

What's New in DGF-4C Revision 4.04 (Released on 9/1/2009)

Bug Fixes

- DSP: fixed bug in enabling trigger distribution over backplane (ModCSRA bit 2). Also inverted meaning of this bit (now: bit not set = triggers connected to backplane) to match behavior of Rev. D/E code. Updated Igor, online help and Programmer manual accordingly.
- DSP: Fixed bug in computing of TOTALTIME, list mode time stamps
- System FPGA: Fixed bug that caused re-synchronization of event/channel time stamps at every run, resumed or new.
- Doc: Added driver readme file explaining use of drivers and including links to Adaptec ASPI drivers, which are usually required for Jorway controller under Windows XP but not or incompletely provided by Microsoft.

What's New in DGF-4C Revision 4.03 (Released on 7/28/2009)

New features and major changes:

- Revised and improved run statistics
 - Previous “livetime” was ill defined. It counted the time a channel was active (i.e. able to issue triggers) and was stopped for the FPGA readout, but not filter dead time. Now livetime simply counts the time a channel is active, all dead time effects are counted in SFDT for all run types
 - Added SFDT, FTDT and GDT counters to count dead time in slow filter due to pileup inspection and readout, dead time in trigger filter counting input pulses, and the time a channel was gated, respectively.
 - All time counters are measuring “individual” times for a channel, so the (ill defined) channel option was removed
 - Added/Activated NOUT to count output pulses for each channel
 - Added TOTALTIME measuring the time since the DSP received the most recent start run command (in list mode run, start of first spill). This is the best measure of total lab time passed since clicking “start run” button. However, this can not count time lost in host PC for issuing command to DSP, and the clock is only precise to 50ppm, thus may deviate from true lab time
 - Added ICR and OORF counter for current input count rate and the fraction a channel is out of range, counted over 32*64K clock cycles with a simple averaging scheme.
- Increased maximum length of trigger filter to allow lowering threshold in noisy systems
- Revised Gate and GFLT functions (adding options to invert and stretch/delay signals)
- Made baseline parameters BLCUT and BLAVG available for user I/O in the “Expert Panel”. These parameters are useful for fine tuning settings for best energy resolution.
- Removed legacy “fast list mode” run types. If DSP still receives a runstart command with a fast list mode run, it treats it as a standard list mode run.
- Added advanced pileup control options (disable, invert, pause) and option to disable out-of-range rejection
- Updated User and programmer manuals and online help
- Old settings files are slightly incompatible with new settings files due to several changes in variable definition.

Parameter	Old	New	Notes
MODCSRA	Bit 0 controlled local time stamp option in	Bit 0 now ignored	Use CHANCSRA bit 13 instead (for each

	group trigger mode		channel individually)
CHANCSRA	Bit 1 controlled “individual livetime” option	Bit 1 now ignored	Counters always measure channels independently
	Bit 9 was reserved	Bit 9 now is used to allow negative energies as a result of the pulse height computation	
	Bit 13 was reserved	Bit 13 now is used for local time stamp option in group trigger mode	
CHANCSRC	Unused	Bit 0-2 control GATE/VETO options. Bits 3-6 control advanced pileup options	
FASTADCTHR USERDELAY	Unused, likely zero	Must be equal to Trace Delay (in clock cycles)	

Complete list of changes:

Igor

- Updated User Interface to display tabs and controls properly in Igor 6.
- Added controls for new input variables (GATE, CSR options) and displays for new run statistics
- Removed fast list run option
- Added new global variables for I/O with C library

C library

- Added I/O for new global variables and corresponding DSP parameters

DSP code changes

- Added user option to allow energies <0
- Updated default values for input parameters after power up
- Removed unused DSP parameters
- Revised and improved run statistics
- changed default setting for FTwidth (now 1, was 16)
- Changed DSP parameters:

