Installing SCPI Device Drivers

Installation Note

Important

If you are using Windows®* and an external PC, we recommend that you use Agilent VIC to install drivers. Agilent VIC is a Windows 3.1 VXI hardware installation program. The program helps you configure and install VXI instruments and can also download MS-DOS®*-formatted instrument drivers. Using Agilent VIC to download drivers is easier and faster than using the procedures described in this installation note. Agilent VIC downloads drivers during the configuration process and stores a copy of the driver in the C:\VIC\DRIVERS directory the FIRST TIME the instrument is configured. If you are updating an already installed driver, the new driver can be downloaded using Agilent VIC's Driver Download utility. Instructions for using Agilent VIC and its Driver Download utility are contained in the software's online help. Agilent VIC ships with the Agilent E1306/E1406 Command Modules and the Agilent E1300/E1301 mainframes.

**Windows® and MS-DOS® are U.S. registered trademarks of Microsoft Corporation.*

Agilent Technologies

Copyright© Agilent Technologies, Inc., 1996 - 2006

Manual Part Number: E1401-90022
Printed in Malaysia E0506

AGILENT TECHNOLOGIES, INC. SOFTWARE LICENSE TERMS

ATTENTION: USE OF THE SOFTWARE IS SUBJECT TO THE LICENSE TERMS SET FORTH BELOW.

IF YOU DO NOT AGREE TO THESE LICENSE TERMS, THEN (A) DO NOT INSTALL OR USE THE SOFTWARE, AND (B) YOU MAY RETURN THE SOFTWARE FOR A FULL REFUND, OR, IF THE SOFTWARE IS SUPPLIED AS PART OF ANOTHER PRODUCT, YOU MAY RETURN THE ENTIRE PRODUCT FOR A FULL REFUND. NOTWITHSTANDING ANYTHING TO THE CONTRARY IN THIS NOTICE, INSTALLING OR OTHERWISE USING THE SOFTWARE INDICATES YOUR ACCEPTANCE OF THESE TERMS.

AGILENT SOFTWARE LICENSE TERMS

Software. "Software" means one or more computer programs in object code format, whether stand-alone or bundled with other products, and related documentation.

License Grant. Agilent grants you a non-exclusive license to use one copy of the Software for internal purposes in accordance with these License Terms and the documentation provided with the Software. Such documentation may include license terms provided by Agilent's third party suppliers, which will apply to the use of the Software and take precedence over these License Terms. In the absence of documentation specifying the applicable license, you may use one copy of the Software on one machine or instrument. If the software is licensed for concurrent or network use, you may not allow more than the maximum number of authorized users to access and use the software concurrently.

License Restrictions. You may make copies or adaptations of the Software only for archival purposes or only when copying or adaptation is an essential step in the authorized use of the Software. You must reproduce all copyright notices in the original Software on all permitted copies or adaptations. You may not copy the Software onto any public or distributed network.

Upgrades. This license does not entitle you to receive upgrades, updates or technical support. Such services may be purchased separately.

Ownership. The Software and all copies thereof are owned and copyrighted by Agilent or its third party suppliers. Agilent and its third party suppliers retain all right, title and interest in the Software. Agilent's third party suppliers may protect their rights in the Software in the event of any violation of these License Terms.

No Disassembly. You may not disassemble or otherwise modify the Software without written authorization from Agilent, except as permitted by law. Upon request, you will provide Agilent with reasonably detailed information regarding any permitted disassembly or modification.

High Risk Activities. The Software is not specifically designed, manufactured or intended for use in the planning, construction, maintenance or direct operation of a nuclear facility, nor for use in on line control or fail safe operation of aircraft navigation, control or communication systems, weapon systems or direct life support systems.

Transfer. You may transfer the license granted to you here provided that you deliver all copies of the Software to the transferee along with these License Terms and pay any applicable fees to the extent permissible under local laws. The transferee must accept these License Terms as a condition to any transfer. Your license to use the Software will terminate upon transfer.

Termination. Agilent may terminate your license upon notice for breach of these License Terms. Upon termination, you must immediately destroy all copies of the Software.

Export Requirements. If you export, re-export or import Software, technology or technical data licensed hereunder, you assume responsibility for complying with applicable laws and regulations and for obtaining required export and import authorizations. Agilent may terminate this license immediately if you are in violation of any applicable laws or regulations.

U.S. Government Restricted Rights. Software and technical data rights granted to the federal government include only those rights customarily provided to end user customers. Agilent provides this customary commercial license in Software and technical data pursuant to FAR 12.211 (Technical Data) and 12.212 (Computer Software) and, for the Department of Defense, DFARS 252.227-7015 (Technical Data - Commercial Items) and DFARS 227.7202-3 (Rights in Commercial Computer Software or Computer Software Documentation).

