



5/6 Series MSO

Declassification and Security

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Contents

Preface	4
Terminology.....	4
Memory devices.....	5
Media and data export devices.....	8
Sanitizing the instrument.....	9
Resetting the instrument clock after CMOS reset.....	10
How to clear or sanitize a nonfunctional instrument	11
Service safety summary.....	11
Remove the m.2 memory board.....	12
Repair charges.....	17

Preface

This document helps customers with data security concerns to clear or sanitize the following instruments.

- 5 Series MSO (MSO54, MSO56, and MSO58) with a serial number below B020000 or C040000
- 6 Series MSO (MSO64)

The procedures in this document are written to meet the requirements specified in:

- National Industrial Security Program Operating Manual (NISPOM), DoD 5220.22–M, Chapter 8
- Defense Security Service Manual for the Certification and Accreditation of Classified Systems under the NISPOM

Terminology

The following terms may be used in this document:

- **Clear.** This eradicates data on media/memory before reusing it in a secured area. All reusable memory is cleared to deny access to previously stored information by standard means of access.
- **Erase.** This is equivalent to clear.
- **Media.** Storage/data export device. A device that stores or exports data from the instrument, such as a USB flash drive or USB port.
- **Sanitize.** This removes the data from media/memory so that the data cannot be recovered using any known technology. This is typically used when the device is moved (temporarily or permanently) from a secured area to a nonsecured area.
- **Scrub.** This is equivalent to sanitize.
- **Remove.** This is a physical means to clear the data by removing the memory device from the instrument. Instructions are available in the product service manual.
- **User-Accessible.** The user can directly retrieve the memory device contents.
- **User-Modifiable.** The memory device can be written to by the user during normal instrument operation, using the instrument user interface or remote control.
- **Volatile memory.** Memory that loses data when the instrument is powered off.
- **Nonvolatile memory.** Memory that retains data when the instrument is powered off.
- **Power off.** Some instruments have a “Standby” mode, in which power is still supplied to the instrument. For clearing data, putting the instrument in Standby mode does not qualify as powering off. For these products, you must either push a rear-panel OFF switch or remove the power source from the instrument.
- **Instrument Declassification.** A term that refers to procedures that must be undertaken before an instrument can be removed from a secure environment. Declassification procedures include memory sanitization, memory removal, and sometimes both.

The following terms may be used in the volatile and non-volatile memory device tables:

- **User data.** Describes the type of information stored in the device. Refers to waveforms or other measurement information representing signals connected to the instrument by users.
- **User settings.** Describes the type of information stored in the device. Refers to instrument settings that can be changed by the user.
- **Both.** Describes the type of information stored in the device. It means that both user data and user settings are stored in the device.

- **None.** Describes the type of information stored in the device. It means that neither user data or user settings are stored in the device.
- **Directly.** Describes how data is modified. It means that the user can modify the data.
- **Indirectly.** Describes how data is modified. It means that the instrument system resources modifies the data and that the user cannot modify the data.

Memory devices

The following tables list the memory devices in the instrument.

Volatile memory devices

These are the memory capacities at the time of publishing this document, but are subject to change.

Type and size	Function	Type of user info stored	Backed up by battery	Method of modification	Data Input method	Location	User accessible	To clear	To sanitize
SDRAM 16 GB (All models)	Host processor memory	User data	No	Indirectly	Written by processor system	Module socket (SODIMM) on the carrier interface assembly	No	Remove power from the instrument for a minimum of 30 seconds.	
SDRAM MSO54: 4 GB MSO56/8: 8 GB MSO64: 16 GB	Holds active acquisition data	User data	No	Indirectly	Application software operations	Module socket (SODIMM) on acquisition board	No	Remove power from the instrument for a minimum of 30 seconds.	
SDRAM 4 GB	Holds video graphics data	User data	No	Indirectly	Application software operations	Acquisition board	No	Remove power from the instrument for a minimum of 30 seconds.	
CMOS RAM 256 Bytes	Holds clock and BIOS configuration data	None	Yes	Indirectly	BIOS operations	Carrier interface assembly	Yes	Remove power from the instrument and press the CMOS clear button for a minimum of 30 seconds.	
FPGA <30 MB	Interface between compute system and acquisition system	None	No	None	Written by processor system	Acquisition board	No	Remove power from the instrument for a minimum of 30 seconds	

Nonvolatile memory devices

These are the memory capacities at the time of publishing this document, but are subject to change. SPC (signal path compensation) information is stored on the Linux m.2 card. SPC does not contain any user settings.

