

# Generation 3 Controller Advanced Programming Guide

March 24, 2021

v1.0.5

Technical Brief

## Cycle Testing



INNOTION

A Caldwell Company

# G3 Advanced Programming Guide

Part Number(s): 28C0030(G3), 28C0061(RCM), 29C0052(RS485)

## If you READ nothing else, read this...

- Prior to installing an INMOTION G3 system verify the mechanical installation is 100% operational.
  - All panels move smoothly, without excessive force required at all points across the span
  - The frame is square & plumb, and the lead panel meets the jam evenly top to bottom.
  - All required weather stripping is installed properly and not binding during panel movement.
  - Panels are NOT warped, and panel pickups release and operate smoothly without issues.
  - Interlocks engage and disengage properly without dragging extra panels etc.
  - In a nutshell the door should be at its mechanical “best” before automation is installed
- NEVER leave a door running on a Cycle Test unattended...even for a minute, unless it is in a controlled environment completely void of people and pets.
- DO NOT experiment with commands you find in this guide unless you know what you are doing or have been directed to do so by a trained factory representative.
- Remember the G3 has been certified by UL to be safe, but that only applies if it has been installed safely by the installer.
- If you have any question or concerns, please consult the factory.
- Remember INMOTION offers free training, year-round, all you have to do is ask.

## About this Guide...

This guide documents the more advanced options and features of the G3 Controller by INMOTION. It covers the G3 Controller with v0.7.0 or later firmware. This release added 4 “special feature” modes besides the “normal” mode present in the previous release. In addition, there is a cycle test option available to integrators and installers that can exercise the G3 while running any of the 5 supported modes for testing, option enabling or tuning.

When the G3 first boots, it is operating at the “user” level, and no password is required. In this mode, all commands to operate the door must come from wired or wireless accessories such as wall switches and remotes or from a home automation system wired into the wall switch circuit.

To access any of the advanced mode options, called modifiers, a password is required. The password entered will set the user level. The current user / password level can be checked at any time by entering the command “**pwd**” or “**p**” on the CLI. The current level will be displayed on the CLI.

In this guide each page will indicate what user level is required for the given command or function by the graphic shown. A checkmark next to the various levels indicate which user levels can call or modify the command or function documented.

Installers have access to the User, Installer and Developer levels by entering the appropriate password. The difference between the Installer and Developer levels is that some commands change such that the Installer level will not accidentally erase critical door programming information causing more work than necessary. If an installer needs to access one these protected commands, they only need to change to the Developer level to perform the task. For general and advanced programming, the Installer password will work for 99% of the tasks required.

### Supported User Levels

<input checked="" type="checkbox"/>	User
<input checked="" type="checkbox"/>	Installer
<input checked="" type="checkbox"/>	Developer
<input checked="" type="checkbox"/>	Factory

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## CLI Password Access

Supported User Levels

- ☒ User
- ☒ Installer
- ☒ Developer
- ☒ Factory

Starting with the “Special Features” v0.7.0 firmware release, the G3 controller requires unique passwords for each controller. This is due a California law, as of Jan 1, 2020, requiring minimum security for IoT devices. To address this change, the G3 utilizes its unique serial number as part of the password. Once programmed at the factory, this new password scheme is activated. The previous release supported 2 password levels for access to the CLI. Those being “Installer” and “Developer” and they were the same for all G3’s running v0.6.7 firmware. If you memorized those passwords, then the new password mechanism will not take too much effort.

The previous passwords for firmware v0.6.7 were:

User:	“0”	// Rarely used as it’s the default at boot
Installer:	“pwd1”	
Developer:	“IM1635”	

The new passwords use the same characters as before but with different numbers at the end.

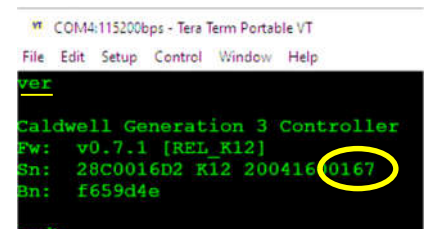
User:	“0”	// Did not change from v0.6.7
Installer:	“pwdXXXX”	// Replace the “XXXX” with the <b>last 4 digits</b> of the serial number
Developer:	“IMXXXX”	// Replace the “XXXX” with the <b>last 4 digits</b> of the serial number

*Note: Entering an incorrect password, immediately puts the controller into “user” mode or minimum access.*

As shown above adding the last 4 digits of the G3’s serial number will allow the installer to determine the password and access the G3’s CLI at the required user level. The serial number can be found on a sticker affixed to the back of the controller itself.