Table of Contents

Getting Started 5
Device Driver Installation Kit Contents 5
Special E1406 Capabilities 6
Driver RAM Configuration 7

Setting System Configuration 8
Default Configuration 8
Editing the Configuration File 8

Standard Device Driver Installation 10
Installing from a BASIC (programming language) System 10
System Setup 10
Procedure 11
Installing Device Drivers from MS-DOS 11
System Setup 11
Procedure 11
Installing from IBASIC 12
System Setup 12
Procedure 12

Manual Device Driver Installation 13
Installing Over GPIB 13
System Setup 13
Procedure 13
Installing Over RS-232 14
Transmission Format 14
Pacing the Data 14
Procedure 15
Transferring Device Drivers Using a COPY Command 16
Transferring Device Drivers Using a CAT Command 16
Transferring Device Drivers Using Custom Software 17

Installing SCPI Device Drivers

Getting Started

This note describes how to install SCPI device drivers into these products:

- Agilent E1300/1301 B-Size Mainframe (with built-in Command Module)
- Agilent E1306 B-Size Command Module
- Agilent E1405A/B C-Size Command Module
- Agilent E1406A C-Size Command Module

Table 1 shows installation combinations supported by the programs provided with the device drivers:

Table 1. Supported Automatic Installations

Installations	E1300/ E1301	E1306	E1405	E1406
BASIC to Driver RAM over GPIB	**X**	X	**X**	**X**
BASIC to Flash ROM over GPIB				**X**
MS-DOS to Driver RAM over RS-232	**X**	X	**X**	**X**
MS-DOS to Flash ROM over RS-232				**X**
IBASIC to Driver RAM over GPIB	**X**		**X**	**X**

The *Manual Device Driver Installation* section of this manual also provides basic instructions in case you cannot use any of the installation programs provided.

Throughout this note, the term "Command Module" indicates the E1306, E1405A/B and E1406 Command Modules and the built-in Command Module in the Agilent E1300/E1301 Mainframe. Specific Command Module or Mainframe model numbers will be used only when there is reason to distinguish between models.

Device Driver Installation Kit Contents

The device driver files and installation software are:

- LIF format for installing over the GPIB (IEEE 488.2) interface.
- MS-DOS format for installing over an RS-232 interface.

Table 2. Installation Disk Contents

LIF Disk	MS-DOS Disk	Description
README	README	Additional information about this software
VXIDLD_CFG	VXIDLD.CFG	Configuration file.
VXIDLD_GET		Installation program for use from BASIC
AUTOST	AUTOST	Installation Program for use from IBASIC
	VXIDLD.EXE	Installation program for use from MS-DOS
	VXIDLD.BAS	QuickBasic version of MS-DOS installation program
*driver*_DU	*driver*.DU	Device driver software for installation over GPIB
*driver*_DC	*driver*.DC	Device driver software for installation over RS-232

NOTE: Some drivers may come with additional files specific to the drivers (e.g., example programs). Please see the User's Manual that came with the device driver for more details on these files.

Special E1406 Capabilities

If you have an Agilent E1406 Command Module, and have 256Kb or more of Flash ROM above the memory taken by your operating system, you can install device drivers into it by setting the "RUN/LOAD" switch on the front of the Command Module is set to "LOAD" (see Figure 1). Since this frees up memory that you can use for additional NRAM or RDISK, and the drivers installed here are not affected if you redefine memory parameters or cold boot the system, Flash ROM is the preferred location for installing drivers if you have an E1406 Command Module.

You can check to see if there is enough Flash ROM left to download your drivers by using the "DIAG:FROM:SIZE?" command while the "RUN/LOAD" switch on the front of the Agilent E1406 Command Module is set to "LOAD." Additional memory can be purchased from Agilent Technologies if required.

NOTE You must have an installation program with a revision of 1.33 or higher to access Flash ROM in the E1406 Command Module. If you have an older version you should contact Agilent Technologies about an upgrade.

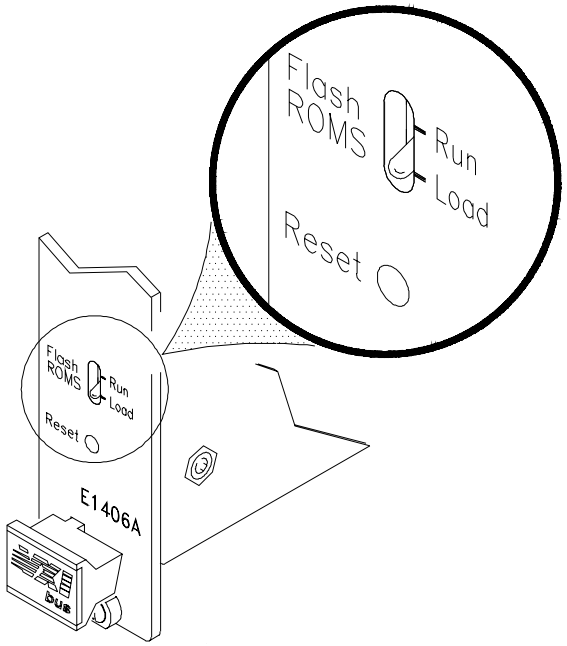


Figure 1. Switch Setting for Installing to Flash ROM

Installing drivers to Flash ROM does not affect drivers already installed in Driver RAM (DRAM). Redefining Driver RAM (DRAM), User Non-volatile RAM (NRAM), or RAM Disk (RDISK) does not affect drivers loaded into Flash ROM.

