**LabVIEW/Hardware Install and Set Up**

**May 2019 - Jeff Ketterling updated**

**October 2020 - Cameron Hoerig and J Ketterling**

**August 2021 – J Ketterling – Shift to Galil controller**

**October 2021 – J Ketterling – Shift to 64 bit LabVIEW**

**September 2022 – J Ketterling – Disabled parts of code. Removed some install items.**

**December 2022 – J Ketterling – Disabled all Acqiris calls but subroutines can be turned back on.**

**Software**

In addition to LabVIEW 20xx 64 bit and basic driver install, make sure that you install (NI-motion no longer supported after LabVIEW 2018 32 bit. 32 bit LabVIEW no longer will work):

Now using Github for the repository. Need a guest or Cornell ID and then set up an account at <https://github.coecis.cornell.edu/> . Github desktop easiest software to use for push/pull. https://desktop.github.com/

Good idea to add the folder with all the vis (usually :\LabVIEWStuff\\* or whatever name is used) to VI search path in LabVIEW. Occasionally paths change and LabVIEW might have trouble finding a VI.

Need these package. They may be installed as the Device Driver part of Install.

~~NI-Motion (This now obsolete after moving to Galil controller) All No-motion routines were blocked out so as not to load.~~

~~NI-Switch~~ Disabled in software so should not need to install.

NI-Scope

NI-VISA

Vision Development Module – Disabled to avoid need to install Vision. So don’t need NI vision

Separate install. Needed for Tiff writing utilities and also for vector flow data review of videos. Might need a license but haven’t fully figured that out.

* Selected “Evaluation” instead of inputting a license.

Also need to install some packages using JKI VI Package Manager. Installing one will bundle in others.

OpenG String Library

OpenG LabVIEW Data Library

OpenG Error Library

OpenG Array Library

**Install these 3rd party driver packages (need these even if not using the hardware)**

Acqiris calls have been disabled as hardware no longer used anywhere.

~~Acqiris 4.2c CD (may move folder to local drive)~~

* ~~Copied CD folder to This PC\Documents. During installation, selected “Windows Program Development” only.~~
* ~~Selected “NO LabVIEW” when prompted to install LabVIEW drivers. The options are 8.5, 8.2.1, 8.0, and No LabVIEW. Will manually place vis into LabVIEW later.~~
* ~~Had to manually force 64 bit dll call in CIN nodes. Copy instr.lib updated in shared software distributions. Drivers quite old and don’t seem to handle 64 bit install.~~

Galil (If using)

* galil\_gclib\_566
* galil\_gdk\_786.exe
* GalilTools-1.6.4.580-Win-x64 (we have paid version that allows motor tune). Need this to assign IP address to controller. May need to reset controller when first setting up.
* Need an extra ethernet port on PC for link to Galil. Usually need to turn other ports off when setting up. But need a dedicated port.
* Short out Master Reset pins for 30 seconds or more to force total reset so that Galil Tools will allow new address assignments.
* Assign IP address 192.168.42.1 to Port on PC. Then Galil controller is assigned. 192.168.42.2 or 192.168.42.3 etc.
* Put a label on controller showing IP address
* GDK password “Jeff Ketterling, Riverside Research Institute|648B48810ED0E01A27643EE67E8EDAC49DC6BD0C”

Pickering has been disabled in software don’t need this.

~~Pickering - pipx40vpp-31.exe~~

* ~~Install VISA drivers, not the Direct I/O~~
* ~~Quite old and should be removed from master software.~~

Tabor has been disabled in code but can be re-enabled if needed. Do not need to install these.

Tabor - ww1281drv\_64bit.exe

Tabor - all\_usbdrv.exe (for 1281 - may be problem with 64 bit machines. Only needed if connecting a unit with USB.)

Tabor - wx218xdrv\_64bit.exe (for 2181 unit) (unusual problem with broken .dll calls. Not clear why and when. Had to hardware \*dll path in one install. C:\Program Files\IVI Foundation\IVI\Bin)

IviSharedComponents\_300

lecroyscope.3.2.9.0-x64

lecroyvicppassportinstaller\_v1.12 (Must install this for VICP addressing to work)

Alazar (driver)- autorun.exe (v7.5.2 current as of 9/29/2021)

Alazar LV SDK - ATS-SDK-7.5.0.exe (note ATS-VI is obsolete)

If no actual Alazar card is installed, driver install may not install the low level \*.dll. This issues no longer seems to a problem~~.~~

Teledyne TSPD-SDK-installer\_r57787.exe.

CUDA

Have moved away from using GPU beamforming and do not need this part. However, current code may not have CUDA portions blocked out

Need to install NVIDIA CUDA Toolkit 8.0. Have yet to update GPU routines to keep up with newest CUDA release. Later versions of CUDA may not work until code is recompiled.

Without CUDA, unable to use GPU annular array \*dll (in ~LabVIEW Suite\GPU\_HK\LabVIEW Example). Use riversideSAFilter-X64.dll for 64 bit. LabVIEW code is not able to dynamically adjust. Now only using 64 bit LabVIEW

Optional (Usually): If also need to recompile code, need to install Visual Studio 20?? BEFORE installing CUDA. Visual studio community is probably the install package. Used Visual Studio 2015 originally

The following packages will be needed in \instr.lib. Some will already be installed when hardware drivers are installed and some need to be manually copied. When upgrading to new version of LabVIEW, will need to copy and paste all this stuff from previous to new version of LabVIEW.

