

What is the effect of the STEP 7 function "Copy RAM to ROM"?

STEP 7 / V5.7

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1 What is the effect of the STEP 7 function "Copy RAM to ROM"?

1.1 General

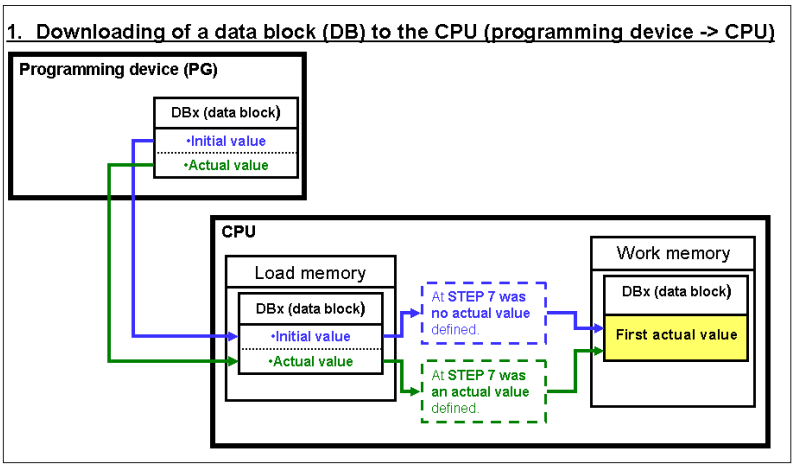
On all CPUs you can only run the "Copy RAM to ROM..." function in the "STOP" operating mode. If the CPU is not yet in the "STOP" operating mode, you are ask whether the CPU should be switched to "STOP" via STEP 7.

We will be looking at how it works on data and code blocks in SIMATIC S7-300 CPUs and C7 devices (with reference to the controller part) taking into account various storage concepts. Since deleting the EPROM memory is also partially executed via the "Copy RAM to ROM..." function, this entry also includes an overview of how various storage media can be deleted. There is also a brief description of how to change a memory card (MC) using the "Copy RAM to ROM..." function.

Chapter 1.6 lists the S7-300 CPUs and the C7 devices that support the "Copy RAM to ROM..." function.

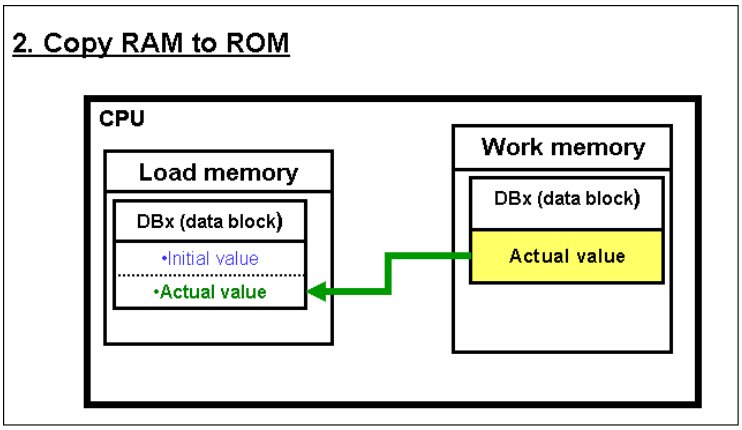
Below we explain this process in three pictures. The procedure is identical for all 3 load memory types (internal EPROM, FLASH Memory Card, Micro Memory Card).

1. In the case of data blocks the initial values and the actual values are transferred from STEP 7 to the CPU in the load memory (memory card). However, the initial value is always then taken as the "First actual value" in the main memory if no actual value has been defined in STEP 7. If an actual value defined in STEP 7, it is transferred to the main memory. The ”first actual value” describes the value, of the data block element (for example: DBW) after downloading (without changes by the PLC program, without changes by ”Modify variable”).