If you are installing drivers into Flash ROM, and if you also need to install a new or updated operating system, the installation programs can install the operating system and all device drivers to Flash ROM at the same time. To do this, you must have all of the required files in the same hard disk directory. Please see the Installation Note for your operating system update for more details on how to do this.

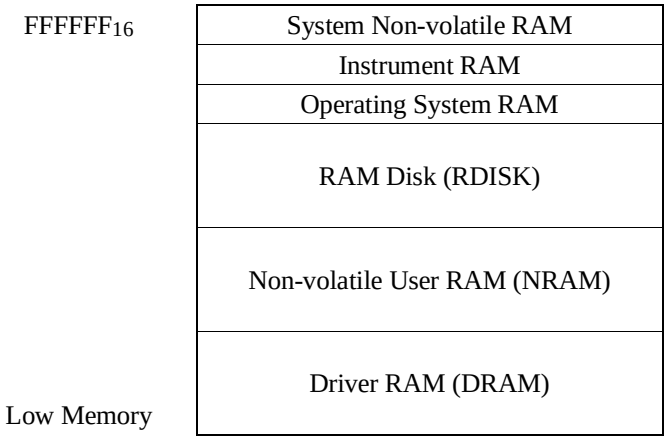
Driver RAM Configuration

Before attempting to install any device drivers into Driver RAM you should understand how memory is affected when you specify a size for one or more types of RAM. There are three types of memory that you can allocate:

- RAM disk (RDISK)
- Non-volatile User RAM (NRAM)
- Driver RAM (DRAM)

Figure 2 shows the positioning of the basic RAM memory areas. The first three memory areas are temporary memory to which the user has no access. The last three areas only exist if specified by the user. NRAM and RDISK both occupy higher memory addresses than the DRAM. Because the size of these areas is variable, they do not have a fixed starting position. At creation time, the lowest unused memory address becomes the starting address for the requested type of RAM. Memory areas set at higher addresses can be created without affecting previously created lower memory areas, but creating a new memory area removes any areas *above it*.

NOTE If you wish to use RDISK or NRAM, you can modify the configuration file so that the installation program sets up the required memory segments.



The Low Address is equal to the highest address plus 1 (1000000_{16}) minus the size of memory installed. The boot time messages will tell you how much RAM you have installed in your system. In an Agilent E1406 with 512Kbytes of memory the Low Address is *low address* = $1000000_{16} - 80000_{16} = F80000_{16}$, or 16,252,928 decimal.

Figure 2. Positioning of Allocatable RAM

Example *If you create a RAM Disk area without creating any User Non-volatile RAM or Driver RAM, the starting address for the RAM Disk will be at the lowest address ($F80000_{16}$ for a Command Module with 512Kbytes of memory). If you now create a Driver RAM area, the RAM Disk area will be removed since the new area has to be at a lower address then the RAM Disk area.*

Setting System Configuration

If you do not use the default configurations for installing device drivers, you will need to edit the appropriate configuration file to match your system configuration. If the default values shown are correct for your setup, you can go to the appropriate installation instructions.

Default Configuration

The configuration defaults for transferring over an RS-232 link are::

- The installation program searches for device drivers in the current directory.
- Execution Log is OFF (log to screen only).
- Device drivers in the current directory will be installed.
- COM1 is used for output.
- Baud rate is 9600.
- 1 stop bit is used

The configuration defaults for transferring over a GPIB (IEEE 488.2) link are:

- The installation program searches for device drivers in the current directory.
- Execution Log is OFF (log to screen only).
- Device drivers in the current directory will be installed.
- The interface address is 70900.

Editing the Configuration File

The configuration file (VXIDLD.CFG if you are using the MS-DOS disks or VXIDLD_CFG if you are using the LIF disks) on your device driver distribution disk is shipped with all entries commented out, and the installation programs use the default values listed. To activate or change an entry you must edit the file manually using a standard text editor or word processor, or a BASIC language editor. Comments and instructions are included in the file.

- The beginning of the useful information on each line is the part following "*line number* REM" (the "*line number* REM" is ignored).
- Lines that start with "##" are comments.
- Lines that start with "#" are example configuration statements that you may wish to activate and/or modify.
- Settings are not case sensitive, and should be separated from the associated value by an equal sign ("=").
- Unrecognized settings are ignored.
- If you activate more than one line for a setting that can take only one value, the first value found for the setting will be used.