Type and size	Function	Type of user info stored	Method of modification	Data Input method	Location	User accessible	To clear	To sanitize
Linux Solid State Drive Card ≤512 GB	Host instrument Linux operating system, application software, and Ethernet IP and related settings	Instrument settings including analog channel, digital channel, AFG, DVM, etc. AFG waveform information. User-saved waveforms, screen shots, and settings files. Option licenses. SPC.	Directly settable from UI or by using PI commands	Written by processor system, software operations	Socket (m.2) on the carrier interface assembly	Yes		See procedure for sanitizing the instrument.
EEPROM 2 Kbit	Stores factory data, maintenance data	None	Indirectly	Factory operations	Acquisition board	Yes		Not applicable, does not contain user data or settings. Clearing or sanitizing would disable instrument functionality.
EEPROM 2 Kbit	Holds AFG calibration data, USB/Ethernet port access password	Port access password User Password: Allows user to specify a string in the About menu and lock it with password	Directly settable from UI or by using PI commands	Factory operations	AFG riser board	No		See procedure for sanitizing the instrument.
EEPROM 64 Kbit	Holds the front panel USB configuration	None	None	Factory operations	Front panel LED board	No		Not applicable, does not contain user data or settings. Clearing or sanitizing would disable instrument functionality.

Type and size	Function	Type of user info stored	Method of modification	Data Input method	Location	User accessible	To clear	To sanitize
EEPROM 1 Kb Four to six pieces depending on model	Holds the SODIMM memory configuration data (SPD)	None	None	Factory operations	Module socket (SODIMM) on the carrier interface assembly and module socket (SODIMM) on acquisition board	No	Not applicable, does not contain user data or settings. Clearing or sanitizing would disable instrument functionality.	
Flash Memory 16 Mbit Two pieces	Holds a part of the Acquisition FPGA configuration	None	Indirectly	Application software operations	Acquisition board	No	Not applicable, does not contain user data or settings. Clearing or sanitizing would disable instrument functionality.	
Flash Memory 128 Mbit	Stores processor BIOS firmware, BIOS configuration, and embedded controller firmware. The Ethernet MAC address is stored in this device.	None	Indirectly	BIOS operations, operating system operations and factory operations	Processor module board	No	Not applicable, does not contain user data or settings. Clearing or sanitizing would disable instrument functionality.	
Flash Memory 32 Kbit Three pieces	Stores power supply configuration data	None	Indirectly	Application software operations	Internal to the UCD9248 power supply controller on the acquisition board and carrier interface assembly	No	Not applicable, does not contain user data or settings. Clearing or sanitizing would disable instrument functionality.	
Flash Memory 32 KB	Stores power management controller firmware	None	Indirectly	Application software operations	Internal to the MC9S08 microcontroller on the acquisition board	No	Not applicable, does not contain user data or settings. Clearing or sanitizing would disable instrument functionality.	

Type and size	Function	Type of user info stored	Method of modification	Data Input method	Location	User accessible	To clear	To sanitize
Flash Memory 64 KB MSO64: 1 piece MSO54: 2 pieces MSO56: 3 pieces MSO58: 4 pieces	Stores analog board microcontroller firmware	None	Indirectly	Application software operations	Internal to the MKL14 microcontroller on the analog board	No		Not applicable, does not contain user data or settings. Clearing or sanitizing would disable instrument functionality.
Flash Memory (6 Series MSO) 43 KB Four pieces	Stores analog board microcontroller firmware	None	Indirectly	Application software operations	Internal to the MKL02 microcontroller on the analog board	No		Not applicable, does not contain user data or settings. Clearing or sanitizing would disable instrument functionality.
Flash Memory 0.33 Mbit	Stores the processor carrier FPGA configuration	None	None	Factory operations	Internal to the LCMXO2 FPGA on the carrier interface assembly	No		Not applicable, does not contain user data or settings. Clearing or sanitizing would disable instrument functionality.

