801
A,CM,CP,E,MS

Florida
Hewlett-Packard Co.
P.O. Box 24210
2727 N.W. 62nd Street
FORT LAUDERDALE, FL 33309
Tel: (305) 973-2600
CM,CP,E,MP

Hewlett-Packard Co.
4080 Woodcock Drive, #132
Brownett Building
JACKSONVILLE, FL 32207
Tel: (904) 398-0663
CM,C*,E*,MS**

Hewlett-Packard Co.
P.O. Box 13910
6177 Lake Ellenor Drive
ORLANDO, FL 32809
Tel: (305) 859-2900
A,CM,CP,E,MS

Hewlett-Packard Co.
6425 N. Pensacola Blvd.
Suite 4, Building 1
PENSACOLA, FL 32575
Tel: (904) 476-8422
A,CM,MS

Hewlett-Packard Co.
110 South Hoover, Suite 120
Vanguard Bldg.
TAMPA, FL 33609
Tel: (813) 872-0900
A*,CM,CS,E*,M*

Georgia
Hewlett-Packard Co.
P.O. Box 105005
2000 South Park Place
ATLANTA, GA 30339
Tel: (404) 955-1500
Telex: 810-766-4890
A,CM,CP,E,MP

Hewlett-Packard Co.
Executive Park Suite 306
P.O. Box 816
AUGUSTA, GA 30907
Tel: (404) 736-0592
CM,MS

Hewlett-Packard Co.
P.O. Box 2103
1172 N. Davis Drive
WARNER ROBINS, GA 31098
Tel: (912) 922-0449
CM,E

Hawaii
Hewlett-Packard Co.
Kawaiahao Plaza, Suite 190
567 South King Street
HONOLULU, HI 96813
Tel: (808) 526-1555
A,CM,CS,E,MS

Idaho
Hewlett-Packard Co.
11311 Chinden Boulevard
BOISE, ID 83707
Tel: (208) 376-6000
CM,CS,M*

Illinois
Hewlett-Packard Co.
211 Prospect Road
BLOOMINGTON, IL 61701
Tel: (309) 663-0383
CM,CS,MS**

Hewlett-Packard Co.
1100 31st Street
DOWNERS GROVE, IL 60515
Tel: (312) 960-5760
CM,CP

Hewlett-Packard Co.
5201 Tollview Drive
ROLLING MEADOWS, IL 60008
Tel: (312) 255-9800
A,CM,CP,E,MP

Indiana
Hewlett-Packard Co.
P.O. Box 50807
7301 No. Shadeland Avenue
INDIANAPOLIS, IN 46250
Tel: (317) 842-1000
A,CM,CS,E,MS

Iowa
Hewlett-Packard Co.
2415 Heinz Road
IOWA CITY, IA 52240
Tel: (319) 351-1020
CM,CS,E*,MS

Kansas
Hewlett-Packard Co.
1644 S. Rock
WICHITA, KA 67207
Tel: (316) 265-5200
CM,CS

Kentucky
Hewlett-Packard Co.
10170 Linn Station Road
Suite 525
LOUISVILLE, KY 40223
Tel: (502) 426-0100
A,CM,CS,MS

Louisiana
Hewlett-Packard Co.
P.O. Box 1449
3229 Williams Boulevard
KENNER, LA 70062
Tel: (504) 443-6201
A,CM,CS,E,MS

Maryland
Hewlett-Packard Co.
7121 Standard Drive
HANOVER, MD 21076
Tel: (301) 796-7700
A,CM,CP,E,MS

Hewlett-Packard Co.
2 Choke Cherry Road
ROCKVILLE, MD 20850
Tel: (301) 948-6370
Telex: 710-828-9685
A,CM,CP,E,MP

Massachusetts
Hewlett-Packard Co.
32 Hartwell Avenue
LEXINGTON, MA 02173
Tel: (617) 861-8960
A,CM,CP,E,MP

Michigan
Hewlett-Packard Co.
23855 Research Drive
FARMINGTON HILLS, MI 48024
Tel: (313) 476-6400
A,CM,CP,E,MP

Hewlett-Packard Co.
4326 Cascade Road S.E.
GRAND RAPIDS, MI 49506
Tel: (616) 957-1970
CM,CS,MS