If for some reason the label is unreadable or missing, then the serial number must be obtained from the CLI using the “**ver**” or “**info**” commands. Both the password (**pwd**) and version (**ver**) commands are supported at boot (user level).



G3 VERSION COMMAND

After obtaining the serial number, the password can be entered in the CLI using the password command “**pwd**” or “**p**” for short.

Installer:	pwd <b>pwd0167</b>	// Installers should use this one
Developer:	pwd <b>IM0167</b>	// Only use if needed or when directed to do so by the factory

```
cmd>pwd pwd0167
Level = 1 (Installer)
cmd>
```

```
cmd>pwd IM0167
Level = 2 (Developer)
cmd>
```

\* Passwords will auto-expire after 30 minutes regardless of CLI activity. This timeout can be extended by issuing the “**pwd**” or its abbreviation “**p**” (just the command, no password needs to follow)

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## Tech Brief – Cycle Testing

Supported User Levels

- ☐ User
- ☒ Installer
- ☒ Developer
- ☒ Factory

### TLE Warning:

Prior to running a cycle test verify the controller does not indicate “TLE” events in the CLI. Running a cycle test on a controller that is experiencing TLE Over-temperature faults will damage the controller’s motor driver chip after approximately 100 events. Refer to the TLE Mitigation Tech Brief for information on preventing TLE faults if you wish to cycle test a system on a high friction installation.

### Overview

The “**cyct**” or “**t**” command, initiates, updates, or reports the status of a cycle test already running. It can be used by installers during their final test, while tuning “Soft Touch”, or dealer/customer demonstrations. The test can be commanded to exercise an G3 automation system to open and close a door between 1 and 1,000,000 times.

The command is not a customer feature and has been designed as a pure debug/evaluation tool. While testing, special features can be enabled or disabled via the CLI and evaluated without stopping the test. All special feature modifiers and options are executed as they are during runtime. Safety devices are fully operational including “Soft Touch” for evaluation and tuning but do operate slightly differently in order to keep the cycle test running. Wall switches, remotes and even home automation accessories continue to function as they normally would except in a few specific instances.

Unattended cycle tests, in a controlled environment which is void of people and pets, are further protected by a Cycle Count Fault Limit “**ctfl**” parameter. This parameter limits the number of “friction faults” per single Open and Close cycle to 5 events. If this limit is reached, the test stops with an error message. The parameter can be set from 1 to 1000 events per cycle.

Cycle tests must be initiated from the CLI. While running though, the test can be paused or canceled from any wired/wireless wall switch or remote in addition to the CLI.

### Door Behaviors While Testing

During testing, friction/motion faults, CLI and wall switch/remote commands behave differently than while the controller is in normal runtime mode. All commands and faults are acknowledged and counted during the test, then the test continues. This means the door does NOT stop while testing unless it’s part of the test, paused, the test is completed or errored out due to excessive friction faults.

- Friction Fault Acknowledgement: Panel stops, backs up 4”, pauses and continues.
- Motion Fault Acknowledgement: Panel stops, pauses and continues.
- Open, Close, Stop (wall switch or CLI): Panel stops, executes the command and then continues.
- Unlock/Release: 1<sup>st</sup> Unlock/Release the test **pauses**, 2<sup>nd</sup> Unlock/Release the test **resumes**.
  - *Pause & Resume works best when the panel is moving and not stopped at the jams.*
- All modifiers are used and can be tested. By default, span adjust is enabled for 5s. This means that for every cycle, at open, the door will wait for a span adjustment. After that time expires the door will begin to close.

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## Pausing & Canceling the Test

Testing can be paused indefinitely, then resumed or canceled via the CLI or any wall switch/remote.

