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# MICROGATE SERIAL COMMUNICATIONS RUN TIME KIT WINDOWS GUIDE

MicroGate Systems, Ltd

<http://www.microgate.com>

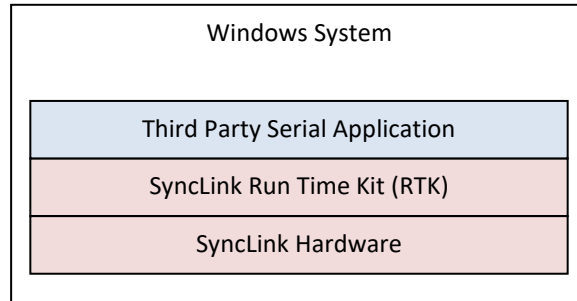
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## OVERVIEW

This guide describes the use of SyncLink serial hardware with third party applications on the Windows operating system. A complete setup consists of a Windows system, SyncLink hardware, the SyncLink Run Time Kit and a third party application as shown in this diagram.



Refer to documentation supplied by the third party application vendor for installation and configuration details appropriate for your environment. MicroGate will not have this information.

Install the SyncLink Run Time Kit before configuring and installing the hardware so Windows can automatically detect the hardware and install the appropriate drivers. PCI serial cards require configuration of interface selection jumpers before installation into a compatible PCI system slot. USB to Serial converters do not have jumper settings and are connected to system USB ports with USB cables. Refer to the Hardware User's Manual that came with your hardware for detailed configuration and cabling information.

## SUPPORTED WINDOWS VERSIONS

The serial API supports these 32-bit and 64-bit Windows versions:

Windows XP (Server 2003/2003R2)  
Windows Vista (Server 2008)  
Windows 7 (Server 2008R2)  
Windows 8 (Server 2012)  
Windows 8.1 (Server 2012R2)  
Windows 10 (Server 2016/2019)

## REQUIRED KNOWLEDGE

Installing SyncLink hardware and software on Windows **requires** the following knowledge:

1. Basic Windows administration
2. Documentation for third party serial application software
3. Configuration details for third party serial application
4. Reading supplied MicroGate documentation

## SOFTWARE INSTALLATION

Before using or installing SyncLink hardware, install supporting software and device drivers. The MicroGate software package is included on media shipped with your hardware. The latest version can be downloaded from:

<http://www.microgate.com/ftp/hdlcapi.rtk/hdlcrtk.exe>

`hdlcrtk.exe` is a self extracting executable that expands by default to `c:\mgrtk`. Run the package from a command line or from the Windows explorer.

These files are required for application use and should be distributed with the application and hardware.

<code>drivers\winXP-8.1\win32</code>	drivers for 32-bit Windows XP/Server 2002 to 8.1/Server 2012R2
<code>drivers\winXP-8.1\win64</code>	drivers for 64-bit Windows XP/Server 2002 to 8.1/Server 2012R2
<code>drivers\win10\win32</code>	drivers for 32-bit Windows 10
<code>drivers\win10\win64</code>	drivers for 64-bit Windows 10, Server 2016 and later
<code>tools\win32</code>	32-bit support tools
<code>tools\win64</code>	64-bit support tools

Run `setup.exe` in the `drivers` directory as Administrator. This installs drivers so Windows can automatically detect and support SyncLink hardware. Setup updates previously installed devices to the latest drivers.

```
C:\mgrtk\drivers\>setup
```

After software installation, install hardware as described in the next section. Windows detects the hardware and installs drivers for each device. If Windows does not find the drivers automatically, manually specify the search location as the above directories and follow the displayed instructions to complete device installation.

### Software Removal

Run `setup.exe` in the appropriate directory with the `/u` option to remove all device instances and the driver packages.

```
C:\mgrtk\drivers>setup /u
```

## HARDWARE INSTALLATION

This section describes the configuration and installation of the serial hardware. Configuration must match application requirements.

