## COMPAQ
STORAGEWORKS

Installing DIMMs in an HSG80 or HSZ80 Cache Module

This document contains instructions to replace DIMMs in a cache module and to upgrade cache memory in either an HSG80 ACS Version 8.x Array Controller or an HSZ80 ACS Version 8.x Array Controller. See the appropriate *HSG80 Array Controller ACS Version 8.x User's Guide*, *HSZ80 Array Controller ACS Version 8.x User's Guide, HSG80 Array Controller ACS Version 8.x Maintenance and Service Guide,* or *HSZ80 Array Controller ACS Version 8.x Maintenance and Service Guide* for instructions on upgrading a single-controller configuration to a dual-redundant controller configuration.
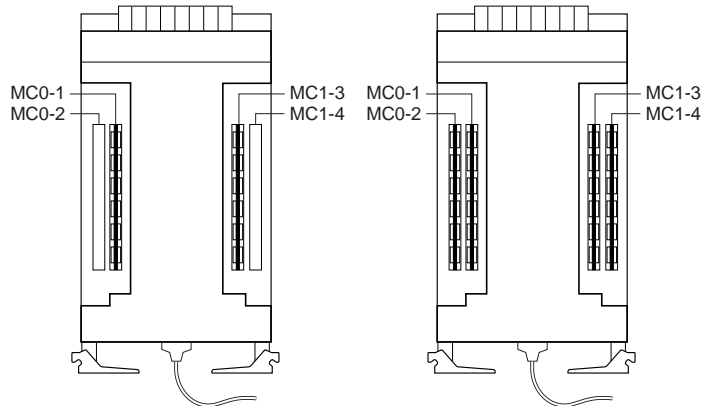

CXO5714A
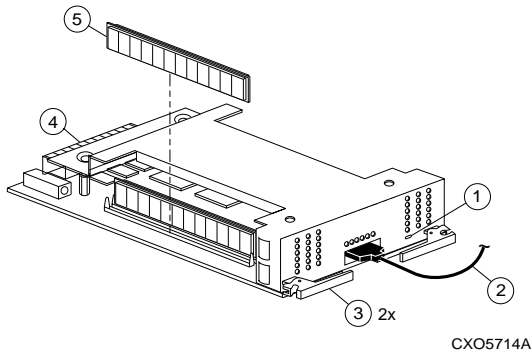
1 **Cache-memory power LED**
2 **External cache battery (ECB) cable**
3 **Retaining lever**
4 **Backplane connector**
5 **Dual inline memory module (DIMM)**

Figure 1. HSG80 or HSZ80 Cache Module

EMU	PVA
Controller A	
Controller B	
Cache module A	Cache module B
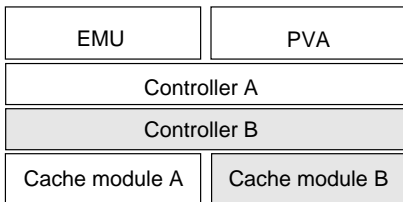
CXO6283A

Figure 2. Location of Cache Modules

64MB configuration (2 x 32 MB)
256 MB configuration (2 x 128 MB)

128 MB configuration (4 x 32 MB)
512 MB configuration (4 x 128 MB)

CXO6288A

Memory	DIMMs	Quantity	Location
64 MB	32 MB	2	MC0-1 and MC1-3
128 MB	32 MB	4	MC0-1, MC0-2, MC1-3, and MC1-4
256 MB	128 MB	2	MC0-1 and MC1-3
512 MB	128 MB	4	MC0-1, MC0-2, MC1-3, and MC1-4

Figure 3. Cache-Module Memory Configurations

NOTE: The only valid cache-module memory configuration for the HSG80 ACS Version 8.0 Array Controller is 128 MB (4 x 32 MB).

EK–80DIM–IN. D01/388625-001

Replacing DIMMs in a Cache Module

Use this procedure for the following configurations:

HSG80 ACS Version 8.x Single Controller
HSG80 ACS Version 8.0 Dual-Redundant Controller
HSZ80 ACS Version 8.x Single Controller

Use the following steps in "Removing DIMMs" and "Installing DIMMs" to replace DIMMs in a cache module.