Media and data export devices

The following table lists the data export devices in the instrument.

Type	Function	Method of modification	Data Input method	Location	User accessible	To disable
USB Host ports	User storage and recall of reference waveforms, screen images, and instrument setups, and installation of firmware updates using removable USB flash drives	Directly	User writeable	Three USB Host ports on front of the instrument; four USB Host ports on the back of the instrument	Yes	Use the Utility > Security menu to disable all USB ports (Host and Device). Requires a password (user-created when first disabled).

Type	Function	Method of modification	Data Input method	Location	User accessible	To disable
USB Device port	Remote control and data transfer to a PC	Directly	Remote control using USBTMC	USB Device port on back of the instrument	Yes	Use the Utility > Security menu to disable all USB ports (Host and Device). Requires a password (user-created when first disabled).
Ethernet	Transfer data and remote control of instrument	Directly	Remote control using LXI, VISA, or Socket Server	Ethernet port on back of instrument	No	Use the Utility > Security menu to disable the Ethernet LAN port. Requires a password (user-created when first disabled)

Sanitizing the instrument

1. Remove any USB memory devices from the instrument, and store or destroy the USB memory devices in accordance with your organization's guidelines.
2. Clear the Ethernet port settings:
 - a. Disconnect the Ethernet cable from the instrument.
 - b. Open the **Utility > I/O** menu.
 - c. Clear all information from the **Host Name**, **Domain Name**, and **Service Name** fields.
 - d. Click the Network Address **Manual** button.
 - e. Manually change the **Instrument IP Address**, **Subnet Mask**, **Gateway IP Address**, and **DNS IP Address** information to 00.00.00.00.
 - f. Tap **Apply Changes**. It will take several moments for the changes to take effect.
 - g. Tap outside the menu to close the menu. You can also clear the instrument Address settings by accessing the instrument's web-based interface. Connect the instrument to your network, enter the instrument's IP address into a Web browser on a PC that is connected to the same network as the instrument, click the Network Configuration link on the left side of the screen, select the Manual TCP/IP Mode box, clear all information from all fields, and click the Submit button for the Address Settings.
3. Open the **Utility > Security** menu and clear the password used to access enabling/disabling ports and software updates.
4. Clear the Network Configuration password:
 - a. Enter the instrument's IP address into a Web browser on a PC that has network access to the instrument.
 - b. Click the **Security for Network Config** link on the left side of the screen.
 - c. Click **Submit**:
 - If a password was set for this function, you are requested to enter the password. If the password is accepted, the password is set to blank (the default setting of the access password fields).
 - If a password was not set for this function, the screen displays the message that the password was successfully changed (to a blank password).
5. Clear the network mDNS Hostname and description:

- a. Enter the instrument's IP address into a Web browser on a PC that has network access to the instrument.
 - b. Click the **Network Configuration** link on the left side of the screen.
 - c. Delete any existing text in both of the Host Settings fields.
 - d. Click the Host Settings Submit button. A message appears stating that the field is empty, and will be configured to the original factory default value.
 - e. Click **OK**. The message closes and the fields are restored to their original factory settings.
6. Tap **TekSecure Erase Memory** to clear/reset internal memory.
 7. Push the **Default Setup** button before powering off the instrument.

Resetting the instrument clock after CMOS reset

CAUTION: Make sure to keep a record of the instrument BIOS password in your organization's records. There is no way for Tektronix to gain access to the instrument BIOS settings once the password is changed from the factory default value. If you need to return the instrument to Tektronix for service, you must reset the BIOS password back to the factory default value "Tektronix" before sending to the Tektronix Service Center.