Minnesota
Hewlett-Packard Co.
2025 W. Larpenteur Ave.
ST. PAUL, MN 55113
Tel: (612) 644-1100
A,CM,CP,E,MP

Mississippi
Hewlett-Packard Co.
P.O. Box 5028
322 N. Mart Plaza
JACKSON, MS 39216
Tel: (601) 982-9363
CM,MS

Missouri
Hewlett-Packard Co.
11131 Colorado Avenue
KANSAS CITY, MO 64137
Tel: (816) 763-8000
Telex: 910-771-2087
A,CM,CS,E,MS

Hewlett-Packard Co.
1024 Executive Parkway
ST. LOUIS, MO 63141
Tel: (314) 878-0200
A,CM,CP,E,MP

Nebraska
Hewlett-Packard
7101 Mercy Road
Suite 101, IBX Building
OMAHA, NE 68106
Tel: (402) 392-0948
CM,MS

Nevada
Hewlett-Packard Co.
Suite D-130
5030 Paradise Blvd.
LAS VEGAS, NV 89119
Tel: (702) 736-6610
CM,MS**

New Jersey
Hewlett-Packard Co.
Crystal Brook Professional Building
Route 35
EATONTOWN, NJ 07724
Tel: (201) 542-1384
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Hewlett-Packard Co.
W120 Century Road
PARAMUS, NJ 07652
Tel: (201) 265-5000
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Hewlett-Packard Co.
60 New England Avenue West
PISCATAWAY, NJ 08854
Tel: (201) 981-1199
A,CM,CP,E

New Mexico
Hewlett-Packard Co.
P.O. Box 11634
11300 Lomas Blvd.,N.E.
ALBUQUERQUE, NM 87123
Tel: (505) 292-1330
Telex: 910-989-1185
CM,CP,E,MS

New York
Hewlett-Packard Co.
5 Computer Drive South
ALBANY, NY 12205
Tel: (518) 458-1550
Telex: 710-444-4691
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Hewlett-Packard Co.
9600 Main Street
CLARENCE, NY 14031
Tel: (716) 759-8621
Telex: 710-523-1893

Hewlett-Packard Co.
200 Cross Keys Office
FAIRPORT, NY 14450
Tel: (716) 223-9950
Telex: 510-253-0092
CM,CP,E,MS

Hewlett-Packard Co.
No. 1 Pennsylvania Plaza
55th Floor
34th Street & 8th Avenue
NEW YORK, NY 10119
Tel: (212) 971-0800
CM,CP,E*,M*

Hewlett-Packard Co.
5858 East Molloy Road
SYRACUSE NY 13211
Tel: (315) 455-2486
A,CM,CS,E,MS

Hewlett-Packard Co.
3 Crossways Park West
WOODBURY, NY 11797
Tel: (516) 921-0300
Telex: 510-221-2183
A,CM,CP,E,MS

North Carolina
Hewlett-Packard Co.
P.O. Box 15579
2905 Guess Road (27705)
DURHAM, NC 27704
Tel: (919) 471-8466
C,M

Hewlett-Packard Co.
5605 Roanne Way
GREENSBORO, NC 27409
Tel: (919) 852-1800
A,CM,CP,E,MS

Ohio
Hewlett-Packard Co.
9920 Carver Road
CINCINNATI, OH 45242
Tel: (513) 891-9870
CM,CP,MS

Hewlett-Packard Co.
16500 Sprague Road
CLEVELAND, OH 44130
Tel: (216) 243-7300
Telex: 810-423-9430
A,CM,CP,E,MS

Hewlett-Packard Co.
962 Crupper Ave.
COLUMBUS, OH 43229
Tel: (614) 436-1041
CM,CP,E*

Hewlett-Packard Co.
330 Progress Rd.
DAYTON, OH 45449
Tel: (513) 859-8202
A,CM,CP,E*,MS

Oklahoma
Hewlett-Packard Co.
P.O. Box 366
1503 W. Gore Blvd., Suite #2
LAWTON, OK 73502
Tel: (405) 248-4248
C

Hewlett-Packard Co.
P.O. Box 32008
304 N. Meridan Avenue, Suite A
OKLAHOMA CITY, OK 73107
Tel: (405) 946-9499
A*,CM,CP,E*,MS

