

Instructions



WFM61UP, WFM70UP, and WFM71UP Upgrades

**WFM6100, WFM7000, and WFM7100
Waveform Monitors**

075-0913-01

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.

www.tektronix.com



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- Worldwide, visit www.tektronix.com to find contacts in your area.

Table of Contents

General Safety Summary	iii
Service Safety Summary	v
Kit Description	1
Products	2
Required Tools	2
Kit Parts Lists	3
Upgrade Installation	7
Verify the Currently Installed Options	7
How to Prevent Electrostatic Discharge	8
Install the Software Upgrade	9
Install the Hardware Upgrade	15
Install the Software Option Key	27
Verify the Upgrade	29

General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it.

To avoid potential hazards, use this product only as specified.

Only qualified personnel should perform service procedures.

While using this product, you may need to access other parts of a larger system. Read the safety sections of the other component manuals for warnings and cautions related to operating the system.

To Avoid Fire or Personal Injury

Use Proper Power Cord. Use only the power cord specified for this product and certified for the country of use.

Connect and Disconnect Properly. Do not connect or disconnect probes or test leads while they are connected to a voltage source.

Ground the Product. This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

Observe All Terminal Ratings. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.

Power Disconnect. The power cord disconnects the product from the power source. Do not block the power cord; it must remain accessible to the user at all times.

Do Not Operate Without Covers. Do not operate this product with covers or panels removed.

Do Not Operate With Suspected Failures. If you suspect there is damage to this product, have it inspected by qualified service personnel.

Avoid Exposed Circuitry. Do not touch exposed connections and components when power is present.

Do Not Operate in Wet/Damp Conditions.

Do Not Operate in an Explosive Atmosphere.

Keep Product Surfaces Clean and Dry.

Provide Proper Ventilation. Refer to the manual's installation instructions for details on installing the product so it has proper ventilation.

Terms in this Manual

These terms may appear in this manual:



WARNING. *Warning statements identify conditions or practices that could result in injury or loss of life.*



CAUTION. *Caution statements identify conditions or practices that could result in damage to this product or other property.*

Symbols and Terms on the Product

These terms may appear on the product:

- DANGER indicates an injury hazard immediately accessible as you read the marking.
- WARNING indicates an injury hazard not immediately accessible as you read the marking.
- CAUTION indicates a hazard to property including the product.

The following symbol(s) may appear on the product:



Service Safety Summary

Only qualified personnel should perform service procedures. Read this *Service Safety Summary* and the *General Safety Summary* before performing any service procedures.

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, disconnect the power cord from the mains power.

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.

To avoid electric shock, do not touch exposed connections.

Kit Description

This document provides instructions for installing the video and audio upgrades listed below into an existing Tektronix WFM6100, WFM7000, or WFM7100 waveform monitor.

Table 1: Supported upgrades

Video Upgrade	WFM61UP	WFM70UP	WFM71UP	Description
Option CPS	■			Adds support for monitoring analog video in composite formats
Option CPSL		■	■	Adds support for monitoring analog video in composite formats
Option SD	■	■	■	Adds support for monitoring standard definition, digital video
Option HD		■	■	Adds support for monitoring high definition, digital video
Option EYE	■		■	Adds support for eye pattern and basic jitter measurements; includes cable length measurements
Option PHY	■		■	Adds the capabilities of Option EYE plus advanced physical layer measurements; includes automated eye measurements
Option DAT	■		■	Adds support for the data analysis, which allows for logic-level viewing of the video and audio digital data stream and ANC data extraction
Audio Upgrade	WFM61UP	WFM70UP	WFM71UP	Description
Option DS	■	■	■	Adds support for monitoring digital audio in embedded and AES/EBU formats
Option AD	■			Adds the capabilities of Option DS plus adds support for monitoring analog audio
Option ADL		■	■	Adds support for analog audio monitoring (2 sets of 6 channel analog audio inputs and 8 channels analog audio outputs); AES/EBU discrete digital audio (8 channels at a time) or 16 channels of embedded audio support; and adds Loudness monitoring.
Option DD	■		■	Adds the capabilities of Option AD plus adds support for monitoring and decoding Dolby Digital (AC-3) audio
Option DDE	■		■	Adds the capabilities of Option DD plus adds support for monitoring and decoding Dolby E audio
Option DPEL			■	Adds Option ADL capabilities and support for decoding and monitoring Dolby E, Dolby Digital Plus, and Dolby D Audio.

Products

The following Tektronix products are supported by this kit:

WFM6100 All instruments
WFM7000 All instruments
WFM7100 All instruments

Required Tools

The following table listed the tools required to install the upgrade:

Table 2: Required tools

Name	Description
TORX screwdriver handle	Accepts TORX-driver bits
T-10 and T-15 TORX tips	TORX-driver bit for T-10 and T-15 screw heads
1/4 inch nut driver (Option EYE and PHY only)	
9/16 inch socket (Option EYE and PHY only)	Deep socket to fit over BNC connector
Anti-static wrist strap	
Television signal generator (Option CPS and CPSL only)	Composite NTSC 100% white field signal output; for example, Tektronix TG2000 with AVG1 module
VGA-to-BNC adapter cable (Option CPS and CPSL only)	For example, Tektronix part number 174-5126-00
Oscilloscope (Option CPS and CPSL only)	For example, Tektronix TDS3012B
Precision 75 Ω termination (Option CPS and CPSL only)	For example, Tektronix part number 011-0102-01
Headphones (Options DS, AD, ADL, DD, DPEL, and DDE only)	Standard 1/4 inch jack
Audio signal source (Options DS, AD, ADL, DD, DPEL, and DDE only) <i>NOTE. The audio signal source can be an SDI serial digital video signal with embedded audio, an AES digital audio signal, or an analog audio signal.</i>	SDI serial digital video signal source example: Tektronix TG2000 with an HDVG1 module for Option HD, or with a DVG1 module for Option SD.

Kit Parts Lists

The following tables list the parts supplied with each upgrade kit. Before you start the upgrade, verify that you received all of the parts for the upgrade kit you ordered.

