# Keysight E6640A EXM Wireless Test Set

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## Security Features and Document of Volatility

KEYSIGHT TECHNOLOGIES

# Notices



### Trademark Acknowledgements

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### CAUTION

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### WARNING

A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

## Warranty

This Keysight technologies instrument product is warranted against defects in material and workmanship for a period of one year from the date of shipment. During the warranty period, Keysight Technologies will, at its option, either repair or replace products that prove to be defective.

For warranty service or repair, this product must be returned to a service facility designated by Keysight Technologies. Buyer shall prepay shipping charges to Keysight Technologies, and Keysight Technologies shall pay shipping charges to return the product to Buyer. For products returned to Keysight Technologies from another country, Buyer shall pay all shipping charges, duties, and taxes.

## Where to Find the Latest Information

Documentation is updated periodically. For the latest information about these products, including instrument software upgrades, application information, and product information, see the following URLs:

http://www.keysight.com/find/e6640a

Information on preventing instrument damage can be found at:

http://www.keysight.com/find/PreventingInstrumentRepair

## Is your product software up-to-date?

Periodically, Keysight releases software updates to fix known defects and incorporate product enhancements. To check for software updates for your product, go to the Keysight website at:

http://www.keysight.com/find/e6640a_software

# Table of Contents

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# 1 Contacting Keysight Sales and Service Offices

Assistance with test and measurement needs, and information to help you find a local Keysight office, is available via the internet at, http://www.keysight.com/find/assist. If you do not have internet access, please contact your designated Keysight representative.

**NOTE** In any correspondence or telephone conversation, refer to the instrument by its model number and full serial number. With this information, the Keysight representative can determine whether your unit is still within its warranty period.

# 2 Products Covered by this Document

| Product Name | Model Numbers |
|---|---|
| EXM Wireless Test Set | E6640A |

This document describes instrument memory types and security features. It provides a statement regarding the volatility of all memory types, and specifies the steps required to declassify an instrument through memory clearing, sanitization, or removal.

For additional information, go to:

http://www.keysight.com/find/security

**IMPORTANT** Be sure that all information stored by the user in the instrument that needs to be saved is properly backed up before attempting to clear any of the instrument memory. Keysight Technologies cannot be held responsible for any lost files or data resulting from the clearing of memory.

Be sure to read this document entirely before proceeding with any file deletion or memory clearing.

# 3 Security Terms and Definitions

| Term | Definition |
|---|---|
| **Clearing** | As defined in Section 8-301a of DoD 5220.22-M, "National Industrial Security Program Operating Manual (NISPOM)", clearing is the process of eradicating the data on media before reusing the media so that the data can no longer be retrieved using the standard interfaces on the instrument. Clearing is typically used when the instrument is to remain in an environment with an acceptable level of protection. |
| **Instrument Declassification** | A term that refers to procedures that must be undertaken before an instrument can be removed from a secure environment, such as is the case when the instrument is returned for calibration. Declassification procedures include memory sanitization or memory removal, or both. Keysight declassification procedures are designed to meet the requirements specified in DoD 5220.22-M, "National Industrial Security Program Operating Manual (NISPOM)", Chapter 8. |
| **Sanitization** | As defined in Section 8-301b of DoD 5220.22-M, "National Industrial Security Program Operating Manual (NISPOM)", sanitization is the process of removing or eradicating stored data so that the data cannot be recovered using any known technology. Instrument sanitization is typically required when an instrument is moved from a secure to a non-secure environment, such as when it is returned to the factory for calibration.<br>Keysight memory sanitization procedures are designed for customers who need to meet the requirements specified by the US Defense Security Service (DSS). These requirements are specified in the "Clearing and Sanitization Matrix" in Appendix O of the ODAA Process Guide for C&A of Classified Systems under NISPOM. |
| **Secure Erase** | Secure Erase is a term that is used to refer to either the clearing or sanitization features of Keysight instruments. |

# 4 Instrument Memory & Document of Volatility

This chapter summarizes all memory types in the instrument.

The descriptions are divided between:

1. Memory in the Controller.
2. Memory in the Frequency Reference.
3. Memory in the TRX.

# Memory in the Controller

This section contains information on the memory components used in the controller.

