

User Manual

Common Sense 3 Controller

Greenhouse Technology Inc.

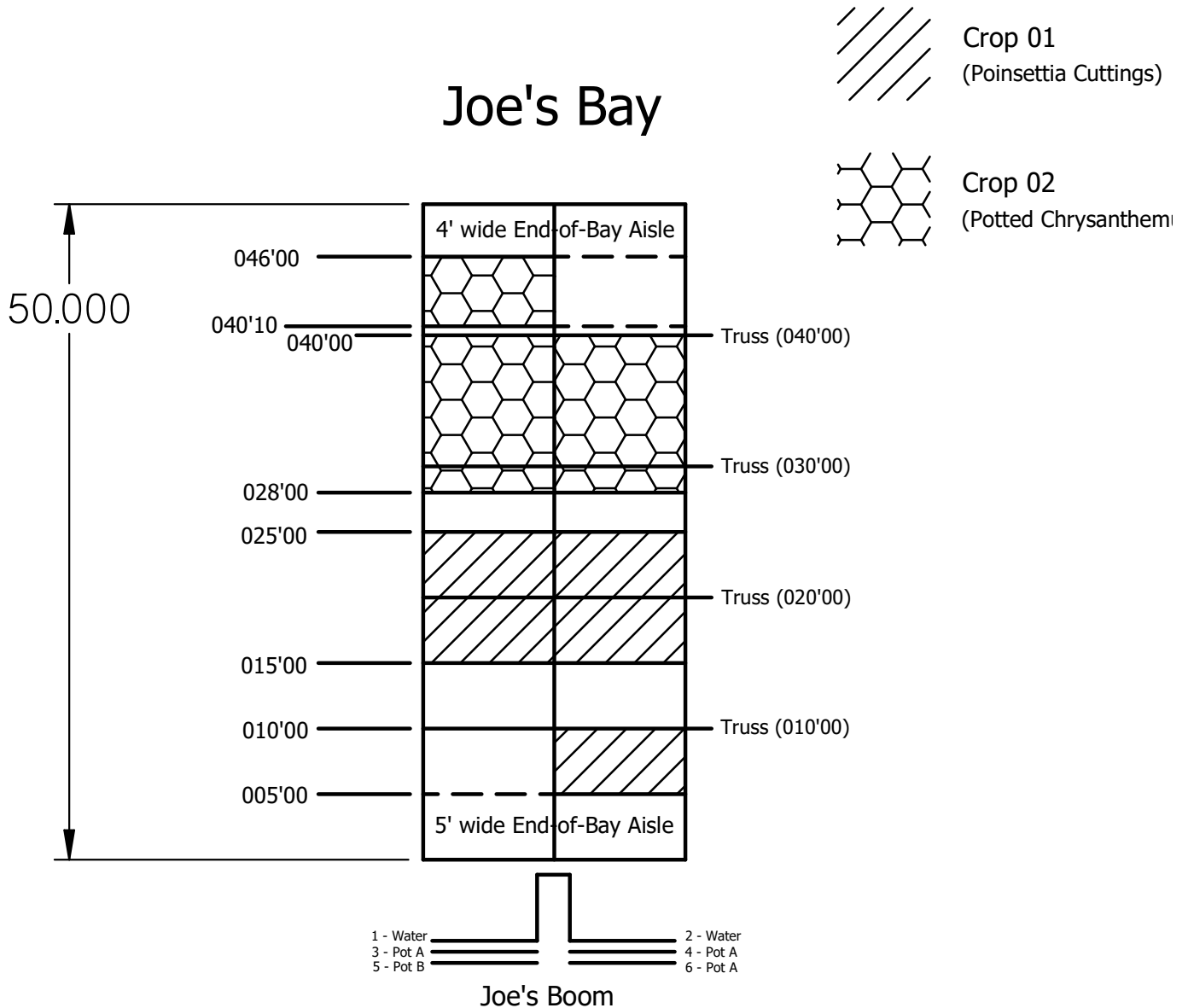
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Scenario

2 Crops - One Pots, One Not

Joe has 2 crops. Crop 01 is poinsettia cuttings, and crop 02 is chrysanthemums in 8" pots spaced in rows 14" apart. He's just installed his Common Sense 3 boom and he's ready to grow!



