

Instructions



040-1562-03 and Above Software Upgrade V2.60 WFM 601A, WFM 601E, & WFM 601M Component Waveform Monitors

075-0228-03

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.

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Service Safety Summary

Only qualified personnel should perform service procedures. Read this *Service Safety Summary* and the safety summaries in your product manual 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 main power by means of the power cord or, if provided, the power switch.

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 kit upgrades the software to V2.60 for the WFM 601A, WFM 601E, and WFM 601M Serial Digital Component Waveform Monitors. The upgrade eliminates minor operation errors and provides the ability to configure the Main board for use in any of these waveform monitors. For a complete list of changes, refer to the topic *Description of Feature Changes* on page 5. The installation instructions assume you are familiar with servicing and configuring waveform monitors.

NOTE. *Adjustment is required following the software upgrade.*

If you load new software, adjustment is necessary. Adjustment is required for the display mode intensities and Arrowhead and Lightning graticules. For more details, refer to page 19.

If you plan on reconfiguring your Main board for use in a different model waveform monitor, first check the version of the Boot ROM (A3U13) on the Main board. If it has a part number ending with -00 or -01 then you need to replace it with the included -02 version. Refer to page 11 for access instructions.

You may need to perform part of the adjustment procedures following this upgrade, depending on what changes you make. In every case, you should perform the performance verification procedures. For a list of the adjustments necessary for each type of upgrade, see page 19. This kit includes the current version of the Adjustment Software to ensure correct adjustment.

This document supports Tektronix modification 86349, 86586, and 87725.

Products

WFM 601A	B000100 and above
WFM 601E	B000100 and above
WFM 601M	B000100 and above

Minimum Tool and Equipment List

Required tools and equipment	Part number
PC computer DOS 3.3 or higher operating system 640 kbyte RAM 3.5"/1.44 MB high-density floppy drive RS-232 port (COM 1, 2, 3, or 4) RS-232 cable	-----

Software Upgrade Disk

The software disk is a 3.5 inch, high-density (1.44 MB) disk. It contains the program files necessary to upgrade the operating software in the waveform monitor. It also allows you to reconfigure the Main board for use in a different model. If you need to use a disk drive other than a 3.5 inch drive, copy the contents of the upgrade disk to the desired size disk or to a hard disk directory.

The upgrade disk contains the following files:

- UPGRADE.EXE performs software upgrade.
- SOFTWARE.DAT is the data file used by UPGRADE.EXE.



CAUTION. The software disk is not write protected.

Kit Parts List

Circuit/figure number	Quantity	Part number	Description
A3U13	1 EA	163-0653-XX	IC, Memory; CMOS EPROM; 128 K x 8
-----	1 EA	075-0228-03	Kit Instructions
-----	1 EA	063-2785-XX	WFM601A/E/M Upgrade Software disk
-----	1 EA	063-2786-XX	WFM601A/E/M Adjustment Procedures Software disk

Description of Feature Changes

The V2.60 software upgrade makes the following changes (when upgrading from V1.2):

- Allows reconfiguration of an A3 Main board for use in another model, such as moving a Main board from a WFM 601A to a WFM 601E. You must reconfigure the Main board as described on page 13.
- Adds remote commands for vertical and horizontal display position as follows:

Lightning display	POSiTion:VERTical:LTNG	-500 to +500
	POSiTion:HORZ:LTNG	-500 to +500
Diamond display	POSiTion:VERTical:DIAMond	-2047 to +2047
	POSiTion:HORZ:DIAMond	-2047 to +2047
Arrowhead display	POSiTion:VERTical:ARROWhead	-2047 to +2047
	POSiTion:HORZ:ARROWhead	-2047 to +2047

- On the Arrowhead display, adds a luminance label (Y) to the vertical axis and a chrominance label (|C|) to the horizontal axis.
- Adds gamut alarm indication (TTL low) to pin 16 of the Remote output. The gamut alarm must be enabled.
- On the Digital Cursor display, fixes a problem with the digital cursor skipping over samples 1440 to 1456 in the first line while in Freeze mode.
- On the Vector display, adds a flesh tone indicator (I) between the yellow (Y) and red (R) vectors.
- Allows the use of an external reference signal (EXT REF input) to set the Line Select unblank in all display modes, except Digital Waveform and Digital List. Line Select gate also works better for Jitter and Eye display modes. Most display modes now operate identically to the similar modes on the WFM601 and WFM601i monitors when set to 1H or 15H Line Select modes while using an external reference signal.

