Tektronix Inc MSO44 4 4 Series Mixed Signal Oscilloscopes Instructions

Contents

Tektronix Inc MSO44 4 4 Series Mixed Signal Oscilloscopes

Product Information

Specifications

- **Product Name:** MSO44, MSO46, MSO44B, and MSO46B 4 Series Mixed Signal Oscilloscopes
- **Manufacturer:** Tektronix, Inc.
- **Trademark:** TEKTRONIX and TEK
- **Model Numbers:** MSO44, MSO46, MSO44B, and MSO46B
- **Processor System:** Contains non-removable mass storage
- **Data Storage:** Memory devices and data export interfaces (USB and Ethernet)

Product Usage Instructions

Clear and Sanitize Procedures

This document provides instructions on how to clear or sanitize the memory devices and disable the data output interfaces of the 4 Series MSO instruments. It also includes steps to sanitize a non-functioning instrument.

Supported Products

This document covers the Tektronix 4 Series Mixed Signal Oscilloscope products.

Terminology

The following terms are used in this document:

- **Memory Devices:** Refers to volatile and non-volatile memory devices in the instrument.
- **Volatile Memory Devices:** Memory capacities subject to change. Listed sizes at the time of publishing:
  - **MSO44 and MSO46 Volatile Memory Devices:**
  - **SDRAM:** 4 GB (All processor models)
  - **User Data:** No

- **SDRAM:** Holds active data
- **MSO44:** 4 GB acquisition data
- **MSO46:** 8 GB acquisition data
- **SDRAM:** 512 MB
- Holds video graphics data
- **CMOS RAM:** Holds clock configuration data (7 bytes)
- FPGA: –

FAQ (Frequently Asked Questions)

- **Q: Who should perform the servicing of the product?**
  A: The servicing instructions are for use by qualified personnel only. Do not perform any servicing unless you are qualified to do so.
- **Q: How can I protect my product?**
  A: You can register your product by clicking the following link: **tek.com/register**
- **Q: Where can I find product information, sales, service, and technical support?**
  A: Visit **tek.com** to find contacts in your area for product information, sales, service, and technical support.
- **Q: How can I check the warranty status of my product?**
  A: You can visit **tek.com/warranty-status-search** for warranty information.

MSO44, MSO46, MSO44B, and MSO46B 4 Series Mixed Signal Oscilloscopes

Declassification and Security Instructions

Warning: The servicing instructions are for use by qualified personnel only. To avoid personal injury, do not perform any servicing unless you are qualified to do so. Refer to all safety summaries prior to performing service.

Register now!

- Click the following link to protect your product.
- **tek.com/register**
- *P 077172001*
- 077-1720-01 October 2023

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- Tektronix, Inc.
- 14150 SW Karl Braun Drive
- P.O. Box 500
- Beaverton, OR 97077

- US
  - For product information, sales, service, and technical support visit **tek.com** to find contacts in your area.
  - For warranty information visit **tek.com/warranty-status-search** .

Clear and sanitize procedures

- This document helps customers with data security concerns to clear or sanitize 4 Series MSO instruments.
- This series of instruments contain a processor system with non-removable mass storage.
- These products have data storage (memory) devices and data export interfaces (USB and Ethernet). These instructions describe how to clear or sanitize the memory devices and disable the data output interfaces. The instructions also describe how to sanitize an instrument that is not functioning.

Reference
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

Supported products
Tektronix 4 Series Mixed Signal Oscilloscope products are covered by this document.

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 non secured 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 volatile and non-volatile memory devices in the instrument.

MSO44 and MSO46 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 acce- sible	To clear	To sanitize
SDRAM 4 GB (All models)	Host processor memory	User data	No	Indirectly	Written by processor system	Processor board	No	Unplug the instrument for at least 30 seconds	
SDRAM MSO44: 4 GB MSO46: 8 GB	Holds active acquisition data	User data	No	Indirectly	Application software operations	Module socket (SODIMM) on the Acquisition board	No	Unplug the instrument for at least 30 seconds	
SDRAM 512 MB	Holds video graphics data	User data	No	Indirectly	Application software operations	Acquisition board	No	Unplug the instrument for at least 30 seconds	
CMOS RAM 7 bytes	Holds clock and configuration data	None	Yes	Indirectly	Boot operations	Processor board	No	Cannot be cleared	Unplug the instrument 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	Unplug the instrument for a minimum of 30 seconds	

MSO44B and MSO46B 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 acce- sible	To clear	To sanitize
SDRAM 8 GB (All models)	Host processor memory	User data	No	Indirectly	Written by processor system	Processor board	No	Unplug the instrument for at least 30 seconds	

