ESG-A/AP and ESG-D/DP Security Features

This document provides information on how to protect classified proprietary data stored in the following Agilent signal generators:

ESG-A series	ESG-AP series	ESG-D series	ESG-DP series
E4400B	E4423B	E4430B	E4434B
E4420B	E4424B	E4431B	E4435B
E4421B	E4425B	E4432B	E4436B
E4422B	E4426B	E4433B	E4437B

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Instrument Memory Types

The ESG-A/AP and ESG-D/DP comprise several memory types, each used for storing a specific type of data. The following tables describe the memory types for each board in the instrument. A "Yes" in the "Writable During Normal Operation?" column indicates that sensitive user data can reside in that memory type. Refer to the footnotes in the "Purpose/Contents" column for information on removing sensitive user information.

Table 1 A14 CPU/Motherboard Memory

Memory Type/Size	Writable During Normal Operation?	Data Retained When Powered Off?	Purpose/Contents	Data Input Method
EPROM (64 KB)	No	Yes	main firmware image	factory installed or firmware upgrade
IC ROM DS (256 KB)	No	Yes	CPU bootup program and firmware loader/updater	factory programmed
IC ROM F (1 MB)	No	Yes	factory calibration/ configuration data	factory or service only
Battery-backed SRAM (544 KB)	Yes	Yes	stores the following user data: • directory information, such as file names, for the main file system[1, 2] • directory information, such as file names, for the volatile ARB file system[1, 2] • directory information, such as file names, for the non-volatile ARB file system[1, 2] • user data, such as table editor information, stored in the main file system[3] • temporary storage of some cached user data, such as the displayed frequency[3]	firmware operations
Microprocessor Cache, SRAM (3 kB)	Yes	No	CPU data and instruction cache. Can contain fragments of user data.	memory is managed by CPU, not user.

1. Refer to "Zero Overwriting Directory Information" on page 6.
2. Refer to "Sanitizing Directory Information" on page 6.
3. Refer to "Sanitizing the Main File System Memory" on page 7.

Table 2 A5 Dual Arbitrary Waveform Generator Board Memory

Option	Memory Type/Size	Writable During Normal Operation?	Data Retained When Powered Off?	Purpose/Contents	Data Input Method
UND	SRAM (4 MB)	Yes	No	I and Q waveform data[1]	normal user operation
	SRAM (512 KB)	Yes	No	sequencer data	normal user operation
	Flash (1 MB)	No	Yes	firmware image	firmware upgrade
	EEPROM (512 B)	No	Yes	calibration data and board header	firmware upgrade
	SRAM (512 KB)	Yes	No	operating memory for the dual arbitrary waveform generator	During normal operation, some user information, such as payload data, can remain in the memory.
	Flash (4 MB)	Yes	Yes	I and Q waveform data[2]	normal user operation

1. Refer to "Sanitizing Volatile ARB Memory" on page 7.
2. Refer to "Sanitizing Non-Volatile ARB Memory" on page 7.

Table 3 A6 Bit Error Rate Test Board Memory

Option	Memory Type/Size	Writable During Normal Operation?	Data Retained When Powered Off?	Purpose/Contents	Data Input Method
UN7	SRAM (512 KB)	Yes	No	CPU operating memory	memory is managed by CPU, not user
	Flash (2 MB)	No	Yes	CPU program and FPGA configuration	firmware upgrade
	EEPROM (512 B)	No	Yes	calibration data and board header	firmware upgrade
300	SRAM (1 MB)	Yes	No	CPU operating memory	memory is managed by CPU, not user
	Flash (512 KB)	No	Yes	CPU program	firmware upgrade
	EEPROM (512 B)	No	Yes	calibration data and board header	firmware upgrade
	EEPROM (3.2 MB)	No	Yes	FPGA configuration	firmware upgrade