Installation Instructions

This procedure upgrades the software for the WFM 601A, WFM 601E, and WFM 601M Serial Digital Component Waveform Monitors. These instructions assume that you are familiar with servicing and configuring waveform monitors.

NOTE. Check the version of the waveform monitor boot ROM before installing new software. The boot ROM is the socketed IC U13 on the Main board (A3). See Figure 3. The A3 Main board is the large board on the bottom of the waveform monitor. Read the last two digits from the part number label on the boot ROM to determine the version. If the boot ROM version is 00 or 01, you need to replace it with the 02 boot ROM before loading new software. Contact your Tektronix Service Representative for more information.

This document refers to the adjustment procedure and the performance verification procedure in the *WFM 601A, WFM 601E, and WFM 601M Serial Digital Component Waveform Monitors Service Manual* (Tektronix part number 070-9836-XX). You may need this manual to verify operation following the software upgrade.

Please read all these instructions before starting the upgrade procedure. This procedure includes the following parts:

- *Getting Started*
- *Replacing the Boot ROM*
- *Upgrading the Software*
- *Configuration after Repairing or Replacing the Main Board*
- *Using NVDATA.TXT*
- *Recovering from a Failed or Interrupted Upgrade*
- *Adjustment and Verification Following an Upgrade or Configuration*

For additional assistance, contact your nearest Tektronix, Inc., Service Center or Tektronix Factory Service.

Getting Started

The Upgrade program overwrites the instrument software contained in Flash EPROM with a newer software version. The Upgrade program can also load software after replacement of the Flash EPROM.



CAUTION. *Interrupting the upgrade procedure before normal completion will corrupt the Flash EPROM. To prevent this, ensure that your PC and waveform monitor are not used or interrupted while the Upgrade program is running. To recover from an unsuccessful upgrade attempt, see Recovering from an Interrupted or Failed Upgrade on page 17. If this recovery procedure is not successful, return the waveform monitor to Tektronix for repair.*

Determining the Current Software Version

Before performing an upgrade, confirm that your current version of operating software is older than the upgrade version.

To determine the software version on your waveform monitor follow these steps:

1. Press the CONFIG menu button.
2. Select the CALIBRATE submenu.
3. Find the software version number located in the lower right corner of the CALIBRATE submenu. It is preceded by the letter V. The coprocessor code, preceded by the letter C, is not important here.
4. The software version number for the upgrade is printed on the diskette label. If the version number on the diskette is newer (higher) than the version number on your waveform monitor, you may benefit from an upgrade.

NOTE. *Check the version of the waveform monitor boot ROM before installing new software. The boot ROM is the socketed IC U13 on the Main board (A3). See Figure 3. The A3 Main board is the large board on the bottom of the waveform monitor. Read the last two digits from the part number label on the boot ROM to determine the version. If the boot ROM version is 00 or 01, you need to replace it with the 02 boot ROM before loading new software. Contact your Tektronix Service Representative for more information.*

Configure the PC

For better file security and execution speed, you should copy the contents of the 3.5 inch disk to your hard drive and run the program from there. You also need to configure your PC for remote communications before running the Upgrade program. You can run the Upgrade program from the floppy drive on your PC, if necessary. To prepare the PC, follow these steps:

1. Insert the upgrade disk into the 3.5 inch floppy drive on the PC and copy the contents to a directory on your hard drive.
2. Connect the rear-panel RS-232 connector of the waveform monitor to the COM 1, 2, 3, or 4 connector on the PC using a cable wired as shown in Figure 1.

NOTE. For remote communications to function properly for the upgrade, valid software must be running in the waveform monitor.