WFM61UP CPS
WFM70UP CPS
WFM70UP CPSL
WFM71UP CPS
WFM71UP CPSL

Table 3: Option CPS parts list

Quantity	Part number	Description
1 EA	-----	ENVELOPE, IMPORTANT DOCUMENTS; CONTAINS SOFTWARE OPTION KEY
1 EA	075-0913-XX	INSTRUCTIONS; WFM61UP, WFM70UP, AND WFM71UP UPGRADES
1 EA	672-1788-XX	CIRCUIT BD SUBASSY; ANALOG COMPOSITE

WFM61UP SD
WFM70UP SD
WFM71UP SD
WFM70UP HD
WFM71UP HD
WFM61UP DAT
WFM71UP DAT

Table 4: Option SD, Option HD, and Option DAT parts list

Quantity	Part number	Description
1 EA	-----	ENVELOPE, IMPORTANT DOCUMENTS; CONTAINS SOFTWARE OPTION KEY
1 EA	075-0913-XX	INSTRUCTIONS; WFM61UP, WFM70UP, AND WFM71UP UPGRADES

WFM61UP EYE

Table 5: WFM61UP EYE parts list

Quantity	Part number	Description
1 EA	-----	ENVELOPE, IMPORTANT DOCUMENTS; CONTAINS SOFTWARE OPTION KEY
1 EA	075-0913-XX	INSTRUCTIONS; WFM61UP, WFM70UP, AND WFM71UP UPGRADES
3 EA	134-0246-XX	PLUG, HOLE COVER; BUTTON PLUG, ACCOM 0.5 DIA HOLE, NYLON, BLACK
1 EA	174-5028-XX	CABLE ASSY, FLAT RIBBON; 2X20, 4.50 INCH LONG
1 EA	672-6318-XX	CIRCUIT BD SUBASSY; PHYSICAL LAYER (SD)

WFM71UP EYE

Table 6: WFM71UP EYE parts list

Quantity	Part number	Description
1 EA	-----	ENVELOPE, IMPORTANT DOCUMENTS; CONTAINS SOFTWARE OPTION KEY
1 EA	075-0913-XX	INSTRUCTIONS; WFM61UP, WFM70UP, AND WFM71UP UPGRADES
3 EA	134-0246-XX	PLUG, HOLE COVER; BUTTON PLUG, ACCOM 0.5 DIA HOLE, NYLON, BLACK
1 EA	174-5028-XX	CABLE ASSY, FLAT RIBBON; 2X20, 4.50 INCH LONG
1 EA	672-6305-XX	CIRCUIT BD SUBASSY; PHYSICAL LAYER (SD & HD))

WFM61UP PHY**Table 7: WFM61UP PHY parts list**

Quantity	Part number	Description
1 EA	-----	ENVELOPE, IMPORTANT DOCUMENTS; CONTAINS SOFTWARE OPTION KEY
1 EA	075-0913-XX	INSTRUCTIONS; WFM61UP, WFM70UP, AND WFM71UP UPGRADES
3 EA	134-0246-XX	PLUG, HOLE COVER; BUTTON PLUG, ACCOM 0.5 DIA HOLE, NYLON, BLACK
1 EA	174-5028-XX	CABLE ASSY, FLAT RIBBON; 2X20, 4.50 INCH LONG
1 EA	672-6318-XX	CIRCUIT BD SUBASSY; PHYSICAL LAYER (SD)

WFM71UP PHY**Table 8: WFM71UP PHY parts list**

Quantity	Part number	Description
1 EA	-----	ENVELOPE, IMPORTANT DOCUMENTS; CONTAINS SOFTWARE OPTION KEY
1 EA	075-0913-XX	INSTRUCTIONS; WFM61UP, WFM70UP, AND WFM71UP UPGRADES
3 EA	134-0246-XX	PLUG, HOLE COVER; BUTTON PLUG, ACCOM 0.5 DIA HOLE, NYLON, BLACK
1 EA	174-5028-XX	CABLE ASSY, FLAT RIBBON; 2X20, 4.50 INCH LONG
1 EA	672-6305-XX	CIRCUIT BD SUBASSY; PHYSICAL LAYER (SD & HD))

**WFM61UP DS
WFM70UP DS
WFM71UP DS****Table 9: Option DS parts list**

Quantity	Part number	Description
1 EA	-----	ENVELOPE, IMPORTANT DOCUMENTS; CONTAINS SOFTWARE OPTION KEY
1 EA	075-0913-XX	INSTRUCTIONS; WFM61UP, WFM70UP, AND WFM71UP UPGRADES
1 EA	672-6306-XX	CIRCUIT BD SUBASSY; DIGITAL AUDIO

WFM61UP AD
 WFM70UP AD
 WFM70UP ADL
 WFM71UP AD
 WFM71UP ADL

Table 10: Option AD parts list

Quantity	Part number	Description
1 EA	-----	ENVELOPE, IMPORTANT DOCUMENTS; CONTAINS SOFTWARE OPTION KEY
1 EA	075-0913-XX	INSTRUCTIONS; WFM61UP, WFM70UP, AND WFM71UP UPGRADES
1 EA	131-7430-XX	CONN, DSUB; SLDR CUP, MALE, STR, 62 POS
1 EA	672-6307-XX	CIRCUIT BD SUBASSY; DIGITAL AND ANALOG AUDIO

WFM61UP DD
 WFM71UP DD

Table 11: Option DD parts list

Quantity	Part number	Description
1 EA	-----	ENVELOPE, IMPORTANT DOCUMENTS; CONTAINS SOFTWARE OPTION KEY
1 EA	075-0913-XX	INSTRUCTIONS; WFM61UP, WFM70UP, AND WFM71UP UPGRADES
1 EA	131-7430-XX	CONN, DSUB; SLDR CUP, MALE, STR, 62 POS
1 EA	672-6308-XX	CIRCUIT BD SUBASSY; DIGITAL AND ANALOG AUDIO

WFM61UP DDE
 WFM71UP DDE
 WFM71UP DPEL

Table 12: Option DDE parts list

Quantity	Part number	Description
1 EA	-----	ENVELOPE, IMPORTANT DOCUMENTS; CONTAINS SOFTWARE OPTION KEY
1 EA	075-0913-XX	INSTRUCTIONS; WFM61UP, WFM70UP, AND WFM71UP UPGRADES
1 EA	119-7167-XX	CIRCUIT BD ASSY; CAT552 DOLBY E/DIGITAL DECODER MODULE; 72 PIN SIMM
1 EA	131-7430-XX	CONN, DSUB; SLDR CUP, MALE, STR, 62 POS
1 EA	672-6309-XX	CIRCUIT BD SUBASSY; DIGITAL AND ANALOG AUDIO

Upgrade Installation

This section provides instructions for the following:

- Verifying the currently installed options
- Preventing electrostatic discharge
- Installing the software upgrade
- Installing the hardware upgrade
- Installing the software option key

Verify the Currently Installed Options

The software option key supplied in this kit is based on the serial number you supplied when you ordered the upgrade for the waveform monitor. The new software option key should enable the new option(s) you ordered, and also preserve your previously purchased options.

