

# SC1 Gen2 V2 by Draper

## Application Notes

- Abbreviations used in this document: # = Main Channel of the SC1 Gen2 V2 - factory default is **1**; **O** = Open; **C** = Close; **S** = **STOP**; **N** = SC1 Channel between 1 and 60; **Chan** = SC1 Channel; **O<sub>x</sub> O<sub>y</sub> O<sub>z</sub>** = Multi-button sequences using **Open** commands as integers 0-9 (O10 as 0, O1 as 1, O2 as 2, ...); **SPST** = Single Pole Single Throw; **SPDT** = Single Pole Double Throw
- Note that **O#** can also be **OALL** if you want to program more than one SC1 gen2 V2 motor control.
- See *SC1 Gen2 V2 Programming Summary* for specific programming sequences.
- See *SC1 Gen2 Specifications and Installation Instructions* for wiring instructions and electrical schematics.
- See *SC1 Gen2 V2 Command Summary* for additional technical information relating to RQ commands and protocol.

## Factory Defaults:

### Channels:

Main Channel = 1 using standard action, Groups 1-6 = Off and not Sticky, no Special Action channel, no Specific Stop channel, **ALL** button on Transmitter acted on using Sticky action.

### Motor Actions:

Maintained Motor Action, Standard Motor Direction, Standard Motor Release Time, Do not Stop on Transmitter Button Release.

### Manual Inputs:

SPDT, Standard Timing, Do Not Stop On Manual Input Release, Standard action (not sticky), Manual Inputs as labeled, Override Disabled.

### Run Time:

180 seconds.

### Intermediate Positions:

Standard accuracy, reference is at the Open limit, Auto-Tilt not enabled, Travel Time = 10 seconds. Intermediate Positions A & B enabled on 3<sup>rd</sup> Group Channel, Intermediate Positions C & D enabled on 4<sup>th</sup> Group Channel, all other channels and switches do not have Intermediate Positions enabled. Intermediate Position A (Open command) = 20%, Intermediate Position B (Close command) = 80%, Intermediate Position C (Open command) = 40%, Intermediate Position D (Close command)=60%, and no nudge amount.

### Load Sensing:

Minimum Load Threshold = approximately .05 Amp (6W at 115VAC, 12W at 230VAC). This default value is overwritten during Auto Calibration.

Stall Load Threshold = 0 (ignored). This default value is overwritten during Auto Calibration.

### LED:

On power-up, the LED will blink red, red, green. ( • • • )

# DRAPER®

411 S. Pearl St., Spiceland, IN 47385 USA ■ 765-987-7999  
www.draperinc.com ■ fax 765-987-7142

Copyright ©2010 Draper, Inc. Form SC1gen2V2\_AppNotes10 Printed in USA

# SC1 Gen2 V2 Application Notes

## Change History:

### V1 to V2:

1. Resolved issue related to nudging Intermediate Positions A&B.
2. Resolved issue related to unintended movement when rapid button presses from an SC1 Input Device (transmitter or keypad).
3. Resolved issue related to unintended movement on power-up related to Manual Inputs.
4. Resolved issue related to unexpected results while moving to a new position from an SC1 Gen2 move command while already in motion to limit via any previous command.
5. Updated RQ Manual Input (switch) reporting to always be enabled.

### **“Special Action” Channel**

Setting this Channel (S+7+7 > O# > C20 > O“N” > Ox) creates channel N with special features.

- **Reversed** means an Open command is converted to Close, and vice versa. Other features enabled as selected.
- **Sequential** action means the direction of the command is ignored, and the motor will go in the opposite direction it went last. If the motor is moving when either command is received it will stop. This may not operate correctly if load sensing is not working properly.

### **“Auto-Reset” and Position Accuracy**

The accuracy of the position is not as good when the motor is moving towards the reference as it is when moving away from the reference. Auto-Reset is used to reduce this error. An Auto-Reset sequence works as follows: Instead of going to the commanded position, the motor will first go to the reference, then reverse and go to the commanded position.

