

## 5.7 GGCS Command Summary

The INI Protocol Emulation Module was developed for the GGCS in order to maintain software compatibility with the older INI goniometer controller. The command structure for the GGCS is essentially identical to that of the INI, with additional commands. The following pages will describe the complete set of commands that can be sent to the controller.

<i>Command</i>	Description
<CTLF>	<b>SOFT ABORT</b> Stops all movement only.
<CTLG>	<b>PANIC STOP</b> Stops all movement, closes shutter, disengages attenuator.
* <ESC>	<b>Pseudo &lt;CTL-BRK&gt;</b> Program will abort if the debug level is non-zero.
* !	<b>Repeat the previous command string.</b>
* %	<b>Comment marker</b> All remaining characters on line are ignored.
* ? or H	<b>Get online help when using 'TALK' or 'COMTST'.</b>
An,a	<b>Increment target angle of axis 'n'.</b>
* An	<b>Show angle increment of axis 'n'.</b>
* ACn,a	<b>Set the acceleration for axis 'n'.</b>
* ACn	Show the acceleration of axis 'n'.
* AGx	Set SIEMENS Detector preamp gain. 1=gain of 33, 2=gain of 50, 3=gain of 100. Valid only with a Siemens Detector Interface.
* AG	Show the current detector gain. Valid only with a Siemens Detector Interface.
* Bn,l,h	Set the software limits for axis 'n'. If unlimited movement is desired, set both 'l' and 'h' equal.
* Bn	Show the software limits for axis 'n'.

- Ci,t*** Set the scan type and time.  
*i* = count threshold \* report flag  
where, report flag = 0 for normal scan  
-1 for peak search  
1 for half-height search  
*t* = time in seconds
- \* *C*** Show scan type and time.  
Reported as type\_time, where time is in millisecs.
- D*** Execute drive/scan.
- \* *DDx*** Set the debug output device.  
0 = PC monitor, 1 = COM1, 2 = COM2.
- \* *DD*** Show the debug output device.  
0 = PC monitor, 1 = COM1, 2 = COM2.
- \* *DLx*** Set the debug level.  
0 = no debug output.  
higher levels = more debug output.
- \* *DL*** Show the debug level.  
0 = no debug output.
- \* *DTx*** Set detector type. 0=MWPC, 1=CCD.  
This changes the sense of the detector enable signal.
- \* *DVx*** Set the count rate divider.  
This is used to prescale the FSD Detector output to allow  
use of the standard ratemeter.  
0=divide by 2,  
1=divide by 10.  
Valid only with a Siemens Detector Interface.
- \* *DV*** Show count rate divider.
- \* *DZ*** Set the debug level to zero.  
Equivalent to '***DLO***'.
- \* *EFn*** Turn axis '*n*' encoder option off.
- \* *ENn,x*** Turn axis '*n*' encoder option on.  
*x* = encoder pulses per degree.

- \* **En**                    Show encoder status.  
Reported as encoder pulses\_dead band.
- \* **EZn,a**                Set the encoder index offset.  
This is used to adjust the encoder zero in software.  
The entered offset is added to the existing software offset.  
**a** = angular offset in degrees.
- \* **EZn**                    Show the encoder index offset.  
The offset shown is in degrees.
- \* **Fn,a**                    Set the target position for axis '**n**', in degrees.
- \* **Fn**                      Show the target position for axis '**n**', in degrees.
- \* **GCxx**                  Set generator current.  
Valid only for Siemens K710D generators.  
The GGCS responds with either a '<CR>' or a '?##<CR>' error code.

Error Code	Meaning
1	Illegal command
2	Arguments required
3	Incorrect arguments
4	Can use command only in computer mode
13	Generator switched off
14	Generator power limited

- \* **GPx**                    Generator parameter.  
Valid only for Siemens K710D generators.  
The GGCS responds with 'GP<parameter><CR>'.

Parameter	Meaning
1	Minimum voltage/kV (KVmin)
2	Maximum voltage/kV (KVmax)
3	Minimum current/mA (mAmin)
4	Maximum current/mA (mAmax)
5	Limiting power

- \* **GRx**                    Generator register.  
Valid only for Siemens K710D generators.  
The GGCS responds with 'GR<register><CR>'.