3. Set the communication parameters for the PC as shown in Table 1.

Table 1: Remote communication parameters

Baud	9600
Data bits	8
Stop bits	1
Parity	None
Flow control	Xon/Xoff

For more information on configuring your waveform monitor for remote communications, refer to the *Remote Operation* section in the User manual for your model.

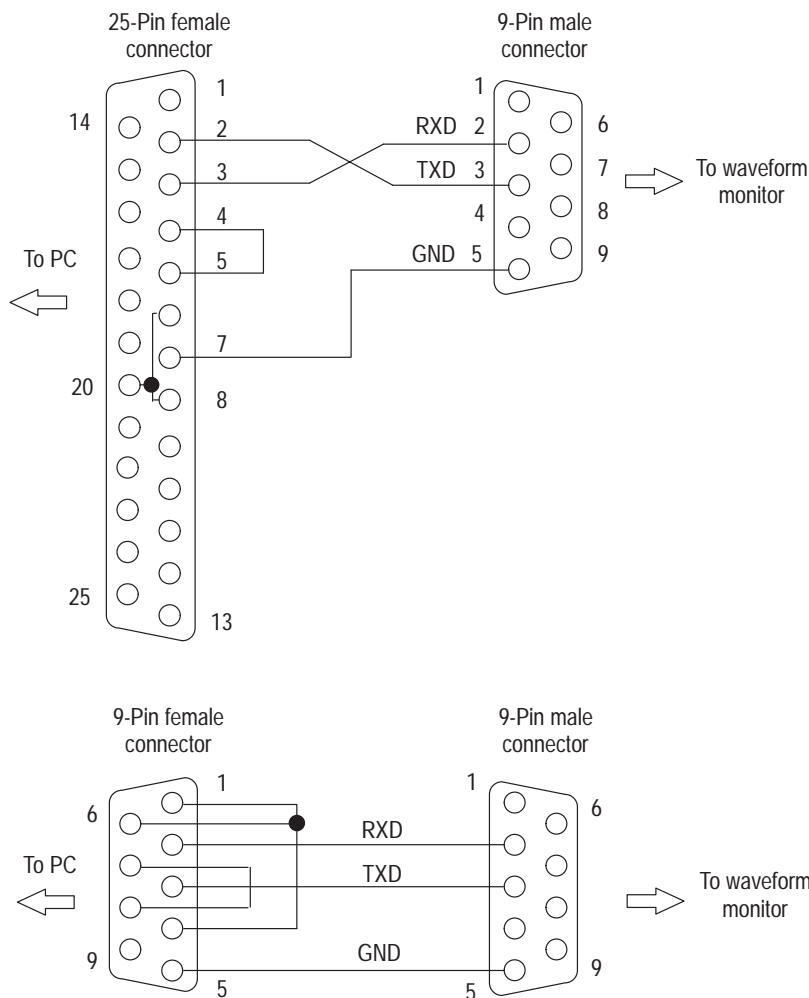


Figure 1: Configuration for RS-232 communications

Replacing the Boot ROM

This procedure replaces the boot ROM on the A3 Main board with the new version included in this kit. You should replace the boot ROM if you have an older instrument with a -00 or -01 version of the boot ROM. The main advantage of changing the boot ROM from -01 to -02 is the ability to configure the waveform monitor to work in any model. The -00 boot ROM must be changed to be compatible with the new software version V2.20 and higher.

To access the boot ROM, you need to remove the cover and turn the instrument over. The A3 Main board is the large board on the bottom. See Figure 3.

- Setup**
1. Disconnect the power cord from the AC mains and the waveform monitor.
 2. Remove the two TORX T15 screws shown in Figure 2.