Before you install the upgrade, perform the following steps to verify which options are currently installed in your waveform monitor. After you install the upgrade, you will verify that the new options are installed and that any previously installed options are still enabled.

1. Power on the waveform monitor you are upgrading.
2. Press the **MAIN** button on the front panel.
3. Touch the **Config** soft key, and then touch the **Utilities** soft key.
4. Touch the **View Instmt Options** soft key.
5. Make a note of which options are installed.

How to Prevent Electrostatic Discharge

When you perform any service that requires internal access to the instrument, adhere to the following precautions to avoid damage due to electrostatic discharge (ESD):

1. Minimize handling of static-sensitive circuit boards and components.
2. Transport and store static-sensitive boards or modules in static protected containers.
3. Discharge the static voltage from your body by wearing a grounded antistatic wrist strap while handling these modules.
4. Service static-sensitive modules only at a static-free work station.
5. Do not allow anything capable of generating or holding a static charge on the work surface.
6. Handle circuit boards by the edges or hold onto grounded shields when possible.
7. Do not slide circuit boards over any surface.

Install the Software Upgrade



CAUTION. *To prevent upgrade failure, if your waveform monitor does not have the latest version of software installed, you must upgrade the software to the latest version before you install the hardware upgrade and before you install the software option key.*

Before You Begin

You do not need to perform the software upgrade if your waveform monitor already has the latest version of software installed. Perform the following steps to determine if the software on your waveform monitor needs to be upgraded:

1. Power on the waveform monitor.
2. Verify the current software version installed on the waveform monitor:
 - a. Press the **MAIN** button on the front panel.
 - b. Touch the **Config** softkey, touch the **Utilities** softkey, and then touch the **View Hw/Sw Version** softkey.
 - c. In the Hardware and Software Versions display window, note the software version number of the waveform monitor.
3. Verify the latest version of software at the Tektronix Web site:
 - a. Use the Web browser on a PC to navigate to the following Tektronix Web site:

`http://www.tek.com/products/video_test`
 - b. On the Video Test Web page, click the link **Software and Firmware** under Product Resources.
 - c. On the Software and Firmware Finder Web page, search by model number (i.e.: WFM7100) or use the keyword WFM to locate the software-upgrade package for the waveform monitor.
 - d. Note the latest version number of the software-upgrade package(s).
4. If the latest software version at the Web site is newer than the version on your waveform monitor, you need to upgrade the firmware on your waveform monitor.

To perform the upgrade, you will use a PC to transfer the new software to the waveform monitor using your local Ethernet network or using an Ethernet cross-over cable. Read the entire procedure before starting the software upgrade. The time required to complete the upgrade is about 25 minutes.



CAUTION. *Once the instrument has started to erase internal flash, DO NOT remove power from the instrument. If you do so, the instrument flash will be corrupted. The instrument will have to be sent to a Tektronix factory service center to have the system software restored.*

NOTE. *If power to the instrument is lost before it begins erasing the internal flash, you can restart the software upgrade after the instrument reboots.*

PC System Requirements. The data-transfer utility used to upgrade the waveform monitor runs on the following PC systems: Windows 98, Windows NT 4.0, Windows ME, Windows 2000, and Windows XP. The utility also requires an Ethernet interface and 128 MB of free disk space be present on the PC system.

Upgrade the Software

After you have verified that your waveform monitor needs to have the software upgraded, perform the following procedure to upgrade the software on your waveform monitor:

1. If you are connecting your PC directly to the waveform monitor, connect the Ethernet cross-over cable between the Ethernet ports on the PC and waveform monitor, otherwise proceed to step 2.
2. Connect the waveform monitor and PC to your local Ethernet network.
3. Power on the waveform monitor.
4. Assign the waveform monitor an IP address:

NOTE. *The data-transfer utility requires that the waveform monitor be assigned a valid IP address. To allow network access to the instrument, the waveform monitor must be assigned a valid IP address for your network. Network addresses can be assigned either manually or automatically using DHCP. If your network does not use DHCP, you will have to manually enter the address for the instrument. To get a valid IP address, contact your local LAN administrator.*

Alternatively, if you connect the PC directly to the waveform monitor using an Ethernet cross-over cable, you can assign the waveform monitor any IP address that is compatible with the IP address of the PC.

- a. Press the **MAIN** button on the front panel.
- b. Touch the **Config** softkey, touch the **Utilities** softkey, and then touch the **Communications** softkey.
- c. Touch the **Config Mode** softkey, and then touch either the **Manual** or **DHCP** softkey as directed by your LAN administrator. Select **Manual** if you are using an Ethernet cross-over cable to connect the PC directly to the waveform monitor. Touch the **Close Config Mode** soft key to exit the Config mode.
- d. If you selected **Manual** mode, touch the **Network Setup** softkey. Enter the IP address, subnet mask, and gateway address as directed by your LAN administrator. You need to enter only an IP address if you are using an Ethernet cross-over cable to connect the PC directly to the waveform monitor. Touch **OK** to close the Network Setup dialog box.

NOTE. *If you selected DHCP mode, the network will automatically assign the waveform monitor an IP address.*

5. Download the latest version of software at the Tektronix Web site:
 - a. Use the Web browser on the PC to navigate to the following Tektronix Web site:

`http://www.tek.com/products/video_test`
 - b. On the Video Test Web page, click the link **Software and Firmware** under Product Resources.
 - c. On the Software and Firmware Finder Web page, search by model number (i.e.: WFM7100) or use the keyword WFM to locate the latest software-upgrade package for the waveform monitor.
 - d. Download the latest version to your PC.
 - e. After the software package is downloaded, click on the self-extracting archive to extract the following files into the directory of your choice: transfer.exe and firmware.pkg. There may also be a readme.txt file.
6. Prepare the waveform monitor for the software upgrade:
 - a. Press the front panel **MAIN** button to display the Main menu.
 - b. Touch the **Config** softkey, and then touch the **Utilities** softkey.
 - c. Touch the **System Upgrade** softkey. This displays a Question dialog box that asks you to confirm that you want to shutdown to upgrade the system.
 - d. Touch **Yes** to confirm you want to upgrade the system. The waveform monitor display will go to black and will display a screen stating that it is waiting for data transfers from the network.
 - e. Note the IP address displayed on the screen of the waveform monitor.

7. Perform the software upgrade:
 - a. On the PC, double-click the **transfer.exe** file to launch the transfer program.
 - b. Type the IP address or DNS name of the waveform monitor you are upgrading, and then press **Enter**. This starts the software upgrade process. In Figure 1 below, the IP address 128.181.216.128 was entered.