Table 3. Configuration File Settings

Config. File Entry	Allowed Values	Default	Comments
DIRECTORY=	Valid Directory	Current Directory	Specifies the directory where you put the device drivers and where the installation program logs progress information. This directory must be writeable if you are installing using MS-DOS or IBASIC, or are logging progress.
EXECUTION LOG=	Valid file name	Screen	Specifies where to log progress information. If you specify a file name the installation program logs to the screen and the file.
PROGRAM FILE=	Valid program file names	Last set of program files found in current directory	Specifies the program file (part 1) to install. Please see the Installation Note for your operating system update for more details on this entry.
DRIVER FILE=	Valid driver file names	First 20 device driver files found in the current directory	Specifies the driver file to install. The default when installing over GPIB is all drivers which end in "DU". The default when installing over RS-232 is all drivers ending with "DC". You can have multiple driver file entries, each on a separate line.
ADDRESS=	Valid communications port address.	For GPIB = 70900 For RS-232 = 1	Specifies the I/O interface to use. The default address over GPIB is 70900. The default address when running over RS-232 is 1 (for COM1:).
BAUD=	300, 1200, 2400, 4800, 7200, or 9600	9600	Specifies the RS-232 interface baud rate for transmission. The default is 9600.
STOP BITS=	1 or 2	1	Specifies the number of RS-232 stop bits per byte.
NRAM=	0 to available RAM	0 bytes	Specifies the size in bytes of the NRAM area to set up. You can change this value without affecting DRAM , but changing it will delete any RAM disk that you have specified. The installation program will stop if it finds NRAM already allocated.
RDISK=	0 to available RAM	0 bytes	Specifies the size in bytes of the RAM disk to set up. You can change this value without affecting either DRAM or NRAM. The installation program will stop if it finds RAM Disk already allocated.
BEGINNING COMMAND=	Valid Command Module commands	none	Lets you send a command to the Command Module before the installation program checks the configuration. You can use multiple lines of this entry if necessary.
SETUP COMMAND=	Valid Command Module commands	none	Lets you send a command to the Command Module before the drivers have been downloaded and the system rebooted with the requested memory. You can use multiple lines of this entry.
CLEANUP COMMAND=	Valid Command Module commands	none	Lets you send a command to the Command Module after the drivers are installed.

A GPIB address has the form "sspp00" where **ss** is the select code of the GPIB interface card, **pp** is the primary GPIB address used for the Command Module, and **00** is the secondary GPIB address used for the Loader Instrument

The communication interface you will be using when running from DOS is the "RS-232" interface. When using an RS-232 interface, a serial cable must be connected to the built-in RS-232 connection of the Command Module or an RS-232 module (Agilent E1324A) that is set to interrupt at the default interrupt level (level 1). RS-232 addresses are 1 for COM1 or 2 for COM2:.

Standard Device Driver Installation

Installation programs are provided for the following operating systems/interfaces.

- Install from a BASIC system over GPIB.
- Install from an MS-DOS system over RS-232.
- Install from IBASIC over GPIB.

NOTE

Because the installation programs re-configure memory, you must download all of your device drivers at the same time. If you already have device drivers on your system and wish to add another driver, you must delete the existing drivers and reinstall them with the new driver.

If you start an installation program and it detects existing drivers, or detects memory allocations that it will destroy, it will issue a warning with appropriate instructions and abort.

These procedures assume that you are installing a single device driver. If you have multiple device drivers you should copy all of the installation and driver files to a single hard disk directory and run the installation program from that directory.

Installing from a BASIC System

This installation method requires you to have a system with BASIC 5.0 or later and a GPIB (IEEE 488.2) communications port.

System Setup

Set the "Sys Control/Talk Listen" switch on your Agilent E1300/E1301 Mainframe to "Talk/Listen" or the GPIB Controller switch on your Agilent E1405/E1406 Command Module to zero or OFF (no setup is required for the Agilent E1306 Command Module).