Each SyncLink port must be configured for one of three electrical specifications using jumpers on PCI cards and software for USB.

<b>RS-232/V.28</b>	single ended, unbalanced signals
<b>V.35</b>	differential data/clock signals and single ended control/status signals
<b>RS-422/RS-485/V.11</b>	differential signals

Refer to the hardware guide (PDF) for details. Hardware guides are available at [www.microgate.com](http://www.microgate.com)

### PCI CARDS

PCI and PCI Express cards are installed into internal expansion slots on the host system. The card type must match the expansion slot type. SyncLink PCI cards are “universal” and are compatible with 3.3V, 5V, 32-bit, 64-bit and PCI-X expansion slots. Do not confuse PCI-X with PCI Express, they are different slot types. SyncLink PCI Express cards are compatible with 1x, 4x, and 16x PCI Express expansion slots.

- Verify card interface selection jumpers (RS232,V.35,RS422) are correctly installed.
- Shutdown system.
- Remove system case cover.
- Insert adapter in compatible slot.
- Secure card bracket with screw or clamp.
- Replace system case cover.
- Start system.

### USB ADAPTER

The USB serial adapter plugs into a host USB port using the supplied Type B male to Type A male USB cable.

SyncLink USB should be plugged into a USB 2.0 or later Hi-speed (480Mbps) USB port. Operating on a slower USB port is not recommended. Install directly into a host USB port instead of a USB hub for better performance.

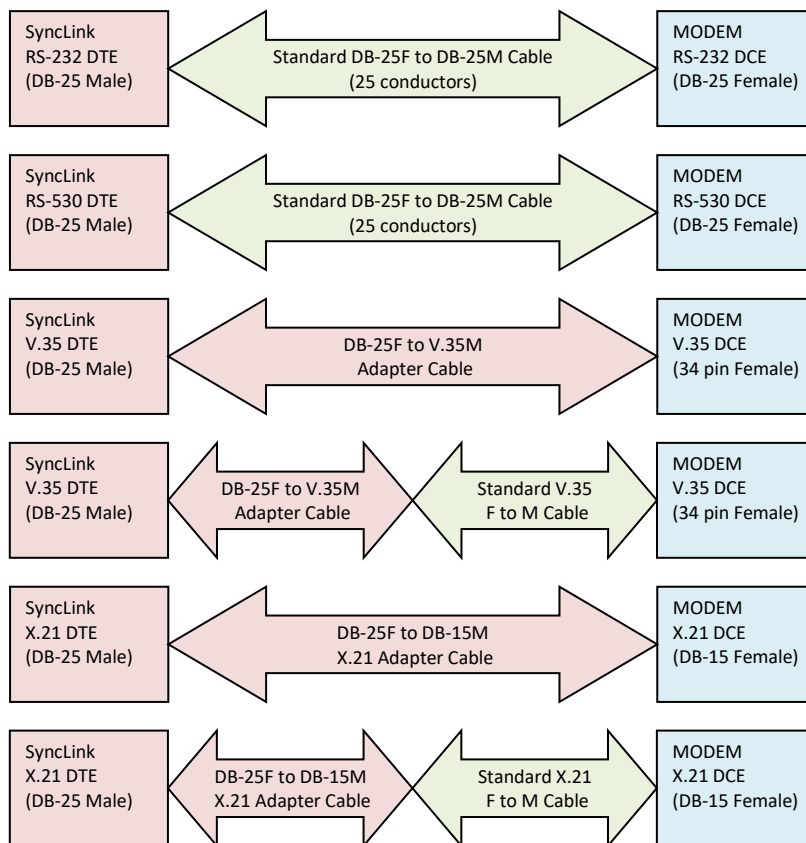
SyncLink USB requires 500mA of power from the USB port, which is standard and supported by most USB ports. Some USB ports may not provide a full 500mA, such as unpowered hubs or ports in small mobile devices.

After insertion and driver installation select the SyncLink USB interface type in the [Windows Device Manager](#).