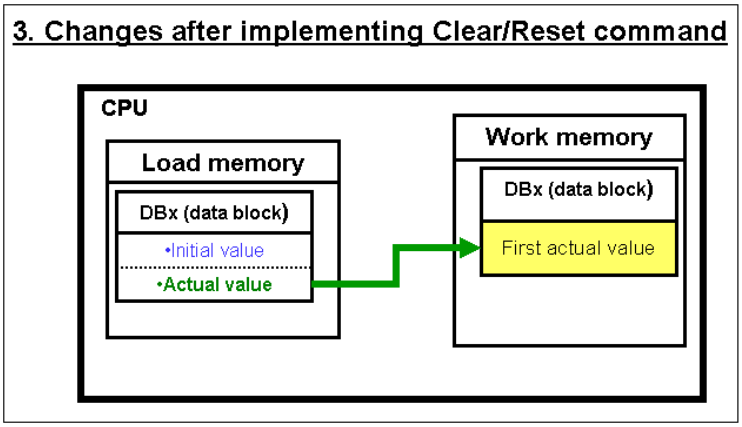


2. When you perform the "Copy RAM to ROM..." function, the actual values in the load memory are overwritten with the actual values from the main memory. The ”actual value” describes the value, of the data block element (for example: DBW) at this moment (after changes by PLC program, after changes by ”Modify variable”).

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3. If the load memory is transferred again to the main memory (e. g. after overall reset), then the actual values from the load memory are taken as the "First actual values" in the main memory.



NOTE When you run the STEP 7 "Copy RAM to ROM..." function, the actual values of the runtime-relevant data blocks in the load memory are overwritten with the actual values from the main memory. If the runtime-relevant data blocks are then transferred again to the main memory (e. g. after overall reset), then the CPU takes the actual values from the load memory as initial values. These new initial values are displayed in SIMATIC STEP 7 in the "Actual value" column.

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1.2 SIMATIC S7-300 CPUs and SIMATIC C7 devices with built-in RAM and EPROM as load memory

In the case of CPU modules that have a built-in EPROM you can use the "Copy RAM to ROM..." function to copy the content of the internal RAM load memory to the built-in EPROM load memory so as not to lose data in the case of power failure without battery or overall reset. In the case of SIMATIC S7-300 CPUs or C7 devices with internal EPROM as load memory the code and data blocks are written from the RAM load memory to the EPROM load memory.

Delete EPROM

The built-in EPROM is deleted by deleting the complete contents of the RAM and using the "Copy RAM to ROM..." function to copy the new RAM contents into the internal load memory EPROM. Proceed as follows:

1. Connect the programming device (PG) with the CPU.
2. Open the SIMATIC Manager and go to "PLC > Display Accessible Nodes".
3. Open the view of the blocks in the dialog "Accessible Nodes".
4. Mark the blocks to be deleted (the system data too if you wish). If you want to delete the complete internal EPROM, mark all the blocks to be deleted and the system data. You cannot delete system functions (SFC) and system function blocks (SFB).
5. Delete the marked blocks via "Edit > Delete" or via the "Del" key.
6. Perform "PLC > Copy RAM to ROM...". This copies all the valid blocks from the RAM load memory to the internal EPROM memory. The blocks deleted in the internal RAM load memory are thus no longer written to the internal EPROM load memory and are thus also deleted in the EPROM.

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1.3 SIMATIC S7-300 CPUs and SIMATIC C7 devices with built-in RAM and an external memory card (MC)

When you perform the "Copy RAM to ROM..." function, the runtime-relevant program and data blocks are copied from the internal RAM load memory to the memory card (MC).

Change the Memory Card (MC)

1. Set CPU in STOP mode.
2. Remove any slotted memory card.
3. Slot the "new" memory card.
4. Do an overall reset of the CPU.
5. If the memory card does not yet contain the matching user program, you must first load the user program into the CPU (internal RAM load memory) and then use "Copy RAM to ROM..." to transfer it to the memory card. Please note here that blocks already in the RAM load memory that are not overwritten by the new user program are also transferred to the memory card. But here you can also use the "Load user program onto memory card" function directly.

NOTE It is not permitted to remove and slot the memory card (MC) in the RUN operating mode. When you remove/slot a memory card the CPU demands an overall reset and so the user program is lost in the RAM.

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Delete individual blocks

You cannot delete individual blocks from a memory card on the PG. You can only delete individual blocks with a combination of the CPU and PG. The requirement for this is that you slot the memory card in the CPU.