- While the door is moving mid span, press or send the **"Release/Unlock"** command.
  - The door stops, status changes to **"Paused"** and a report is displayed.
- To resume testing, press or send **"Release/Unlock"** again and the test resumes.
- To cancel testing:
  - While paused, pressing, or sending a **"Stop"** command cancels the test with a report.
  - Sending the command **"t 0"** will also cancel the test.
- While the test is in a **"Cancelled"** state all test data is available with a CLI **"t"** command.
  - If while in the **"Cancelled"** state and a second CLI **"t"** command is received OR a new test is requested with **"t value"**, all previous test data is cleared.
- Test data from a previous test is available until another test is requested, or the controller is rebooted.
- Test data is not stored in flash memory.
- A test cannot be paused while stopped at either jam.
  - Wait until the door is moving before trying to pause the test.

## Starting a Cycle Test (cT)

To execute a test, 2 commands are required:

- **"t 3"** Initializes the cT for 3 open + close cycles. Door does not move
- **"b c"** Button Close is used to "start" the test. Door begins to move and testing begins.
  - \* If the door was already closing when the **"t"** setting was issued, the 2<sup>nd</sup> command **"b c"** is not required. Testing will begin after the door closes.

## Example: Program Controller then Test for 3 cycles

A cycle test can be requested to execute before a door is even programmed. This allows the installer to program a controller and seamlessly enter a cycle test after the door completes its programming cycle. Here is how that is done.

```
***** // Controller is NOT programmed so this
001.790: <<< INSTALLATION REQUIRED >>> // banner is displayed at boot
001.794:
001.796: Controller must be programmed
001.800: prior to use by a qualified
001.804: installer
001.808:
001.808: Wall Switch Commands:
001.812: -----
001.818: To Program: STOP(15s)
001.820: Toggle Brake: RELEASE(1s)
001.824: Reboot: STOP+RELEASE(10s)
001.830:
001.830: www.caldwellmfgco.com
*****
cmd>p IM1234 // Installer or Developer password is entered
cmd>t 3 // Request a 3 cycle test.
// cT Ready status reports display (NOT SHOWN)
cmd>b autosetup // Button command to program the door
// Installer moves panels as they normally would during the install process
// Programming instructions & messages scroll by (NOT SHOWN)
cmd> // Programming "learn" cycle completes and door does its final close...
cmd> // cT test starts up for a 3 cycle test automatically
```



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## Example: Test for 15 cycles

```
Cmd>t 15 // Cycle test requested

Cycle Test
-----
Status          READY // Status is "Ready" to start. Door does NOT move yet...
Progress:       0.00%
Oneway Travel:  0.00 ft
Cycle Time:     TBD // Time for 1 open + close cycle. Updates after 1st cycle.
Time Remaining: TBD // Estimated time to completion in sec, min, hours, days, months and years
Cycle Info      Opening // Current operation, either Opening or Closing
Current Cycle:  0
Total Cycles:   3 // Total cycles requested. Can be changed with "t VALUE" while running
On Open         // Friction & Motion Faults during Open
Friction Faults: 0
Motion Signals: 0
On Close        // Friction & Motion fault counts during Close
Friction Faults: 0
Motion Signals: 0
Cycle Faults:   0/5 // Cycle fault count down, Current/Maximum, before the test errors out

cmd>b c // Starts the test and the cT status changes to "Running". Movement starts.
```

## 15 Cycle Test Result

```
Cycle Test
-----
Status          COMPLETE // Test successfully completed without excessive friction faults
Progress:       100.00%
Oneway Travel:  118.83 ft // Total distance panel traveled. Bi-part report double this distance
Cycle Period:   44s // Time required for 1 Open + Close cycle
Time Remaining: 0s
Cycle Info
Current Cycle:  15
Total Cycles:   15
On Open         // Fault Count totals for Opens
Friction Faults: 1
Motion Signals: 2
On Close        // Fault Count totals for Closes
Friction Faults: 2
Motion Signals: 4
Cycle Faults:   0/5
```

## Other Usage Models

Cycle tests can be updated at any time, even before they start. This means that if a test is about to run, in the "Ready" state, and you decide to change the number of cycles or cancel the test, its only 1 command.

- Test is set for 100 cycles in the "Ready" state (Not Running).

- Change to 1000 cycles: `cmd>t 1000 // Cycles changed to 1000 cycles`
- Cancel the test: `cmd>t 0 // Test is canceled`

- Test is "running" a 50 cycle test at the 25<sup>th</sup> cycle and I want to...