SDRAM MSO44B: 4 GB MSO46B: 8 GB	Holds active acquisition data	User data	No	Indirectly	Application software operations	Module socket (SODIMM) on the Acquisition board	No	Unplug the instrument for at least 30 seconds
SDRAM 2 GB	Holds video graphics data	User data	No	Indirectly	Application software operations	Acquisition board	No	Unplug the instrument for at least 30 seconds
CMOS RAM	Holds clock and configuration data	None	Yes	Indirectly	Boot operations	Processor board	No	Cannot be cleared
SRAM 4 KB	Host processor power sequencer micro- controller RAM	None	No	Indirectly	Application software operation	Internal to the MSP430 micro- controller on the processor board	No	Unplug the instrument for at least 30 seconds
32 KB SRAM	Front panel micro- controller RAM	None	No	Indirectly	Application software operation	Internal to the TIVA TM4C micro- controller on the front panel LED board	No	Unplug the instrument for at least 30 seconds
FPGA 6.5 MB	Interface between compute system and acquisition system	None	No	None	Written by NOR Flash	Acquisition board	No	Unplug the instrument for a minimum of 30 seconds

MSO44 and MSO46 Non-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	Method of modification	Data input method	Location	User accessible	To clear	To sanitize

Primary e.MMC 32 GB	Stores Host instrument Linux operating system, application software, and instrument settings	None	Indirect	Written by processor system, software operations	Processor board	No	Not applicable, does not contain user data or settings. Clearing or sanitizing would disable instrument functionality.
Secondary e.MMC 32 GB	Stores user data including waveforms, measurement results and instrument settings	Waveforms, measurement results, instrument settings	Direct	Application software operations and file operations	Processor board	Yes	Remove the processor board (*How to sanitize a non-functional instrument*) and contact Tektronix service for repair.
EEPROM 2 Kbit	Stores factory data, maintenance data	None	Indirect	Factory operations	Acquisition board	Yes	Not applicable, does not contain user data or settings. Clearing or sanitizing would disable instrument functionality.
EEPROM 1 Kb Two to four pieces depending on model	Stores the SODIMM memory configuration data (SPD)	None	None	Factory operations	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 32 KB	Stores power management controller firmware	None	Indirect	Application software operations	Internal to the MC9S08 micro- controller on the acquisition board	No	Not applicable, does not contain user data or settings. Clearing or sanitizing would disable instrument functionality.
Flash Memory 64 KB	Stores analog board micro- controller firmware	None	Indirect	Application software operations	Internal to the KL14 micro- controller on the Acquisition board	No	Not applicable, does not contain user data or settings. Clearing or sanitizing would disable instrument functionality.

MSO44B and MSO46B Non-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	Method of modification	Data input method	Location	User acce- ssible	To clear	To sanitize
e.MMC 64 GB	Stores host instrument Linux operating system, application software, and user data; including waveforms and measurement results, and instrument settings	Stores user data and user settings	Directly	User interface (UI), application software operations, factory operations and programmatic commands	Processor board	Yes	Remove the processor board (*How to sanitize a non-functional instrument*) and contact Tektronix service for repair.	
NOR Flash 32 MB	Stores host processor bootloader	None	Indirectly	Factory operations	Processor board	No	Not applicable, does not contain user data or settings. Clearing or sanitizing would disable instrument functionality.	
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 1 Kb	Stores power management controller factory data	None	Indirectly	Application software operations	Acquisition board	No	Not applicable, does not contain user data or settings. Clearing or sanitizing would disable instrument functionality.	
EEPROM 1 Kb	Stores the host processor memory configuration data (SPD)	None	None	Factory operations	Processor board	No	Not applicable, does not contain user data or settings. Clearing or sanitizing would disable instrument functionality.	
EEPROM 1 Kb, two to four pieces depending on model	Stores the SODIMM memory configuration data (SPD)	None	None	Factory operations	Module socket (SODIMM) on acquisition board	No	Not applicable, does not contain user data or settings. Clearing or sanitizing would disable instrument functionality.	

Table continued…

Type and size	Function	Type of user info stored	Method of modification	Data input method	Location	User accessible	To clear	To sanitize
Flash Memory 32 KB	Stores power management micro-controller firmware	None	Indirectly	Application software operations	Internal to the MC9S08 micro- controller on the acquisition board	No	Not applicable, does not contain user data or settings. Clearing or sanitizing would disable instrument functionality.	
FRAM 32 KB	Stores host processor power sequencer micro- controller firmware	None	Indirectly	Application software operations	Internal to the MSP430 micro- controller on the processor board	No	Not applicable, does not contain user data or settings. Clearing or sanitizing would disable instrument functionality.	
Flash Memory 64 KB	Stores analog front end micro- controller firmware	None	Indirectly	Application software operations	Internal to the KL14 micro- contrroller on the Acquisition board	No	Not applicable, does not contain user data or settings. Clearing or sanitizing would disable instrument functionality.	
Flash Memory 256 KB	Stores front panel micro-controller firmware	None	Indirectly	Application software operations	Internal to the TIVA TM4C micro- controller on the front panel LED board	No	Not applicable, does not contain user data or settings. Clearing or sanitizing would disable instrument functionality.	
FPGA NOR Flash 64 MB	Stores 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.	

FPGA NOR Flash 64 MB	Stores backup copy of 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.