Register	Meaning
1	K710D program version string
2	Switch-off circuit status register
3	Switch-off circuit hold register
4	Protection circuit status register

- 5 Protection circuit hold register
- 6 Register diagnosis

**\* GSx** Generator status.  
Valid only for Siemens K710D generators.  
The GGCS responds with 'GS<status><CR>'.

Status	Meaning
1	Operating mode control word
2	Actual voltage
3	Actual current
4	Heater current
5	Water flow
6	Operating hours

**\* GVxx** Generator voltage.  
Valid only for Siemens K710D generators.  
The GGCS responds with either a '<CR>' or a '?##<CR>' error code.  
(see GCxx command).

**\* Hn,s** Set motor steps/360 units for axis '*n*'.  
This is handy when configuring the system for use with a different goniometer.

**\* Hn** Show motor steps/360 units for axis '*n*'.

**\* HMn,v** Home axis '*n*' at '*v*' steps/sec, where steps/sec must be <= 1024.

**\* HVx** Set SIEMENS Detector high-voltage.  
Range is from 0 to 2047 VDC.  
Valid only with a Siemens Detector Interface.

**lx** Set number of scan reads.  
Valid only for systems with a scintillation detector.

**\* l** Show number of scan reads.  
This is the number that was previously set.  
Valid only for systems with a scintillation detector.

**\* IHx** Set half-height scan integration width.  
This number defaults to 50, which is what the INI uses.  
Valid only for systems with a scintillation detector.

**\* IH** Show the half-height scan integration width.  
Valid only for systems with a scintillation detector.

- \* **IP<sub>x</sub>** Set the peak scan integration width.  
This number defaults to 1, which is what the INI uses.  
Valid only for systems with a scintillation detector.
- \* **IP** Show the peak scan integration width.  
Valid only for systems with a scintillation detector.
- \* **L, l, h** Set the omega-2theta limit.  
'l' must be the negative limit, 'h' must be the positive limit.
- \* **L** Show the omega-2theta limits.  
They are shown in the order: negative, positive.
- Md, d1, d2** Enter manual mode.  
**d** is the slow speed divisor for all axes except the XYZ stage.  
'd1' is the divisor for the X- and Y-axes of the XYZ stage.  
'd2' is the divisor for the Z-axis.  
The divisor is used when the user presses either FORWARD SLOW or REVERSE SLOW on the manual control box.  
The default setting of all values is 8.  
If '**d**' is set with no '**d1**' or '**d2**' then '**d1**' and '**d2**' are equal to '**d**'.  
If '**d**' and '**d1**' are set with no '**d2**' then '**d2**' is equal to '**d1**'.  
The slow speed is set equal to FAST/'**d**', FAST/'**d1**' or FAST/'**d2**'.  
The '**d1**' and '**d2**' divisors are only available on the GGCS controller.  
Setting '**C0,1 I1 M**' will cause the scaler to count while in manual mode.  
This is useful when no rate meter is available.  
The manual mode feature is only available on the GGCS controller.
- \* **M+n, x** Move axis '**n**' continuously in the positive direction for '**x**' revolutions of 360 degrees.  
This number of revs defaults to 32767 if none is entered.  
The upper and lower limits must be equal for this to work, i.e. unlimited movement.
- \* **M-n, x** Move axis '**n**' continuously in the negative direction for '**x**' revolutions of 360 degrees.  
This number of revs defaults to 32767 if none is entered.  
The upper and lower limits must be equal for this to work, i.e. unlimited movement.
- \* **On, a, v, x** Oscillate axis '**n**' '**a**' degrees at velocity '**v**' deg/sec a total of '**x**' times.  
This is used to assure that data collection is not stopped mid-oscillation.