Then proceed as follows:

1. Connect the programming device (PG) with the CPU.
2. Open the SIMATIC Manager and go to "PLC > Display Accessible Nodes".
3. Open the view of the blocks "Accessible Nodes".
4. Mark the blocks to be deleted (the system data too if you wish).
5. Delete the marked blocks via "Edit > Delete" or via the "Del" key.
6. Perform "PLC > Copy RAM to ROM...". This copies all the valid blocks to the memory card. The block deleted in the CPU is then no longer written to the memory card and is therefore deleted.

Completely delete the memory card (MC)

Proceed as follows:

1. Slot the memory card into the programming device (PG).
2. In the SIMATIC Manager select "File > S7-MemoryCard > Delete".
3. Acknowledge with "yes" the security question asking whether you really want to delete.

1.4 SIMATIC S7-300 CPUs and SIMATIC C7 devices with micro memory card (MMC)

When you perform the "Copy RAM to ROM..." function, the runtime-relevant data blocks are copied from the main memory to the MMC. Here the actual values of the data blocks are overwritten on the MMC so that after an overall reset new initial values (the new actual values) are effective. These new initial values are displayed in SIMATIC STEP 7 in the "Actual value" column.

In the case of CPU modules that work with a micro memory card (MMC) the load memory is on the MMC. When loaded, the program is stored on the MMC in such a way as to be immune to power failure and overall reset. The program is therefore always remanent in the load memory (on the MMC).

Delete individual blocks on a micro memory card (MMC)

- **With the PG**
  1. Slot the MMC into the programming device (PG).
  2. In the SIMATIC Manager select "File > S7-MemoryCard > Open".
  3. Mark the blocks to be deleted (the system data too if you wish).
  4. Delete the marked blocks via "Edit > Delete" or via the "Del" key.
- **Via the CPU**
  The requirement for this is that you slot the micro memory card in the CPU.
  1. Connect the programming device (PG) and your CPU.
  2. Open the SIMATIC Manager and go to "PLC > Display Accessible Nodes".
  3. Open the view of the blocks "Accessible Nodes".
  4. Mark the blocks to be deleted (the system data too if you wish).
  5. Delete the marked blocks via "Edit/Delete" or via the "Del" key.

Completely delete the micro memory card (MMC)

1. Slot the MMC into the programming device (PG).
2. In the SIMATIC Manager select "File > S7-MemoryCard > Delete".
3. Acknowledge with "yes" the security question asking whether you really want to delete.

NOTE In order to be able to read and write micro memory cards (MMC) on your PC too you need a prommer that can read and write the special format of the micro memory cards. A suitable prommer is available under order number 6ES7792-0AA00-0XA0.

You must never format the MMC in a standard slot or card reader with Windows, otherwise you will no longer be able to use the MMC for the SIMATIC-CPUs. You can also find information in the FAQ:

- How do you format or reset an MMC (MicroMemoryCard) for SIMATIC S7-300 CPUs?

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1.5 SIMATIC S7-400 CPUs

The "Copy RAM to ROM..." function is not supported by S7-400 CPUs and the CPU S7-318 2DP. The options offered by the S7-400 are given in the FAQ:

- How can the program be written to the FLASH memory card if a SIMATIC S7-400 CPU is used?

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1.6 Table of the S7-300 CPUs and the C7 devices that support the "Copy RAM to ROM..." function.

The table below shows the C7 devices that support the "Copy RAM to ROM..." function. For better orientation, the type of load memory was also specified.