The unit remembers its position over a power cycle UNLESS the motor is moving when power fails. If this happens and an Intermediate Position button is pressed before the unit goes to either limit, then the command will cause the motor to Auto-Reset.

When an Auto-Reset occurs, an SC1 gen2 message will be generated when the motor starts, indicating position and direction. There will be a second position and direction message when the motor reverses at the reference. Then there is a final position message when the motor gets to the commanded position.

### **Normal Accuracy**

To help eliminate drift, the control counts how many times the motor has stopped while moving towards the reference after having been at either limit. If the count reaches 6, then an Auto-Reset happens on the next SC1 gen2 move to position command, or when a move to Intermediate Position bus command is received. (This count is not yet administrable.)

### **High Accuracy with reference at the open limit**

There is an Auto-Reset if an RQ move to position command, or a move to Intermediate Position bus command, is received and the motor has gone in the Open direction anytime since being at the Open limit.

### **High accuracy action with reference at the close limit**

There is an Auto-Reset if an RQ move to position command, or a move to Intermediate Position bus command, is received and the motor has gone in the Close direction any time since being at the Close limit.

# SC1 Gen2 V2 Application Notes

## Calibration

The SC1 Gen2 V2 has one Calibration procedure. From the SC1 Bus, S+7+7 > O# > C10 > O10 will cause the motor to perform the Calibration sequence:

**If the motor being installed requires the utilization of Stall Load and/or Minimum Load Thresholds, be sure to set them prior to performing calibration.**

1. Move to the reference limit or stall.
2. Reverse and move to the other limit or stall.
3. Reverse and move back again to the reference limit or stall.

**\*DO NOT interrupt the Calibration sequence. STOP will be ignored during the calibration sequence unless pressed for at least 2 seconds and then the Calibration will be aborted.\***

If you are changing the motor direction (S+7+7 > O# > C6 > O2) or changing the reference (S+7+7 > O# > C10 > O11), these options must be selected before doing the Calibration.

The motor physical limits must be set before doing the Calibration. If the limits are changed, then you must re-Calibrate.

The Intermediate Positions are calculated based on % of travel time plus nudge offset and the % and nudge can be set before Calibration if so desired.

If travel time is unknown (not yet calibrated), all Intermediate Position commands are ignored. Calibration sequences set the Run Time to 5 seconds more than the longest Travel Time.

If the unit is not calibrated correctly, the Intermediate Positions will be different when going open than when going closed. The positions may also be off if the material is thick, or if the motor does not move at a constant speed in both directions.

### Calibration Alternative A

You may also perform a calibration sequence while the motor is stopped by pressing and holding for 10 seconds the STOP button on any keypad, the T5-5000 transmitter or any other input device (i.e. R2D7) that can send the STOP command for a minimum of 10 seconds.

### Calibration Alternative B

You may specifically set the Travel Time to  $100x+10y+z$  seconds if you do not want to go through the Calibration procedure by pressing S+7+7 > O# > C10 > O13 then  $O_x > O_y > O_z$  (maximum is 299 seconds, use O10 for zero). Doing this will make the SC1 gen2 messages work, but the position is likely to be off.

If the unit is not calibrated correctly, the Intermediate Positions will be inaccurate. The positions may also be off if the material is thick, or if the motor does not move at a constant speed in both directions.

# SC1 Gen2 V2 Application Notes

## Setting Intermediate Positions Alternative

With the motor stopped at the position of the desired Intermediate Position, you may hold the appropriate open or close channel command which is programmed to have Intermediate Positions enabled. When the open or close command is held for 5 seconds that Intermediate Position channel will be set 'there'. In response, the motor will jog for .1 sec, stop for 1 sec, then jog back to let you know the Intermediate Position was set. Repeat this sequence for the other channel commands programmed for Intermediate Positions.