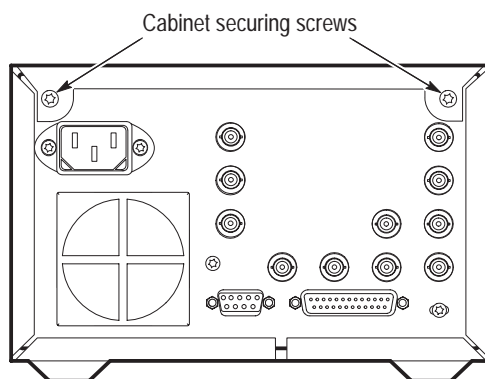


Figure 2: Removing the case from the waveform monitor

3. Slide the case off the rear of the waveform monitor.
4. Position the instrument with the bottom up and the front panel to your left.
5. Replace socketed U13 with the IC Tektronix part number 163-0653-XX provided in the kit. Refer to Figure 3 for the component location.
6. Install the instrument in the cabinet.
7. Install new software following the instructions beginning on page 12 in this kit.

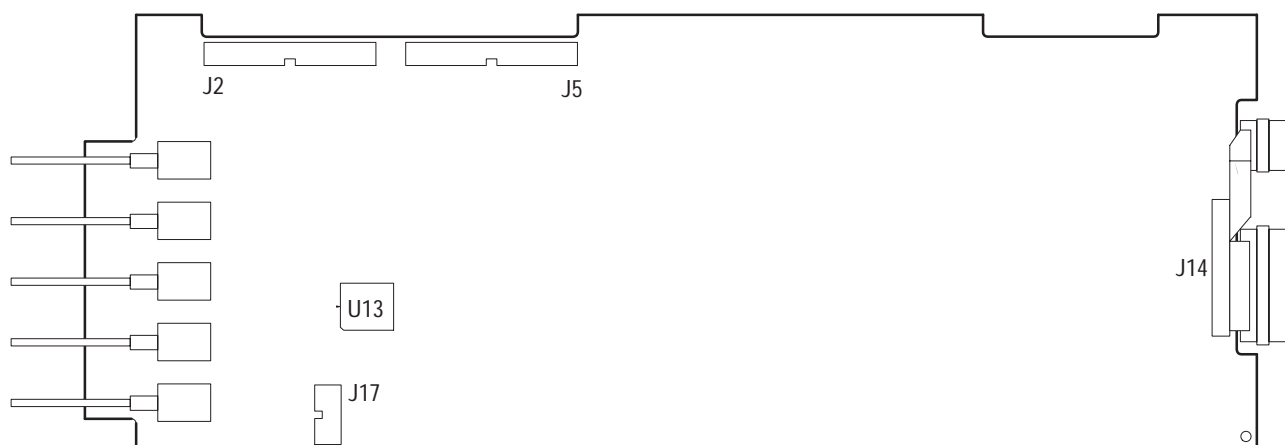


Figure 3: Main board showing location of U13

Upgrading the Software

Use the following procedure to upgrade the software on your waveform monitor. The procedure takes about 35 minutes to complete.

NOTE. *Adjustment is required following the software upgrade.*

If you load new software, adjustment is necessary. Adjustment is required for the display mode intensities and Arrowhead and Lightning graticules. For more details, refer to page 19.



CAUTION. *Interrupting the Upgrade program before normal completion will corrupt the Flash EPROM. To prevent this, ensure that your PC and waveform monitor are not used or interrupted while the Upgrade program is running. To recover from an unsuccessful upgrade attempt, see Recovering from an Interrupted or Failed Upgrade on page 17. If this recovery procedure is not successful, return the waveform monitor to Tektronix for repair.*

1. Ensure that the file NVDATA.TXT is *not* located in the same directory as the upgrade files. NVDATA.TXT is a temporary file created by the Upgrade program to hold user presets and calibration information during the upgrade. If NVDATA.TXT is present, move it to another directory or rename it. For more information about NVDATA.TXT, see *Using NVDATA.TXT* on page 16.
2. Exit from all applications on your PC.
3. From the DOS prompt, change to the directory containing the upgrade files.
4. Type UPGRADE and press ENTER.
5. When asked for the COM port, enter the number of the port you are using. If you enter an incorrect port number, you are prompted to retry the same port or quit. You must quit to select a different COM port.
6. If the file NVDATA.TXT is detected in your working directory, you are prompted to make the following choice:
 - To use the current calibration constants in your waveform monitor NVRAM, type N.
 - To use the NVDATA.TXT file already in your directory to reload calibration constants, type Y.