The E6640A test set was initially equipped with the NI PXIe-8135 controller, but this model is being replaced by the Keysight M9037A PXIe controller. To determine which controller model is installed in a particular test set, check the **System > Show > Hardware** menu. The two controller models are discussed separately below.

## Memory in the NI PXIe-8135 Controller

The table provides details of the size of each memory component, its type, how it is used, its location, volatility, and the sanitization procedure.

**NOTE** The instrument contains no user-accessible non-volatile memory, except for the hard disk drive listed as the second item in the table below. For this reason, as indicated in the tables below, no sanitization procedure is required for any memory component except the hard disk drive.

Table 4-1 Summary of NI PXIe-8135 controller instrument memory

| Memory Component, Type and Size | User Modifiable (Y/N)? | Volatile (Y/N)? | Purpose/Contents/Remarks | Location in Controller | Sanitization Procedure |
|---|---|---|---|---|---|
| Main memory (RAM) 12 GB. | Yes | No | Windows Operating System memory. Data input from user, operating system. | Motherboard | Cycle power. This is volatile memory. |
| Media Storage 250 GB Hard Disk Drive | Yes | Yes | Windows Operating System boot device and user files including saved programs, data, settings, images, license files, etc. Data (Operating System) is factory installed; other data is user-saved. | Motherboard | Remove the drive; see instructions on page 21. |
| Flash memory for BIOS (non-volatile memory) | No | Yes | Contains default BIOS settings for use when booting the controller. Programmed at factory or during BIOS upgrade. Settings may be toggled by user. Contains no user data. | Motherboard | None |
| DDR2-533 memory | No | No | Video RAM | Motherboard | Cycle power. This is volatile memory. |

## Memory in the Keysight M9037A Controller

The table provides details of the size of each memory component, its type, how it is used, its location, volatility, and the sanitization procedure.

**NOTE** The controller contains no user-accessible non-volatile memory, except for the SSD listed as the second item in the table below. For this reason, as indicated in the tables below, no sanitization procedure is required for any memory component except the SSD.

Table 4-2 Summary of M9037A controller instrument memory

| Memory Component, Type and Size | User Modifiable (Y/N)? | Volatile (Y/N)? | Purpose/Contents/Remarks | Location in Controller | Sanitization Procedure |
|---|---|---|---|---|---|
| Main memory (RAM) 16 Gb. | Yes | No | Windows Operating System memory. Data input from user, operating system. | Motherboard | Cycle power. This is volatile memory. |
| Media Storage 240 GB Solid State Drive | Yes | Yes | Windows Operating System boot device and user files including saved programs, data, settings, images, license files, etc. | Motherboard | Remove the drive; see instructions on page 22. |
| Flash memory for BIOS (non-volatile memory) | No | Yes | Contains default BIOS settings for use when booting the controller. Programmed at factory or during BIOS upgrade. Settings may be toggled by user. Contains no user data. | Motherboard | None |
| DDR2-533 memory | No | No | Video RAM; controller video graphics only. | Motherboard | Cycle power. This is volatile memory. |

## Memory in the Frequency Reference

This section contains information on the memory components used in the M9300A PXIe Frequency Reference.

The table provides details of the size of each memory component, its type, how it is used, its location, volatility, and the sanitization procedure.

Table 4-3 Summary of frequency reference instrument memory

| Memory Component, Type and Size | User Modifiable (Y/N)? | Volatile (Y/N)? | Purpose/Contents/Remarks | Location in Controller | Sanitization Procedure |
|---|---|---|---|---|---|
| 1. Flash Memory 128 Mbit | No | No | Stores Module Model Number, Serial Number, Manufacturing Number, PCB Part and Version Numbers, Cal Verify Date, Max Module Temperature, and Calibration Data. | Reference PC board | None; this is not user accessible. |
| 2. Flash Memory 128 Mbit | No | No | Device firmware. Images can be changed using the Keysight Soft Front Panel firmware update utility. | Reference PC board | None; this is not user accessible. |
| 3. Flash Memory 128 Mbit | Yes | No | Stores Calibration Preferences: Due Date, Subject to Periodic Cal, Module Cal Warnings, Cal Due Reminder, Module Cal Reminder and Passphrase. | Reference PC board | All values can be reset using the Soft Front Panel. |
| 4. FPGA | Yes | Yes | Reference Output selections, External Reference and Frequency selections, Time Shift and Self Test results. | Reference PC board | Cycle power. |
| 5. Flash Memory 128 Mbit | Yes | Yes | Stores User Customizable Asset Number and System Identification. | Reference PC board | All values can be reset using IVI driver. |

## Memory in the TRX

This section contains information on the memory components available in your instrument.