Hewlett-Packard Co.
Suite 121
9920 E. 42nd Street
TULSA, OK 74145
Tel: (918) 665-3300
A**,CM,CS,M*

Oregon
Hewlett-Packard Co.
1500 Valley River Drive, Suite 330
EUGENE, OR 97401
Tel: (503) 683-8075
C

Hewlett-Packard Co.
9255 S. W. Pioneer Court
WILSONVILLE, OR 97070
Tel: (503) 682-8000
A,CM,CP,E*,MS

Pennsylvania
Hewlett-Packard Co.
1021 8th Avenue
King of Prussia Industrial Park
KING OF PRUSSIA, PA 19406
Tel: (215) 265-7000
Telex: 510-660-2670
A,CM,CP,E,MP

Hewlett-Packard Co.
111 Zeta Drive
PITTSBURGH, PA 15238
Tel: (412) 782-0400
A,CM,CP,E,MP

South Carolina
Hewlett-Packard Co.
P.O. Box 6442
6941-0 N. Trenholm Road
COLUMBIA, SC 29260
Tel: (803) 782-6493
CM,CS,E,MS

SALES & SUPPORT OFFICES
Arranged alphabetically by country

UNITED STATES (Cont.)

South Carolina (Cont.)
Hewlett-Packard Co.
814 Wade Hampton Blvd.
Suite 10
GREENVILLE, SC 29609
Tel: (803) 232-0917
C

Tennessee
Hewlett-Packard Co.
P.O. Box 22490
224 Peters Road
Suite 102
KNOXVILLE, TN 37922
Tel: (615) 691-2371
A*,CM,MS

Hewlett-Packard Co.
3070 Directors Row
MEMPHIS, TN 38131
Tel: (901) 346-8370
A,CM,CS,MS

Hewlett-Packard Co.
Suite 103
478 Craighead Street
NASHVILLE, TN 37204
Tel: (615) 383-9136
CM,MS**

Texas
Hewlett-Packard Co.
Suite 310W
7800 Shoalcreek Blvd.
AUSTIN, TX 78757
Tel: (512) 459-3143
CM,E

Hewlett-Packard Co.
Suite C-110
4171 North Mesa
EL PASO, TX 79902
Tel: (915) 533-3555
CM,CS,E*,MS**

Hewlett-Packard Co.
5020 Mark IV Parkway
FORT WORTH, TX 76106
Tel: (817) 625-6361
CM,C*

Hewlett-Packard Co.
P.O. Box 42816
10535 Harwin Street
HOUSTON, TX 77036
Tel: (713) 776-6400
A,CM,CP,E,MP

Hewlett-Packard Co.
3309 67th Street
Suite 24
LUBBOCK, TX 79413
Tel: (806) 799-4472
M

Hewlett-Packard Co.
P.O. Box 1270
930 E. Campbell Rd.
RICHARDSON, TX 75081
Tel: (214) 231-6101
A,CM,CP,E,MP

Hewlett-Packard Co.
205 Billy Mitchell Road
SAN ANTONIO, TX 78226
Tel: (512) 434-8241
CM,CS,E,MS

Utah
Hewlett-Packard Co.
3530 W. 2100 South Street
SALT LAKE CITY, UT 84119
Tel: (801) 974-1700
A,CM,CP,E,MS

Virginia
Hewlett-Packard Co.
P.O. Box 9669
2914 Hungary Spring Road
RICHMOND, VA 23228
Tel: (804) 285-3431
A,CM,CP,E,MS

Hewlett-Packard Co.
P.O. Box 4786
3110 Peters Creek Road, N.W.
ROANOKE, VA 24015
Tel: (703) 563-2205
CM,CS,E**

Hewlett-Packard Co.
P.O. Box 12778
5700 Thurston Avenue
Suite 111
VIRGINIA BEACH, VA 23455
Tel: (804) 460-2471
CM,CS,MS

Washington
Hewlett-Packard Co.
15815 S.E. 37th Street
BELLEVUE, WA 98006
Tel: (206) 643-4000
A,CM,CP,E,MP

Hewlett-Packard Co.
Suite A
708 North Argonne Road
SPOKANE, WA 99206
Tel: (509) 922-7000
CM,CS

West Virginia
Hewlett-Packard Co.
4604 MacCorkle Ave., S.E.
CHARLESTON, WV 25304
Tel: (304) 925-0492
A,CM,MS