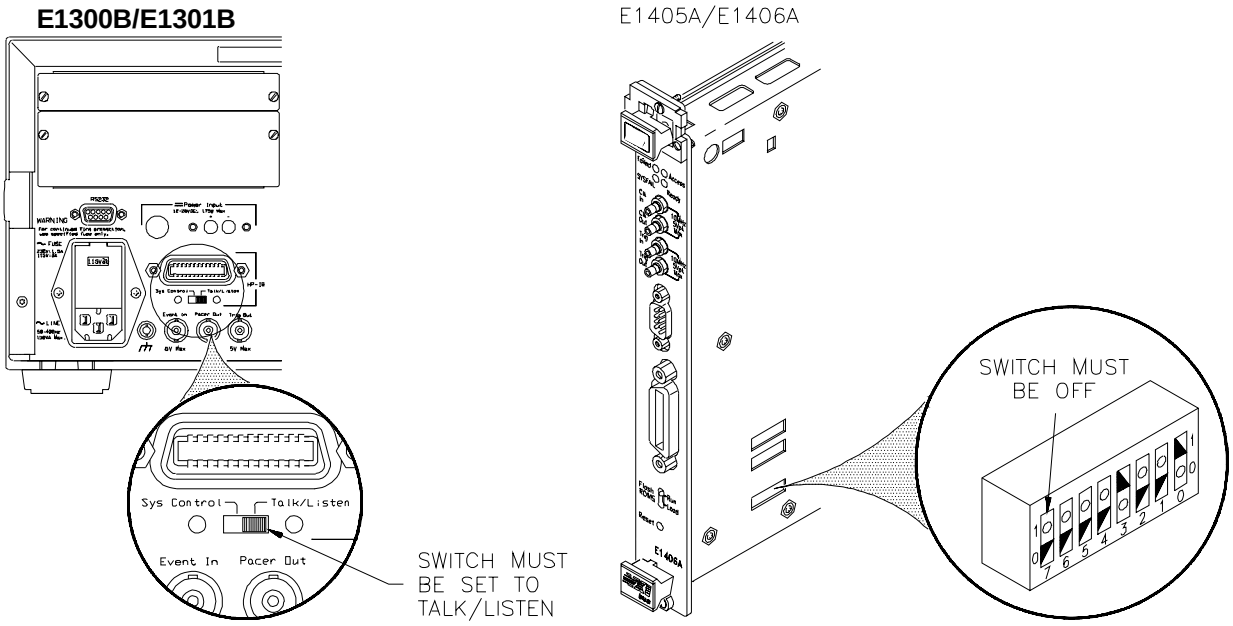


Figure 3. Setting GPIB Controller Mode OFF

Procedure

1. Put the LIF disk into your drive and make sure that this drive is your current drive.
2. Start BASIC and load the installation program (type ’GET "VXIDLD_GET"’ and press ENTER) and run the program (type "RUN" and press ENTER).
3. The installation program will create RAM partitions if required, reboot the system if required, and install the required device driver files from the disk into the Command Module.

   Errors encountered while installing will be reported and will cause the program to abort. You will get an error message with explanation, and in most cases a suggested solution.

Installing Device Drivers from MS-DOS

This installation procedure assumes that you have an MS-DOS computer for installing the device drivers, and will be communicating with the Command Module over an RS-232 link..

CAUTION

Terminate and Stay Resident programs in your MS-DOS system may cause errors in the installation. If you encounter errors indicating that the installation program did not receive back what it expected, and the new device drivers are not loaded, remove all of your TSRs from memory and try the installation procedure again.

System Setup

Make sure that the RS-232 port you are using is set for 9600 BAUD, 8 data bits, 1 stop bit, and parity check OFF before installing (these are the defaults for the Command Module after cold boot). The installation program handles its own pacing, so the setting for pacing does not matter.

Procedure

1. Put the MS-DOS disk into your disk drive and make sure that this drive is your current drive and is writeable.
2. Execute the installation program (type "VXIDLD" and press ENTER).
3. The installation program will create RAM partitions if required, reboot the system if required, and install the required device driver files from the disk into the Command Module.

   Errors encountered while installing will be reported and will cause the program to abort. You will get an error message with explanation, and in most cases a suggested solution.

Installing from IBASIC

This procedure assumes that you have the optional IBASIC installed in the Command Module, and that the disk drive that will contain your AUTOST program is at GPIB address 0 (zero). This procedure will not work correctly if your disk drive is at any other GPIB address.

NOTE If you wish to see the messages that the installation program generates, you need to have a terminal connected to the IBASIC display port, and you must press the IBASIC function key once IBASIC has loaded.

System Setup

Set the "Sys Control/Talk Listen" switch on your Agilent E1300/E1301 Mainframe to "Sys Control" or the GPIB Controller switch on your Agilent E1405/E1406 Command Module to 1 or ON.