The table provides details of the size of each memory component, its type, how it is used, its location, volatility, and the sanitization procedure.

Table 4-4 Summary of TRX instrument memory

| Memory Component, Type and Size | User Modifiable (Y/N)? | Volatile (Y/N)? | Purpose/Contents | Location in Instrument and Remarks | Sanitization Procedure |
|---|---|---|---|---|---|
| 1. Config. PROM for FPGA<br>128Mb (16MB) | No | No | FPGA configuration, Board header, Module header, License storage, FLASH file system. | WDIF | None; this is not user accessible. |
| 2. Flash Memory<br>64Mb (8MB) | Yes | No | Board header, Receiver calibration data (User and Factory) | Down-converter | User calibration data can be reset. |
| 3. FPGA<br>4Mb (512KB) | No | No | FPGA configuration | Down-converter | None; this is not user accessible. |
| 4. Flash Memory<br>4Mb (512KB) | No | No | Board header, RFIO board header | Power Supply | None; this is not user accessible. |
| 5. Flash Memory<br>64Mb (8MB) | Yes | No | Board header, Receiver calibration data (User and Factory) | Modulator | User calibration data can be reset. |
| 6. FPGA<br>4Mb (512KB) | No | No | FPGA configuration | Modulator | None; this is not user accessible. |
| 7. Config. PROM for FPGA<br>128Mb (16MB) | No | No | FPGA configuration, Board header, Module header, License storage, FLASH file system | BBG | None; this is not user accessible. |

Table 4-4 Summary of TRX instrument memory

| Memory Component, Type and Size | User Modifiable (Y/N)? | Volatile (Y/N)? | Purpose/Contents | Location in Instrument and Remarks | Sanitization Procedure |
|---|---|---|---|---|---|
| 8. DRAM<br>4 GB DDR2 | Yes | Yes | Signal data captured | WDIF | Cycle power. |
| 8. DRAM<br>4 GB DDR2 | Yes | Yes | Signal data for playback | BBG | Cycle power. |

# 5 Memory Clearing, Sanitization and/or Removal Procedures

This section explains how to clear, sanitize, and remove memory from your instrument, for all types of non-volatile memory that can be written to during normal instrument operation.

# Instrument Sanitization Procedures

## Removable Drive Data Destruction

Several commercially available software programs exist to completely destroy all data on a data storage device such as the removable hard disk drive (or solid state drive). DoD 5220.22-M is a software based data sanitization method for total data destruction. The DoD 5220.22-M sanitization method was originally defined by the U.S. National Industrial Security Program (NISP) in the National Industrial Security Program Operating Manual (NISPOM). The process involves overwriting existing information on the hard drive (or other data storage device). Typically, this means writing a 0 (zero) to every addressable location on the device, verifying the write, writing a 1 (one) to every addressable location and verifying the write, and then writing a random character (in some cases writing a 97) to every addressable location and verifying the write. Using a DoD 5220.22-M sanitization (or a variant) prevents all software and hardware based data recovery methods from obtaining information from the SSD.The instrument's disk drive is divided at the factory into three visible partitions, labeled C:, D: and E:, plus a fourth hidden partition.