Do the following steps to reset the instrument clock after a CMOS reset:

1. Connect a keyboard to the instrument.
2. Power on the instrument.
3. While the instrument is powering on, continuously tap the **F11** function key until the **BIOS Login** screen appears.
4. Enter the password (yours or the default password). If you are logging in for the first time, the factory installed password is "Tektronix". Once you have logged in using the factory default BIOS password, create and enter a new password in accordance with your organization's policies.
5. The **Please select a boot device** screen appears.
6. Use the down arrow key to select **Enter Setup** and press **Enter**.
7. In the Main tab (default), use the down arrow to select **System Date**. If the date is not current, use the keys as described on the screen to select and enter correct information in the date fields.
8. In the Main tab (default), use the down arrow to select System Time. If the time is not current, use the keys as described on the screen to select and enter correct Coordinated Universal Time (UTC) information in the date fields. Use the Web to determine the current UTC time. (note; Do not enter your local time.)
9. Once the time is set, press the F4 key to save this value and exit the setup screen. The instrument powers on to the normal oscilloscope view.
10. Double-tap the **Date and Time** badge in the lower right of the screen.
11. Tap the **Time Zone** field and select the correct time zone for your instrument location.
12. Enable the **Automatically adjust clock for Daylight Savings Time** function if used in your time zone.
13. Tap outside the menu to close the time zone setting.

How to clear or sanitize a nonfunctional instrument

An instrument stores user instrument settings, last waveform acquisition data, port-enable passwords, and Ethernet IP settings on the instrument. Do the following to clear or sanitize your instrument if it is not functioning and must be returned to Tektronix for repair:

1. Remove all external USB memory devices and store or destroy the USB memory devices in accordance with your organization's guidelines.
2. Follow the instructions in section Remove the m.2 memory board to get access to the rear chassis and remove the m.2 memory board. Store or destroy the m.2 memory board in accordance with your organization's guidelines.
3. Reassemble the instrument without the m.2 memory board and return it to Tektronix. The instrument will then be repaired and calibrated as necessary.

Contact the Tektronix Customer Care Center for assistance with returning the instrument to a repair center. Visit www.tek.com to find contacts in your area.

Service safety summary

The *Service safety summary* section contains additional information required to safely perform service on the product. Only qualified personnel should perform service procedures. Read this *Service safety summary* and the *General safety summary* before performing any service procedures.

To avoid electric shock

Do not touch exposed connections.

Do not service alone

Do not perform internal service or adjustments of this product unless another person capable of rendering first aid and resuscitation is present.

Disconnect power

To avoid electric shock, switch off the product power and disconnect the power cord from the mains power before removing any covers or panels, or opening the case for servicing.

Use care when servicing with power on

Dangerous voltages or currents may exist in this product. Disconnect power, remove battery (if applicable), and disconnect test leads before removing protective panels, soldering, or replacing components.

Verify safety after repair

Always recheck ground continuity and mains dielectric strength after performing a repair.

Remove the m.2 memory board

Use these procedures to get access to the rear chassis and remove the m.2 memory board from the carrier interface assembly, to sanitize a nonfunctional instrument before returning the instrument to Tektronix for repair. Refer to your company's internal policies regarding handling or disposal of the m.2 memory board. A new m.2 memory board is installed and the instrument is repaired and adjusted as necessary. Removing the M.2 board also removes the instrument calibration constants and any option licenses that you have installed.

CAUTION: Do not dispose of the carrier interface assembly after the m.2 memory board is removed. Reassemble the instrument with carrier board before returning it to a Tektronix Service Center.

WARNING: Before doing this procedure, disconnect the power cord from the line voltage source. Failure to do so could cause serious injury or death.