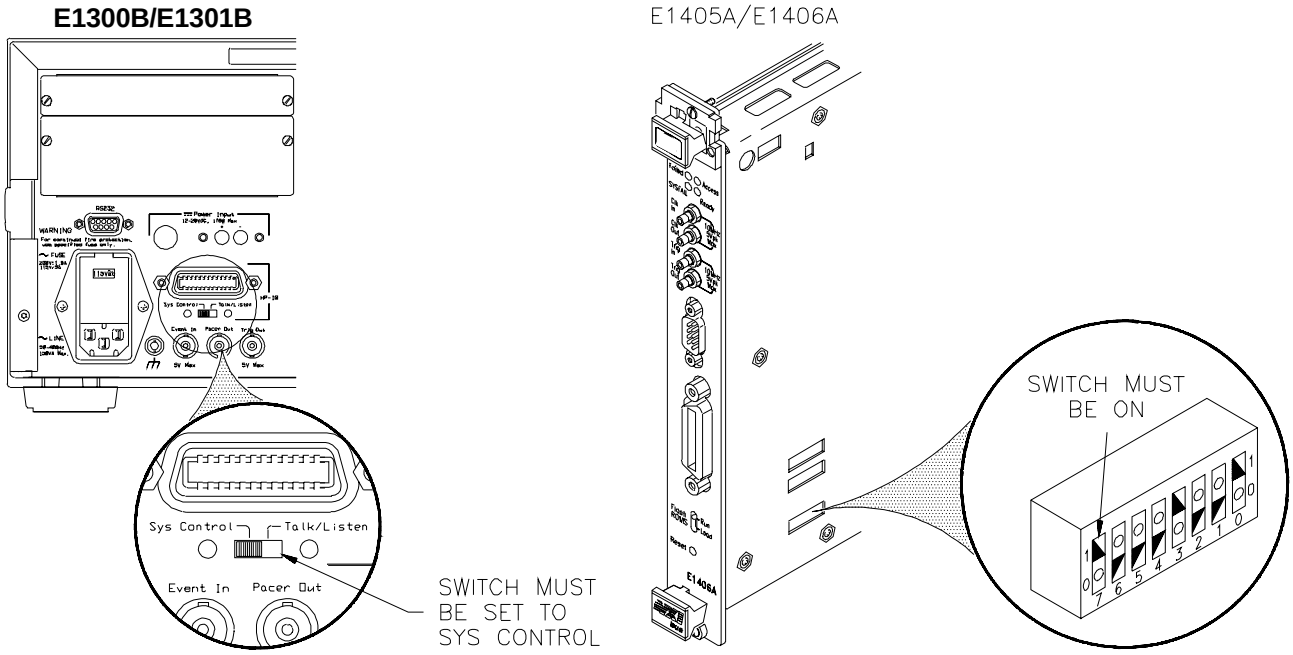


Figure 4. Setting GPIB Controller Mode ON

Procedure

1. Put the LIF disk or the MS-DOS disk into your disk drive and make sure that this drive is your current drive and is writeable.
2. Turn the mainframe OFF and then ON again. Once IBASIC has loaded, press the IBASIC function key so that you can watch progress.
3. The installation program will create RAM partitions if required, reboot the system if required, and install the required device driver files from the disk into the Command Module.

   Errors encountered while installing will be reported and will cause the program to abort. You will get an error message with explanation, and in most cases a suggested solution.

Manual Device Driver Installation

If you cannot use one of the supplied installation programs you will need to install the device drivers manually. Manually downloading device drivers is fairly straightforward because all drivers supplied by Agilent Technologies are formatted so they can be transferred directly into Command Module memory.

Installing Over GPIB

The driver files (*driver*_DU) must be on media that is accessible to the computer that will control the installation.

System Setup

Set the "Sys Control/Talk Listen" switch on your Agilent E1300/E1301 Mainframe to "Talk Listen" or the GPIB Controller switch on your Agilent E1405/E1406 Command Module to zero or OFF (see Figure 3). No specific setup is necessary for the Agilent E1306 Command Module.

Procedure

On most computers, a program will be required for the actual installation process. Since driver files contain the command to start the installation plus the data to transfer, this program just needs to set up the appropriate memory area and transfer the driver files into it.

1. Send a *RST command and a *CLS command to the Command Module to put it in a known state before beginning your installation.
2. Use the DIAG:DRAM commands to create the driver memory area if you are installing into Driver RAM, or the DIAG:FROM commands if you are installing into Flash ROM. If you are installing to Driver RAM and wish to allocate NRAM or RDISK you should issue the appropriate commands at this time.
3. If you are installing to Driver RAM, issue a DIAG:BOOT command to reboot the Command Module and allocate the specified memory.
4. Transfer the device driver file to the Command Module. This file contains the appropriate commands to accomplish the installation.
5. Send the SCPI query SYST:ERR? to make sure that there were no errors during the installation.
6. Reboot your system if you installed to DRAM (send DIAG:BOOT), or send the DIAG:DRIV:INST command and switch the "RUN/LOAD" switch to the "RUN" position if you installed to Flash ROM.
7. Check to make sure that your drivers have been loaded into memory by sending the SCPI command DIAG:DRIV:LIST:RAM? or DIAG:DRIV:LIST:FROM? once you are in "RUN" mode.

Installing Over RS-232

Although similar in concept to manual installation over GPIB, manual installation over RS-232 is complicated by the lack of built in pacing. The driver files (*driver*.DC) must be on media that is accessible to the computer that will control the installation.

Transmission Format

You need to make sure that the transmission format of your computer matches the format used in the Command Module. The default configuration for the Command Module after a DIAG:BOOT:COLD command has been issued is

- 9600 BAUD
- 8 data bits
- 1 stop bit
- Parity checking is OFF
- XON/XOFF pacing

If you are going to use any other setting, you must set up the appropriate settings in the Command Module using the following commands:

COMM:SER[*n*]:REC:BAUD <*rate*>	*sets BAUD rate*
COMM:SER[*n*]:REC:SBITS <*bits*>	*sets number of stop bits*
DIAG:COMM:SER[*n*]:STOR	*saves settings so they will be kept through a reboot.*

NOTE Because the formatting for binary files uses 8 data bits, you must set the number of data bits to 8 and parity checking OFF for the device driver files to transfer properly.

