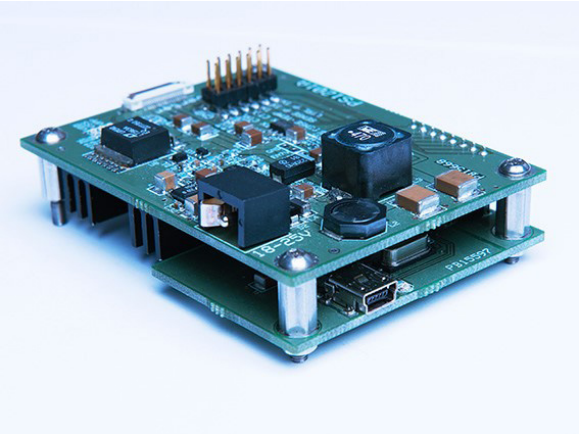
CO1211A/00
Converter Control/Power



Description

The CO1211A/00 is an integrated power supply and controller for Sivers IMA mm-wave converters. It provides proper biasing and allows for control of converter functions using a PC, over a USB connection.

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CO1211A/00
Converter Control/Power

Compatibility

E-band converters

FC1002E/00
FC1002E/01
FC1002E/02
FC1002E/03

E-band converters with LO

FC1003E/00
FC1003E/01
FC1003E/02
FC1003E/02

V-band converters

FC1003V/01

V-band converters with LO

FC1005V/00

Interfaces

• 24V DC, 1 Amp max, compatible with power supply plugs NES/J 21, NES/J 21 W, NES/J 210, XNES/J 21020 pin ZIF connector
• 12 pin jumper block
• Mini-B USB jack
• LED indicators

Power Requirements

24V DC, 1 amp, regulated power

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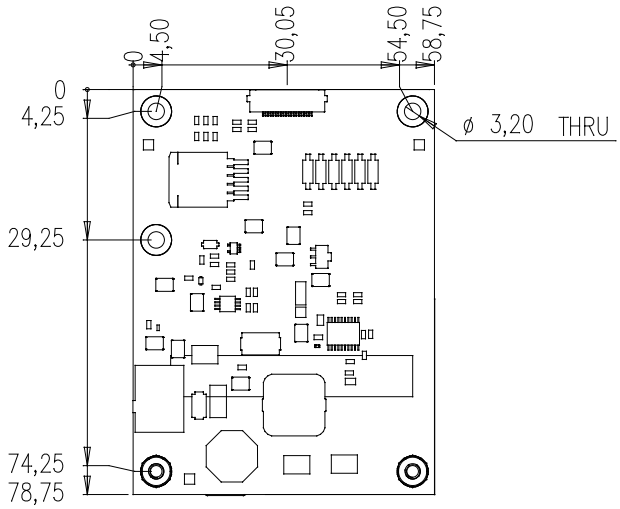
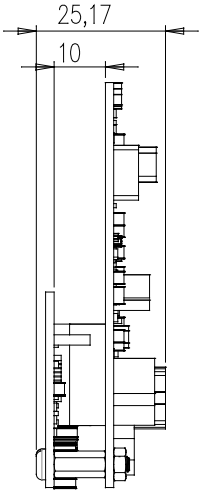
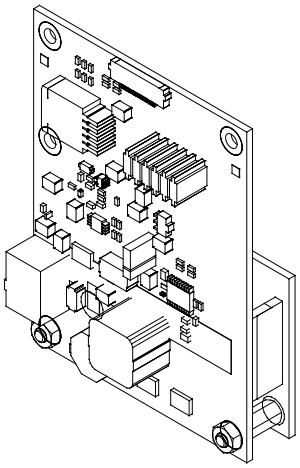
CO1211A/00
Converter Control/Power