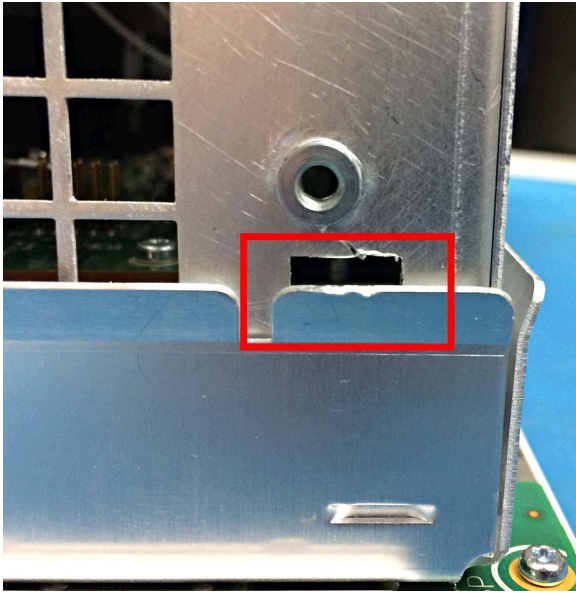
CAUTION: To avoid damaging other circuits in the instrument, perform the following procedure in a static-safe environment with proper electrostatic discharge controls in place.

WARNING: The 5 Series MSO uses aluminum tape along the bottom edge of the chassis. Do not use fingers to remove the aluminum tape. The tape is sharp and can cause injury.

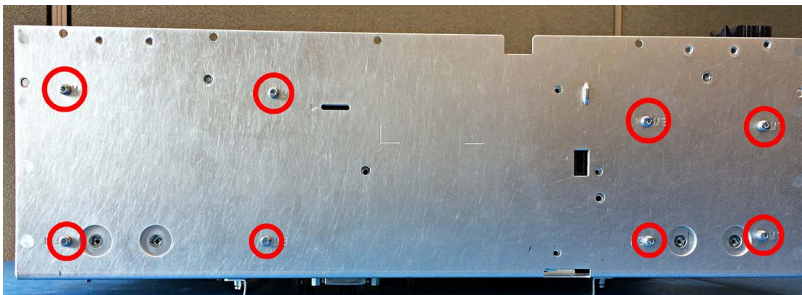
CAUTION: Be careful when removing the aluminum tape on the 5 Series MSO from across cables to prevent damage. Pull the tape off parallel to (across) the chassis surface; do not pull the tape off by pulling straight out from the cable. Hold down the exposed cable when removing the rest of the tape.

1. Remove the handle from the instrument:
 - a. Use a Torx T-10 screwdriver to remove two screws from each end of the handle.
 - b. Separate the handle from the hubs.
 - c. Set the handle and the two plastic hub parts aside.
2. Lay the instrument on its front on a soft antistatic foam pad or similar, to protect the buttons and knobs from damage while disassembling the instrument.
3. Remove the metal grill from the rear of the instrument:
 - a. Use a Torx T8 screwdriver to remove the six (6) screws located on the grill.
 - b. Remove the grill.
4. Remove the feet from the bottom of the instrument:
 - a. Open the feet.
 - b. Use a Torx T-10 screwdriver to remove the four (4) screws from each foot.
 - c. Remove the feet and set aside.
5. Remove the rear case from the instrument:
 - a. Use a Torx T-10 screwdriver to remove the six (6) screws from the back of the instrument.
 - b. Lift the rear case off the back of the instrument, and set it aside.
6. Separate the rear chassis from the front chassis:

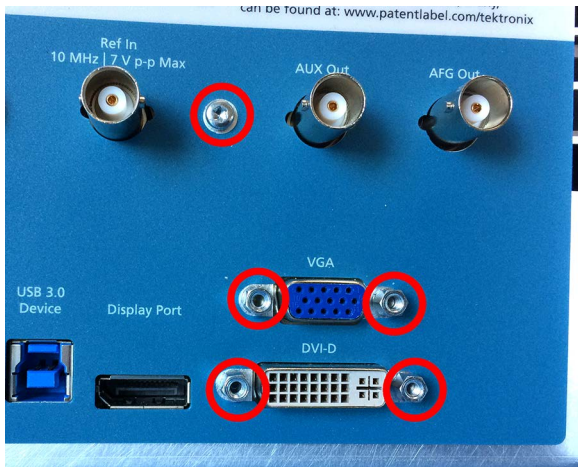
- a. For 5 Series instruments: use needle nose pliers to carefully remove the aluminum tape along the bottom edge of the chassis. Discard or recycle the removed aluminum tape pieces.
- b. Use a Torx T-10 screwdriver to remove the 18 screws (5 Series instruments) or 19 screws (6 Series instruments) securing the rear chassis to the front chassis. There are five screws each along the top and bottom, and four screws on each side.
- c. Insert a large flat blade screwdriver no more than 1/4 inch into the rectangular slot on the corner of the rear chassis (see following image). Rotate the screwdriver to lift the corner of the rear chassis from the front chassis. Repeat on each corner. There may be a little resistance from the front right corner of the bottom edge, where the rear chassis interconnects to the front chassis.
- d. When loose, lift off the rear chassis of the instrument.