CAUTION. To prevent upgrade failure, do not close the *transfer.exe* window until the transfer utility asks for another IP address. When the software upgrade completes, the waveform monitor may reboot.

- c. When the software upgrade is complete, the transfer utility asks you to enter another IP address. Press **Enter** to exit the transfer utility.

```

C:\temp\WFM6K7K_Firmware_upgrade\transfer.exe
Please enter DNS name or address of target instrument:
128.181.216.128
Opened TCP connection to 128.181.216.128
Reading Firmware Data (801582 bytes)... done
Reading Firmware Data (23854875 bytes)... done
Reading Firmware Data (24970495 bytes)... done
Initializing Kernel Upgrade... done
Verifying Flash Programming... done
Initializing Application Upgrade... done
Verifying Flash Programming... done
Initializing Filesystem Upgrade... done
Erasing Flash... done
Programming Flash... done
Verifying Flash Programming... done
done.
Please enter DNS name or address of target instrument:
CC
  
```

Figure 1: Transfer.exe window after the upgrade is complete

8. If the waveform monitor did not reboot at the completion of the software upgrade, remove and then reapply power to the waveform monitor to cause it to reboot.
9. During the reboot, you are forced to recalibrate the touchscreen. On-screen instructions direct you to touch crosshairs in five locations: top left, top right, bottom right, bottom left, and then center. After you recalibrate the touchscreen, the waveform monitor completes the reboot.

10. Verify the software upgrade:

NOTE. *If the software-upgrade package includes a Readme.txt file, read this file to determine whether all of the Configuration menu and instrument-mode settings from the previous software version are preserved in the new version you just installed.*

- a. Press the **MAIN** button on the front panel.
- b. Touch the **Config** softkey, touch the **Utilities** softkey, and then touch the **View Hw/Sw Version** softkey.
- c. In the Hardware and Software Versions display window, verify that the software version number matches the version of the software-upgrade package you installed.

Install the Hardware Upgrade



CAUTION. To prevent upgrade failure, if your waveform monitor does not have the latest version of software installed, you must upgrade the software to the latest version before you install the hardware upgrade. Refer to *Install the Software Upgrade on page 9.*

The procedures in this section are only for upgrades that include the installation of hardware modules. For software-only upgrades, you do not need to remove the instrument cover since these upgrades are enabled by the new software key you received with this kit.

If you are only installing one of the software-only upgrades (Options SD, HD, or DAT), proceed to *Install the Software Option Key on page 27.*

The hardware installation procedure consists of the following steps:

- Removing the instrument cover and the module guide brackets
- Installing the new hardware
- Reinstalling the module guide brackets and the instrument cover

Locations of the Optional Hardware Modules

The modules for the hardware options can be installed only in the specific locations shown in Figure 2.

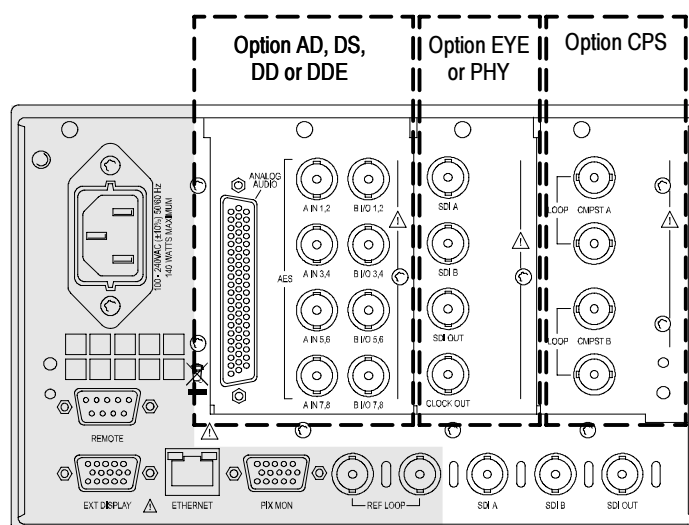


Figure 2: Rear panel showing the locations of the optional modules

Remove the Instrument Cover and Module Guide Brackets

If you are installing an upgrade option that includes hardware installation, perform the following steps to remove the instrument cover and module guide brackets.



WARNING. *Disconnect the power source from the instrument before beginning this or any procedure requiring you to remove the cover from the instrument chassis. Fan blades and other components inside the instrument could cause serious injury if power is on while the instrument chassis is open.*

1. If necessary, remove the instrument from the portable cabinet or rack adapter sleeve. Refer to *Hardware Installation* in the *WFM6100, WFM7000, and WFM7100 User Manual* for instructions.
2. Place the instrument on a static-safe work surface. Be sure to follow safe handling procedures to avoid electrostatic damage to the instrument or module (refer to *How to Prevent Electrostatic Discharge* on page 8).
3. Remove the six screws from the chassis cover as shown in Figure 3. Save the screws for reinstallation.

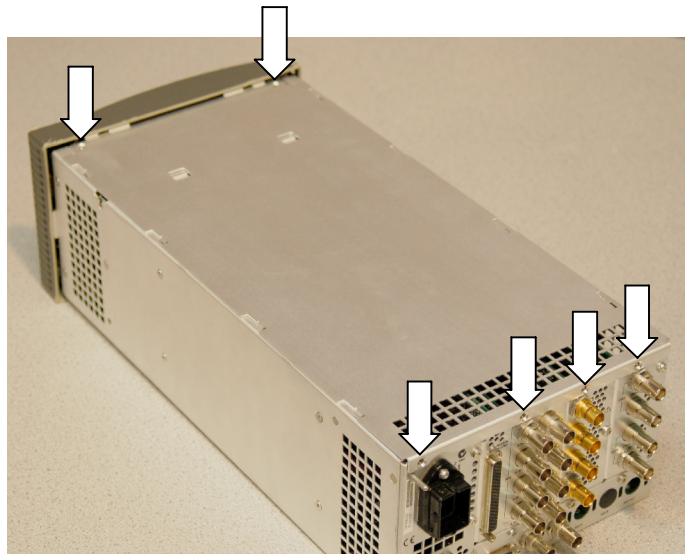


Figure 3: Removing the chassis cover

4. Slide the chassis cover toward the back of the instrument, and then lift and remove the chassis cover from the instrument.
5. Remove the four screws from the module guide brackets as shown in Figure 4. Remove the brackets and save the screws for reinstallation. Note that the brackets are keyed to the fit on the chassis in only one direction.