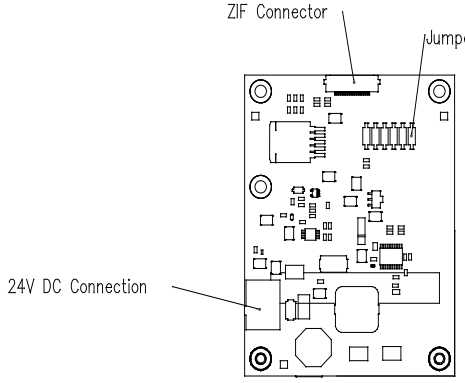
Dimensions

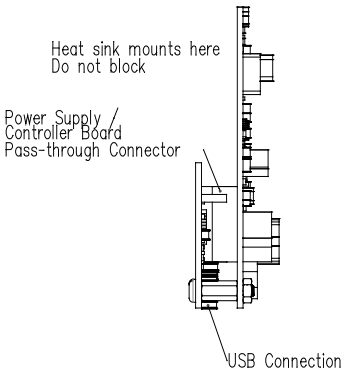


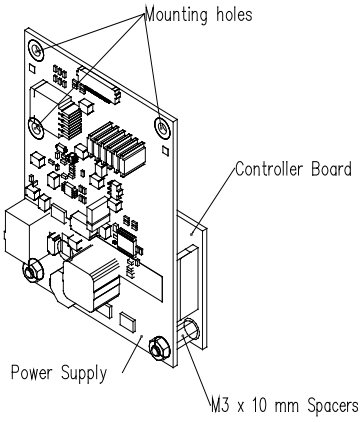




Features / Interfaces







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Power Supply Operating Instructions (Units without I2C interface)

Units without I2C interface (FC1002E/00, FC1002E/01, FC1003V/01)

Powering up:

Begin with power supply disconnected from AC adapter or lab power supply.

Connect waveguide port to antenna, instrument or other waveguide device.

Connect IF and LO to instrument, modem, or LO as required using SMA connectors on converter. Termination of unused ports is recommended.

Connect power supply to converter using supplied ribbon cable by inserting into ZIF connectors on converter and on power supply and closing ZIF connector latch.

Select mode of operation by installing jumper in correct location on jumper block.

No pins connected - both TX and RX off

TX-CTRL pins connected - TX on, RX off

RX-CTRL pins connected - RX on, TX off
Both pins connected - RX on, TX on

Connect AC adapter or lab power supply and power on. Converter is now operational.

Powering down:

Reverse sequence above.

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Power Supply Operating Instructions (Units with I2C interface)

Units with I2C interface (FC1002E/02, FC1002E/03, FC1003E/00, FC1003E/01, FC1003E/02, FC1003E/03, FC1005V/00)

Special note: Units listed above must be used with CO1211A converter control / power supply card; PS1201A power supply is integrated into this unit.

Powering up:

Begin with power supply disconnected from AC adapter or lab power supply.

Connect waveguide port to antenna, instrument or other waveguide device.

Connect IF and LO to instrument, modem, or LO as required using SMA connectors on converter. Termination of unused ports is recommended.

Connect combo card to converter using supplied ribbon cable by inserting into ZIF connectors on converter and on power supply and closing ZIF connector latch.

Ensure that no jumper pins are connected on jumper block.

Connect USB cable to control card and PC.

Connect AC adapter or lab power supply and power on. Converter is now operational.

Converter TX and RX power may be controlled using terminal program.

Powering down:

Reverse sequence above.

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Controller Board Usage(Units with internal LO and/or I2C interface)

Overview

The converter control board is used to interface the 20-pin bias and control port of Sivers IMA frequency converter units with on-board synthesizers, or stand-alone synthesizer units. An example of a setup is shown in the picture below.

The 20-pin flat cable carries bias supply voltages (VDD, VSS, VPP) and control signals (I2C bus) to the converter unit.

The control board circuitry is powered by the USB bus. Its only purpose is to transfer commands between the I2C bus and the USB bus. If converter unit is to be tested without using the I2C interface, the USB may be left unconnected.