Variable	Change	Type	Description
MODCSRA	definition change	Module input	See table above
CHANCSRA, C	definition change	Channel input	See table above
FASTADCTHR0..3	removed	Channel input	Never used
USERDELAY0..3	added		Stores “Trace Delay”, the amount of pre-trigger waveform. Replaces PALENGTH and TRIGGERDELAY in firmware operation, however both these parameters still have to be set to legal values for backwards compatibility; Uses address previously used for FASTADCTHR
GATEWINDOW0..3	added	Channel input	Sets length of GATE coincidence window after rising edge on GATE input
GATEDELAY0..3	added	Channel input	Sets additional delay between GATE input

			and detector input (detector input typically delayed by ~200ns due to ADC and other analog stages)
TOTALTIMEA..C	added	Module output	Measures time since last runstart command (first spill in list mode runs). Best measure of total lab time passed since clicking “start run”, but can not account for delays caused by host PC
AECORR, LECORR	removed	Module output	No longer used
ATCORR, LTCORR	removed	Module output	Never used
LIVETIMEA..C0..3	definition change	Channel output	Previously counted time a channel is active, in List Mode run minus time for FPGA readout. Now simply counts time a channel is active, readout and other effects are counted in SFDT
OVERFLOWA..B0..3	removed	Channel output	Never used
INSPECA..B0..3	removed	Channel output	Never used
UNDERFLOWA..B0..3	removed	Channel output	Never used
ADCPERDACA..B0..3	removed	Channel output	Never used
FTDTA..C0..3	added	Channel output	Counts time trigger filter is over threshold and thus can not detect new pulses
SFDTA..C0..3	added	Channel output	Counts dead time associated with each pulse
GCOUNTA..B0..3	added	Channel output	Number of pulses on GATE input
NOUTA..B0..3	added	Channel output	Number of output counts for this channel
GDTA..C0..3	added	Channel output	Counts time GATE is active (length of GATEWINDOW for each GATE pulse OR VETO being high)
ICR0..3	added	Channel output	Current input count rate
OORF0..3	added	Channel output	Current out-of-range fraction

Manual

- Updated programmer manual for Rev. F modules
- Added section on run statistics to user manual
- Revised/updated user manual sections Gate/GFLT functions
- Revised/updated online help for new panels and functions

Firmware

- Revised waveform capture logic to reduce dead time
- Revised and improved run statistics
- Increased maximum length of trigger filter to allow lowering threshold in noisy systems
- Added advanced pileup control options (disable, invert, pause) and option to disable out-of-range rejection
- Added ICR and Out-of-range counters updated independent of a run being in progress
- Revised Gate/GFLT logic
- Moved event time stamp counters to System FPGA (was DSP) for better synchronization with channel time stamp and less problems with 16-bit overflows.
- Moved channel time stamp counters to Fippi. Includes change of I/O direction from System to Fippi in “RTlatch line”, **therefore this new FW is not compatible with older FW.**
- Revised DSP writes to external memory

Development still in progress:

- DSP/Firmware: increase data readout speed from FPGA
- FPGA: debug occasional bad traces for very short/very long pre-trigger trace setting

Previous changes and releases

- 2/23/2009: clean release of revised USB firmware
(unchanged from IKP debugging in August 2008)
- 2/19/2009: revised System firmware to version 0xC505, DSP code to 3.64
 - debugged external memory I/O
 - remove TSAR/IDMA write at end of run (possible output data error)
 - ControlTask 22 can be used for Module ID
 - added ControlTask 26 for MCA testDSP code 3.55 to 3.64 also includes the following changes:
 - corrected +/-1 discrepancy of slow filter length in Fippi and in DSP, leading to worse resolution at very low filter length
 - corrected RAMPDAC function to compute offsets (was often reading ADC values instead of baselines)
 - added test for energy overflow in MCA processing
 - energy of events with E>64K is set to zero
 - allowed user code to skip histogramming and to remove/overwrite event in output buffer (compressed list mode runs only)
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- 12/14/2007: updated Fippi firmware to version 0x0056
 - modified VETO delay/polarity
- 10/27/2007: updated DSP code to version 3.55
 - restored parameter DECIMATION
 - RESUME zeroed at end of run to for next spill
- 4.01, 10/9/2007: initial Rev. F software release. See file DGF differences.doc for details of changes from Rev. D/E software