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
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; two USB Host ports on the back of the instrument	Yes
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
Ethernet	Transfer data and remote control of instrument.	Directly	Remote control using LXI, VISA, or Socket Server	Ethernet port on back of instrument	Yes

How to sanitize a working instrument

- Sanitize means that all data in non-volatile memory is changed or overwritten such that the original data is no longer in memory, and that the data cannot be recovered using any known technology. You typically do a sanitize operation when you:
    - Turn the instrument over to another person or department
    - Move an instrument (temporarily or permanently) from a secured area to a non secured area
    - Send an instrument to Tektronix for calibration and/or repair

Sanitizing is done through commands on the instrument. To sanitize 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 Network Configuration password (if set):
    1. Enter the instrument's IP address into a Web browser on a PC that has network access to the instrument.

2. Click the Security for Network Config link on the left side of the screen.
3. **Click Submit:**
    1. 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).
    2. If a password was not set for this function, the screen displays the message that the password was successfully changed (to a blank password).
3. Clear the network mDNS Hostname and description:
    1. Enter the instrument's IP address into a Web browser on a PC that has network access to the instrument.
    2. Click the Network Configuration link on the left side of the screen.
    3. Delete any existing text in both of the Host Settings fields.
    4. 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.
    5. Click OK. The message closes and the fields are restored to their original factory settings.
4. Clear the Ethernet port settings:
    1. Disconnect the Ethernet cable from the instrument.
    2. Open the Utility > I/O menu.
    3. Clear all information from the Host Name, Domain Name, and Service Name fields.
    4. Click the Network Address Manual button.
    5. Manually change the Instrument IP Address, Subnet Mask, Gateway IP Address, and DNS IP Address information to 00.00.00.00.
    6. Tap Apply Changes. It will take several moments for the changes to take effect.
    7. Tap outside the menu to close the menu.

    Note: 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.
5. Open the Utility > Security menu and clear the password used to access enabling/disabling ports and software updates. See the Help system for information on the Security menu functions.
6. Tap TekSecure Erase Memory to clear/reset internal memory.
7. Push the Default Setup button before powering off the instrument.

How to sanitize a non-functional instrument

Do the following to 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 Processor board removal instructions on page 12 to get access to and remove the Processor board, which contains user data and settings. Store or destroy the Processor board in accordance with your organization's guidelines.
3. Reassemble the instrument without the Processor board and return it to Tektronix. The instrument will then be repaired and calibrated as necessary.

In North America, contact the Tektronix Customer Care Center (1-800-833-9200) for assistance with returning the instrument to a repair center. Worldwide, visit **www.tektronix.com** to find contacts in your area.
Tektronix does not guarantee calibration after removal and replacement of any module. Adjustment and calibration can be performed only by a Tektronix Service Center. To determine if adjustment and calibration is necessary, perform the Performance Verification procedures found in the Specifications and Performance Verification Manual.

Processor board removal instructions
Use these procedures to remove the Processor board when you need 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 Processor board. A new Processor board is installed and the instrument is repaired and adjusted as necessary.

- **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.
- **CAUTION:** Do not lay the instrument on its front while disassembling the instrument. All disassembly steps can be done with the instrument positioned as instructed in the steps. Laying the instrument on its front can damage the controls.