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Controller Board Usage (Units with internal LO and/or I2C interface)

Command reference

Command		Converter firmware revision
Control board generic commands		
VERSion?		n/a
SLAVe?, SLAVe		n/a
LOWLevel:	STARt	n/a
	STOP	n/a
	WRITe	n/a
	READ	n/a
Converter control		
CONVerter:	STORe	A, B, C
	RESTore	A, B, C
	RXON?, RXON	A, B, C
	TXON?, TXON	A, B, C
	TXPSetting?, TXPSetting	B, C
	ADDRess	A, B, C
	ADSTore	A, B, C
	FLUSh	A, B, C
	VERSion?	A, B, C
Synthesizer control		
SYNThesizer:	STORe	A, B, C
	RESTore	A, B, C
	RXON?, RXON	C
	TXON?, TXON	C
	RXFR?, RXFR	A, B, C
	TXFR?, TXFR	A, B, C
	REFErence, REFErence?	B, C

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Controller Board Usage (Units with internal LO and/or I2C interface)

Command syntax

Commands adhere to a SCPI-like syntax;

- Command line must begin with the first four characters of the primary command
- First occurrence of delimiter ':' must be followed by the first four characters of the secondary command
- First occurrence of delimiter ' ' must be followed by input argument(s), if any. Syntax of input arguments depends on primary and secondary commands
- Delimiter '?' defines request commands, and terminates command line. Bytes following '?' are ignored
- Commands are case-insensitive

Command descriptions

VERSion?

Command returns version of control board firmware. Not to be confused with the version of the converter unit firmware (as returned by CONVerter:VERSion?).

SLAVe

Command sets I2C address of target slave device (i.e. the converter unit). The control board sends all commands towards this address. Not to be confused with CONVerter:ADDRess which sets the address setting of the connected converter unit.

Example:

SLAVE 08 Sets target address to 0x08

For normal operation the target address must agree with the address setting of the connected converter unit.

SLAVe?

Returns the I2C address of target slave device.

LOWLevel:STARt, LOWLevel:STOP, LOWLevel:WRITe, LOWLevel:READ

Commands for low-level access to I2C bus. Not used for normal operation.

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CONVerter:STORe

Command stores currently set converter settings to EEPROM internal on converter unit. Specifically, RX/TX bias states and TX power setting are stored. Settings stored in EEPROM are automatically loaded on startup.

For instance, if CONV:STOR is executed when the RX/TX bias states are ON; both states will reset to ON on start-up.

CONVerter:RESTore

Command restores converter settings from EEPROM on converter unit.

CONVerter: RXON, CONVerter:TXON

Commands set converter RX/TX bias state on/off.

Example:

CONV:RXON ON

Sets RX converter bias on

CONV:TXON OFF

Sets TX converter bias off

CONVerter:RXON?, CONVerter:TXON?

Commands return converter RX/TX bias state on/off.

CONVerter:TXPSetting

Command sets TX power setting (0x00-0xFF). Nominal setting of 0x00 corresponds to maximum TX gain, while setting 0xFF corresponds to minimum TX gain.

CONVerter:TXPSetting?

Commands returns TX power setting (0x00-0xFF).

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CONVerter:ADDRess

Command sets the I2C address setting of the converter unit. For instance,

CONV:ADDR 0A

Will set the converter unit address to 0x0A momentarily. The converter will subsequently only answer when addressed with new setting. The new setting is however not stored to the EEPROM so a reset will revert the change. Hence if the address is changed inadvertently (possibly to an unknown setting), a reset will recover the converter unit.

CONVerter:ADSTore

Command stores currently set I2C address to the EEPROM internal on converter unit. Address setting stored in EEPROM is automatically loaded on start-up

CONVerter:FLUSh

Command to flush the I2C input buffer of the converter unit.

CONVerter:VERSion?

Command returns version of converter unit firmware. Not to be confused with the version of the control board firmware (as returned by VERSion?).