C7-devices	From order number	Load memory
SIMATIC C7-621, complete device	6ES7621-1AD0x-0AE3	RAM and EPROM integrated
SIMATIC C7-621, complete device	6ES7621-6BD0x-0AE3	RAM and EPROM integrated
SIMATIC C7-623/P, complete device	6ES7623-1DE0x-0AE3	RAM and EPROM integrated
SIMATIC C7-624, complete device	6ES7624-1AE0x-0AE3	RAM and EPROM integrated
SIMATIC C7-624/P, complete device	6ES7624-1DE0x-0AE3	RAM and EPROM integrated
SIMATIC C7-626/P, complete device	6ES7626-1DG0x-0AE3	RAM and EPROM integrated
SIMATIC C7-621/P DP, complete device	6ES7626-2DG0x-0AE3	RAM and EPROM integrated
SIMATIC C7-633/P, complete device	6ES7633-1DF0x-0AE3	Memory Card (MC)
SIMATIC C7-633/P DP, complete device	6ES7633-2BF0x-0AE3	Memory Card (MC)
SIMATIC C7-634/P, complete device	6ES7634-1DF0x-0AE3	Memory Card (MC)
SIMATIC C7-634/P DP, complete device	6ES7634-2BF0x-0AE3	Memory Card (MC)
SIMATIC C7-613, complete device	6ES7613-1CA0x-0AE3	Micro Memory Card (MMC)
SIMATIC C7-635 Touch	6ES7635-2EB0x-0AE3	Micro Memory Card (MMC)
SIMATIC C7-635 Keys, complete device	6ES7635-2EC0x-0AE3	Micro Memory Card (MMC)
SIMATIC C7-636 Keys, complete device	6ES7636-2EC00-0AE3	Micro Memory Card (MMC)

In the following table you will find the SIMATIC S7-300 CPUs that the Support Copy RAM to ROM..." function. For better orientation the type of load memory was also specified.

SIMATIC S7-300 CPU	From order number	Load memory
CPU 312 IFM	6ES7312-5ACxx-0AB0	RAM and EPROM integrated
CPU 314 IFM for S7-300	6ES7314-5AExx-0AB0	RAM and FEPROM integrated
CPU 313	6ES7313-1AD01-0AB0	Memory Card (MC)
CPU 314	6ES7314-1AE02-0AB0	Memory Card (MC)
CPU IFM with slot for MC	6ES7314-5AE10-0AB0	Memory Card (MC)
CPU 315	6ES7315-1AF01-0AB0	Memory Card (MC)
CPU 315-2 DP	6ES7315-2AF01-0AB0	Memory Card (MC)
CPU 316-2 DP	6ES7316-2AG00-0AB0	Memory Card (MC)

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CPU 312C	6ES7312-5BD0x-0AB0	Micro Memory Card (MMC)
CPU 313C	6ES7313-5BE0x-0AB0	Micro Memory Card (MMC)
CPU 313C-2 PtP	6ES7313-6BE0x-0AB0	Micro Memory Card (MMC)
CPU 313C-2 DP	6ES7313-6CE0x-0AB0	Micro Memory Card (MMC)
CPU 314C-2 PtP	6ES7314-6BF0x-0AB0	Micro Memory Card (MMC)
CPU 314C-2 DP	6ES7314-6CF0x-0AB0	Micro Memory Card (MMC)
CPU 3112, 16 KB	6ES7312-1AD10-0AB0	Micro Memory Card (MMC)
CPU 314, 48 KB	6ES7314-1AF1x-0AB0	Micro Memory Card (MMC)
CPU 315-2 DP	6ES7315-2AG10-0AB0	Micro Memory Card (MMC)
CPU 315-2 PN/DP	6ES7315-2EG10-0AB0	Micro Memory Card (MMC)
CPU 317-2 DP	6ES7317-2AJ10-0AB0	Micro Memory Card (MMC)
CPU 317-2 PN/DP	6ES7317-2EJ10-0AB0	Micro Memory Card (MMC)
CPU 319-3PN/DP, 1400 KB	6ES7318-3EL00-0AB0	Micro Memory Card (MMC)
CPU315F-2 PN/DP, 192 KB	6ES7315-2FH10-0AB0	Micro Memory Card (MMC)
CPU315F-2 DP, 192 KB	6ES7315-6FF0x-0AB0	Micro Memory Card (MMC)
CPU 317F-2 PN/DP, 512 KB	6ES7317-2FJ10-0AB0	Micro Memory Card (MMC)
CPU 317F-2 DP, 512 KB, 0.1 ms/kAW	6ES7317-6FF00-0AB0	Micro Memory Card (MMC)
CPU 315T-2 DP, 128 KB, 0.1 ms/kAW	6ES7315-6TG10-0AB0	Micro Memory Card (MMC)
CPU 317T-2 DP, 512 KB, 0.1 ms/kAW	6ES7317-6TJ10-0AB0	Micro Memory Card (MMC)

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