Pacing the Data

Since the RS-232 interface is asynchronous, the computer that is doing the transfer can overrun the Command Module, causing part of the device driver to be lost. To prevent this from happening, you must enable a handshake protocol.

The default for the Command Module is software handshake enabled and hardware handshake disabled. To set up software handshake, use:

SYST:COMM:SER:PACE:THR:STOP? MAX

to find the maximum number of characters to fill the input buffer.

SYST:COMM:SER:PACE:THR:STOP <*max-20*>

to set the threshold for stopping data to the maximum size of the input buffer minus 20 characters.

SYST:COMM:SER:PACE:THR:STAR 0

to set the start buffer level to zero. This makes sure that the input buffer is flushed whenever transmissions are stopped.

SYST:COMM:SER:PACE:XON

to enable the software handshake protocol.

The start threshold must be less than the stop threshold. The stop threshold must be set low enough to handle the maximum number of characters that are likely to be received at the Command Module after it sends the XOFF signal.

Hardware handshake can be set to use DTR (Data Terminal Ready) or RTS (Ready to Send). Use SYST:COMM:SER:CONT:DTR IBFULL to set DTR mode or

SYST:COMM:SER:CONT:RTS IBFULL to set RTS mode. Use SYST:COMM:SER:PACE NONE to set software handshake OFF. When the Command Module input buffer is not full, the specified hardware line is asserted. When either hardware handshake mode is enabled the Command Module will not transmit characters when either the CTS (Clear to Send) or the DSR (Data Set Ready) lines are not asserted.

NOTE The Command Module RS-232 interface is implemented as DTE (Data Terminating Equipment). Since most computer RS-232 interfaces are also implemented as DTE, you will need a null modem cable (which swaps the receive and transmit lines) to connect the computer to the Command Module.

CAUTION The Command Module RS-232 interface echoes any characters received with an ASCII value greater than 32 and less than 128. Carriage returns are echoed as carriage return/linefeed. These echoes can fill up the RS-232 receive buffer of your computer if they are not read, and cause the computer to send the "Stop Transmitting" signal to the Command Module, which could block the remaining transmitted bytes or other commands sent after the installation.

Since the device driver files contain command strings and many carriage returns that will be echoed, your program should read the returning echo characters. This will also let you see if there are any error messages being returned.

Procedure

On most computers, a program will be required for the actual installation process. Since the driver files contain the command to start the installation plus the actual data to transfer, this program just needs to set up the appropriate memory area and transfer the driver files into it.

1. Send a *RST command and a *CLS command to the Command Module to put it in a known state before beginning your installation.
2. Use the DIAG:DRAM commands to create the memory area if you are installing into Driver RAM, or the DIAG:FROM commands if you are installing into Flash ROM. If you are installing to Driver RAM and wish to allocate NRAM or RDISK you should issue the appropriate commands at this time.
3. If you are installing to Driver RAM, issue a DIAG:BOOT command to reboot the Command Module and allocate the specified memory.
4. Transfer the device driver file to the Command Module. This file contains the appropriate commands to accomplish the installation.
5. Send the SCPI query SYST:ERR? to make sure that there were no errors during the installation.
6. Reboot your system if you installed to DRAM (send DIAG:BOOT), or send the DIAG:DRIV:INST command and switch the "RUN/LOAD" switch to the "RUN" position if you installed to Flash ROM.

7. Check to make sure that your drivers have been loaded into memory by sending the SCPI command DIAG:DRIV:LIST:RAM? or DIAG:DRIV:LIST:FROM? once you are in "RUN" mode.

Transferring Device Drivers Using a COPY Command

On some computers it is possible to use an RS-232 port and the copy command to transfer the device driver files. Hardware or software handshake must be used by the copy command on the computer doing the installing, and the same handshake mode must be enabled on the Command Module.

1. Set the required handshake mode and data format (e.g., on DOS systems use the MODE command).
2. Type "COPY *filename port*" to transfer the file through the RS-232 port to the Loader Instrument (e.g., on a DOS system you might use "COPY B:\ *filename*.DC COM1:"). This command may be slightly different depending on the type of computer being used.

NOTE Since errors are echoed immediately, this method of transfer has no means of trapping errors.

Transferring Device Drivers Using a CAT Command

On HP-UX systems you can use the *cat* command to transfer the device driver files. The appropriate Unix® device file must exist. All shell commands are assumed to be executed from either the /bin/sh or /bin/ksh shell.

1. Start a process that opens the Unix device file to be used. This process should keep the device file open long enough for the transfer to begin. This step is done so that the following command to set the device file configurations will remain in effect for the transfer. A command that will do this is:

   (cat < *device file* > /dev/null; sleep 1000) &

NOTE To check for errors you can substitute a real file name for "/dev/null" in the above statement. This file will contain the output of the System/Loader Instrument which would include any errors reported.