SYNThesizers:STORe

Command stores currently set synthesizer settings to EEPROM internal on converter unit. This includes RX/TX LO frequencies, selection of reference source, and other synthesizer settings. Settings stored in EEPROM are automatically loaded on startup.

SYNThesizers:RESTore

Command restores synthesizer settings from EEPROM on converter unit.

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SYNThesizers: RXON, SYNThesizers:TXON

Commands set synthesizer RX/TX bias state on/off.

Example:

SYNT:RXON ON	Sets RX synthesizer bias on
SYNT:TXON OFF	Sets TX synthesizer bias off

SYNThesizers:RXON?, SYNThesizers:TXON?

Commands return synthesizer RX/TX bias state on/off.

SYNThesizers:RXFRequency, SYNThesizers:TXFRequency

Commands set synthesizer RX/TX LO frequency setting. The setting is defined by number of frequency steps, *N*. Output frequency *f* relates to *N* as

$$f = N \times f_{step}$$

where the frequency step f_{step} is a hardware parameter. For instance, the FC1005V00 unit has a f_{step} =62500 Hz (equivalent to V-band frequency step of 4×62500 Hz = 0.25 MHz). A frequency of e.g. 14500 MHz thus corresponds to *N* = 232000 = 0x038A40.

The input argument to the SYNT:RXFR and SYNT:TXFR commands is *N* given as a three-byte hexadecimal number. E.g. the following command sets the TX LO frequency to 14500 MHz,

SYNT:TXFR 03 8A 40

Input bytes are separated by a single space.

SYNThesizers:RXFRequency?, SYNThesizers:TXFRequency?

Command returns synthesizer RX/TX LO frequency setting as number of frequency steps, *N*, given as a hexadecimal number. For instance, if

SYNT:RXFR?

returns *N* = 0x03A340 = 238400, and the frequency step is f_{step} =62500 Hz, the output frequency is *f* = 238400×62500 Hz = 14900 MHz.

SYNThesizers:REFErence

Command sets synthesizer reference source (10 MHz clock). Available options are INT (internal on-board clock), or EXT (external clock connected to REF). For instance,

SYNT:REFE EXT

sets reference source to external.

SYNThesizers:REFErence?

Command returns synthesizer reference source; INT when internal clock is enabled, EXT when external clock is used.

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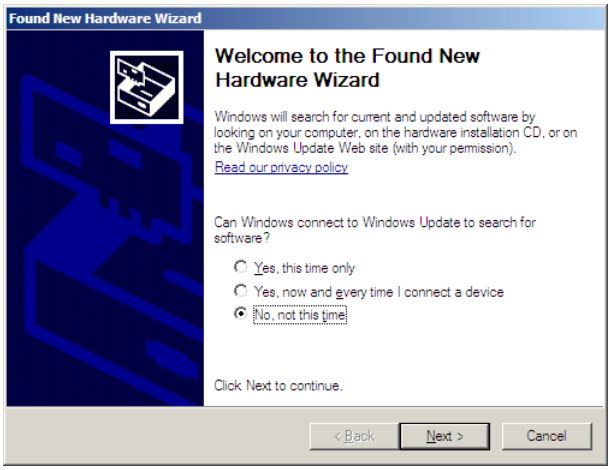
PC installation instructions

When the control board is connected to a pc for the first time its USB drivers must be installed as described below. Once the drivers are installed, the pc will recognize the control board automatically. The following walk-through applies for Windows XP although the procedure should be similar in other operating systems.