> **NOTE:** The new cache module must contain the same memory configuration as the existing cache module.

Removing DIMMs

Use the following steps to remove DIMMS from a cache module:

1. From the host console, dismount the logical units in the subsystem. If you are using a Windows NT® platform, shut down the server.

2. If the controller is operating, connect a PC or terminal to the controller's maintenance port.

    If the controller is not operating, go to step 5.

3. Run FMU to obtain the last failure codes, if desired.

4. Shut down the controllers. In single controller configurations, shut down "this controller." In dual-redundant controller configurations, shut down the "other controller" first, then shut down "this controller" with the following commands:

    SHUTDOWN OTHER_CONTROLLER

    SHUTDOWN THIS_CONTROLLER

    When the controllers shut down, their reset button and the first three LEDs are lit continuously. This may take several minutes, depending on the amount of data that needs to be flushed from the cache modules.

    > **CAUTION:** Electrostatic discharge (ESD) can easily damage a cache module or a DIMM. Wear a snug-fitting, grounded ESD wrist strap.

5. Disable the ECB by pressing the battery disable switch until the status light stops blinking—about five seconds.

    > **CAUTION:** The ECB must be disabled—the status light is not lit and is not blinking—before disconnecting the ECB cable from the cache module. Failure to disable the ECB could result in cache module damage.

6. Disconnect the ECB cable from the cache module.

7. Disengage both retaining levers, remove the cache module, and place the cache module onto a grounded antistatic mat.

8. Press down on the DIMM retaining levers at either end of the DIMM you want to remove.

9. Grasp the DIMM and gently remove it from the DIMM slot.

Installing DIMMs

Figure 3 shows the cache-module memory configurations for both the HSG80 and HSZ80 array controllers. Use the following steps to install DIMMS in a cache module:

> **NOTE:** The only valid cache-module memory configuration for the HSG80 ACS Version 8.0 Array Controller is 128 MB (4 x 32 MB).

> **CAUTION:** ESD can easily damage a cache module or a DIMM. Wear a snug-fitting, grounded ESD wrist strap.

1. Insert the DIMM straight into the socket and ensure that the notches in the DIMM align with the tabs in the socket as shown in Figure .
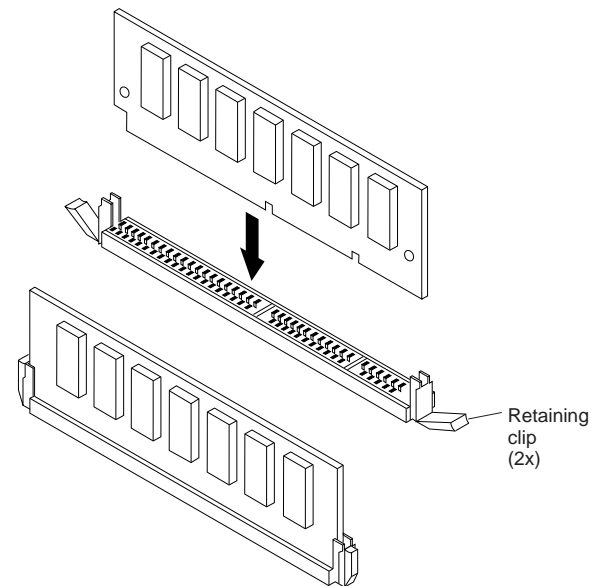
Retaining clip (2x)

CXO6163A

Figure 4. Inserting a DIMM into Its Slot

2. Press the DIMM gently until it's seated in the socket.

3. Double-check to ensure both ends of the DIMM are firmly seated in the slot and both retaining clips engage the DIMM.

    > **CAUTION:** Make sure you align the cache module in the appropriate guard rails. If you do not align the cache module correctly, damage to the backplane can occur.

4. Insert the new cache module into its slot and engage its retaining levers.

> **CAUTION:** The ECB must be disabled—the status light is not lit and is not blinking—before connecting the ECB cable to the cache module. Failure to disable the ECB could result in ECB damage.