Table 4 A7 Baseband Generator Board Memory

Option	Memory Type/Size	Writable During Normal Operation?	Data Retained When Powered Off?	Purpose/Contents	Data Input Method
UN3/4	SRAM (64 KB)	Yes	No	burst envelope data	normal user operation
	EEPROM (256 KB)	No	Yes	calibration data and board header	firmware upgrade
UN8/9	SRAM (64 KB)	Yes	No	burst envelope data	normal user operation
	SRAM (512 KB)	Yes	No	PRAM data (framing and payload data information for real-time formats) *This part not loaded onto board.*	normal user operation
	EEPROM (9 KB)	No	Yes	firmware image	firmware upgrade
	EEPROM (512 B)	No	Yes	calibration data and board header	firmware upgrade

Table 5 A8 Data Generator Board Memory

Option	Memory Type/Size	Writable During Normal Operation?	Data Retained When Powered Off?	Purpose/Contents	Data Input Method
UN3 (1 MSa)	SRAM (1024 KB)	Yes	No	PRAM data (framing and payload data information for real-time formats)[1]	normal user operation
	EEPROM (256 KB)	No	Yes	calibration data and board header	firmware upgrade
UN4 (8 MSa)	SRAM (8192 KB)	Yes	No	PRAM data (framing and payload data information for real-time formats)[1]	normal user operation
	EEPROM (256 KB)	No	Yes	calibration data and board header	firmware upgrade
UN8 (1 MSa)	SRAM (1024 KB)	Yes	No	PRAM data (framing and payload data information for real-time formats)[1]	normal user operation
	DRAM (8 MB)	Yes	No	CPU operating memory	memory is managed by CPU, not user.
	SRAM (128 KB)	Yes	No	I/Q data generation	memory is managed by CPU, not user.
	Flash (4 MB)	No	Yes	CPU program and FPGA configuration	firmware upgrade
	Flash (128 KB)	No	Yes	CPU boot ROM	firmware upgrade
	EEPROM (512 B)	No	Yes	calibration data and board header	firmware upgrade

Table 5 A8 Data Generator Board Memory

Option	Memory Type/Size	Writable During Normal Operation?	Data Retained When Powered Off?	Purpose/Contents	Data Input Method
UN9 (8 MSa)	SRAM (8192 KB)	Yes	No	PRAM data (framing and payload data information for real-time formats)[1]	normal user operation
	DRAM (8 MB)	Yes	No	CPU operating memory	memory is managed by CPU, not user.
	SRAM (128 KB)	Yes	No	I/Q data generation	memory is managed by CPU, not user.
	Flash (4 MB)	No	Yes	CPU program and FPGA configuration	firmware upgrade
	Flash (128 KB)	No	Yes	CPU boot ROM	firmware upgrade
	EEPROM (512 B)	No	Yes	calibration data and board header	firmware upgrade

1. Refer to "Sanitizing PRAM Memory" on page 8.

Table 6 Other Boards

Board/Option	Memory Type/Size	Writable During Normal Operation?	Data Retained When Powered Off?	Purpose/Contents	Data Input Method
A9 Output	EEPROM (512 B)	No	Yes	calibration data and board header	firmware upgrade
A11 Reference					
A12 Synthesizer/Doubler					
A20 Down Converter (Option 300)					
A21 Demodulator (Option 300)					
A22 YIG Driver					
A24 Frac-N/Divider					
A23 Sampler					
A1 Front Panel Keyboard	No memory on these boards.				
A15 Daughterboard					
A17 Rear Panel Interface					
A18 BER Rear Panel Interface (Option UN7/300)					

User Data Removal Methods

This section describes the methods for removing various user data types stored in the instrument.

Zero Overwriting Directory Information

Use this procedure to zero overwrite all directory information, such as file names. This procedure *does not* affect the stored user data associated with the file name.