These libraries will need to be manually inserted into the \instr.lib folder

<Acqiris Bx>

<Acqiris Dx>

<Acqiris Tx>

<ag33xxx>

<Agilent 33XXX Series>

<ndt5800>

<LeCroy Wave Series>

<Newport ESP301>

<hp33120A>

Don’t need these generally

<ww128x> (Tabor LabVIEW drivers buried in another folder on install but use copy from vi.lib)

<wx218x> (Tabor LabVIEW drivers buried in another folder on install but use copy from vi.lib)

There may be others still needed. They will be in master archive with drivers etc.

The AlazarTech LabVIEW files will install at C:\AlazarTech. Leave there.

~~And in \user.lib folder~~

~~<ADQAPI>~~

Will not be able to run software without all the necessary hardware present but can view and modify code. Most NI hardware can be simulated in NI Automation Explorer.

If any components are missing, it will be apparent when VIs cannot be found after opening MasterControl.vi. A search window will open and you will see which VIs are missing. This will provide a clue as to what still needs to be installed.

**Misc Software Settings**

Many of the software settings are tied to selections on front panel of MasterControl with location being one of the primary variables. The location settings are found in block diagram <CTRL> E in Frame 1, lower left case structure the key items are:

***LeCroy address*** – Older style TCIP connections needed the format VICP::LCRYxxxx or VICP::IP address. Newer scopes will use USB::XXXX style address. Make sure the correct connection option is selected on the LeCroy.

For correct time delay, must make change in the XStream Browser. Connect to Local Instrument and then change Acquisition:Horizontal:HorOffsetOrigin to 0 instead of 5. This will move delay=0 to leftmost point of screen instead of center. The current version of the control software should make this change automatically.

***Acqiris address*** – PCI::INSTR0 covers most cases

**# axis** – motion axis present in system

***Data paths*** – Need to choose partition.

***Tabor address*** – ASRLx::INSTR this address will change. 2182 uses a usb:: format.

***SMAC axis*** – choose axis that is the SMAC axis, if present.

Encoder counts per mm for each stage may need to be adjusted. The encoder counts are in an integer array with 4 values. A value of 1000 means 1000 counts in 1 mm. If this value is wrong, the motor will not move the correct distance.

Default values for velocity and acceleration are lumped in with location parameters now.

There are deeper settings than, but they get more technical and typically would not need to be changed. Almost all the default settings have been pulled up into master control either as a front panel option or a setting linked to the location.

**Hardware**

**Measurement and Automation (NI MAX) Setup.**

If possible, the overall M&A profile should be imported from the master system at RR. This will avoid some of the manual configuration steps.

**Hardware Names**

~~Motion board ID should be "1" (Motion boards not supported after LV2018 and once Galil migration happens.)~~

This has been made mostly obsolete.

Multipurpose DAQ card (6221) ID should be "Dev1" (Much of this functionality has moved to Galil. Only needed for counter/timer but that can be handled with an external function generator)

If Daxsonics pulser is used, find ASRL/COM port item in NI MAX.

Use the alias “Daxsonics” for older units. For newest 5 channel pulser use alias name “Dax2021” for COM. May need to install FT232 VCP drivers to get COM port to work.

If there is a 6602 timing card for 5 channel pulsing, it's ID is "Timer" (this is not needed for new Daxsonics)

NI 5152 cards are named "Dig1", "Dig2", and "Dig3" (Chs 1&2, Chs 3&4, Ch 5)

~~Pickering card is named "Pick" (may need to use Picka under certain circumstance)~~

~~For special case with Quantel motor drive unit and second 6602 (or 6601 Card) name the card "Quant"~~

**M&A Settings**

Before using motion components, a profile needs to be imported to the motion card. These can be exported from old PC and imported to new PC. May need to make dummy aliases until software fully purged of unused calls.

Add these Data Neighborhood\NI-DAQmx Tasks if not present from profile transfer

* “DIO-L2 L3” – Digital Output on Dev1/port0/line2 +Dev1/port0/line3 Very important or trigger out will not work! This will be moved to Galil controller in future
* ~~“Dev1 FlipFlop” – Digital Output on Dev1/port0/line1~~ Important if a SMAC motor is used and generated a RT trigger burst! This IO was moved Galil system.
* ~~“QuantFlipFlop”- Digital Output on Quant/port0/line0~~ Should not be needed.
* “~~Doppler-I” – Analog input on Dev1\ai0~~ Should not be needed.
* ~~“Doppler-Q” - Analog input on Dev1\ai1~~ Should not be needed.
* “~~QuantGate” - Gate signal when using Aviso Quant\ctro~~ Should not be needed.

**Motion Notes**

NI Motion is now obsolete with Galil controller. Stages will need to have parameters tuned with Galil.

~~When loading a motion setting profile into motion card, make sure the xml file has a different name than the name you eventually want to use. You can then create a new profile with the name you want in NI MAX and then load the values that were imported via the xml file. In most cases a profile with the name SMAC will be used. The method of importing and naming motion profiles is a bit awkward in NI MAX.~~

When running the initial test with a new stage or new motion profile, it is a good idea to unplug the power connection on the Trust Automation amplifier (small plug block). The encoder and limit switches will still be active. Then use ~~NI MAX~~ Galil Design Kit to test the limit switches work properly and that encoder counts up in forward direction and down for reverse direction.

New stages should also be tuned so the feedback loop parameters are optimal. Tuning parameters are embedded in LabVIEW motion init routine.

**GPIB Address Defaults: (These are the assumed addresses in software)**

Most new equipment will use a USB connection. Only the Panametrics pulse and older function generators will need. Most GPIB connections will now also be made using a USB-GPIB link.

* GPIB::1 Panametrics (5800 or 5900)
* GPIB::11 PRF function generator (typically an Agilent) – The onboard counter is now the default PRF source. An external PRF source from the Agilent is no longer needed.
* GPIB::10 Burst function generator (typically an Agilent) – Used in therapy/burst modes.