5. Connect the ECB cable to the new cache module.

6. If not already connected, connect a PC or terminal to the controller's maintenance port.

7. Mount the logical units on the host. If you are using a Windows NT platform, restart the server.

8. Set the subsystem date and time. In single controller configurations, set "this controller." In dual-redundant controller configurations, set "this controller" and the "other controller" with the following commands:

   SET THIS_CONTROLLER TIME=*dd-mmm-yyyy:hh:mm:ss*

   SET OTHER_CONTROLLER TIME=*dd-mmm-yyyy:hh:mm:ss*

9. Disconnect the PC or terminal from the controller's maintenance port.

Replacing DIMMs in a Cache Module

Use this procedure for the following configurations:

HSZ80 ACS Version 8.1 Dual-Redundant Controller

Use the following steps in "Removing DIMMs" and "Installing DIMMs" to replace DIMMS in a cache module.

> **NOTE:** The new cache module must contain the same memory configuration as the existing cache module.

Removing DIMMs

Follow these steps to remove DIMMS from a cache module:

1. Connect a PC or terminal to the operational controller's maintenance port. The controller to which you're connected is "this controller"; the controller whose cache module you're replacing is the "other controller."

2. Disable failover with the following command:

   SET NOFAILOVER

3. Start FRUTIL with the following command:

   RUN FRUTIL

4. Enter option 1, *Replace or remove a controller or cache module*, from the FRUTIL Main menu:

   ```
   FRUTIL Main Menu:
    1. Replace or remove a controller or cache module
    2. Install a controller or cache module
    3. Replace other cache module battery
    4. Replace a PVA module
    5. Replace an I/O module
    6. Set battery life to new
    7. Exit
   Enter choice: 1, 2, 3, 4, 5, 6, or 7 -> 1
   ```

5. Enter option 3, *Other cache module*, from the Replace or Remove Options menu to remove the other cache module:

   ```
   Replace or remove Options:
    1. Other controller and cache module
    2. Other controller module
    3. Other cache module
    4. Exit
   Enter choice: 1, 2, 3, or 4 -> 3
   ```

6. Confirm that you want to remove the other cache module. FRUTIL displays the following:

   ```
   Remove the slot A [or B] cache module? Y/N
   ```

7. Enter Y(es) and press return.

8. Wait for FRUTIL to quiesce the device ports. After the ports have been quiesced (this may take several minutes), FRUTIL displays the following:

   ```
   All device ports quiesced.
   Remove the slot B cache module within x minutes, xx
   seconds. Then disconnect the external battery, if in
   use, from the cache module.
   ```

   > **NOTE:** A countdown timer allows a total of two minutes to remove the cache module. If you exceed two minutes, "this controller" will exit FRUTIL and resume operations.

   > **CAUTION:** ESD can easily damage a cache module or a DIMM. Wear a snug-fitting, grounded ESD wrist strap.

9. Disengage both retaining levers and partially remove the other cache module—about half way.

10. Disable the ECB by pressing the battery disable switch until the status light stops blinking—about five seconds.

    > **CAUTION:** The ECB must be disabled—the status light is not lit and is not blinking—before disconnecting the ECB cable from the cache module. Failure to disable the ECB could result in cache module damage.

11. Disconnect the ECB cable from the cache module, remove the cache module, and place it onto a grounded antistatic mat.

12. Once the cache module is removed, FRUTIL displays the following:

    ```
    Restarting all device ports. Please wait...
     .
     .
     .
    Do you have a replacement cache module? Y/N
    ```

13. Enter N(o).

14. Press down on the DIMM retaining levers at either end of the DIMM you want to remove.

15. Grasp the DIMM and gently remove it from the DIMM slot.

Installing DIMMs

Figure 3 shows the cache-module memory configurations for HSZ80 ACS Version 8.1 array controller. Use the following steps to install DIMMs in a cache module.:

> **CAUTION:** ESD can easily damage a cache module or a DIMM. Wear a snug-fitting, grounded ESD wrist strap.

1. Insert the DIMM straight into the socket and ensure that the notches in the DIMM align with the tabs in the socket as shown in Figure .

2. Press the DIMM gently until it's seated in the socket.

3. Double-check to ensure both ends of the DIMM are firmly seated in the slot and both retaining clips engage the DIMM.

4. Connect a PC or terminal to the operational controller. The controller to which you're connected is "this controller"; the controller whose cache module you're installing is the "other controller."