NOTE. *If you use the pre-existing file to restore calibration constants, the program deletes NVDATA.TXT after loading it into NVRAM.*

7. If you typed N, you are prompted to make the following choice:
 - To overwrite the existing NVDATA.TXT file with the calibration constants currently in the NVRAM and to continue the upgrade, type Y.
 - To exit the Upgrade program without changing your waveform monitor, type N.
8. The program asks you to confirm the upgrade to a new version of software.
 - To upgrade your software, type Y.
 - To exit the Upgrade program without changing your waveform monitor, type N.
9. The program displays status messages as the upgrade progresses. The program erases NVRAM and flash EPROM and then loads new software. After approximately 35 minutes, the program completes and displays a message indicating that the upgrade was successful.

If the error message “Failed to restore CAL Constants” appears, try reloading the NVDATA.TXT file using the instructions on page 18.

You have completed the software upgrade procedure.

Configuration After Replacing or Repairing the Main Board

Use the following procedure to load software into your waveform monitor following replacement or repair of the Main board. You must always run the Upgrade program following replacement of the Main board. With the Upgrade program (UPGRADE -C), you configure the Main board with the current Model type, Serial number, and date.

Applying Power After Installing a Main Board

To check a replacement Main board, connect the completely assembled waveform monitor to AC power and press the power switch. The waveform monitor will either power up and display the usual Display mode window or show the following error message:

CONFIGURATION ERROR

CONTACT TEKTRONIX SERVICE

This error indicates that you need to use the Upgrade program to configure the Main board and, possibly, load software. If this error occurs after you have

loaded software it could indicate that you entered incorrect information during the upgrade. Disconnect power and check that all circuit boards and connecting cables are properly seated.



CAUTION. *Interrupting the upgrade procedure before normal completion will corrupt the Flash EPROM. Ensure that your PC and waveform monitor are not used or interrupted while the Upgrade program is running. To recover from an unsuccessful upgrade attempt, see Recovering from an Interrupted or Failed Upgrade on page 17. If this recovery procedure is not successful, return the waveform monitor to Tektronix for repair.*

Configuration Procedure

Follow these steps to configure a replacement Main board or to load new firmware in a repaired Main board.

1. Ensure that the file NVDATA.TXT is not located in the same directory as the upgrade application files. NVDATA.TXT is a temporary file created by the Upgrade program to hold user presets and calibration information. If NVDATA.TXT is present, move it to another directory or rename it. For more information about NVDATA.TXT, see *Using NVDATA.TXT* on page 16.
2. If the waveform monitor is operating, save the calibration information into an NVDATA.TXT file before replacing or repairing the Main board. To save the current calibration information, perform the upgrade save procedure on page 16. If you cannot capture the NVDATA information, you will need to run the Adjustment Procedure following configuration.
3. Exit from all applications on your PC before running the Upgrade program.
4. From the DOS prompt, change to the directory containing the upgrade files.
5. Type `UPGRADE -C` and press ENTER.
6. When asked for the COM port, enter the number of the port you are using. If you enter an incorrect port number, you are prompted to retry the same port or quit. You must quit to select a different COM port.
7. The Upgrade program prompts you to supply the following information:
 - Model type, either WFM 601A, WFM 601E, or WFM 601M
 - Instrument serial number from the rear panel, such as B012345
 - Current date in the form MM/DD/YY, such as 03/18/97 for March 18, 1997

8. The program asks whether you want to proceed with the changes. Type Y to confirm your entries or N to discard your entries.
9. The program checks the current instrument model and compares it against the model type you entered. The program then stores the new configuration in NVRAM. The program asks whether to install new software.
 - If the Main board is a replacement from Tektronix, it has the latest version of software installed. Type N to exit the Upgrade program and proceed to step 11 in this procedure.
 - If you have repaired the EPROM on the Main board, you should proceed to load new software. Type Y to load the new version of the software.
10. The program displays status messages as the upgrade progresses. After approximately 35 minutes, the program displays a message indicating that the upgrade was successful.
11. If you were able to save the calibration information in step 2, reload this information now by following the instructions on page 16.
12. If you were NOT able to save the calibration information in step 2 of this procedure, perform the procedures in the *Adjustment Procedures* section of the Service manual.