7. Set the front half of the instrument aside.
8. Use a Torx T-10 screwdriver to remove the eight (8) screws from the bottom of the rear chassis.

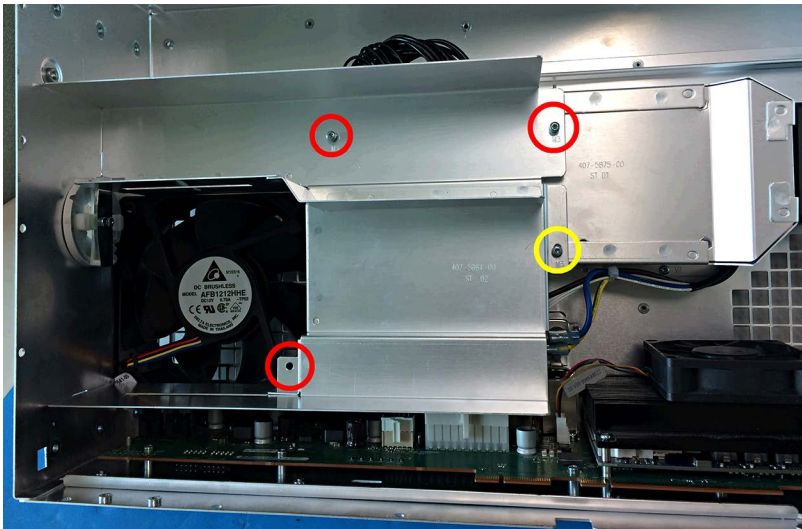


9. Use a Torx T-10 screwdriver to remove the one (1) screw from the back of the rear chassis.

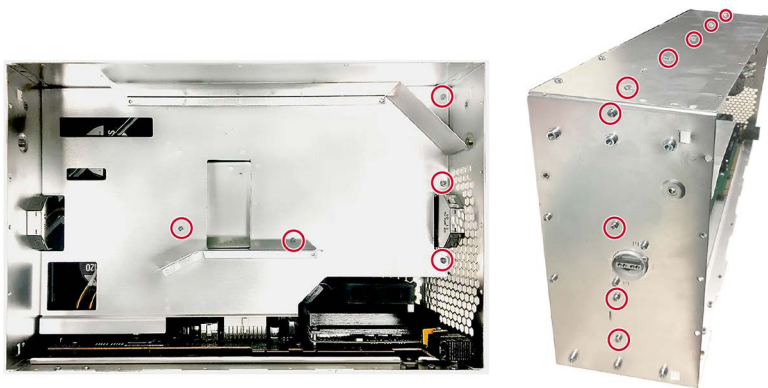


10. Use a 3/16 nut driver or wrench to remove the four (4) standoff jack screws from the back of the rear chassis. See above image.