5. Start FRUTIL with the following command:

    RUN FRUTIL

6. Enter option 2, *Install a controller or cache module*, from the FRUTIL Main menu:
   ```
   FRUTIL Main Menu:
    1. Replace or remove a controller or cache module
    2. Install a controller or cache module
    3. Replace other cache module battery
    4. Replace a PVA module
    5. Replace an I/O module
    6. Set battery life to new
    7. Exit
   Enter choice: 1, 2, 3, 4, 5, 6, or 7 ->
   ```

7. Enter option 3, *Other cache module*, from the Install Options menu to install the other cache module:
   ```
   Install Options:
    1. Other controller and cache module
    2. Other controller module
    3. Other cache module
    4. Exit
   Enter choice: 1, 2, 3, or 4 ->
   ```

8. Confirm that you want to install the other cache module. FRUTIL displays the following:
   ```
   Insert the slot A [or B] cache module? Y/N
   ```

9. Enter Y(es) and press return.

10. Wait for FRUTIL to quiesce the ports. After the ports have been quiesced (this may take several minutes), FRUTIL displays the following:
    ```
    All device ports quiesced.
    ```

    NOTE: A countdown timer allows a total of two minutes to install the cache module. If you exceed two minutes, "this controller" will exit FRUTIL and resume operations.

11. If not already done, disable the ECB to which you're connecting the new cache module by pressing the battery disable switch until the status light stops blinking—about five seconds.

> **CAUTION:** The ECB must be disabled—the status light is not lit and is not blinking—before connecting the ECB cable to the cache module. Failure to disable the ECB could result in ECB damage.

12. Connect the ECB cable to the new cache module.

> **CAUTION:** Make sure you align the cache module in the appropriate guard rails. If you do not align the cache module correctly, damage to the backplane can occur.

13. Insert the new cache module into its slot and engage its retaining levers.

14. Enable failover, and reestablish the dual-redundant controller configuration with the following command:

    SET FAILOVER COPY=THIS_CONTROLLER

    This command copies the subsystem's configuration from "this controller" to the "other controller."

15. Disconnect the PC or terminal from the controller's maintenance port.

Replacing DIMMs in a Cache Module

Use this procedure for the following configurations:

HSG80 ACS Version 8.2 Dual-Redundant Controller

Use the following steps in "Removing DIMMs" and "Installing DIMMs" to replace DIMMS in a cache module.

Removing DIMMs

Use the following steps to remove DIMMS from a cache module:

1. Connect a PC or terminal to the operational controller's maintenance port. The controller to which you're connected is "this controller"; the controller whose cache module you're replacing is the "other controller."

2. Disable failover with the following command:

   SET NOFAILOVER

3. Remove the program card's ESD cover and program card. Save them for reinstallation later.

4. Start FRUTIL with the following command:

   RUN FRUTIL

   FRUTIL displays the following:
   ```
   Do you intend to replace this controller's cache
   battery? Y/N
   ```

5. Enter N(o). FRUTIL displays the FRUTIL Main menu:
   ```
   FRUTIL Main Menu:
    1. Replace or remove a controller or cache module
    2. Install a controller or cache module
    3. Replace a PVA module
    4. Replace an I/O module
    5. Exit
   Enter choice: 1, 2, 3, 4, or 5 ->
   ```

6. Enter option 1, *Replace or remove a controller or cache module*, from the FRUTIL Main menu. FRUTIL displays the Replace or Remove Options menu:
   ```
   Replace or remove Options:
    1. Other controller and cache module
    2. Other controller module
    3. Other cache module
    4. Exit
   Enter choice: 1, 2, 3, or 4 ->
   ```

7. Enter option 3, *Other cache module*, from the Replace or Remove Options menu. FRUTIL displays the following:
   ```
                  Slot Designations
                    (front view)
      [ ---  EMU  --- ][ ---  PVA  --- ]
      [ --------   Controller A  -------    ]
      [ --------   Controller B  -------    ]
      [ Cache Module A ][ Cache Module B ]

   Remove the slot A [or B] cache module? Y/N
   ```

8. Enter Y(es) and press return. FRUTIL displays the following:
   ```
   Quiescing all device ports.  Please wait...
     Device Port 1 quiesced.
     Device Port 2 quiesced.
     Device Port 3 quiesced.
     Device Port 4 quiesced.
     Device Port 5 quiesced.
     Device Port 6 quiesced.
    All device ports quiesced.
   Remove the slot A [or B] cache module within 2
   minutes. Then disconnect the external battery from
   the cache module.
   ```

   CAUTION: The device ports must quiesce before removing the cache module. Failure to allow the ports to quiesce may result in data loss. Quiescing may take several minutes.