When you load software into the empty EPROM, default calibration information is loaded into NVRAM. You must perform the full Adjustment Procedure in order to adjust the default calibration information. This adjustment will ensure that your waveform monitor meets the advertised specifications. You can return the waveform monitor to your Tektronix Service Center for a complete calibration.

13. If you repaired or replaced the Main board, verify that the waveform monitor still performs to specifications by performing the procedures in the *Performance Verification* section of the Service manual.

This completes the configuration procedure.

Using NVDATA.TXT

During the upgrade process, the Upgrade program saves user presets and calibration information from your waveform monitor NVRAM to a temporary file named NVDATA.TXT. After the program loads the new software, it automatically reloads the presets and calibration information from NVDATA.TXT back into NVRAM. This process configures your waveform monitor with the operating parameters it had before you ran the Upgrade program. Before exiting the upgrade, and after ensuring that NVDATA.TXT was loaded correctly, the program deletes NVDATA.TXT.

If the NVDATA.TXT file is lost, you can recalibrate the waveform monitor by using the Adjustment Procedure in the Service Manual. Alternatively, if you have saved a copy of the NVDATA.TXT file, you can load the contents of NVDATA.TXT into the waveform monitor using the UPGRADE -R option described in *Reloading NVDATA.TXT* on page 18.

Backing up Calibration Information and Presets

If NVRAM fails, your waveform monitor can lose calibration information and stored presets. To ensure that you retain the calibration information, you can copy the NVRAM data into the NVDATA.TXT file using the following procedure. This procedure takes about two minutes.

1. Exit from all applications on your PC.
2. From the DOS prompt, change to the directory containing the upgrade files.
3. Type UPGRADE -S and press ENTER.

The -S option saves the current front-panel settings, presets, and calibration information into the working directory in the file NVDATA.TXT and exits.

4. Rename NVDATA.TXT or move it into another directory to prevent the Upgrade program from overwriting it.

Calibration information is unique to each waveform monitor. Make a separate backup of the NVDATA.TXT file for each waveform monitor.

Loading NVDATA.TXT into NVRAM

To load an existing NVDATA.TXT file into NVRAM, use the following procedure. Loading the data file takes about two minutes to complete.

1. Ensure that the NVDATA.TXT file from your waveform monitor is in the same directory as the Upgrade program files.
2. Verify the RS-232 configuration as shown in Figure 1 on page 10 and Table 1, on page 9.
3. Exit from all applications on your PC.
4. From the DOS prompt, change to the directory containing the upgrade files.

5. Type `UPGRADE -R` and press `ENTER`.

The `-R` option attempts to reload the `NVDATA.TXT` file, but makes no other changes to your waveform monitor.

6. When asked for the COM port, enter the number of the port you are using.

The Upgrade program now attempts to restore the information from `NVDATA.TXT` to `NVRAM`.

Recovering from an Interrupted or Failed Upgrade

In rare cases, the Upgrade program may quit prematurely; for example, if power to the PC or the waveform monitor is interrupted, the RS-232 connection is broken, or the Upgrade program is significantly delayed by another application.

If the Upgrade program quits prematurely, use the following procedure.

1. Save a copy of `NVDATA.TXT` into another file or location.

Saving a copy now will back up your presets and calibration information. Leave a copy of `NVDATA.TXT` in the directory with the upgrade files. You can use this copy to restore the settings to your waveform monitor.

2. Verify the RS-232 configuration as shown in Figure 1 on page 10 and Table 1, on page 9.
3. Cycle the power on the waveform monitor by pressing the `POWER` button twice.
4. Exit from all applications on your PC.
5. From the DOS prompt, change to the directory containing the upgrade files.
6. Type `UPGRADE` and press `ENTER`.
7. When asked for the COM port, enter the number of the port you are using.
8. When asked if you want to use the detected `NVDATA.TXT` file to reload the calibration information, choose one of the following options:
 - To use the existing file to reload calibration information, type `Y`.
 - To quit the Upgrade program without making any changes to the waveform monitor, type `N`.
9. If you typed `Y`, the Upgrade program prompts you to confirm that you want to upgrade the current software to the new version. Choose one of the following options:
 - To continue with the upgrade, type `Y`.