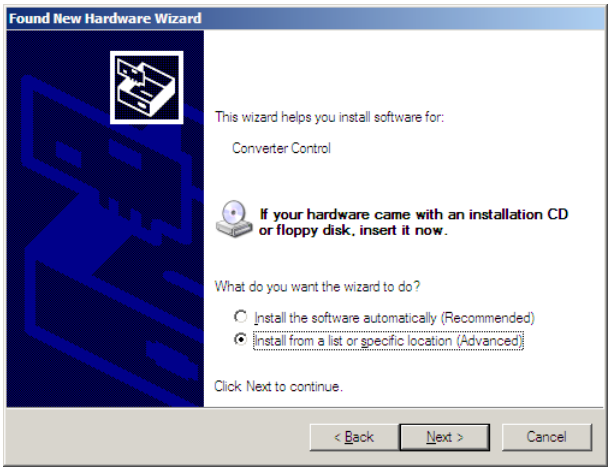
Connect the control board to the pc using a USB-cable. At this point, do not connect any other cables.
The operating system will discover the control board as an unidentified device, and ask whether it should search for appropriate software

Select “No, not this time”, and click “Next”



In the next dialog,

Select ”Install from a list or specific location (Advanced)”, and click “Next”



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In the next dialog,

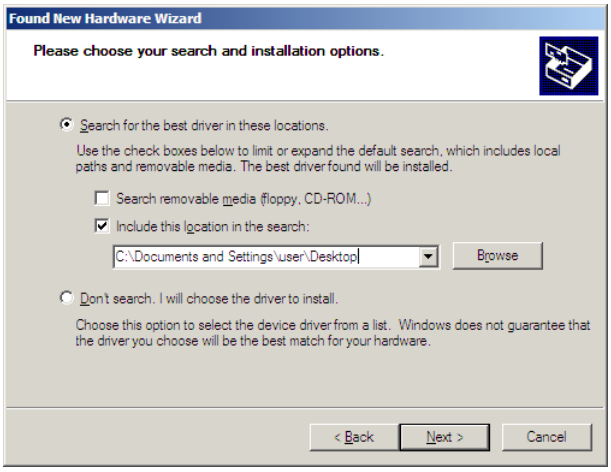
Select ”Search for the best driver in these locations”

Check “Include this location”

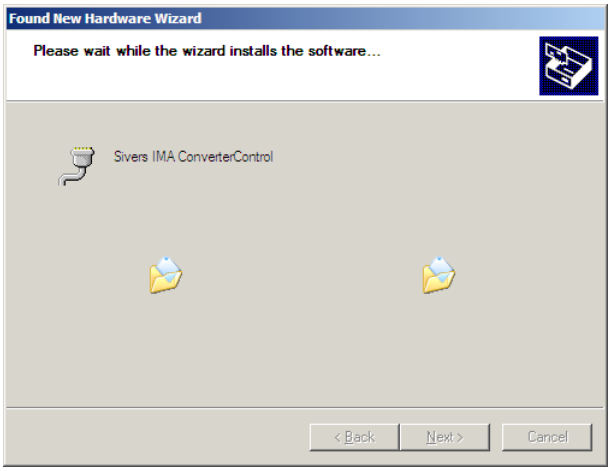
Browse location of the driver file ConverterControl.inf

The driver file ConverterControl.inf is provided by Sivers IMA and may be placed anywhere by user. It is only used during the installation process.

Click next

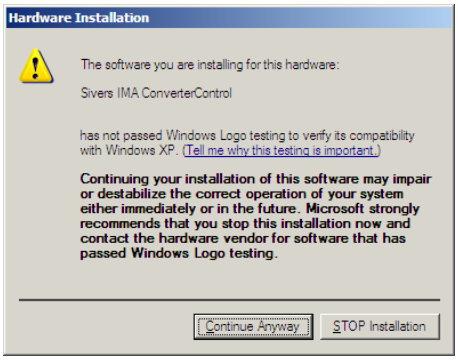


The driver will now be installed in the operating system.