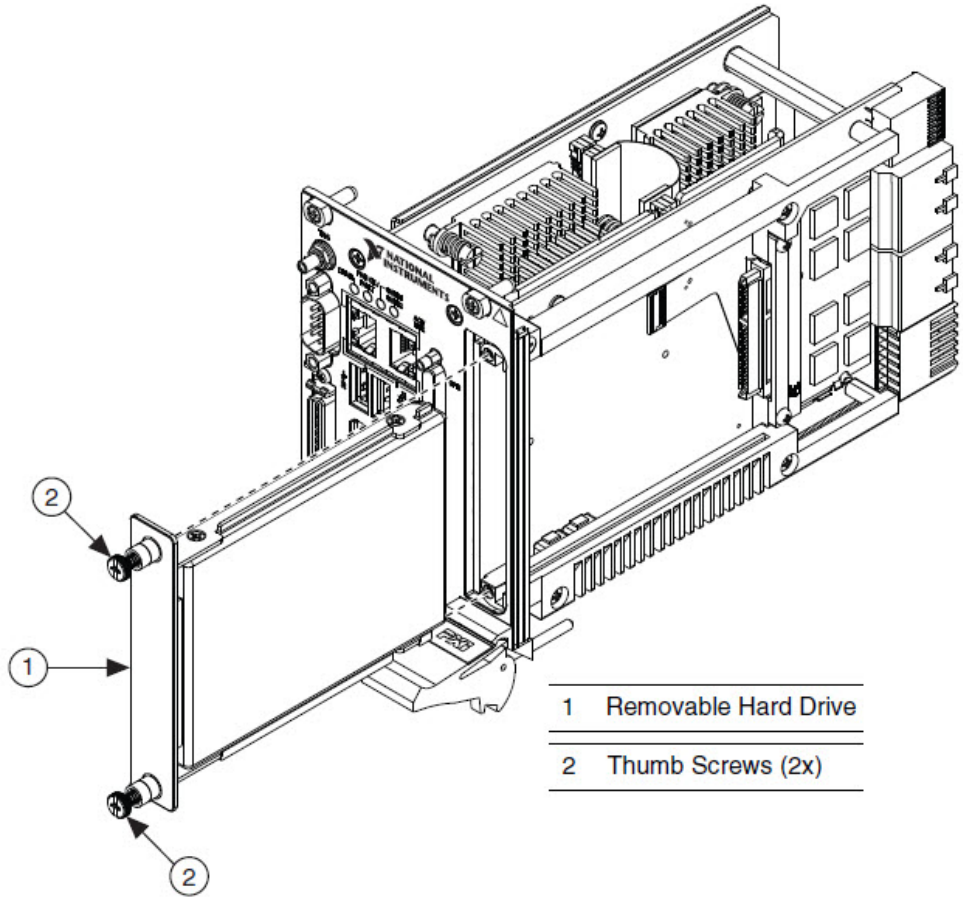
As the two possible controller models have different removable drives, separate procedures for removing them are presented here.

## Hard Disk Drive Removal (NI PXIe-8135 Controller)

Because it is virtually impossible to completely and selectively erase all user data on a hard disk drive without also destroying the operating system, the best method for maintaining security when the controller must be removed from a secure area is to remove or replace the hard drive, as described below.

1. Turn the PXIe chassis power off.
2. Remove the controller from the PXIe chassis.
3. Position the controller, top side up, on the workbench. Loosen the thumb screws.
4. Unseat the removable hard drive from the connector and remove it from the slot.
5. Store the hard drive in the original antistatic packaging when not in use to avoid damage.

Figure 5-1 Removing the hard drive (NI PXIe-8135 Controller)



## Solid State Drive Removal (Keysight M9073A Controller)

Because it is virtually impossible to completely and selectively erase all user data on a solid state drive without also destroying the operating system, the best method for maintaining security when the controller must be removed from a secure area is to remove or replace the hard drive, as described below.

1. Turn the PXIe chassis power off. You do not need to remove the M9037A controller from the chassis to replace the SSD drive.
2. Loosen the two thumb screws securing the cover to the controller's front panel.
3. Unseat the removable SSD with its mounting bracket from the connector and pull straight out.

Figure 5-2 Removing the solid state drive (Keysight M9037A controller)


**NOTE** If the SSD is removed from the M9037A, do not attempt to power it up. Always install the SSD before applying power to the M9037A. If you do not, then the SATA selection is eliminated from the boot option list. If the SSD is then reinstalled, then at boot the SATA selection will no be the first option to boot from. The boot order should be changed so that SATA is the first option.