## CABLES

Serial devices are DTE (data terminal equipment) or DCE (data circuit-terminating equipment). A DTE connects directly to a DCE. Two DTEs connect with a cross over cable or null MODEM. A DTE sends and receives data. A DCE converts data to a signal suitable for links like a phone line or radio. SyncLink devices are DTE with a DB25 male connector.

The following diagram shows where standard cables (green) are used and where adapter cables (red) must be purchased from MicroGate to convert the SyncLink DB25 connector to the DCE connector.



If the attached device does not use any of the above connectors, consult documentation for the SyncLink and attached devices to create a custom cable. Pinouts, electrical specification and configuration options are contained in the hardware user's manual (PDF) for your SyncLink device. Pay close attention to differential signal polarity.

## VERIFYING INSTALLATION

Before running an application, verify the correct installation of serial hardware and device drivers.

### WINDOWS DEVICE MANAGER

The primary tool for verification is the Windows Device Manager, an administrative tool included with Windows. This tool displays a tree diagram of hardware devices arranged by type or connection.

The Windows device manager can be started from a command prompt.

To open a command prompt, click the **Start** button, select **All Programs** then **Accessories** and right click on **Command Prompt**. Finally, select **Run as administrator** from the pop-up menu. If prompted for permission to continue, select allow. In the command prompt, run the following command:

```
C:\>devmgmt.msc
```

Once the device manager is running, look for a branch labeled **SyncLink Adapters**.

If you do not see SyncLink Adapters, try selecting the **Computer** branch, click the Action menu and select the “Scan for hardware changes” menu item. This should prompt Windows to detect new hardware and install drivers.

If you still do not see SyncLink Adapters, look for entries with a yellow question mark symbol labeled either “PCI Simple Communications Controller” or “SyncLink USB”. Right click each of these entries and select “Update Driver” from the pop-up menu and follow any displayed instructions. If for some reason Windows can’t find the drivers automatically, manually specify the search location as the driver directory in the SDK package.

Once the SyncLink Adapter branch is present, expand the branch to display SyncLink devices. Devices with a yellow symbol on the icon have a problem. If no yellow symbol is visible, the device and driver have been correctly installed. Right click on a device entry and select Properties from the pop-up menu.

## SYNCLINK DEVICE PROPERTIES

The SyncLink device properties in the Windows device manager displays device and driver information, configures the device and allows testing the device. The device properties window has multiple tabs for different purposes.

### GENERAL TAB

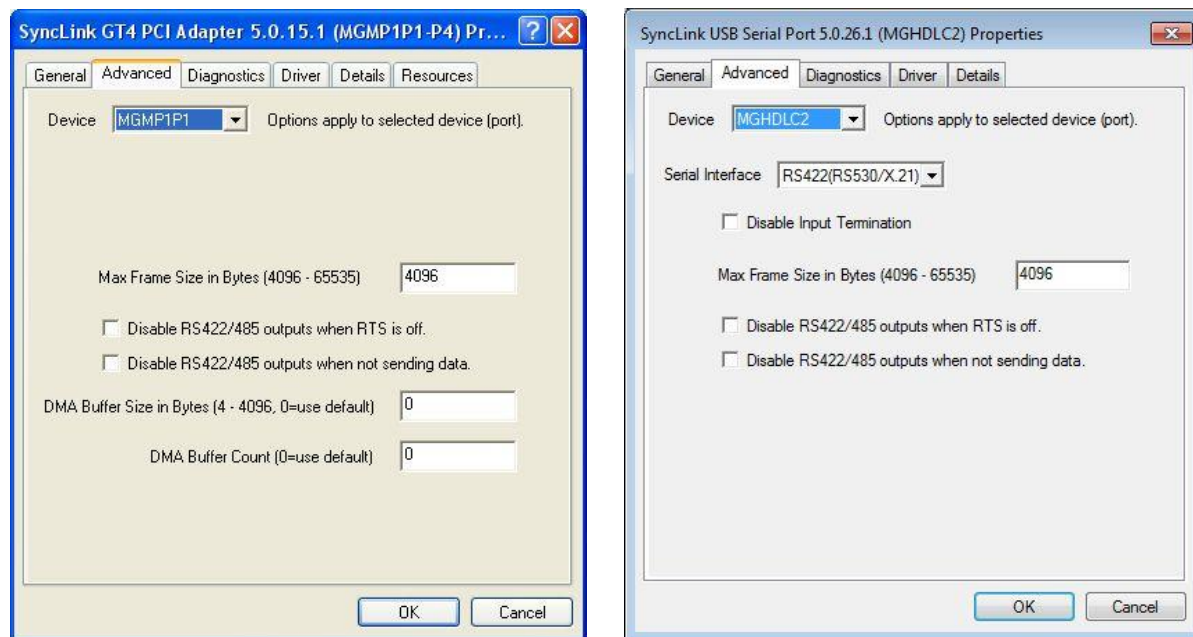
This tab displays the device status and location (slot or port number). If the device status is working properly then proceed to the next tab. Otherwise note the error message for diagnosing an installation problem. The device driver version and device names are displayed to the right of the card icon near the top.