- Change to 1000 cycles: `cmd>t 1000 // Cycles changed to 1000 cycles`
- Cancel the test: `cmd>t 0 // Test stops in "Canceled" state, Test data`  
`// is available with the "t" command`  
`cmd>t 0 // Test "Disabled" and test data is cleared`

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## Other Usage Models (cont)

- I want to run a cT for a set period such as 12 hours, 10 days or a Month...

- Set a high cycle count:

- Start the test:

These update immediately  
after the 1<sup>st</sup> cycle

```
cmd>t 10000 // This is to get the test ready...
```

```
cmd>b c // Button close starts the test
```

Cycle Test

```
-----
Status          READY
Progress:        0.00%
Oneway Travel:   0.00 ft
Cycle Time:      TBD // TBD during 1st cycle
Time Remaining:  TBD // TBD during 1st cycle
```

- After the 1<sup>st</sup> cycle

```
cmd>t // Request test results after 2nd cycle starts
```

```
Cycle Period:    44s
Time Remaining:  5d 2h 12m 36s
```

- With the “Cycle Period” known, set different cycles until your desired period is correct  
*Waiting for a cycle is not required anymore so set, check, set, check rapidly is ok...*

55000 is close enough for  
a 1 Month run

Done

```
cmd>t 60000
cmd>t // Time Remaining: 1M 0w 2d 13h 18m 32s
cmd>t 57500
cmd>t // Time Remaining: 1M 0w 1d 6h 45m 12s
cmd>t 55000
cmd>t // Time Remaining: 1M 0w 0d 0h 7m 28s
```

- I want to complete a test now with a “Complete” status report, but it still has X number of cycles to go.

- Check the report:

```
cmd>t // Display report to get the current cycle
```

```
Cycle Info      Opening
Current Cycle:   3491 cmd>t // Display report to
get the current cycle cmd>t // Display report to
```

- Check the report:

```
cmd>t 3492 // Add 1 or 2 cycles to “Total Cycles”
```

- The test will “complete” in 1 or 2 closures and the “Complete” report will display

Test completes as if you  
intended to run 3492 cycles

```
Cycle Test
-----
Status          COMPLETE
Progress:        100.00%
```

- I want to cycle test the G3 as fast as possible, as quickly as possible

Make sure options such as delayed “brake on close”, “brake on open” etc. are disabled. These options will delay at the open & close for the period they are set for. If its an hour, then 1 cycle will take about an hour.

- Disable Span Adjust:

```
cmd>c fsat 0 // Default is 5s. Turn this off.
```

- Run the test:

```
cmd>t 1000 // Each cycle will be ~5s shorter than normal
```

## References

pwd	Requires a minimum user level of “Installer”
c ctf	Cycle Count Fault Limit sets the maximum friction faults per open/close cycle before failure
c fsat	Disabling “Span Adjust” will decrease the cycle time by ~5s / cycle.
Tech Brief	TLE Mitigation

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## Supported User Levels

<input type="checkbox"/>	User
<input checked="" type="checkbox"/>	Installer
<input checked="" type="checkbox"/>	Developer
<input checked="" type="checkbox"/>	Factory

## cyc (Cycle Test)

Syntax: cyc [VALUE]  
Abbreviation: t  
Range/Units: 1 - 1000000  
Default: n/a

## Command Description

The “**cyc**” or “**t**” command, initiates, updates or reports the status of a cycle test already running. It can be used by installers during their final test, while tuning “Soft Touch”, or dealer/customer demonstrations. The test can be commanded to exercise an G3 automation system to open and close a door between 1 and 1,000,000 times.

## Starting a Cycle Test (cT)

To execute a test, 2 commands are required:

- “t 3” Initializes the cT for 3 open + close cycles. Door does not move
- “b c” Button Close is used to “start” the test. Door begins to move and testing begins.
  - \* If the door was already closing when the “t” setting was issued, the 2<sup>nd</sup> command “b c” is not required. Testing will begin after the door closes.