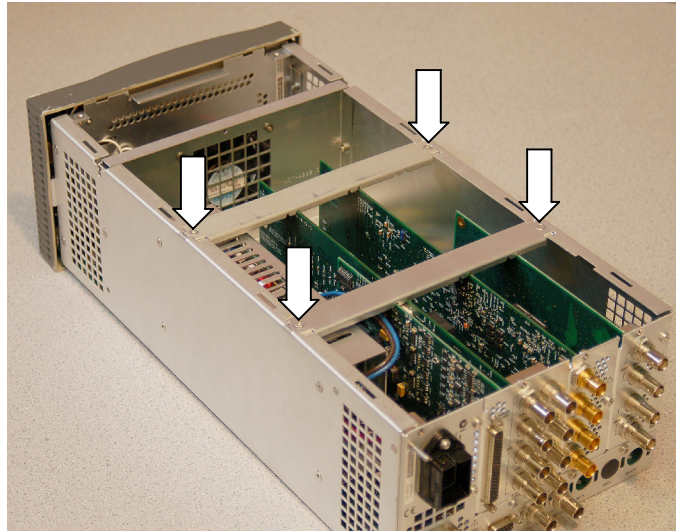


Figure 4: Removing the module guide brackets

Hardware Installation
WFM61UP EYE
WFM71UP EYE
WFM61UP PHY
WFM71UP PHY

For Option EYE and PHY upgrades only, perform the following steps to install the Option EYE or PHY module into the instrument. Read the entire installation procedure before installing the module.

NOTE. *If you are installing Option PHY and your instrument already has an Option EYE module installed, you must remove the Option EYE module and replace it with the Option PHY module supplied in this kit.*

1. Remove the six screws from the Option EYE and CPS rear panels. See Figure 5. Save the screws for reinstallation.
2. Remove the Option EYE and CPS or CPSL rear panels, or if installed, remove the Option Eye and/or Option CPS or CPSL module(s) from the instrument.

NOTE. *If you have difficulty removing or installing a module or rear panel because of a lack of clearance with an adjacent rear panel, loosen the screws on the adjacent panel to allow more room for moving the desired module or rear panel while you are performing this procedure.*

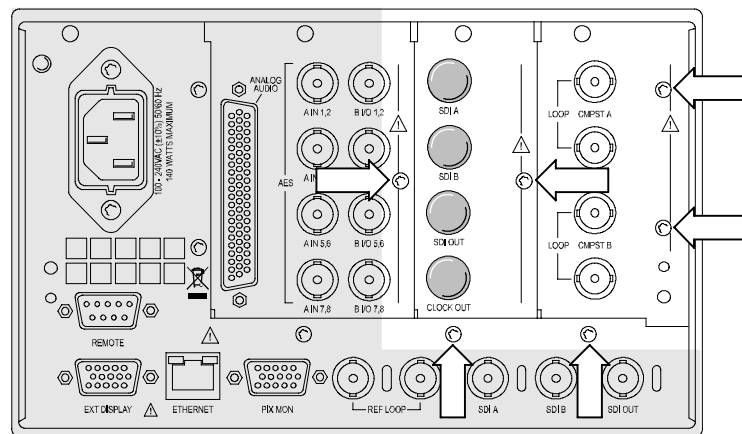


Figure 5: Removing the Option EYE and CPS rear panel screws

3. If installed, perform the following steps to remove the I/O Mezzanine module:
 - a. Remove the hex nuts and washers from the three BNC connectors on the I/O Mezzanine module. See Figure 6.

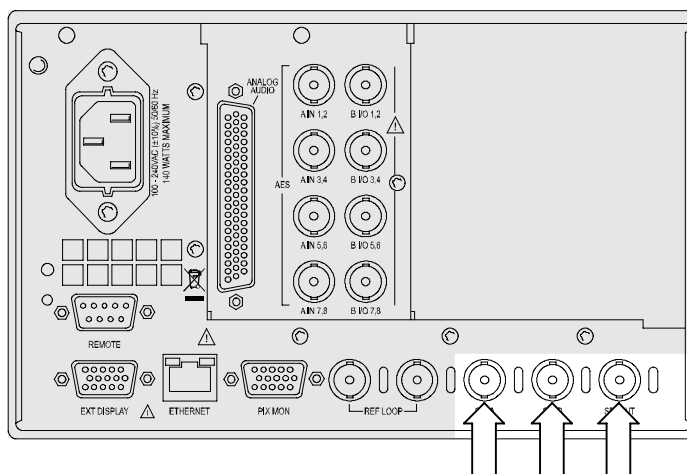


Figure 6: Removing the hex nuts and washers from the BNC connectors



CAUTION. To prevent damage to the cable wires, remove the ribbon cable by grasping the connector housing. Do not pull up on the cable wires.

- b. Remove the ribbon cable between J4 in the I/O Mezzanine module and J16 on the Main Interface board. See Figure 7.
- c. Remove the two screws from the I/O Mezzanine module. Save the screws for reinstallation.
- d. Lift the I/O Mezzanine module out of the instrument. Place the removed module in an anti-static bag for storage.
- e. Replace the two standoff posts on the Main Interface board with the two screws you removed in step c. Tighten the screws to 4 in/lbs.
- f. Insert the plastic hole plugs supplied in this kit into the three empty BNC connector holes on the rear panel.