   ESD can easily damage a cache module or a DIMM. Wear a snug-fitting, grounded ESD wrist strap.

   NOTE: A countdown timer allows a total of two minutes to remove the cache module. If you exceed two minutes, "this controller" will exit FRUTIL and resume operations.

9. Disengage both retaining levers and partially remove the cache module—about half way.

10. Disable the ECB by pressing the battery disable switch until the status light stops blinking—about five seconds.

    CAUTION: The ECB must be disabled—the status light is not lit and is not blinking—before disconnecting the ECB cable from the cache module. Failure to disable the ECB could result in cache module damage.

    ---

11. Disconnect the ECB cable from the cache module, remove the cache module, and place it onto a grounded antistatic mat.

    Once the cache module is removed, FRUTIL displays the following:
    ```
    Restarting all device ports. Please wait...
      Device Port 1 restarted.
      Device Port 2 restarted.
      Device Port 3 restarted.
      Device Port 4 restarted.
      Device Port 5 restarted.
      Device Port 6 restarted.
    Do you have a replacement cache module? Y/N
    ```

12. Enter N(o).

13. Press down on the DIMM retaining levers at either end of the DIMM you want to remove.

14. Grasp the DIMM and gently remove it from the DIMM slot.

Installing DIMMs

Figure 3 shows the cache-module memory configurations for both the HSG80 and HSZ80 array controllers. Use the following steps to install DIMMs in a cache module:

CAUTION: ESD can easily damage a cache module or a DIMM. Wear a snug-fitting, grounded ESD wrist strap.

---

1. Insert the DIMM straight into the socket and ensure that the notches in the DIMM align with the tabs in the socket as shown in Figure .

2. Press the DIMM gently until it's seated in the socket.

3. Double-check to ensure both ends of the DIMM are firmly seated in the slot and both retaining clips engage the DIMM.

4. If not already connected, connect a PC or terminal to the operational controller. The controller to which you're connected is "this controller"; the controller whose cache module you're installing is the "other controller."

5. Start FRUTIL with the following command:

   RUN FRUTIL

   FRUTIL displays the following:
   ```
   Do you intend to replace this controller's cache
   battery? Y/N
   ```

6. Enter N(o). FRUTIL displays the FRUTIL Main menu:
   ```
   FRUTIL Main Menu:
    1. Replace or remove a controller or cache module
    2. Install a controller or cache module
    3. Replace a PVA module
    4. Replace an I/O module
    5. Exit
   Enter choice: 1, 2, 3, 4, or 5 ->
   ```

7. Enter option 2, *Install a controller or cache module*, from the FRUTIL Main menu. FRUTIL displays the Install Options Menu:
   ```
   Install Options:
    1. Other controller and cache module
    2. Other controller module
    3. Other cache module
    4. Exit
   Enter choice: 1, 2, 3, or 4 ->
   ```

8. Enter option 3, *Other cache module*, from the Install Options menu. FRUTIL displays the following:
   ```
   Insert the slot A [or B] cache module? Y/N
   ```

9. Enter Y(es) and press return. FRUTIL displays the following:
   ```
   Quiescing all device ports.  Please wait...
     Device Port 1 quiesced.
     Device Port 2 quiesced.
     Device Port 3 quiesced.
     Device Port 4 quiesced.
     Device Port 5 quiesced.
     Device Port 6 quiesced.
   All device ports quiesced.
    .
    .
    .
   Perform the following steps:
   1. Turn off the battery for the new cache module by
      pressing the battery's shut off button for five
      seconds
   2. Connect the battery to the new cache module.
   3. Insert the new cache module in slot A [or B]
      within 2 minutes.
   ```

   NOTE: A countdown timer allows a total of two minutes to install the cache module. If you exceed two minutes, "this controller" will exit FRUTIL and resume operations.