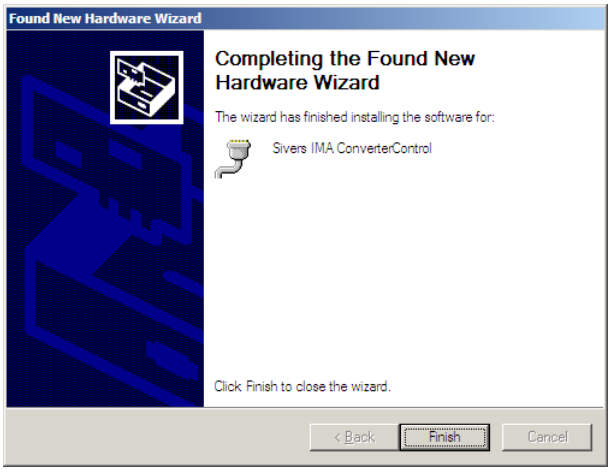
The driver is not verified by Microsoft and a warning may thus appear during the installation process. In that case,

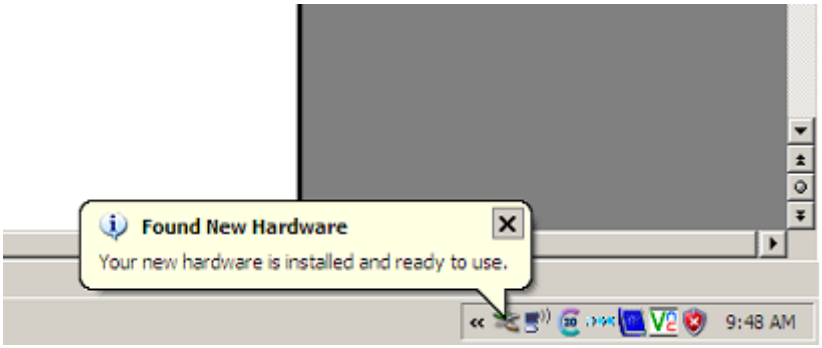
Click “Continue Anyway”



The installation is completed momentarily,

Click Finish





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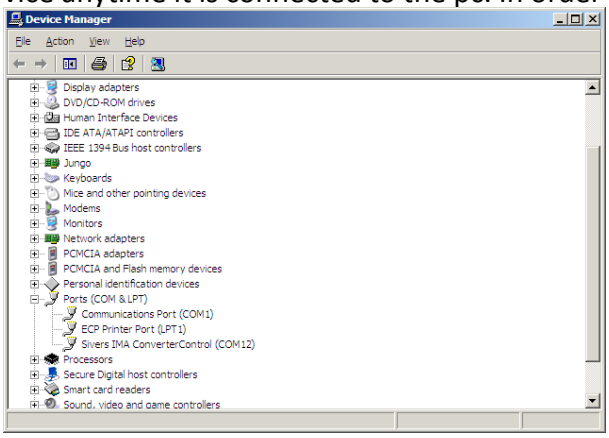
The installation process is done. From now on the control board will appear as a so-called virtual com-port device anytime it is connected to the pc. In order to verify this, one may consult the Windows Device Manager.



In the Device Manager the control board will appear as Sivers IMA ConverterControl under Ports when it is connected to the pc. It will disappear soon as it is disconnected.

Note the com-port number assigned to the control board by the operating system. In the example above it reads COM12, but actual number depends on operating system and hardware configuration.

Controlling the control board using a terminal program

The control board is accessible to any application program that can handle com-port devices. For initial testing it may be convenient simply to connect to it using a terminal program such as the Windows Hyperterminal (included by default in most Windows installations), or PuTTY (freely distributed under MIT license, can be downloaded here http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html).