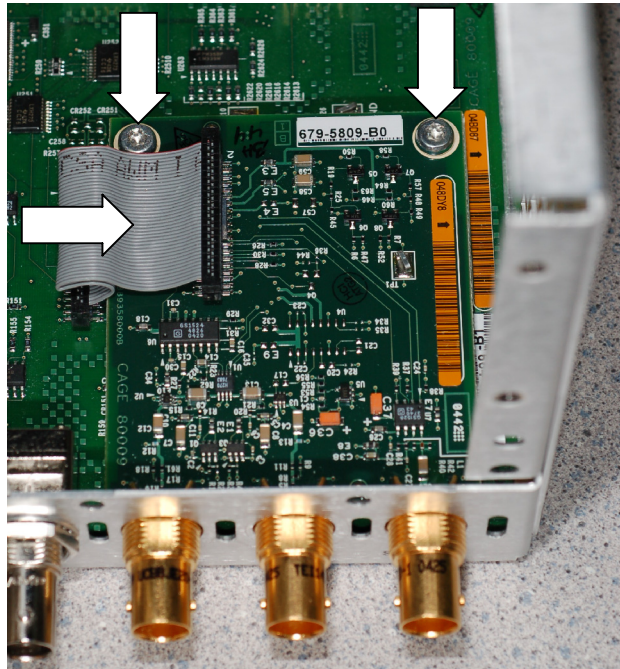


Figure 7: Removing the I/O Mezzanine module

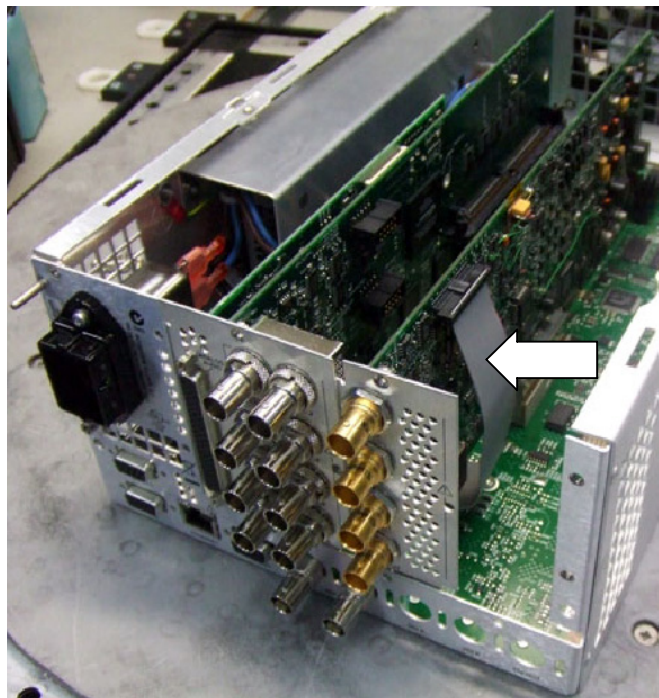


Figure 8: Installing the Option EYE and PHY cable



CAUTION. *To prevent damage to the cable wires, install the ribbon cable by grasping the connector housing. Do not press or pull on the cable wires.*

4. Install one end of the ribbon cable supplied in this kit onto J16 on the Main Interface board. The cable connector is keyed and can only be installed one way. Dress the cable towards the right side of the instrument as viewed from the rear. See Figure 8.
5. Install the new Option EYE or PHY module into the instrument, fully inserting the connector on the module into J9 on the Main Interface board. The recessed flange on the left side of the module rear panel slides behind the adjacent rear panel.
6. Install the other end of the ribbon cable onto J5 on the Option EYE or PHY module.
7. Perform the following steps if you do not have any other hardware modules to install. Otherwise, proceed to installing the next module.
 - a. Reinstall the Option CPS or CPSL rear panel or module. The recessed flange on the left side of the module rear panel slides behind the adjacent rear panel.
 - b. Install the six screws into the Option EYE and CPS or CPSL rear panels. See Figure 5 on page 18. Tighten the six screws and any adjacent rear panel screws you loosened to 8 in/lbs.
 - c. Reinstall the instrument cover and module support brackets by performing the removal procedure in reverse order. See page 16.
 - d. Proceed to *Install the Software Option Key* on page 27.

Hardware Installation
WFM61UP CPS
WFM70UP CPS
WFM71UP CPS

For Option CPS or CPSL upgrades only, perform the following steps to install the Option CPS or CPSL module into the instrument. Read the entire installation procedure before installing the module.

1. Remove the four screws from the Option CPS or CPSL rear panel (see Figure 9), and then remove the panel. Save the screws for reinstallation.

NOTE. *If you have difficulty removing or installing a module or rear panel because of a lack of clearance with an adjacent rear panel, loosen the screws on the adjacent panel to allow more room for moving the desired module or rear panel while you are performing this procedure.*

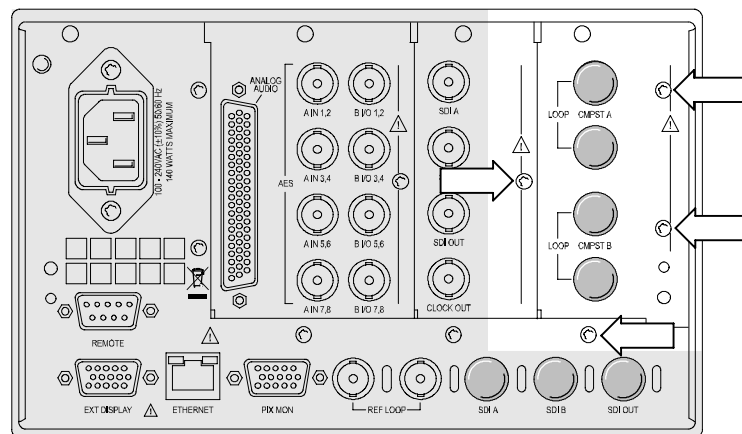


Figure 9: Removing the Option CPS rear-panel screws

2. Install the Option CPS or CPSL module supplied with this kit into the instrument, fully inserting the connector on the module into J13 on the Main Interface board. The recessed flange on the left side of the module rear panel slides behind the adjacent rear panel.
3. Perform the following steps if you do not have any other hardware modules to install. Otherwise, proceed to installing the next module.
 - a. Install the four screws into the Option CPS or CPSL rear panel. Tighten the four screws and any adjacent rear panel screws you loosened to 8 in/lbs.
 - b. Reinstall the instrument cover and module support brackets by performing the removal procedure in reverse order. (See page 16.)
 - c. Proceed to *Install the Software Option Key* on page 27.

Hardware Installation
WFM61UP DS
WFM70UP DS
WFM71UP DS
WFM61UP AD
WFM70UP AD
WFM70UP ADL
WFM71UP AD
WFM71UP ADL
WFM61UP DD
WFM71UP DD
WFM61UP DDE
WFM71UP DDE
WFM71UP DPEL

For audio upgrades only (Option DS, AD, ADL, DD, DPEL, or DDE), perform the following steps to install the audio module into the instrument. Read the entire installation procedure before installing the module.

1. Remove the four screws from the audio-options rear panel. See Figure 10. Save the screws for reinstallation.
2. Remove the audio-options rear panel. If an audio module is already installed, remove the audio module from the instrument. Place the removed module in an anti-static bag for storage.