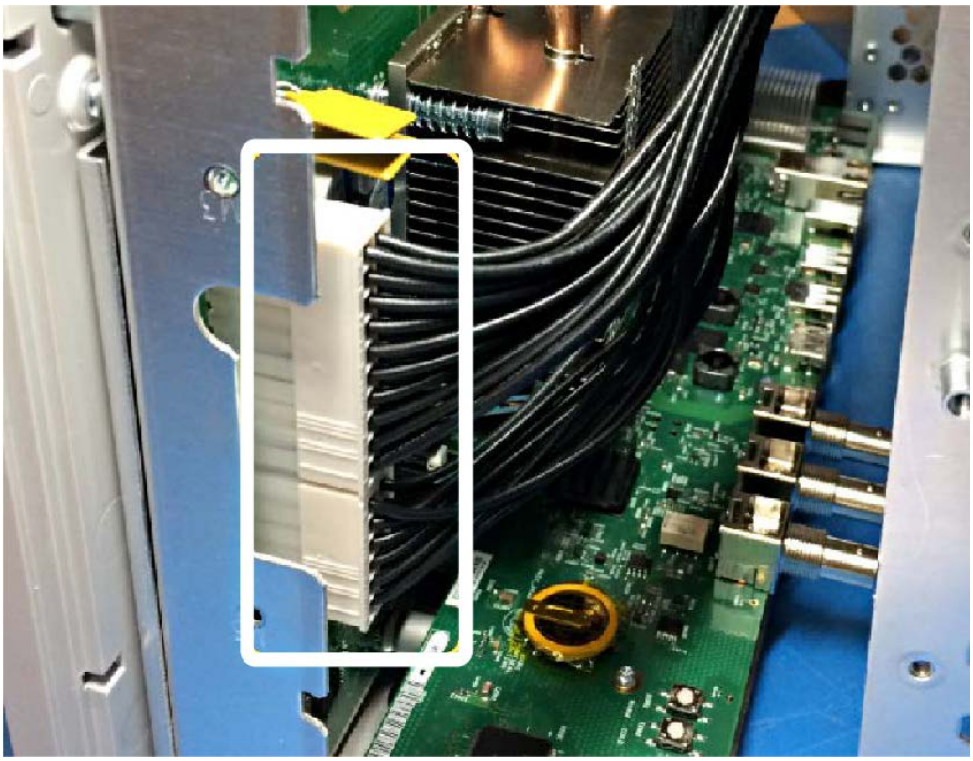
Access the chassis

1. Position the instrument in the normal operating position.
2. Remove the handle from the instrument:
    1. Use a Torx T-10 screwdriver to remove two screws from each end of the handle.
    2. Remove the handle, external handle hubs, and screws aside.
3. Remove the metal grill from the rear of the instrument:
    1. Use a Torx T-10 screwdriver to remove the ten (10) screws located on the grill.
    2. Remove the grill.
4. Remove the internal handle hubs:
    1. Use a Torx T-10 screwdriver to remove the eight (8) Torx T-10 screws from the internal hub assemblies (four screws on each hub).
    2. Remove the internal handle hub assemblies and set aside. Keep the hub assemblies together for each side.
5. Remove the feet from the bottom of the instrument:
    1. Position the instrument so the bottom is facing up.
    2. Open the feet.
    3. Use a Torx T-10 screwdriver to remove the four (4) Torx T-10 screwdriver to screws from each foot.

4. Remove the feet and set aside.

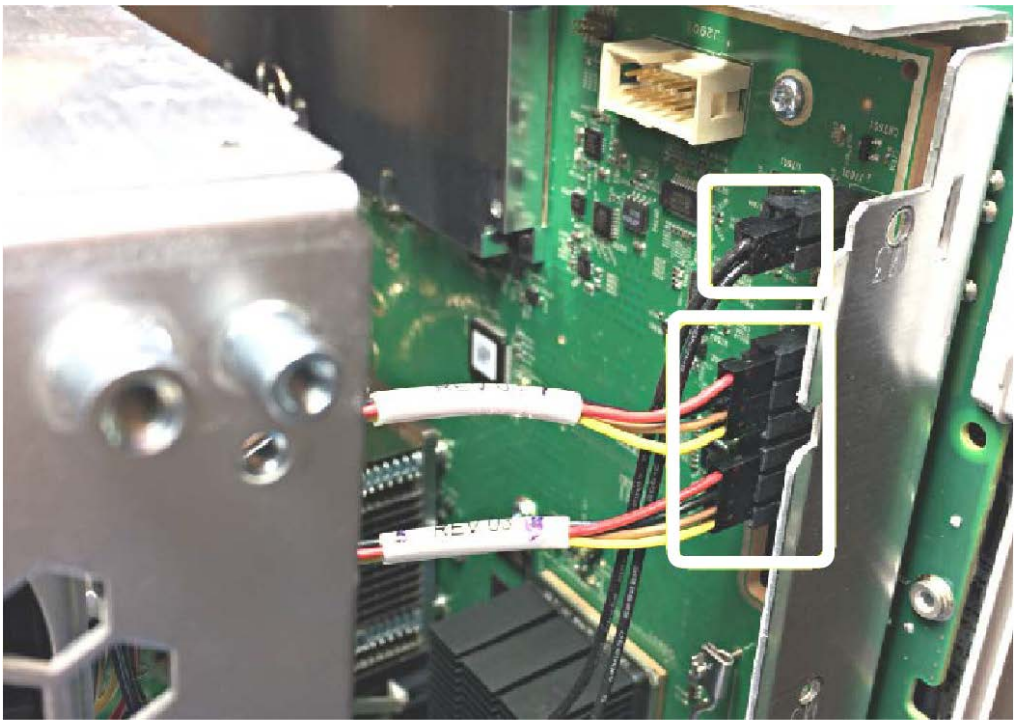
6. Remove the rear plastic case from the instrument:
    1. Use a Torx T-10 screwdriver to remove the six (6) screws from the back of the instrument case.
    2. Lift the rear plastic case off the back of the instrument, and set it aside.
7. Separate the rear metal chassis from the front chassis (with the instrument still in the bottom-up position):
    1. Use a Torx T-10 screwdriver to remove the 25 screws securing the rear chassis to the front chassis. There are 24 screws around the chassis edges, and one (1) screw beneath the HDMI connector.
    2. Remove the three (3) nuts and washers from the BNC connectors.
    3. Gently pry apart the rear chassis assembly. The rear chassis is held in position mostly by the friction of the three BNC connectors.
    4. Continue prying the chassis apart until you have the two halves separated and can access the cables.

5. Disconnect the two power cable connectors.



The power cables are red on MSO44B and MSO46B insruments.