- To quit the Upgrade program without making any changes to the waveform monitor, type N.

10. The program displays status messages as the upgrade progresses. After approximately 35 minutes, the program displays a message indicating that the upgrade was successful.

Reloading NVDATA.TXT

In some cases, the Upgrade program will fail to reload the NVDATA.TXT file. See *Using NVDATA.TXT* on page 16 for more information about this file. If this occurs during a normal upgrade, an error message will inform you that the file was not reloaded.

If the NVDATA.TXT file was not reloaded, use the following procedure to recover the data and restore the waveform monitor to normal operation. This procedure takes about two minutes to complete.

1. Ensure that the NVDATA.TXT file from your waveform monitor is in the same directory as the Upgrade program files.
2. Verify the RS-232 configuration as shown in Figure 1 on page 10 and Table 1, on page 9.
3. Exit from all applications on your PC.
4. From the DOS prompt, change to the directory containing the upgrade files.
5. Type `UPGRADE -R` and press ENTER.

The `-R` option attempts to reload the NVDATA.TXT file, but makes no other changes to your waveform monitor.

6. When asked for the COM port, enter the number of the port you are using.

The Upgrade program now attempts to restore the information from NVDATA.TXT to NVRAM.

Adjustment and Verification

After completing any of the upgrade or configuration procedures described in the kit, adjustment and verification are required. All procedures require performance of the procedures in the *Performance Verification* section of the Service manual to ensure operation to the advertised specifications. Table 2 lists the procedures required following each type of upgrade or configuration.

Table 2: Adjustment and verification required after the upgrade

Upgrade procedure	Performance verification	Adjustment: Full or Limited
Load V2.60 software only	Yes	Limited (see following topic)
Replace -00 or -01 boot ROM and load V2.60 software	Yes	Limited (see following topic)
Configure A3 Main board for new model ¹	Yes	Full
Replace A3 Main board and configure for current model ¹	Yes	Full

¹ The calibration information stored in the replacement A3 Main board is not optimized for the circuitry in the new model or instrument. You must perform the full Adjustment Procedures to ensure correct and specified operation.

Limited Adjustments

Following the upgrade to V2.60 software, you must adjust the Arrowhead display offset and the 1H and 15H Intensities using the included Adjustment Procedures Software disk. If you have reconfigured or replaced the A3 Main board, you must perform the full calibration described in the Service manual instead of this limited procedure. To make the adjustments required for a software upgrade, follow these steps:

1. Connect the serial output of a television signal generator to the waveform monitor SER A input. Terminate the loop-through input with a high-frequency (HF) 75 ohm terminator. Select a 100% Color Bar signal.
2. Load the Adjustment Procedures Software disk and run the cal.exe program.
3. Select your model, such as WFM 601A.
4. Once the main adjustment window appears, press F6 and select the adjustment named CRT Intensities.
5. In this procedure, check and adjust 1H and 15H intensities in all display modes. Use the arrow keys for adjustments.
6. At the end of the CRT Intensities procedure, press F6 and select the adjustment titled Arrowhead Graticule Offset & Gain.

7. In this procedure, adjust ARROW YOFF and ARROW XOFF using the arrow keys. This completes the limited adjustments.
8. Run the complete procedures in the Performance Verification section of the Service manual to ensure operation to the advertised specifications.

Refer to the *WFM 601A*, *WFM 601E*, and *WFM 601M Service Manual* for more information on running the cal.exe application and the Adjustment Procedures.

Adjustment Procedures Software

The included Adjustment Procedures Software contains changes necessary to support the required limited adjustments following a software upgrade and complete adjustment following a Main board replacement. The adjustment software supports all three waveform monitors. Refer to Table 2 for a list of required adjustments following upgrade or configuration.

■ ■ End of document ■ ■