NOTE. *If you have difficulty removing or installing a module or rear panel because of a lack of clearance with an adjacent rear panel, loosen the screws on the adjacent panel to allow more room for moving the desired module or rear panel while you are performing this procedure.*

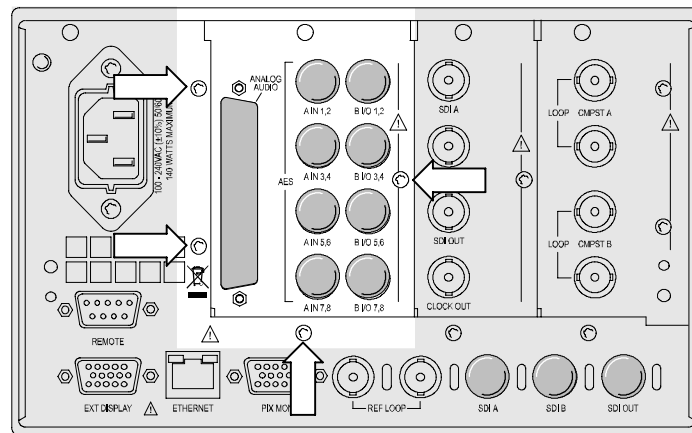


Figure 10: Removing the audio-options rear panel screws

3. **Option AD, ADL, DD, DPEL, and DDE only.** On the new audio module, carefully squeeze the two circuit boards together near the inter-board connector (see Figure 11) to verify that the connector is fully seated.
4. **Option DDE and DPEL only.** Install the Dolby E module supplied in this kit into J631 of the new audio module. Fully insert the connector on the Dolby E module into the socket on the audio module, and then rotate the Dolby E module in towards the audio module until the Dolby E module latches into position. See Figure 12.
5. Install the new audio module into the instrument, fully inserting the module connector into J8 on the Main Interface board. The recessed flange on the left side of the module rear panel slides behind the adjacent rear panel.

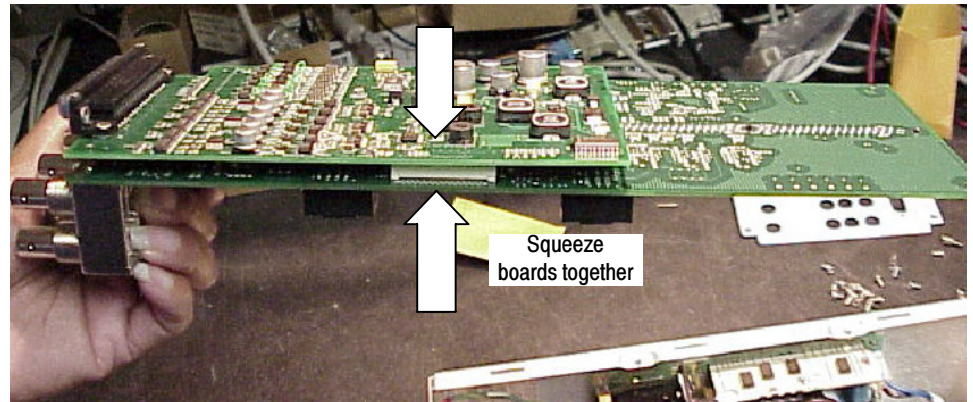


Figure 11: Checking the inter-board connection

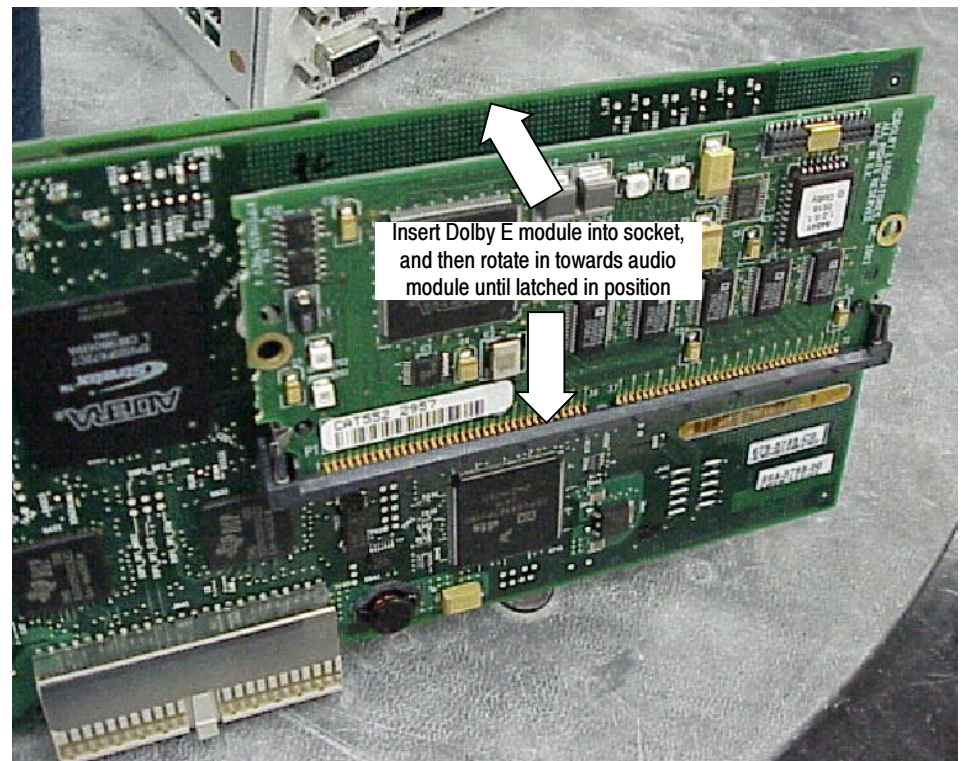


Figure 12: Installing the Dolby E module

NOTE. For audio options AD, ADL, DD, DPEL, and DDE only, use the supplied 62-pin DSUB connector to attach analog-audio signals to the instrument. Solder wires to the connector as needed to accommodate the desired audio inputs and outputs. Refer to the WFM6100, WFM7000, and WFM7100 Waveform Monitors Quick Start User Manual for the connector pin assignments.

Audio signals can be connected as either balanced or unbalanced. Be sure to use a suitable cable when you are wiring balanced audio. An example of a suitable cable is Belden 8451, which is a shielded twisted pair cable.

Alternatively, you can purchase an audio breakout cable (Tektronix part number 012-1688-00), which provides a two meter cable with XLR connectors for all twelve inputs and eight outputs.

6. Perform the following steps if you do not have any other hardware modules to install. Otherwise, proceed to installing the next module.
 - a. Install the four screws into the audio-options rear panel. Tighten the four screws and any adjacent rear panel screws you loosened to 8 in/lbs.
 - b. Reinstall the instrument cover and module support brackets by performing the removal procedure in reverse order. (See page 16.)
 - c. Proceed to *Install the Software Option Key* on page 27.

Install the Software Option Key

Read the entire procedure before installing the software option key.