1. Turn off the signal generator.
2. Press and hold **Preset** while turning on the signal generator. Continue holding **Preset** until the ESG fail-safe recovery sequence screen is displayed.
3. Press the **Yes** softkey to erase (zero overwrite) all of the signal generator's directory information.
4. Cycle the signal generator power to reinitialize factory defaults and reset factory-installed options.

NOTE After completing this procedure, an I/Q calibration must be performed prior to using the signal generator as a digital modulation source. Likewise, a DCFM/DCΦM calibration must be performed prior to using the signal generator as an FM/ΦM source. Refer to the *User's Guide* for more information.

Sanitizing Directory Information

Use this procedure to sanitize all directory information, such as file names. This procedure *does not* affect the stored user data associated with the directory information. You must use remote SCPI commands to perform this procedure. For more information, refer to the *Programming Guide*.

1. Delete all files (:MEM:DEL:ALL).
2. Write as many small files as the system allows with file name patterns of 23 characters.
3. For increased security, repeat steps 1 and 2 as many times as you wish, changing the file name patterns each time.

NOTE Another method for sanitizing the directory information is to open the box and remove the battery from the A14 CPU/Mother board.

Sanitizing the Main File System Memory

Use this procedure to sanitize all user data in the main file system memory. This procedure *does not* affect ARB, NVARB, or PRAM data. You must use remote SCPI commands to perform this procedure. For more information, refer to the *Programming Guide*.

1. Delete all files (:MEM:DEL:ALL).
2. Write a binary file that fills all of the main file system memory.
3. For increased security, repeat steps 1 and 2 as many times as you wish, changing the binary file patterns each time.

NOTE Another method for sanitizing the main file system is to open the box and remove the battery from the A14 CPU/Mother board.

Sanitizing Volatile ARB Memory

Use this procedure to sanitize all user data in the ARB memory. This procedure *does not* affect NVARB, PRAM, or main file system data. You must use remote SCPI commands to perform this procedure. For more information, refer to the *Programming Guide*.

1. Delete all files (:MEM:DEL:ARB).
2. Write a binary file that fills all of the ARB memory.
3. For increased security, repeat steps 1 and 2 as many times as you wish, changing the binary file patterns each time.

Sanitizing Non-Volatile ARB Memory

Use this procedure to sanitize all user data in the NVARB memory. This procedure *does not* affect ARB, PRAM, or main file system data. You must use remote SCPI commands to perform this procedure. For more information, refer to the *Programming Guide*.

1. Delete all files (:MEM:DEL:NVARB).
2. Write a binary file that fills all of the NVARB memory.
3. For increased security, repeat steps 1 and 2 as many times as you wish, changing the binary file patterns each time.

Sanitizing PRAM Memory

Use this procedure to sanitize all user data in the PRAM memory. This procedure *does not* affect ARB, NVARB or main file system data. You must use remote SCPI commands to perform this procedure. For more information, refer to the *Programming Guide*.

1. Delete all files (:MEM:DEL:NVARB).
2. Write a binary file that fills all of the PRAM memory.
3. For increased security, repeat steps 1 and 2 as many times as you wish, changing the binary file patterns each time.

If Your Instrument is Not Functioning

If the signal generator is not functioning and you are unable to erase the memory, using the procedures in this document, you may physically remove the boards that contain sensitive user data (A14 CPU/mother board, A8 Data Generator board, and A5 Dual Arbitrary Waveform Generator board) and do one of the following options:

- Discard the boards and send the instrument to a repair facility. New boards will be installed and the instrument will be repaired and calibrated. If the instrument is still under warranty, you will not be charged for the new boards.
- If you have another working instrument, install the boards into that instrument and erase the memory. Then reinstall the boards back into the non-working instrument and send it to a repair facility for repair and calibration. If you discover that one or more of the boards cause the working instrument to fail, discard the non-working boards and note that they caused the instrument failure on the repair order. If the instrument is still under warranty, you will not be charged for the new boards.

For procedures on removing and replacing boards, refer to the *Service Guide.*