The com-port device settings are

Bits per second	921600
Data bits	8
Parity	none
Stop bits	1
Flow control	none

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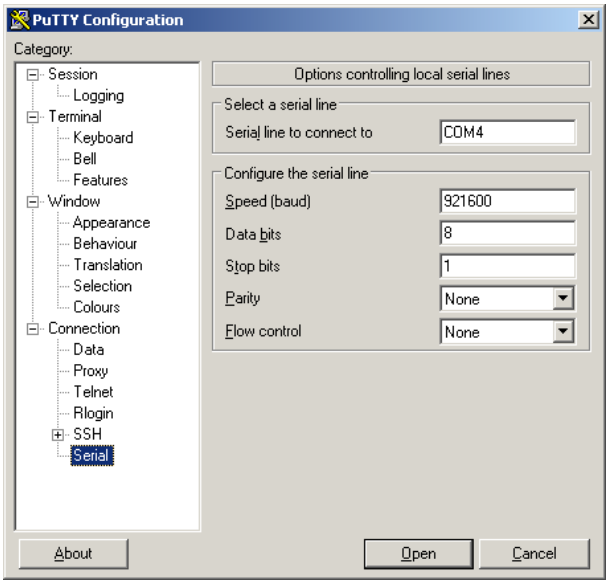
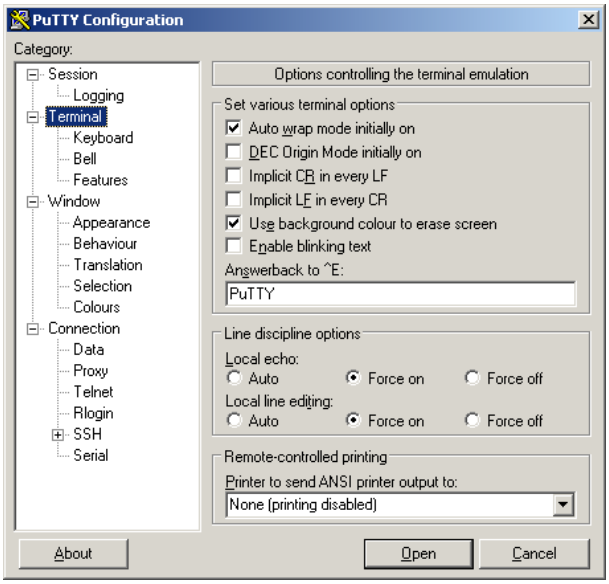
In PuTTY these settings are defined under the Connection > Serial category.



Terminal settings are defined as follows,



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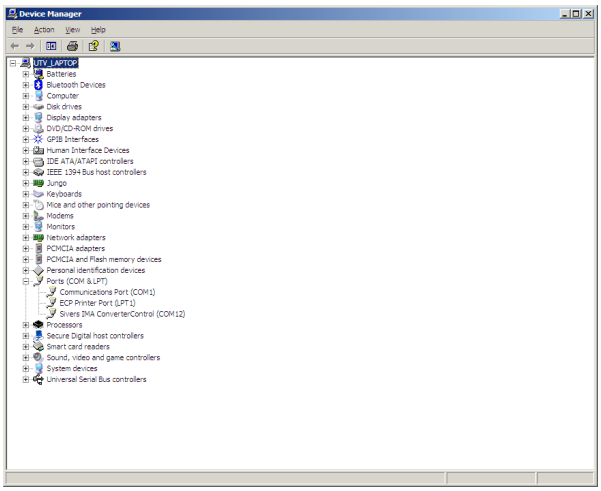
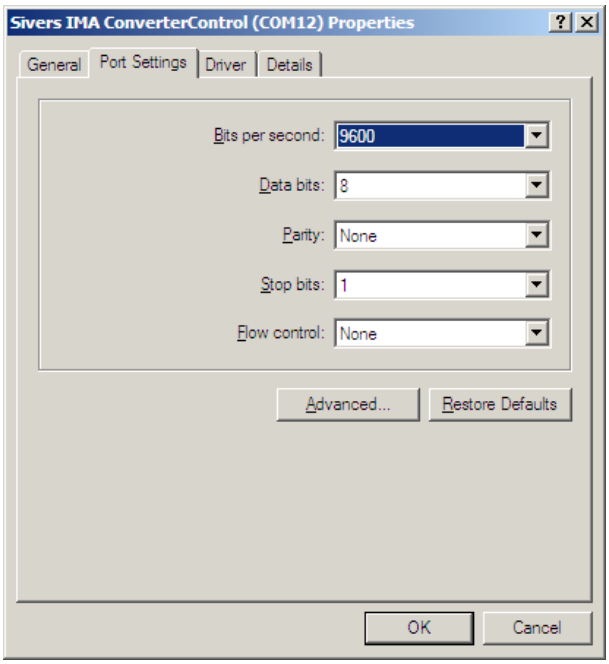
How to change com-port assignment

As described above, the operating system will automatically assign a com-port number to the control board soon as it is connected to the pc. The choice of number is beyond the control of the control board itself. If two control boards are connected to the same pc, each board will have its own number. Normally there is no reason to change the automatically assigned number, but it is possible if for some reason necessary.