10. Disable the ECB to which you're connecting the new cache module by pressing the battery disable switch until the status light stops blinking—about five seconds.

CAUTION: The ECB must be disabled—the status light is not lit and is not blinking—before connecting the ECB cable to the cache module. Failure to disable the ECB could result in ECB damage.

---

11. Connect the ECB cable to the new cache module.

CAUTION: Make sure you align the cache module in the appropriate guard rails. If you do not align the cache module correctly, damage to the backplane can occur.

---

12. Insert the new cache module into its slot and engage its retaining levers.

    NOTE: In mirrored mode, FRUTIL will initialize the mirrored portion of the new cache module, check for old data on the cache module, and then restart all device ports. After the device ports have been restarted, FRUTIL will test the cache module and the ECB. After the test completes, the device ports will quiesce and a mirror copy of the cache module data will be created on the newly installed cache module.

FRUTIL displays the following:

```
The configuration has two controllers.
To restart the other controller:
 1. Type 'restart other_controller'.
 2. Press and hold the reset button while inserting
    the program card on the slot A [or B] controller,
     then release the reset button.
     The controller will restart.

Field Replacement Utility terminated.
```

13. To allow the "other controller" to restart, enter the following command:

    RESTART OTHER _CONTROLLER

14. Hold the reset button while inserting the program card into the controller. Release the reset button and replace the ESD cover. The controller will restart.

15. Enable failover, and re-establish the dual-redundant controller configuration with the following command:

    SET FAILOVER COPY=THIS_CONTROLLER

    This command copies the subsystem's configuration from "this controller" to the "other controller."

16. Disconnect the PC or terminal from the controller's maintenance port.

Replacing DIMMs in a Cache Module

Use this procedure for the following configurations:

HSG80 ACS Version 8.3 Dual-Redundant Controller
HSG80 ACS Version 8.4 Dual-Redundant Controller
HSZ80 ACS Version 8.3 Dual-Redundant Controller

Use the following steps in "Removing DIMMs" and "Installing DIMMs" to replace DIMMS in a cache module.

Removing DIMMs

Use the following steps to remove DIMMS from a cache module:

1. Connect a PC or terminal to the operational controller's maintenance port. The controller to which you're connected is "this controller"; the controller whose cache module you're replacing is the "other controller."

2. Disable failover with the following command:

   SET NOFAILOVER

3. Start FRUTIL with the following command:

   RUN FRUTIL

   FRUTIL displays the following:
   ```
   Do you intend to replace this controller's cache
   battery? Y/N
   ```

4. Enter N(o). FRUTIL displays the FRUTIL Main menu:
   ```
   FRUTIL Main Menu:
    1. Replace or remove a controller or cache module
    2. Install a controller or cache module
    3. Replace a PVA module
    4. Replace an I/O module
    5. Exit
   Enter choice: 1, 2, 3, 4, or 5 ->
   ```

5. Enter option 1, *Replace or remove a controller or cache module*, from the FRUTIL Main menu. FRUTIL displays the Replace or Remove Options menu:
   ```
   Replace or remove Options:
    1. Other controller and cache module
    2. Other controller module
    3. Other cache module
    4. Exit
   Enter choice: 1, 2, 3, or 4 ->
   ```

6. Enter option 3, *Other cache module*, from the Replace or Remove Options menu. FRUTIL displays the following:
   ```
                Slot Designations
                   (front view)
    [ ---   EMU   --- ][ ---   PVA   --- ]
    [ --------   Controller A ------- ]
    [ --------   Controller B ------- ]
    [ Cache Module A ][ Cache Module B ]

   Remove the slot A [or B] cache module? Y/N
   ```

7. Enter Y(es) and press return. FRUTIL displays the following:
   ```
   Quiescing all device ports.  Please wait...
     Device Port 1 quiesced.
     Device Port 2 quiesced.
     Device Port 3 quiesced.
     Device Port 4 quiesced.
     Device Port 5 quiesced.
     Device Port 6 quiesced.
    All device ports quiesced.
   Remove the slot A [or B] cache module within 2
   minutes. Then disconnect the external battery from
   the cache module.
   ```

   CAUTION: The device ports must quiesce before removing the cache module. Failure to allow the ports to quiesce may result in data loss. Quiescing may take several minutes.