## Terminal Output

```
Cmd>t 15 // Cycle test, for 15 cycles is requested

Cycle Test
-----
Status          READY // Status is "Ready" to start. Door does NOT move yet...
Progress:       0.00%
Oneway Travel:  0.00 ft
Cycle Time:     TBD // Time for 1 open + close cycle. Updates after 1st cycle.
Time Remaining: TBD // Estimated time to completion in sec, min, hours, days, months and years
Cycle Info      Opening // Current operation, either Opening or Closing
Current Cycle:  0
Total Cycles:   3 // Total cycles requested. Can be changed with "t VALUE" while running
On Open
Friction Faults: 0 // Friction & Motion Faults during Open
Motion Signals: 0
On Close
Friction Faults: 0 // Friction & Motion fault counts during Close
Motion Signals: 0
Cycle Faults:   0/5 // Cycle fault count down, Current/Maximum, before the test errors out

cmd>b c // Starts the test and the cT status changes to "Running". Movement starts.
```

## TLE Warning:

Prior to running a cycle test verify the controller does not indicate “TLE” events in the CLI. Running a cycle test on a controller that is experiencing TLE Over-temperature faults will damage the controller’s motor driver chip after approximately 100 events. Refer to the TLE Mitigation Tech Brief for information on preventing TLE faults if you wish to cycle test a system on a high friction installation.

## References

pwd	Requires a minimum user level of “Installer”
c ctf	Cycle Count Fault Limit sets the maximum friction faults per open/close cycle before failure
c fsat	Disabling “Span Adjust” will decrease the cycle time by ~5s / cycle.
Tech Brief	Cycle Testing
Tech Brief	TLE Mitigation

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Part Number(s): 28C0030(G3), 28C0061(RCM), 29C0052(RS485)

## Document Revisions

Revision	Release Date	Description
1.0.0	Sep 22, 2020	Initial release
1.0.1	Oct 2, 2020	Fixed typos in "Soft Touch" Tuning
1.0.2	Nov 19, 2020	Added info on "hard current limit" vs "Soft Touch"
1.0.3	Mar 15, 2021	TLE update with firmware v0.7.2
1.0.4	Mar 22, 2021	Updated TLE Tech Brief
1.0.5	Mar 24, 2021	Fixed some typos & added a recommended command to the TLE docs

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## G3 Firmware Revisions

Revision	Release Date	Description															
0.7.2 (latest)	Mar 11, 2021	Maintenance release to address "TLE" over-current/temp issue. <ul style="list-style-type: none"><li>• "hfi" help command added for "TLE" issues</li><li>• Help commands "avi", "maxc" and "acdc" added</li><li>• Config command "spl" added</li><li>• "c all reset" updated to preserve "spl" and "hfi" settings</li><li>• "TLE" over-current/temps counts tracked in flash</li><li>• G3 LED color code updated</li><li>• Panel 1 mass increased to 50,000/100,00lbs (Oneway/Bipart)</li></ul>															
0.7.1	Aug 28, 2020	Functionally identical to the v0.7.0 release. Updated 4 parameters to use new defaults. <table><tr><th>Command</th><th>v0.7.1 New Defaults</th><th>v0.7.0 Defaults</th></tr><tr><td>osp</td><td>4.0000 IPS</td><td>4.5000 IPS</td></tr><tr><td>csp</td><td>4.0000 IPS</td><td>4.5000 IPS</td></tr><tr><td>fpce</td><td>470mA</td><td>430mA</td></tr><tr><td>fpthr</td><td>10 counts</td><td>5 counts</td></tr></table>	Command	v0.7.1 New Defaults	v0.7.0 Defaults	osp	4.0000 IPS	4.5000 IPS	csp	4.0000 IPS	4.5000 IPS	fpce	470mA	430mA	fpthr	10 counts	5 counts
Command	v0.7.1 New Defaults	v0.7.0 Defaults															
osp	4.0000 IPS	4.5000 IPS															
csp	4.0000 IPS	4.5000 IPS															
fpce	470mA	430mA															
fpthr	10 counts	5 counts															
0.7.0	Aug 21, 2020	"Special Features" release for G3 K12. G3 K02 is not supported. <ul style="list-style-type: none"><li>• Entertainment, Close Behind, Simplicity &amp; Motion Assist modes</li><li>• UL325 closing force reduced by 35% over v0.6.7</li><li>• Improved security, delayed mag brake, manual span adjust, etc</li><li>• Integrated cycle testing</li><li>• Profile bin resolution increased by 300%.</li><li>• Cleaner CLI interface optimized for smart phone access</li></ul>															
0.6.7 (K12) 0.5.91(K02)	Dec 3, 2019	Initial production release for G3 supporting basic door functions only using wired & wireless accessories. Processors K02 & K12 supported.															