---

2. Set the required configuration of the Unix device file using the *stty* command The following command will set the device file to work with the default Command Module configuration.

   stty -opost 9600 ixon -ixoff cs8 -cstopb ignpar < *device file*

3. Transfer the file to the Command Module with the *cat* command.

   cat *filename* > *device file*

Transferring Device Drivers Using Custom Software

If the COPY command on your computer cannot directly implement handshaking, or if you wish to trap errors and abort or otherwise modify the transmission process, you must use a program to handle the installation.

This procedure assumes that your computer has some means of looking at data being echoed from the Command Module, and can check for a return character without having to have a character returned. Since the actual operating system program file bytes sent over the RS-232 interface are not echoed, the lack of ability to do this would put the system into an infinite wait at the first byte that was not echoed.

1. Set up the appropriate handshake mode and data format on your system, and the matching handshake mode in the System Instrument.
2. Transfer the device driver files over the RS-232 interface using a program that follows the outline in Figure 5.

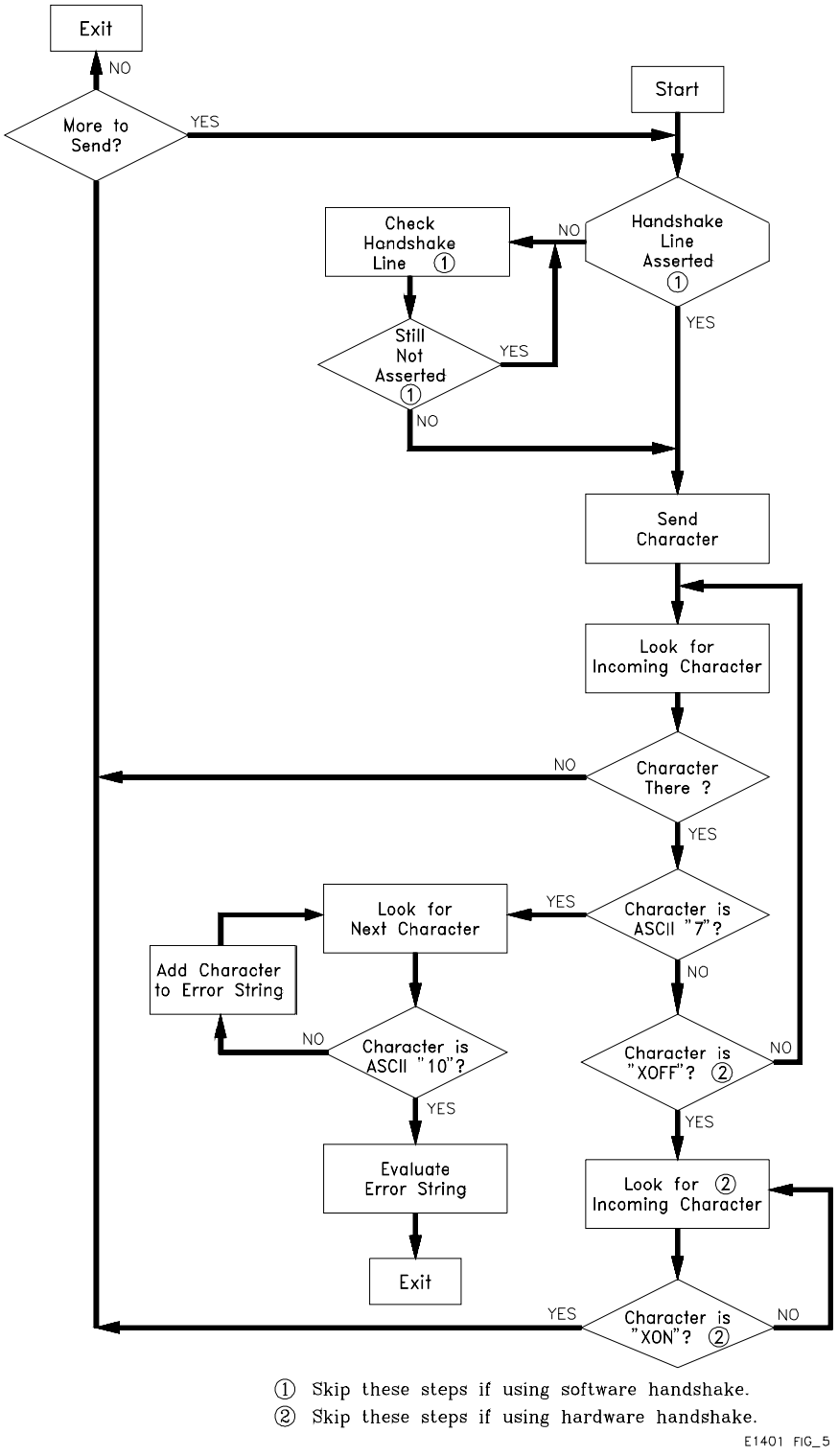


Figure 5. Manually Installing a Device Driver