In the example below, the Control board is assigned to COM12 as shown in the Device managers.



Double-click the control board, and select the Port Settings tab.



Then click Advanced, and select another com-port number.

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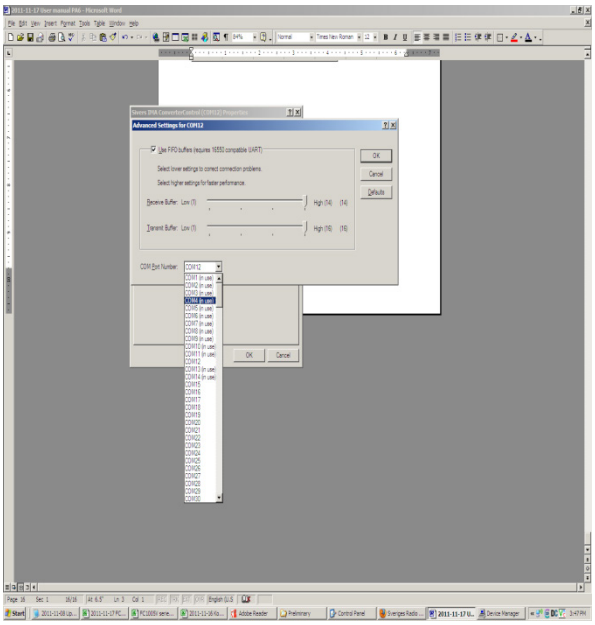
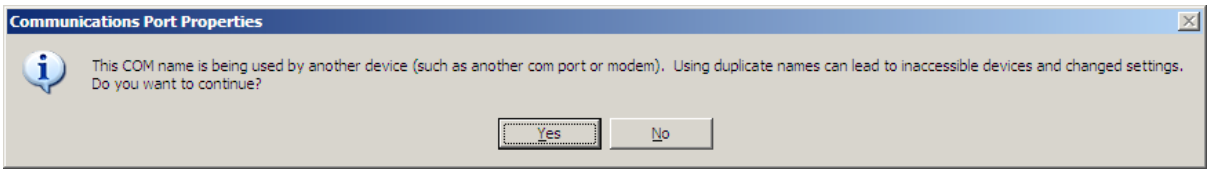
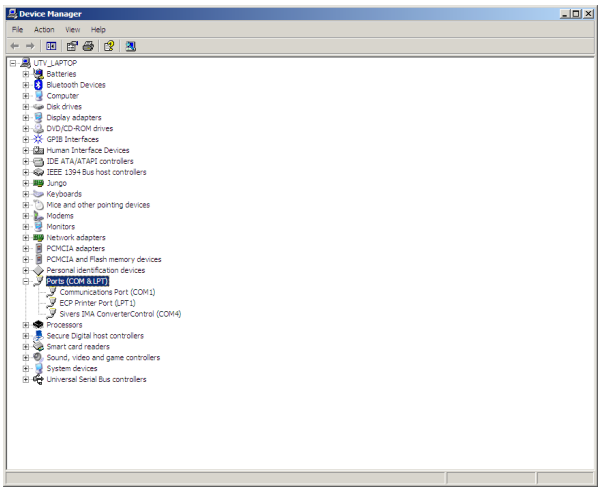


Normally several com-port numbers are marked “in use” (because other devices have previously been assigned to those particular numbers). This may be ignored (by users discretion),



In the Device manager, select Action > Scan for hardware changes.



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