## ADVANCED TAB

These settings are applied at system start or device insertion. Some settings apply only to select device types.



The **Device** pull down list has an entry for each port on the device. Other settings apply to the selected port.

### Max Frame Size

The maximum data size sent or received in a single API call. Default:4096.

### Serial Interface (SyncLink USB and SyncLink PCIe Only)

Select the serial interface electrical specification (RS232, V.35, RS422, etc). GT series cards select the interface with jumper settings. Choose the interface type required by your application. Choosing the incorrect interface type prevents correct operation and may damage the device.

### Disable Input Termination (SyncLink USB and SyncLink PCIe Only)

When checked, this option disables 120ohm input termination on the serial interface when differential modes are selected (RS422/RS530/V.35/X.21). GT series cards enable/disable termination with resistor packs or DIP switch settings.

### Disable RS422/485 Outputs when RTS is off.

Choose this option when the state of the RTS output signal should be used to control output drivers (enabled or tri-state). An application controls RTS to manually tri-state drivers in a 2-wire half duplex (multidrop) environment.

### Disable RS422/485 Outputs when not sending data.

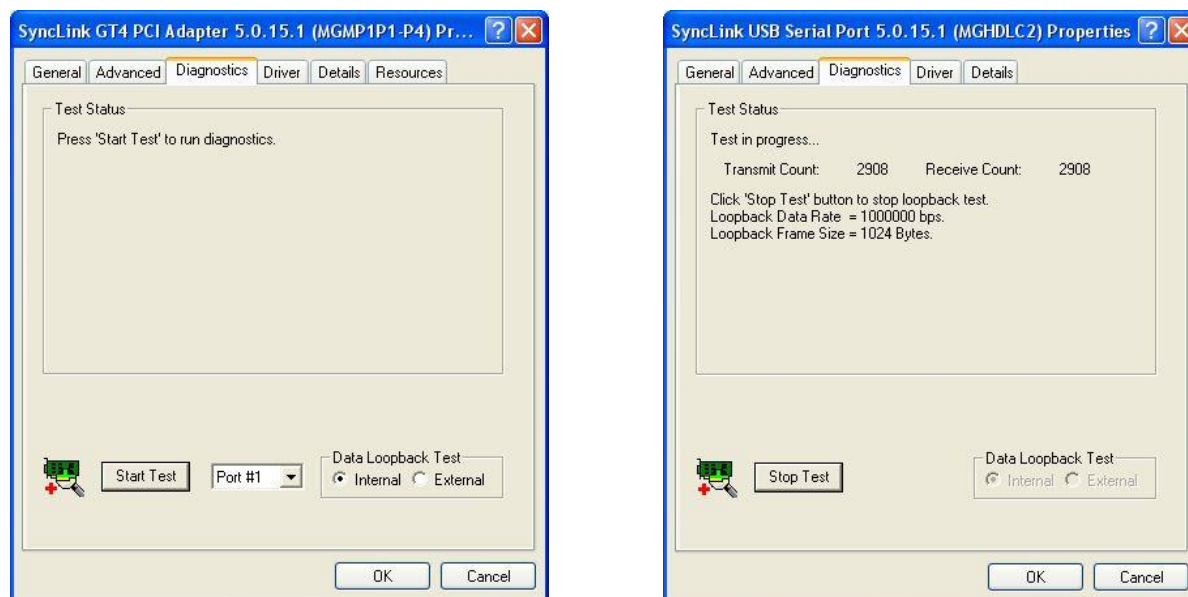
Choose this option if outputs should be disabled (tri-state) when not sending data. Hardware automatically controls driver outputs in a 2-wire half duplex (multidrop) environment.