## Application License Key Storage

License keys for measurement applications are stored on the removable hard drive; if you need to replace the SSD, contact Keysight Customer Support for help with restoring these licenses.

## Other Memories

Other memory devices in the E6640A are described in:

- “Memory in the Frequency Reference” on page 16
- “Memory in the TRX” on page 17

As these memory devices do not include user-accessible non-volatile memory, no sanitization procedure is required for any memory component except the removable hard drive.

# 6 User and Remote Interface Security Measures

This chapter discusses options that are available to you to control and configure remote access to the instrument, including:

- SCPI/GPIB Control of Interfaces
- Operating System Security Features
- USB Interfaces. This topic includes information about how to set the instrument's USB ports to read-only.

**IMPORTANT** **Users are responsible for providing security for the I/O ports for remote access, by controlling physical access to the I/O ports. The I/O ports must be controlled because they provide access to most user settings, user states, and the display memory.**

## SCPI/GPIB Control of Interfaces

The GPIB command `LLO` (local lockout) can be sent by the controller to disable operation of the instrument's front-panel keys and softkey menus.

However, sending the `LLO` command does not disable access to the instrument via its USB ports. For details of how to restrict the operation of the USB ports, see "Configuring USB for Read-only" on page 31 below.

## Operating System Security Features

The instrument's Windows operating system includes a variety of features that you can invoke or modify to enhance system security. These include the following:

- The ability to create custom user accounts, and assign different security levels to each account by adding it to an existing group. The group types predefined by Windows are: Administrator, Power User, User, Backup Operator, and Guest, but you can also define new group types.

- To provide additional protection for instruments that have a network (or internet) connection, the standard Windows Firewall is enabled by default.
- You can install standard third-party antivirus and spyware detection software designed for use with Windows XP or Windows 7, as appropriate for your test set's operting system. If your instrument uses a network (or internet) connection, this may be advisable.

**CAUTION** **Running any third-party program while making measurements may adversely affect the instrument's performance.**

Details of all these features are provided in the "Windows Security" section of the Keysight EXM Wireless Test Set: Getting Started Guide.

## Determining the Test Set's Operating System

You can easily determine your instrument's operating system version as follows:

1. Using the instrument front-panel, press **System > Control Panel...**
2. The Windows Control Panel appears. From the menu at the top of the Control Panel window, select **Help > About Windows**.
3. The `About Windows` message box appears, displaying the installed version of Windows.

## USB Interfaces

The instrument's Microsoft Windows operating system can be configured to improve the security of the USB interfaces. This section includes the following topics:



### Disabling or Enabling Autorun/Autoplay

Autorun, and the associated Autoplay, are Windows features that assist users in selecting appropriate actions when new media and devices are detected. The Autorun feature is disabled in the instrument by default, for improved security, unless the Administrator account is running. (In Administrator mode, Autorun is enabled, to aid with program installation.)

The procedure for disabling and enabling AutoPlay depends on your instrument's operating system (either Windows 7 or Windows XP). To determine the operating system version of your instrument, see "Determining the Test Set's Operating System" on page 27.

#### Windows 7

If your instrument has the Windows 7 operating system, you can disable or enable AutoPlay via the Control Panel. Open the Control Panel and select **Hardware and Sound > AutoPlay**, then uncheck or check the "Use AutoPlay for all media and devices" checkbox.

If you want to understand details of how this AutoPlay setting affects the Windows Registry, see the "Windows XP" on page 27.

#### Windows XP

You can change the Autorun configuration by editing the value of one of two Windows Registry keys. The Windows Registry is a database that stores critical configuration information for the instrument's operating system.

**CAUTION** Exercise extreme caution whenever you edit the Windows Registry. Entering an incorrect Registry value, or accidentally deleting Registry keys, may have serious consequences that can prevent the system from starting, or require that you reinstall Windows. The instructions in "Disable & Enable Procedure" on page 29 below assume that you are familiar with the use of the Windows Registry Editor to modify Registry settings.

### Registry Key Definitions

Autorun can be configured per-machine or per-user.