11. Inside the rear chassis, remove the baffle:

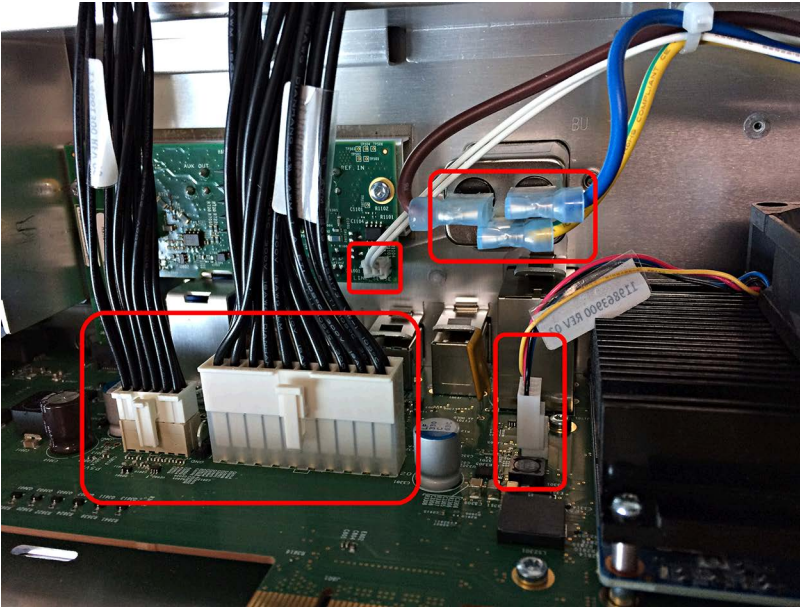


5 Series MSO baffle

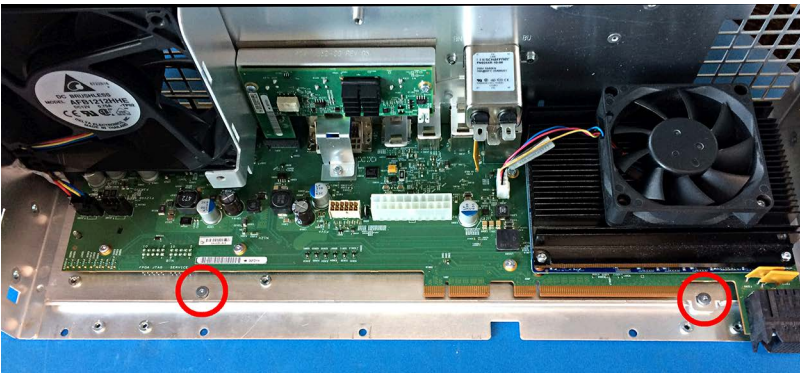


6 Series MSO baffle

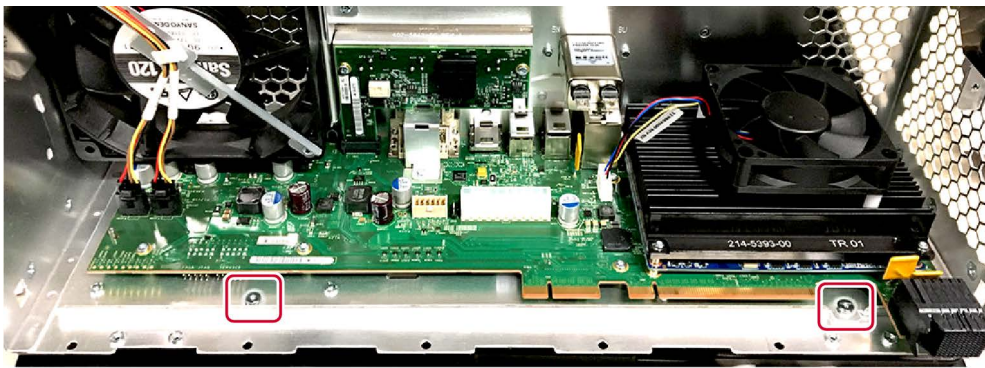
- a. Use a Torx T-10 screwdriver to remove the 4 (5 Series instruments) or 12 (6 Series instruments) screws holding the baffle in place.
 - b. For 5 Series instrument: lift from the end farthest from the sides and pull the baffle from the instrument. The baffle end has tabs that fit into the side chassis, and registration bumps near the right edge of the fan. The baffle fits tight and can require some effort to remove. For 6 Series instrument: lift from the right side and pull the baffle from the instrument. The baffle fits tight and can require some effort to remove.
 - c. Set the baffle aside.
12. Disconnect the four (4) cables from the carrier interface assembly, AFG riser board, and AC power filter.



13. On the 5 Series MSO: Inside the rear chassis, use a Torx T8 screwdriver to remove the two (2) screws at the front edge of the carrier interface assembly bracket (tray).