Wisconsin
Hewlett-Packard Co.
150 S. Sunny Slope Road
BROOKFIELD, WI 53005
Tel: (414) 784-8800
A,CM,CS,E*,MP

URUGUAY
Pablo Ferrando S.A.C. e.I.
Avenida Italia 2877
Casilla de Correo 370
MONTEVIDEO
Tel: 403102
Telex: 901 Public Booth Para Pablo Ferrando 919520
Cable: RADIUM Montevideo
A,CM,E,M

Guillermo Kraft del Uruguay S.A.
Avda. Libertador Brig. Gral.
Lavalleja 2083
MONTEVIDEO
Tel: 234588, 234808, 208830
Telex: 6245 ACTOUR UY
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Hewlett-Packard Co.
Representative Office
Pokrovsky Blvd. 4/17 KV12
MOSCOW 101000 Tel: 294-2024
Telex: 7825 HEWPACK SU

VENEZUELA
Hewlett-Packard de Venezuela C.A.
Apartado 50933
3A Transversal Los Ruices Norte
Edificio Segre 2Y3
CARACAS 1071
Tel: 239-4133, 239-4777, 239-4244
Telex: 25146 HEWPACK
Cable: HEWPACK Caracas
A,CP,E,MS,P

YUGOSLAVIA
Iskra-Commerce-Representation of Hewlett-Packard
Sava Centar Delegacija 30
Milentija Popovica 9
11170 BEOGRAD
Tel: 638-762
Telex: 12042, 12322 YU SAV CEN

Iskra-Commerce-Representation of Hewlett-Packard
Koprska 46
61000 LJUBLJANA
Tel: 321674, 315879
Telex:

ZAMBIA
R. J. Tilbury (Zambia) Ltd.
P.O. Box 2792
LUSAKA
Tel: 81243
A,E,M,P

ZIMBABWE
Field Technical Sales
45 Kelvin Road, North
P.B. 3458
SALISBURY
Tel:
C,E,M,P

FOR COUNTRIES AND AREAS NOT LISTED:

CANADA

Ontario
Hewlett-Packard (Canada) Ltd.
6877 Goreway Drive
MISSISSAUGA, Ontario L4V 1M8
Tel: (416) 678-9430
Telex: 610-492-4246

EASTERN USA

Maryland
Hewlett-Packard Co.
4 Choke Cherry Road
Rockville, MD 20850
Tel: (301) 258-2000

MIDWESTERN USA

Illinois
Hewlett-Packard Co.
5201 Tollview Drive
ROLLING MEADOWS, IL 60008
Tel: (312) 255-9800

SOUTHERN USA

Georgia
Hewlett-Packard Co.
P.O. Box 105005
450 Interstate N. Parkway
ATLANTA, GA 30339
Tel: (404) 955-1500

WESTERN USA

California
Hewlett-Packard Co.
3939 Lankersim Blvd.
LOS ANGELES, CA 91604
Tel: (213) 877-1282

EUROPEAN AREAS NOT LISTED, CONTACT

SWITZERLAND
Hewlett-Packard S.A.
7 Rue du Bois-du-Lan
CH-1217 MEYRIN 2, Switzerland
Tel: (022) 83-81-11
Telex: 27835 hpse
Cable: HEWPACKSA Geneve

EAST EUROPEAN AREAS NOT LISTED, CONTACT

AUSTRIA
Hewlett-Packard Ges.m.b.h.
Wehlistrasse 29
P.O. Box 7
A-1205 VIENNA
Tel: (222) 35-16-210
Telex: 135823/135066

MEDITERRANEAN AND MIDDLE EAST AREAS NOT LISTED, CONTACT

GREECE
Hewlett-Packard S.A.
Mediterranean & Middle East Operations
35, Kolokotroni Street
Platia Kefallariou
GR-Kifissia, ATHENS, Greece
Tel: 808-0359, 808-0429
Telex: 21-6588
Cable: HEWPACKSA Athens

INTERNATIONAL AREAS NOT LISTED, CONTACT

OTHER AREAS
Hewlett-Packard Co.
Intercontinental Headquarters
3495 Deer Creek Road
PALO ALTO, CA 94304
Tel: (415) 857-1501
Telex: 034-8300
Cable: HEWPACK

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