

Connection Speed Comparison for **SIGNAL RECOVERY** Lock-in Amplifiers

Background

There are several different methods of connecting **SIGNAL RECOVERY** instruments to a computer to allow remote operation and recording of data. The speed of data transfer that is achievable depends on a number of factors, such as the programming language and complexity of the program being used on the PC, the operating system, and the type of data being transferred. Nevertheless it is possible to measure the performance of some typical configurations, and this document describes these measurements.

Measurement Method & Results

The speed tests were carried out using a Dell Dimension DIM4700 3.00GHz Pentium Pro machine and two lock-in amplifiers. Results obtained with the first, a model 7265, are also representative of the performance that can be expected when using a **SIGNAL RECOVERY** model 7225 or model 7225BFP, while those from the second, a model 7280, also apply to the 7280BFP. Testing was performed using a LabVIEW version 8.2 program based on our published 72XX LabVIEW driver.

The instruments were set up so that their X output values were about full scale (i.e. 100%) and were then polled for 100 consecutive readings of this value. In the models 7265, 7225 and 7225BFP, the actual rate at which new data is available is 200 Hz or 5 ms per set, while for the 7280 and 7280BFP the corresponding figures are 1000 Hz or 1 ms. Consequently, transferring data any faster than these rates will result in multiple transfers of the same output values.

The results are shown in Table 1

Instrument	Connection Method No.	Computer Port	Lock-In Port	SIGNAL RECOVERY Model numbers used for inconnection	Speed
7265	1	RS232	RS232	C01003	20.0 ms @ 19200 baud
7265	2	USB	RS232	CE0116S & C01003	14.5 ms @ 19200 baud
7265	3	GPIB	GPIB	CE0114S GPIB card & SC0073 cable	7.5 ms
7265	4	USB	GPIB	CE0115S	2.0 ms
7280	5	RS232	RS232	C01003	13.7 ms @ 19200 baud
7280	6	USB	RS232	CE0116S & C01003	10.7 ms @ 19200 baud
7280	7	GPIB	GPIB	CE0114S GPIB card & SC0073 cable	2.0 ms
7280	8	USB	GPIB	CE0115S	1.3 ms

Table 1, Communication Speeds of Different Connection Methods between Models 7265 and 7280 DSP Lock-in Amplifiers and a Computer

These tests indicate that the fastest method of communication is using the CE0115S USB-GPIB adaptor. In the case of the 7265 (connection method 4) the 2.0 ms per point transfer rate allows every possible data value to be transferred, since new values are only available every 5 ms. In the case of the 7280 (connection method 8) the 1.3 ms per point rate implies that at least every other available point can be transferred.

If data acquisition is required at exact sample times, then it is generally better to use the instruments' internal curve buffers. This ensures, for example, that with the 7280 it is possible to store data at the full 1 ms per point rate at which new output values are available. It also avoids any problems other applications software running on the controlling computer might cause if it reduces the available processor time for the software controlling the lock-in amplifier.

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