CAUTION. *To prevent upgrade failure, if your waveform monitor does not have the latest version of software installed, you must upgrade the software to the latest version before you install the hardware upgrade and before you install the software option key. Refer to Install the Software Upgrade on page 9.*

1. Verify that the waveform monitor is powered on and connected to your local network.
2. Verify the IP address of the waveform monitor:
 - a. Press the **MAIN** button on the front panel.
 - b. Touch the **Config** soft key, and then touch the **Utilities** soft key.
 - c. Touch the **Communications** soft key, and then touch the **Network Setup** soft key.
 - d. Note the IP address of the waveform monitor listed in the Network Setup dialog box.
 - e. If the waveform monitor does not have an IP address set, ask your network administrator for a valid IP address. Refer to the *WFM6100*, *WFM7000*, and *WFM7100 Quick Start User Manual* for instructions on how to set the IP address on the waveform monitor.
3. Verify that you have access to a PC with a Web browser application that is connected to a network with access to the waveform monitor.

4. Perform the following steps to enter the software option key:
 - a. On the PC, open your Web browser application.
 - b. In the address bar of the Web browser, enter the IP address of the waveform monitor you are upgrading. This opens the **Tektronix WFM6100/WFM7100 Remote Interface** screen.
 - c. Click the **Instrument Options** link to open the **Active WFM 6x00/7x00 Options** screen.
 - d. In the **Key** field, enter the 20-character option key string (you can include or omit any dashes in the string). The new option key is supplied in the Important Documents envelope you received with this upgrade kit.
 - e. Click the **Submit** button to enable the software option. The instrument enables the option and adds the installed option to the list of currently installed options shown at the top of the screen.

NOTE. *If you purchased multiple options, the software option key supplied with this kit activated all of the options you purchased.*

Verify the Upgrade

Perform the following procedure to verify that the new option(s) have been installed and the instrument is functioning correctly:

1. Power on the waveform monitor.
2. Verify the installed options by performing the following steps:
 - a. Press the **MAIN** button on the front panel.
 - b. Touch the **Config** soft key, and then touch the **Utilities** soft key.
 - c. Touch the **View Instmt Options** soft key to display the installed options.
 - d. Verify that the options installed prior to this upgrade are still enabled, and that the new option(s) you installed are enabled.
 - e. Touch the **OK** softkey to close the installed options display, and then touch the **Close Utilities** softkey.

NOTE. *If the option(s) you just installed are not listed or if your previously installed options are not listed, contact Tektronix for assistance.*

3. Verify that the instrument passes the advanced diagnostic tests by performing the following steps:
 - a. In the Config menu, touch the **Diagnostics** soft key.
 - b. Touch the **Run Advanced** soft key, and then touch the **Run** soft key to start the tests.
 - c. Verify that for each diagnostic test the result reads **Pass**.
 - d. Press the **SELECT** button on the front panel to reboot the instrument.

NOTE. *If a diagnostic test fails, contact Tektronix for assistance.*

4. **Option CPS and CPSL Only.** If your upgrade included the installation of Option CPS or CPSL, perform the following steps to calibrate the Pix Mon output:
- a. Connect an NTSC 100% white field signal from the TG2000 AVG1 to the CMPST A input on the waveform monitor. Terminate the loop-through using a precision 75 Ω termination.
 - b. Connect the VGA-to-BNC adapter cable to the PIX MON output on the waveform monitor. Connect the green channel (Y/G) of the adapter cable to the test oscilloscope with a 75 Ω terminating input.
 - c. Set the test oscilloscope to view the waveform. The following oscilloscope settings normally provide a usable display:

Vertical Scale	100 mV/div
Vertical Position	-3.5 div
Horizontal Scale	5 us/div
Horizontal Trigger Position	50%
Trigger Slope	Rising edge
Trigger Level	500 mV
 - d. On the waveform monitor, press the **PRESETS** button, touch the **Settings** soft key, touch the **Recall Preset** soft key, and then touch the **Factory** soft key. The settings of the waveform monitor are now returned to the Factory Presets.
 - e. Press the **IN/OUT** button, and then touch the **Analog Input A** softkey.
 - f. Touch the **Settings** softkey, touch the **Outputs** softkey, and then touch the **Cmpst Pix Mon On** softkey to turn on the Pix Mon output (the check box is marked). Close all softkey menus.
 - g. On the oscilloscope, check that the amplitude of the G waveform is $1 V_{p-p} \pm 5\%$ from sync tip to white. If the amplitude is within specification, proceed to step i. Otherwise perform step h.

NOTE. *The amplitude of the Pix Mon output should be the same as the video input signal. Therefore, the oscilloscope can be used to compare the two signals. This removes the absolute signal level and oscilloscope accuracy from the accuracy of the adjustment process.*

- h. To adjust the amplitude of the Pix Mon output, press the **MAIN** button, touch the **Config** softkey, touch the **Diagnostics** softkey, touch the **Calibration** softkey, touch the **Analog PixMon** softkey, touch the **OK** confirmation softkey, and then touch the **Composite** softkey. Use the general purpose knob to adjust the signal amplitude on the oscilloscope to $1 V_{p-p} \pm 5\%$.

- i. On the television signal generator (TG2000 with AVG1 module), change the output signal to an NTSC 0% flat field.
 - j. On the oscilloscope, check that the blanking (black) level is 0 mV \pm 100 mV.
5. **Options DS, AD, ADL, DD, DPEL, and DDE Only.** If you installed an audio module into a waveform monitor that did not have an audio module installed at the factory, perform the following steps to verify that the headphone jack on the front panel operates properly:
- a. Connect an audio signal to the waveform monitor.
 - b. Press the **AUDIO** button to access the Audio display.
 - c. Touch the **Headphone icon**, and then use the **General Purpose knob** to adjust the audio volume to a desired level.
 - d. On the audio display, touch one of the level meter bars to select the audio channel to which you want to listen. The channel pair being output to the headphone jack is indicated in the on-screen readout next to the headphone icon.

NOTE. *The audio signal source can be an SDI serial digital video signal with embedded audio, an AES digital audio signal, or an analog audio signal.*

- e. Connect a set of headphones to the headphone jack on the front panel.
- f. Verify that you can hear the audio signal using the headphones.

NOTE. *If the headphone jack is not operating properly, contact Tektronix for assistance. The problem may be on the Main Interface board of the waveform monitor and not on the new audio module you just installed.*

- 6. Verify the performance of the installed options by performing the appropriate performance verification procedures in the *WFM6100, WFM7000, and WFM7100 Waveform Monitors Specifications and Performance Verification Technical Reference* manual.

❑ **End of document** ❑