### DMA Buffer Size and DMA Buffer Count

These options control buffer allocation in the driver. Use 0 unless otherwise directed by Microgate support.

## DIAGNOSTICS TAB

The **Diagnostics** tab allows you to test the device using an internal or external loopback of data.



Devices with more than one port will have a pull down list of ports. Select the port to test before proceeding. Devices with only one port will not have this list.

Select the **Data Loopback Test** type: **Internal** or **External**. The internal test does not access the serial connector and only tests the ability of Windows to talk to the device. If external is chosen, install the loopback plug that came with the device on the serial connector.

Then click the **Start Test** button. Send and receive data counts will start incrementing in the **Test Status** area. The test continues until the **Stop Test** button is clicked. Check the **Test Status** area for any error indications.

## TRACE UTILITY

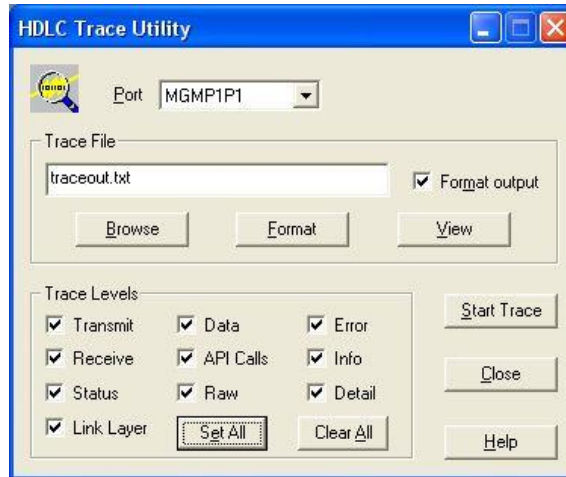
The trace utility records API events for debugging applications and is located at:

```
rtk\tools\win32\mgsltrc.exe    32-bit Windows
rtk\tools\win64\mgsltrc.exe    64-bit Windows
```

### Requirements

- Trace type (32-bit/64-bit) must match application. 32-bit applications may run on 64-bit Windows but never at the same time as 64-bit applications. Application type is shown in Windows Task Manager. For C, C++ and C# the application type is determined by the build target. For Python, the application type is determined by the Python installation type.
- Trace must run as same user as application.
- The user must have administrative privilege.

If an **access denied** or **port in use** error is reported by the application or trace utility then carefully review the above requirements. Tracing may start before or after starting application. Run trace from a command line or the Windows explorer. The trace program appears as shown below.



1. Enter the trace file name and select **Format output**.
2. Select trace levels. If unsure, enable all levels.
3. Select the port in the **Port** pull down list.
4. Click the **Start Trace** button to start the trace.
5. Perform the tasks to record (run application, connect, etc)
6. Click the **Stop Trace** button to stop the trace.

The output file may be examined for debugging or provided to MicroGate for support.