   ESD can easily damage a cache module or a DIMM. Wear a snug-fitting, grounded ESD wrist strap.

   NOTE: A countdown timer allows a total of two minutes to remove the cache module. If you exceed two minutes, "this controller" will exit FRUTIL and resume operations.

8. Disengage both retaining levers and partially remove the cache module—about half way.

9. Disable the ECB by pressing the battery disable switch until the status light stops blinking—about five seconds.

   CAUTION: The ECB must be disabled—the status light is not lit and is not blinking—before disconnecting the ECB cable from the cache module. Failure to disable the ECB could result in cache module damage.
   ---

10. Disconnect the ECB cable from the cache module, remove the cache module, and place it onto a grounded antistatic mat.

    Once the cache module is removed, FRUTIL displays the following:
    ```
    Restarting all device ports. Please wait...
      Device Port 1 restarted.
      Device Port 2 restarted.
      Device Port 3 restarted.
      Device Port 4 restarted.
      Device Port 5 restarted.
      Device Port 6 restarted.
    Do you have a replacement cache module? Y/N
    ```

11. Enter N(o).

12. Press down on the DIMM retaining levers at either end of the DIMM you want to remove.

13. Grasp the DIMM and gently remove it from the DIMM slot.

Installing DIMMs

Figure 3 shows the cache-module memory configurations for both the HSG80 and HSZ80 array controllers. Use the following steps to install DIMMs in a cache module:

> **CAUTION:** ESD can easily damage a cache module or a DIMM. Wear a snug-fitting, grounded ESD wrist strap.

1. Insert the DIMM straight into the socket and ensure that the notches in the DIMM align with the tabs in the socket as shown in Figure .

2. Press the DIMM gently until it's seated in the socket.

3. Double-check to ensure both ends of the DIMM are firmly seated in the slot and both retaining clips engage the DIMM.

4. If not already connected, connect a PC or terminal to the operational controller. The controller to which you're connected is "this controller"; the controller whose cache module you're installing is the "other controller."

5. Start FRUTIL with the following command:

   RUN FRUTIL

   FRUTIL displays the following:
   ```
   Do you intend to replace this controller's cache
   battery? Y/N
   ```

6. Enter N(o). FRUTIL displays the FRUTIL Main menu:
   ```
   FRUTIL Main Menu:
    1. Replace or remove a controller or cache module
    2. Install a controller or cache module
    3. Replace a PVA module
    4. Replace an I/O module
    5. Exit
   Enter choice: 1, 2, 3, 4, or 5 ->
   ```

7. Enter option 2, *Install a controller or cache module*, from the FRUTIL Main menu. FRUTIL displays the Install Options Menu:
   ```
   Install Options:
    1. Other controller and cache module
    2. Other controller module
    3. Other cache module
    4. Exit
   Enter choice: 1, 2, 3, or 4 ->
   ```

8. Enter option 3, *Other cache module*, from the Install Options menu. FRUTIL displays the following:
   ```
   Insert the slot A [or B] cache module? Y/N
   ```

9. Enter Y(es) and press return. FRUTIL displays the following:
   ```
   Quiescing all device ports.  Please wait...
     Device Port 1 quiesced.
     Device Port 2 quiesced.
     Device Port 3 quiesced.
     Device Port 4 quiesced.
     Device Port 5 quiesced.
     Device Port 6 quiesced.
   All device ports quiesced.
    .
    .
    .
   Perform the following steps:
   1. Turn off the battery for the new cache module by
      pressing the battery's shut off button for five
      seconds
   2. Connect the battery to the new cache module.
   3. Insert the new cache module in slot A [or B]
      within 2 minutes.
   ```

   NOTE: A countdown timer allows a total of two minutes to install the cache module. If you exceed two minutes, "this controller" will exit FRUTIL and resume operations.

10. Disable the ECB to which you're connecting the new cache module by pressing the battery disable switch until the status light stops blinking—about five seconds.

> **CAUTION:** The ECB must be disabled—the status light is not lit and is not blinking—before connecting the ECB cable to the cache module. Failure to disable the ECB could result in ECB damage.