**NOTE** If the per-machine Registry key is present, its settings override those of the per-user Registry key.

The Registry key that controls the per-machine Autorun settings is:

`HKEY_LOCAL_MACHINE\Software\Microsoft\Windows\CurrentVersion\Policies\Explorer\NoDriveTypeAutoRun`

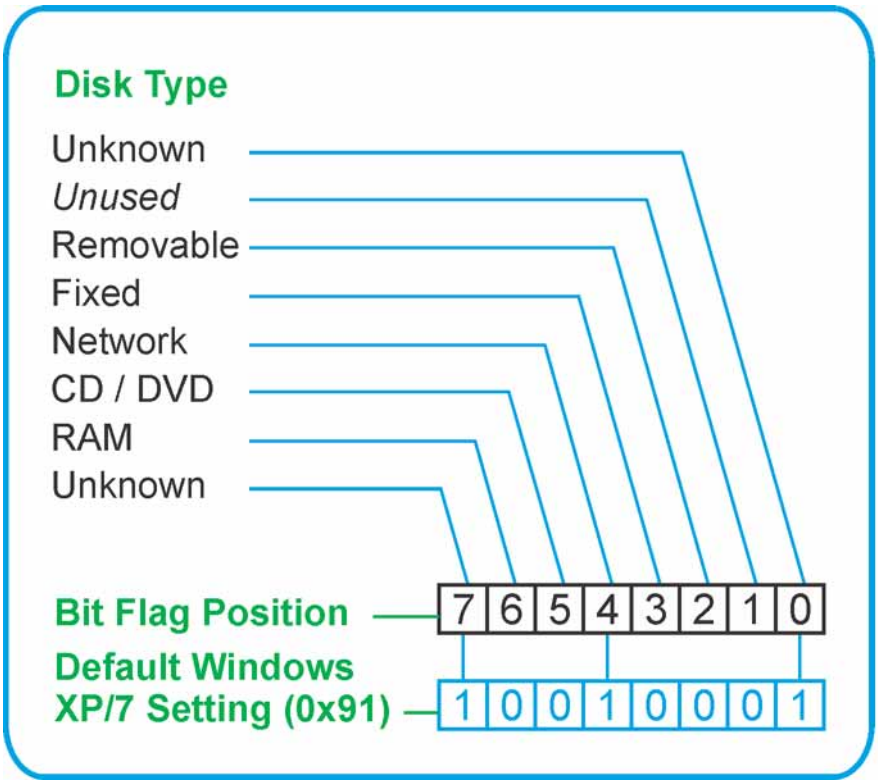
The Registry key that controls the per-user Autorun settings is:

`HKEY_CURRENT_USER\SOFTWARE\Microsoft\Windows\CurrentVersion\policies\Explorer\NoDriveTypeAutoRun`

In the following discussions, we use the industry-standard abbreviation `HKLM` for the root key `HKEY_LOCAL_MACHINE`, and the industry-standard abbreviation `HKCU` for the root key `HKEY_CURRENT_USER`.

The DWORD value of either of these entries represents a set of single-bit flags. Each flag specifies the Autorun setting for a specific drive type, as shown in Figure 6-1. Setting a bit flag to 1 disables Autorun for that drive type.

Figure 6-1 Autorun Flag Definitions for NoDriveTypeAutoRun Registry entry




As shown in Figure 6-1 above, the default Windows XP (post-SP2) and Windows 7 value for this entry is `0x91` (under the entry `HKCU\...\NoDriveTypeAutoRun`). This setting disables Autorun for `Unknown` and `Network` drives, but enables Autorun for `Removable`, `Fixed`, `CD/DVD` or `RAM` drives.

You can disable Autorun for all drive types by changing the value to `0xFF`, as described in the following section.