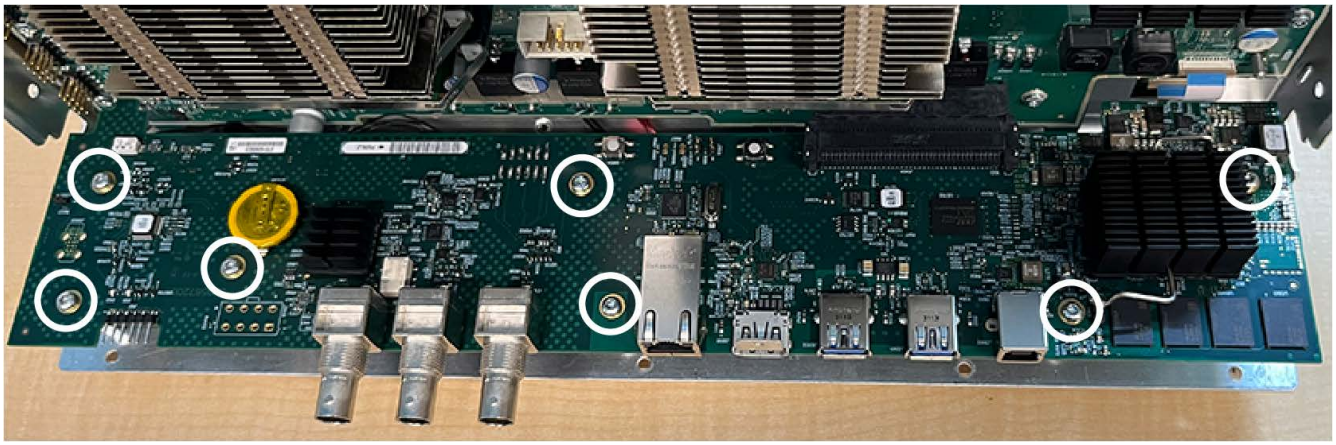
6. Disconnect the smaller cables on the other end of the chassis.



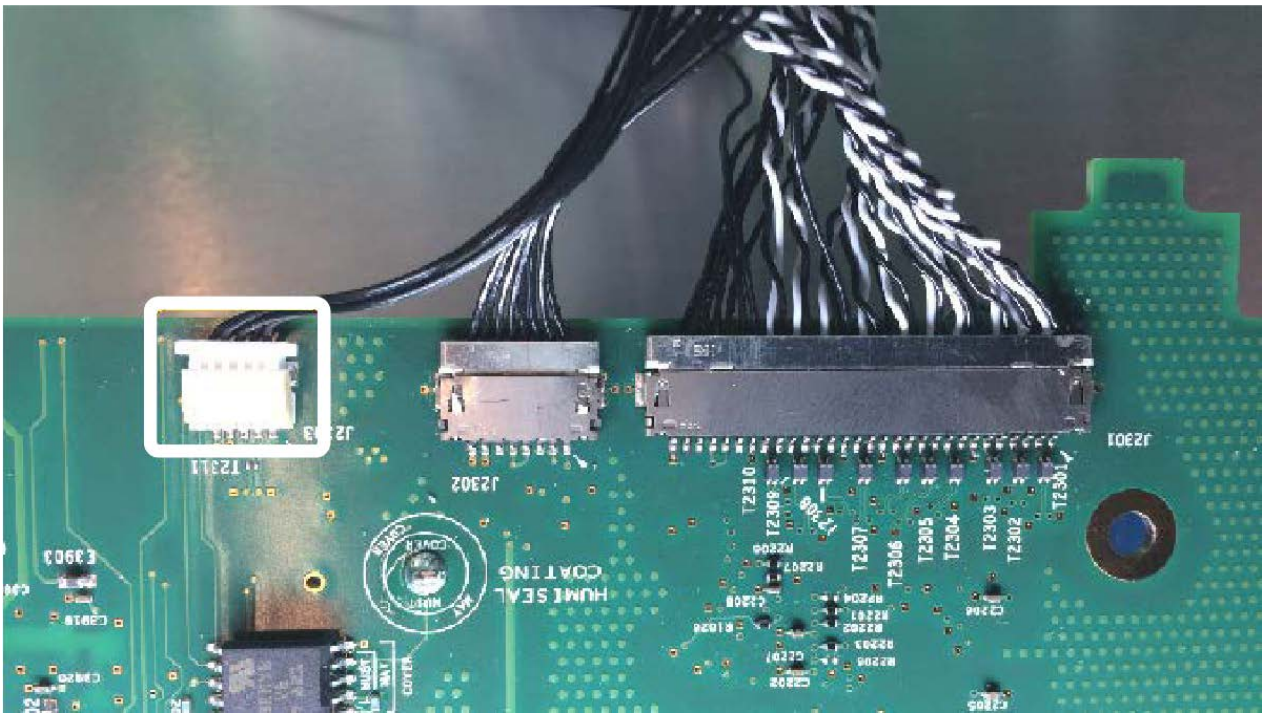
7. Set the rear chassis aside.