## DEVICE INSTANCES AND NAMES

When hardware is first installed, Windows creates a unique collection of data for the hardware describing the location, configuration and associated software. This data is called a device instance. Each device instance for hardware present in the system is displayed in the Windows device manager. When hardware is removed from the system, the device instance remains but is not displayed in the device manager.

### LOCATION LOCKED AND DEVICE LOCKED INSTANCES

Devices with a unique serial number accessible to Windows (SyncLink USB) use a device instance tied to the specific device called a device locked instance. PCI cards use a device instance tied to the location (PCI slot) called a location locked instance.

Hardware with a device locked instance may be moved to any location (USB port) and the same device instance is used. If the hardware is replaced, a new device instance is created for the new hardware with a different serial number.

Hardware with a location locked instance (PCI cards) may be replaced with the same card type in the same location and the same device instance is used. Moving hardware to a different location (PCI slot) creates a new device instance.

## SERIAL API NAMES

When drivers are installed for a SyncLink hardware device, a device name is assigned to the device instance. The name is used to access the device with the serial API. The name is based on an instance number that is assigned sequentially starting with one.

Example:

The first SyncLink GT4 PCI card is adapter number one, with device names MGMP1P1 to MGMP1P4.  
The second SyncLink GT4 PCI card is adapter number two, with device names MGMP2P1 to MGMP2P4.

If a PCI card is moved to a different slot, a new device instance is created with a different device name and applications using the original name will fail. The application must use the new name or the old device instance must be removed before creating a new device instance with the old name.

Example:

The first SyncLink GT4 PCI card is adapter number one, with device names MGMP1P1 to MGMP1P4.  
The second SyncLink GT4 PCI card is adapter number two, with device names MGMP2P1 to MGMP2P4.  
If the first card is moved to a different PCI slot, it becomes MGMP3P1 to MGMP3P2.

To reuse the name MGMP1P1 to MGMP1P4 in the new location, the first device instance must be removed before installing the card in the new location using these steps:

1. Remove hardware from system.
2. Start system and remove device instance. (see next section)
3. Install hardware in new location.

## REMOVING DEVICE INSTANCES OF NON-PRESENT HARDWARE

Device instances of non-present hardware are not displayed in the device manager by default. The device manager can be configured using an environment variable to display device instances of non-present hardware:

1. Set the environment variable `devmgr_show_nonpresent_devices = 1`.
2. Start device manager.
3. Select **Show Hidden Devices** item from **View** menu.

### Setting environment variable in Windows XP

- Click the **Start** button in the lower left of the desktop
- Right click **My Computer**
- Select **Properties** from pop-up menu
- Click the **Advanced** tab
- Click the **Environment Variables** button near bottom of window
- In the **System variables** section, click the **New** button
- In the **Variable name** field, type `devmgr_show_nonpresent_devices`
- In the **Variable value** field, type 1
- Click the **OK** button to dismiss **New System Variable** window
- Click the **OK** button to dismiss **Environment Variables** window
- Click the **OK** button to dismiss **System Properties** window

### Setting environment variable in Windows Vista and Windows 7

- Click the **Start** button in the lower left of the desktop
- Right click **Computer**
- Select **Properties** from pop-up menu
- Click the **Advanced system settings** in left side of window
- Click the **Environment Variables** button near bottom of window
- In the **System variables** section, click the **New** button
- In the **Variable name** field, type `devmgr_show_nonpresent_devices`
- In the **Variable value** field, type 1
- Click the **OK** button to dismiss **New System Variable** window
- Click the **OK** button to dismiss **Environment Variables** window
- Click the **OK** button to dismiss **System Properties** window

Be careful typing the variable name to ensure it is entered **exactly** the same as above.

Now non-present devices are displayed in the device manager with a grayed out icon. Uninstall the device instance by right clicking on the non-present device and selecting **Uninstall** from the pop-up menu. Repeat this for all grayed out devices in the **SynLink Adapters** and **SynLink USB Service Ports** branches of the device tree. Once the non-present device instances have been removed, new hardware can be installed or old hardware moved to a new location.