14. On the 6 Series MSO: Inside the rear chassis, use a Torx T8 screwdriver to remove the two (2) screws at the front edge of the carrier interface assembly bracket (tray).



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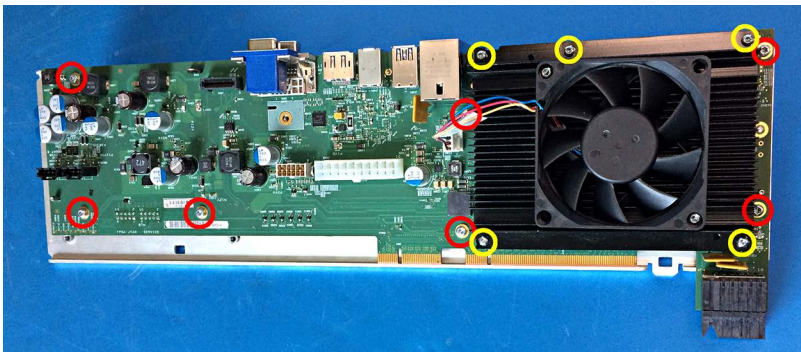
15. Lift the front half of the carrier interface assembly off the rear case enough to clear the mounting screw posts, and slide the carrier interface assembly out of the instrument. There is slight resistance from the spring clips on the rear panel I/O connectors. If the carrier interface assembly will not slide out, check that you have removed the eight screws from the bottom of the chassis (step 1) and the one screw and four jack screws from the rear of the chassis (steps 2, 3).

16. Use a T-10 Torx screwdriver to remove the one screw on the AFG riser assembly bracket.



17. Lift the AFG riser assembly straight up from the carrier interface assembly.

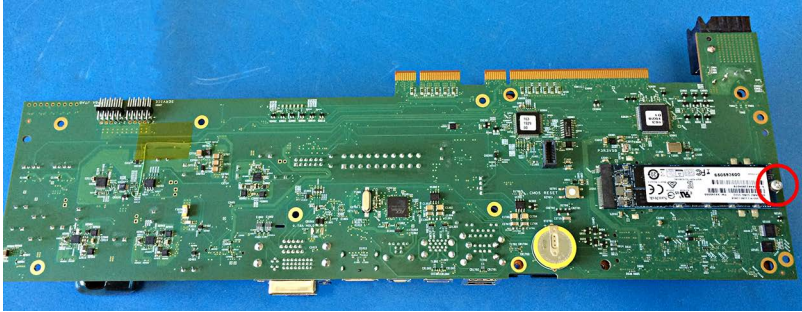
18. Remove the seven T-10 Torx screws from the carrier board (marked in red). Remove the five T-8 Torx screws from the carrier board heat sink (marked in yellow).



19. Carefully hold together the carrier interface assembly and turn it upside down so that the metal carrier tray is facing up. Support the end of the carrier interface assembly away from the heat sink assembly so that it is level.

20. Carefully lift the metal tray from the assembly to expose the bottom of the carrier interface board and the m.2 memory board.

21. Remove the one T-8 Torx screw and remove the M.2 SSD memory board. Store or destroy the m.2 memory board in accordance with your organization's guidelines.



22. Carefully align and set the carrier board tray back onto the carrier interface assembly.
23. Carefully hold together the carrier interface assembly and tray and turn it so that the circuit board and heat sink assembly are facing up.
24. Install the seven T-10 Torx carrier board screws. Tighten to 0.65 N·m.
25. Install the five T-8 Torx screws on the carrier board heat sink. Tighten to 0.45 N·m.
26. Reassemble the instrument by reversing the disassembly procedure.
 - a. Tighten Torx T-10 screws to torque of 0.65 Newton meters.
 - b. Tighten Torx T8 screws to torque of 0.45 Newton meters.
27. Return the assembled instrument to the nearest Tektronix Service Center for replacement of the m.2 memory board and recalibration.

Repair charges

Replacement of damaged and missing hardware is charged according to the rate at the time of replacement.