11. Connect the ECB cable to the new cache module.

> **CAUTION:** Make sure you align the cache module in the appropriate guard rails. If you do not align the cache module correctly, damage to the backplane can occur.

12. Insert the new cache module into its slot and engage its retaining levers.

   NOTE: In mirrored mode, FRUTIL will initialize the mirrored portion of the new cache module, check for old data on the cache module, and then restart all device ports. After the device ports have been restarted, FRUTIL will test the cache module and the ECB. After the test completes, the device ports will quiesce and a mirror copy of the cache module data will be created on the newly installed cache module.

13. FRUTIL will restart the other controller. FRUTIL displays the following:
   ```
   Please wait . . .
   If the other controller did not restart, press its
   reset button.

   Field Replacement Utility terminated.
   ```

14. If the other controller did not restart, press its reset button.

15. Enable failover, and re-establish the dual-redundant controller configuration with the following command:

    SET FAILOVER COPY=THIS_CONTROLLER

    This command copies the subsystem's configuration from "this controller" to the "other controller."

16. Disconnect the PC or terminal from the controller's maintenance port.

Upgrading Cache Memory in an HSG80 or an HSZ80 Controller

Figure 3 shows the cache-module memory configurations for both the HSG80 and HSZ80 array controllers. In order to upgrade cache memory, the controller must be shutdown. Use the following steps to replace DIMMS in a cache module:

> **NOTE:** The cache memory for the HSG80 ACS Version 8.0 controller cannot be upgraded. The only valid cache-module memory configuration for this controller is 128 MB (4 x 32 MB).

1. From the host console, dismount the logical units in the subsystem. If you are using a Windows NT platform, shut down the server.

2. If the controller is operating, connect a PC or terminal to the controller's maintenance port.

3. Shut down the controllers. In single controller configurations, shut down "this controller." In dual-redundant controller configurations, shut down the "other controller" first, then shut down "this controller" with the following commands:

    SHUTDOWN OTHER_CONTROLLER

    SHUTDOWN THIS_CONTROLLER

    When the controllers shut down, their reset buttons and their first three LEDs are lit continuously. This may take several minutes, depending on the amount of data that needs to be flushed from the cache modules.

> **CAUTION:** ESD can easily damage a cache module or a DIMM. Wear a snug-fitting, grounded ESD wrist strap.

4. Disable the ECB for the cache module you will be adding or replacing DIMMS in by pressing the battery disable switch until the status light stops blinking—about five seconds.

> **CAUTION:** The ECB must be disabled—the status light is not lit and is not blinking—before disconnecting the ECB cable from the cache module. Failure to disable the ECB could result in cache module damage.

5. Disconnect the ECB cable from the cache module.

6. Disengage both retaining levers, remove the cache module, and place the cache module onto a grounded antistatic mat.

7. If you are adding DIMMs, insert the new DIMM straight into the socket and ensure that the notches in the DIMM align with the tabs in the socket.

8. If you are replacing DIMMs, press down on the DIMM retaining levers at either end of the DIMM you want to remove.

9. Grasp the DIMM and gently remove it from the DIMM slot.

10. Insert the replacement DIMM straight into the socket and ensure that the notches in the DIMM align with the tabs in the socket.

11. In a dual-redundant controller configuration, repeat steps 4 through 10, as appropriate, for the other cache module.

> **NOTE:** In a dual-redundant controller configuration, both cache modules must contain the same memory configuration.

> **CAUTION:** Make sure you align the cache module in the appropriate guide rails. If you do not align the module correctly, damage to the backplane can occur.

12. Insert the cache module into its slot and engage its retaining levers.

13. Connect the ECB cable to the cache module.

14. In a dual-redundant controller configuration, repeat steps 12 and 13, as appropriate, for the other cache module.

15. Mount the logical units on the host. If you are using a Windows NT platform, restart the server.

16. Set the subsystem date and time. In single controller configurations, set "this controller." In dual-redundant controller configurations, set "this controller," and the "other controller" with the following command:

    SET THIS_CONTROLLER TIME=_dd-mmm-yyyy:hh:mm:ss_

    SET OTHER_CONTROLLER TIME=_dd-mmm-yyyy:hh:mm:ss_

17. Disconnect the PC or terminal from the controller's maintenance port.