Remove the Processor board

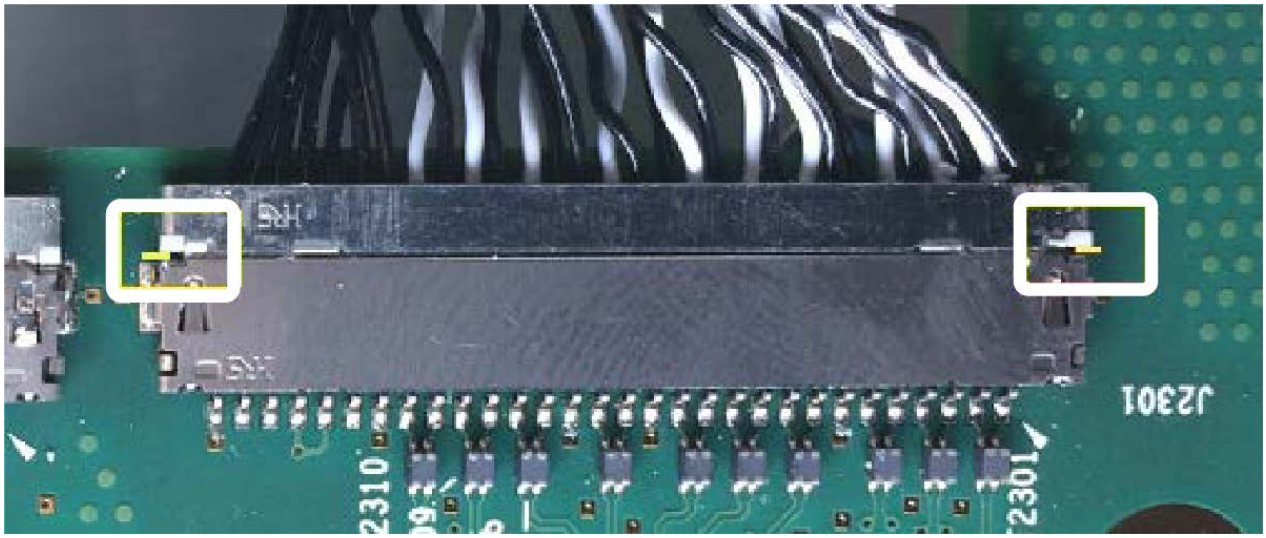
1. Use a Torx T-10 screwdriver to remove the seven (7) screws from the Processor board.



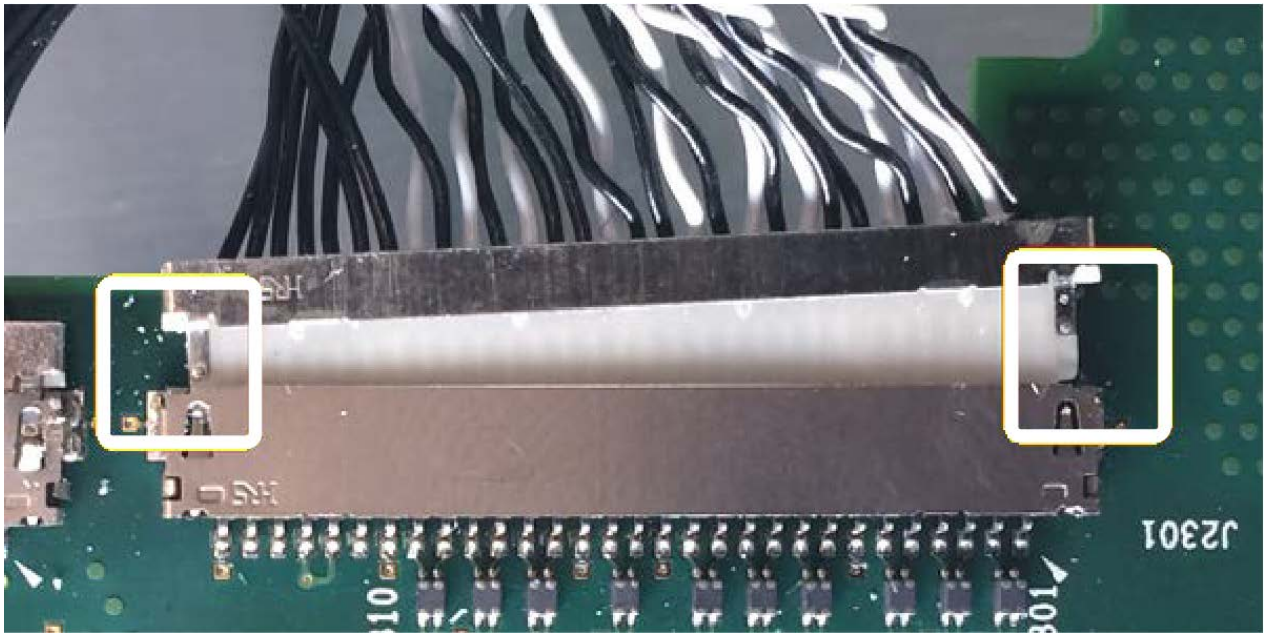
2. Lift and pull the Processor board away from the chassis. It is still connected with cables, so be careful to not pull it too far.
3. Carefully rotate the Processor board 180° counterclockwise to get access to the cable connectors.
4. For MSO44 and MSO46 instruments:
    1. Disconnect the small white plastic cable connector.