## Load Sensing

If load sensing is not working correctly, you will not be able to Calibrate and Intermediate Positions will not work. If a motor stalls at one end of travel, and stall sensing is not well-tuned, then the Intermediate Positions may not be accurate. Refer to the "Table of Thresholds Values" below for specific x, y, and nudge values.

## Minimum Load Threshold and Stall Load Threshold

To set the Minimum Load Threshold for the motor, use the programming sequence: S+7+7 > O# > C18 > O<sub>x</sub> > O<sub>y</sub>. Set the Stall Load Threshold with S+7+7 > O# > C21 > O<sub>x</sub> > O<sub>y</sub>. When entering O<sub>x</sub>, Open commands beyond the range of the unit will be ignored. O<sub>y</sub> does not need to be pressed if it is 0 (O10). Extra digits are ignored after O<sub>y</sub> is entered.

A Minimum Load Threshold of 0 is special. The Minimum Load sense is not checked. This is useful if the unit is driving a very small load such as relays that are switching power to a large motor. Zero may be set via S+7+7 > O# > C18 > O10 > S or by nudging the threshold down to zero (0). If the Minimum Load Threshold is set to 0 and stall is set to ignore, the unit cannot perform the Standard Calibrate sequence and Intermediate Positions will not work.

Once the motor has started, the current must fall below and stay below the Minimum Load Threshold for ½ second for the control to determine that the motor has reached its limit. This time is not adjustable. Stall sensing requires the motor current to exceed and stay above the Stall Load Threshold for ¼ second before power is removed. This time is not adjustable.

## Stop On Stall

To set the unit to stop when the motor stalls, measure the current the motor draws while running or read the number off the motor rating label. Enter that into the Stall Threshold. Run the motor to the stall point and verify that the SC1 gen2 relays shut off ¼ second after the motor stalls. If the control does not shut off, then the stall value is too high. Press STOP then set the threshold lower or nudge it down a few times (S+7+7 > O# > C19 > O12 > O12 > O12). Repeat the stall test until the control shuts off appropriately. Verify that the motor runs correctly from limit to limit without stopping somewhere in the middle. If the motor stops in the middle, then the Stall Threshold is too sensitive. Nudge it up once (S+7+7 > O# > C19 > O11), then re-verify operation. The motor must not get hot during this sequence. If it does, the stall may not be set favorably.

If the stall level is set too low, the motor will only run briefly, then it will only run the other way briefly when that command is received, because the control believes it is at the limit when it detects a stall.

## SC1 Gen2 V2 Application Notes

### Table of Minimum Load and Stall Load Threshold Values

Keep in mind that the values below are approximate. Experimentation may be required to achieve a particular threshold value.

x	y	Threshold(Amps)	Nudge(milliAmps)
0	1	0.09	24
0	2	0.19	25
0	3	0.29	26
0	4	0.40	27
0	5	0.51	28
0	6	0.62	29
0	7	0.74	30
0	8	0.86	31
0	9	0.98	32
1	0	1.11	33
1	1	1.24	34
1	2	1.38	35
1	3	1.52	36
1	4	1.67	37
1	5	1.82	38
1	6	1.97	39
1	7	2.13	40
1	8	2.29	41
1	9	2.45	42
2	0	2.62	43
2	1	2.79	44
2	2	2.97	45
2	3	3.15	46
2	4	3.34	47
2	5	3.53	48
2	6	3.72	49
2	7	3.92	50
2	8	4.12	51
2	9	4.32	52
3	0	4.53	53
3	1	4.74	54
3	2	4.96	55
3	3	5.18	56
3	4	5.41	57
3	5	5.64	58
3	6	5.87	59
3	7	6.11	60
3	8	6.35	61
3	9	6.59	62
4	0	6.84	63
4	1	7.09	64
4	2	7.35	65
4	3	7.61	66
4	4	7.88	67
4	5	8.15	68
4	6	8.42	69
4	7	8.70	70
4	8	8.98	71
4	9	9.26	72
5	0	9.55	73
5	1	9.84	74
5	2	10.14	75