### Disable & Enable Procedure

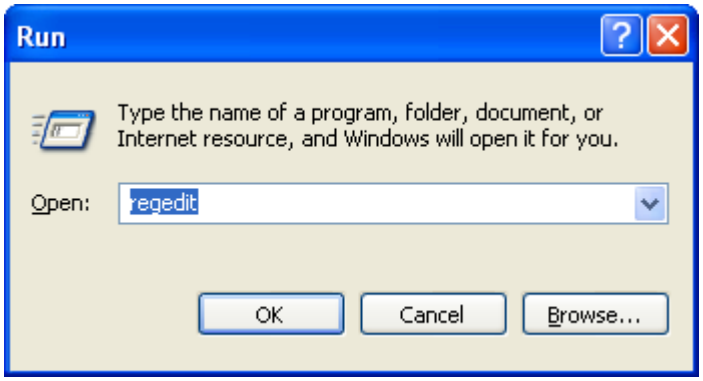
In view of the interaction between the per-machine and per-user Registry settings, as described above, it is recommended that, if both keys exist in your instrument's Registry, you should alter the settings of both Registry keys to the same value at the same time.

Use the following procedure to disable Autorun for all drive types, or to revert all Autorun settings to their Windows XP or Windows 7 default values. (Note that if your test set has a Windows 7 operating system, there is a simpler way to do this via the Control Panel; see "Windows 7" on page 27.)

1. Open the Windows Registry editor, using one of the following methods (depending on your test set's operating system):

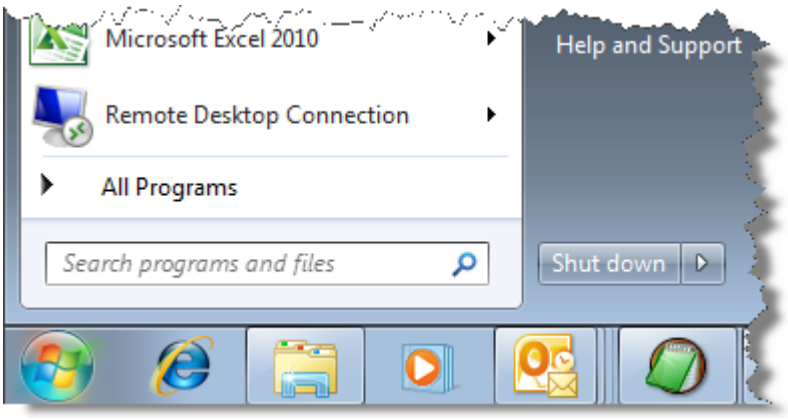
   a. For Windows XP, select **Run...** from the Windows Start menu. Then, type `regedit` into the Windows Run dialog box, as shown in Figure 6-2 below, and click **OK**.

Figure 6-2 Windows XP Run Dialog




b. For Windows 7, click the Windows **Start** button at the bottom left of the screen. Type `regedit` into the **Search programs and files** box, as shown in Figure 6-3 below, then press **Enter**.

Figure 6-3 Windows 7 Search Box




2. The Registry Editor window appears. Using the tree view control on the left of the window, navigate to the per-machine (`HKLM`) key: `HKLM\Software\Microsoft\Windows\CurrentVersion\Policies\Explorer`.
3. To disable Autorun for all drive types, set the value of entry `NoDriveTypeAutoRun` to `0xFF`.

   To revert Autorun settings to the Windows default values, set `the value of entry NoDriveTypeAutoRun` to `0x91`.
4. Again using the tree view control on the left of the Registry Editor window, navigate to the per-user (`HKCU`) key: `HKCU\SOFTWARE\Microsoft\Windows\CurrentVersion\policies\Explorer`.
5. To disable Autorun for all drive types, set `the value of entry NoDriveTypeAutoRun` to `0xFF`.

   To revert Autorun settings to the Windows default values, set the value of entry `NoDriveTypeAutoRun` to `0x91`.
6. From the Registry Editor menu, select **File** > **Exit** to save the settings and exit the editor.

7. Shut down and restart the instrument, to enable the new settings to take effect.

### Microsoft AutoRun Patch

**NOTE** The information in ths section applies only to Windows XP. If your test set has a Windows 7 operating system, you do not require this patch.

There is a defect in Windows XP that compromises the ability to disable Autorun. This defect has been fixed by a patch from Microsoft, as described in the Microsoft Knowledge Base Article ID: 967715.

This patch is included in the test set as shipped from the factory.

After the patch has been applied, there will be a Registry entry at:

`HKLM\Software\Microsoft\Windows\CurrentVersion\Policies\Explorer\HonorAutorunSetting` with a default value of 1.