2. Position your fingernails so that they are between the edge of the larger-size cable connector and its board connector.



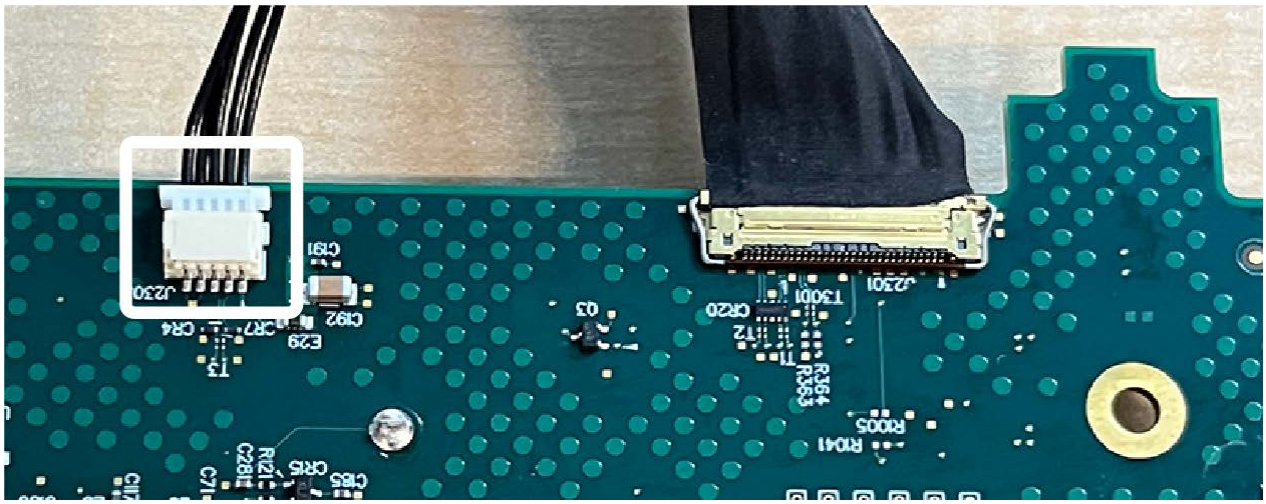
3. Gently push and rock the cable connector side to side to move the wire connector out of the board connector.



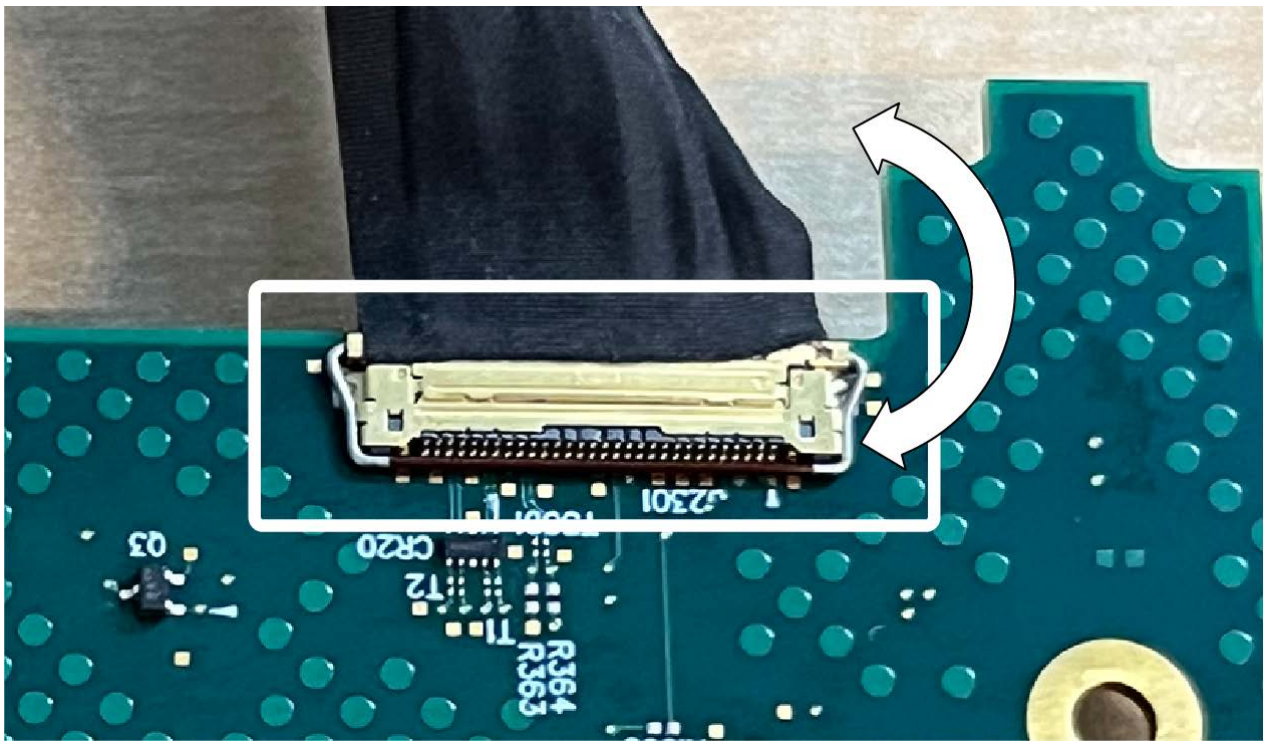
4. Repeat these steps to disconnect the remaining smaller cable connector.