- \* **Pn** Show the angular position of axis '*n*'.
- \* **PC,x** Set the phi/chi factor.  
This is set to '**1**' for the P4 4-circle goniometer.
- \* **Q, <CTLC>** Quit this program.  
The program can only be exited if the debug mode is non-zero.  
This prevents a goniometer halt if a little noise comes down the serial line.
- \* **Rn** Show encoder position of axis '*n*'.  
This is useful when troubleshooting encoders.
- \* **RCx** Generator remote control.  
Valid only for Siemens K710D generators. There is no response from the GGCS.
- | Mode | Meaning                   |
|------|---------------------------|
| 0    | K710D keypad control only |
| 1    | Computer control only     |
- \* **RPx** Repeat the command string '*x*' times.  
This is used to repeat a command string many times (mainly for system testing).
- Sn,v** Set the velocity of axis '*n*' to '*v*' deg/min.
- \* **Sn** Show the speed of axis '*n*' in deg/min.
- \* **SBr** Set serial baud rate.  
The new baud rate won't become the default until an '**SV**' is used to save it in the parameter file. Baud rates of 1200, 2400, 4800, 9600, 19200, and 38400 are supported.
- \* **SU** This command enters the GGCS hardware setup and should only be used by experienced users. Post-V2.00 versions of the GC executable include auto setup to make system configuration painless.
- \* **SV** Save all entered parameters to disk.
- \* **SWn** Show firmware version.  
The GGCS responds with the GC version if no parameter is supplied or the version of indexer '*n*'. '*n*' must be a valid indexer number (starting with 0).
- \* **Tn** Talk directly to indexer '*n*'.

This command is intended to be used for diagnostic purposes only.

Indexer commands can be found in the indexer hardware manual. 'n' must be a valid indexer number (starting with 0).

**U0,0.**

Report all positions and statuses.

The positions are reported 2theta\_omega\_phi\_chi\_hstat\_estat.

Since the release of GC V3.00, the length of this string is fixed at 56 characters (including the <CR>) for all systems except those with an XYZ stage.

The hardware status is as follows:

Value	Description
1	goniometer in collision
2	always set
4	attenuator in
8	attenuator out
16	reverse fast key pressed
32	forward fast key pressed
64	reverse slow key pressed
128	forward slow key pressed
256	omega axis key pressed
512	2theta axis key pressed
1024	chi axis key pressed
2048	phi axis key pressed
4096	axis printout key pressed
32768	shutter open

The error status is as follows:

Value	Description
1	phi encoder error
2	chi encoder error
4	omega encoder error
8	2theta encoder error
16	input ASCII stream error
32	shutter timeout error
64	attenuator timeout error
128	attempt to drive beyond limits
256	collision since last error word
512	hardware configuration error
1024	I/O interface battery failure
2048	generator error

**Un,a**

Update position of axis 'n'.

On systems with incremental encoders, only the whole degree is used, as the fractional portion is already known on startup.

* <b>Un</b>	Show the position of axis ' <b>n</b> '. Same as ' <b>Pn</b> '.
* <b>VBn,v</b>	Set the base velocity of axis ' <b>n</b> ' in deg/min.
* <b>VBn</b>	Show the base velocity of axis ' <b>n</b> ' in deg/min.
<b>W0</b>	Toggle the controller echo mode. The echo mode defaults to NO ECHO on startup.
<b>W+n</b>	Turn on device ' <b>n</b> '. Device numbers are as follows: 1 = High speed shutter (main shutter if only one is available) 2 = Laser (Microdiffraction systems only) 3 = Main shutter (if high speed shutter is available) 4 = Attenuator (P4 systems only) 7 = Area Detector (Area Detector systems only) 5, 6, 8, 9 = Unused
<b>W-n</b>	Turn off device ' <b>n</b> '.
* <b>Wn</b>	Show device status (1=ON or 0=OFF).
* <b>WAx</b>	Wait (delay) for ' <b>x</b> ' milliseconds.
* <b>WS</b>	Set up wait count. This command takes up to 10 seconds to complete.
* <b>XDNLD</b>	Receive a file using modified XMODEM protocol.
* <b>XUPLD</b>	Send a file using modified XMODEM protocol.

\* These commands are only valid with the GGCS controller.