### More Information

The following Wikipedia articles provide more information about AutoRun and AutoPlay:

http://en.wikipedia.org/wiki/AutoRun

http://en.wikipedia.org/wiki/AutoPlay

## Configuring USB for Read-only

A convenient mechanism is provided to set the instrument's USB interfaces to read-only, thus preventing transfer of files from the instrument onto USB devices.

You can change this setting only when you are logged on as the Administrator. For details of how to log on to the instrument as the Administrator, see the Keysight EXM Wireless Test Set: Getting Started Guide. To change the setting, do the following:

1. If you are not currently logged on to the instrument as the Administrator, you must log off.

   If you are currently logged on to the instrument as the Administrator, and the Keysight XSA application is already running, go to Step 4.

   The log-off procedure executes more quickly if you first exit the Keysight XSA application, but you can also log off without exiting the application.

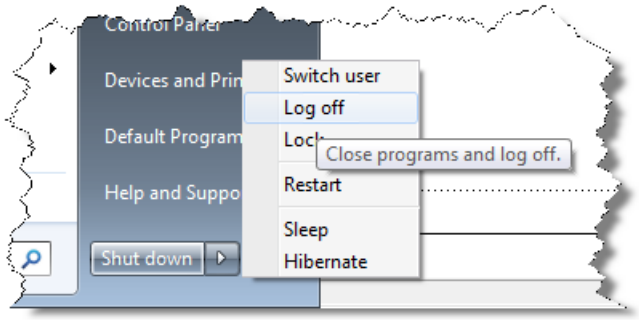
2. To log off, use one of the following procedures, depending on your instrument's operating system:

   a. For Windows XP, select **Log Off** from the Windows XP Start menu (as highlighted in Figure 6-4 below), then click **Log Off** in the Log Off Windows dialog that appears.

Figure 6-4 Log Off Button in XP Windows Start Menu


b. For Windows 7, click the Windows **Start** button, then select **Shut down > Log off** from the Windows Start menu, as shown in Figure 6-5 below.

Figure 6-5 Windows 7 Log off Control




3. After you have logged on to the instrument as the Administrator, restart the Keysight XSA application.
4. When the XSA application has fully initialized (that is, when the main results view and softkey menu are visible), press the **System** front-panel key.
5. From the System softkey menu, select: **More** > **Security** > **USB**.
6. Select the option **Read Only**.
7. To activate the configuration change, either log out and then back in under your usual user name (which by default is "instrument"), or cycle the instrument power.

# 7 Procedure for Declassifying a Faulty Instrument

Even if the instrument is not able to power on, it may be declassified by removing the disk drive from the instrument, using the appropriate procedure as described in “Hard Disk Drive Removal (NI PXIe-8135 Controller)” on page 21.

# A: References

1. **DoD 5220.22-M, "National Industrial Security Program Operating Manual (NISPOM)"**
United States Department of Defense. Revised February 28, 2006.
May be downloaded in Acrobat (PDF) format from:
http://www.dss.mil/isp/fac_clear/download_nispom.html

2. **ODAA Process Guide for C&A of Classified Systems under NISPOM**
Defense Security Service.
DSS-cleared industries may request a copy of this document via email, by following the instructions at:
http://www.dss.mil/isp/odaa/request.html

3. **Keysight EXM Wireless Test Set: Getting Started Guide**
Keysight Technologies Inc. 2013. Part Number: E6640-90001 (subject to revision).
A printed copy of this document is supplied with each instrument.
It is also available in Acrobat (PDF) form:
   - on the instrument's disk drive at the following location:
     C:\Program Files\Agilent\SignalAnalysis\Infrastructure\Help\bookfiles\getstart.pdf
   - via download from:
     http://www.keysight.com/find/e6640a

4. **Microsoft Knowledge Base Article ID: 967715**
"How to disable the Autorun functionality in Windows": may be viewed at:
http://support.microsoft.com/kb/967715
Note that a second article, at: http://support.microsoft.com/kb/953252, "How to correct 'disable Autorun registry key' enforcement in Windows", redirects to article ID 967715.

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