5. For MSO44B and MSO46B instruments:

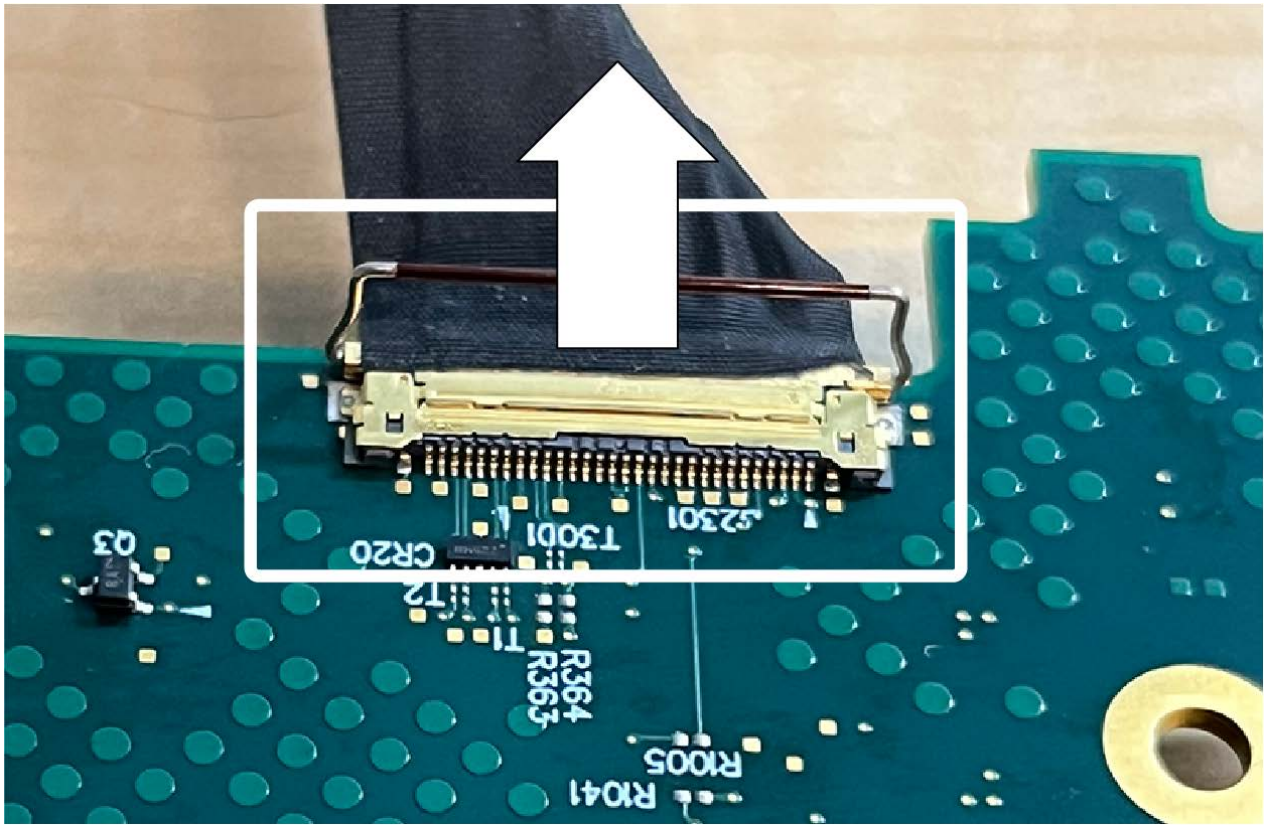
    1. Disconnect the small white plastic cable connector.

    2. Lift the baile clip up.

    3. With the baile clip in the up position, pull the cable connector straight back to disconnect.



6. Remove the Processor board. Secure or dispose of the Processor board as directed by your organization's internal policies regarding handling or disposal of secure devices.
7. Reassemble the instrument by using the disassembly steps in reverse order. Tighten the Torx T-10 screws to 0.65 Newton meters.
8. Package the reassembled instrument, minus the Processor board, and ship to your nearest Tektronix Service Center for repairs. A new Processor board will be installed

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

Documents / Resources

	Tektronix Inc MSO44 4 4 Series Mixed Signal Oscilloscopes [pdf] Instructions MSO44, MSO44 4 4 Series Mixed Signal Oscilloscopes, 4 Series Mixed Signal Oscilloscopes, Mixed Signal Oscilloscopes, Signal Oscilloscopes, Oscilloscopes, MSO46, MSO44B, MSO46B

References

- Test and Measurement Equipment | Tektronix
- Welcome to Product Registration | Tektronix
- Test and Measurement Equipment | Tektronix

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- Warranty Status Search | Tektronix
- User Manual

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