He wants to water Crop 01 at speed 20 every 10 minutes between 7am and 7pm, and he wants to water Crop 02 only twice per day, 7:30 am and 6pm, 15 seconds per pot.

Home Screen

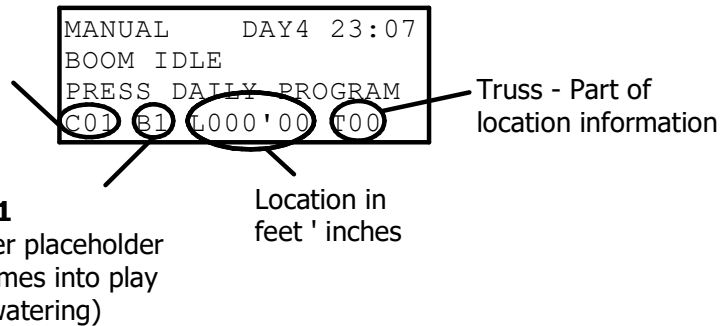
Starting at the Manual Mode home screen:

```
MANUAL      DAY4 23:07
BOOM IDLE
PRESS DAILY PROGRAM
C01 B1 L000'00 T00
```

Joe notices a few things about the screen.

Crop 01

(on this screen, it's a placeholder - it comes into play when watering)



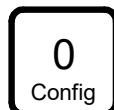
Auto, Pot and Remote modes each have their own home screen showing roughly similar information (Pot mode does not show Day / Time).

Calibration

Joe's boom is brand new, so to start things off, he plans to calibrate it.

Note: Joe lives in America. He's used to working with feet and inches, and all his greenhouse's dimensions are in feet and inches. If you prefer using metric units every day, or if you have a metric greenhouse, please refer to "Changing Units" (page 18) before calibration.

He presses



to open the Config menu.

```
1) SET CLOCK
2) BOOM DEFAULTS
3) SYSTEM CONFIG
4) CALIBRATE
```

During the calibration process, the boom asks you to fill in a few values, then it moves around to learn:

1. Distance
2. Whisker Offset
3. Coasting distance (for end-of-bay emergency stop)

Because the boom is starting from knowing nothing, and a generic configuration that might not match your boom, it might have some errors during calibration, so please be patient.

Starting from the Config Screen

```
1) SET CLOCK
2) BOOM DEFAULTS
3) SYSTEM CONFIG
4) CALIBRATE
```

Joe presses

4

```
WARNING 1/2
BOOM IS VULNERABLE
WHILE CALIBRATING!
[ENTER] = MORE
```

He reads the first part of the warning, then presses

Enter

```
WARNING 2/2
STAY WITH YOUR BOOM
WHILE IT IS MOVING
[ENTER] = OK
```

Now he presses

Enter

again:

```
CALIBRATE 1/9
TEST < > (REV/FWD)
DIST: 0000000
ENTER = MORE
```

Joe can press [Enter] to skip this step, but this boom is brand new, and Joe does not actually know which direction the boom thinks is "forward",

So he presses



The boom moves. Good! Joe wanted the boom to think of this direction as forward. If Joe wanted this direction to be reverse, not forward, he might stop here, unplug the controller and switch the motor leads - then calibrate again, and check the direction again at this same screen.

```
CALIBRATE          1 / 9
TEST < > (REV/FWD)
DIST: -000441
ENTER = MORE
```

The Encoder is out of sync with the motor - See the minus sign? That means that the encoder thinks the boom just moved in reverse. To fix this, power down the controller, then switch the B+ and B- leads in the encoder connector on the circuit board.

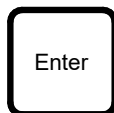
Note: Please stop and take time to:

- 1. Make sure that your boom moves in the correct direction***
- 2. Make sure that the encoder is in sync with the motor***

before proceeding further.

After correcting wiring as needed, Joe tests again. This time the encoder reading is positive. Awesome!

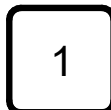
He presses



to continue.

```
CALIBRATE          2 / 9
TRUSS SPACING:
          12 FT
[F1]=UNIT [ENTER]=OK
```

Joe's truss spacing is 10ft., so he types



```
CALIBRATE          2 / 9
TRUSS SPACING:
          10 FT
[F1]=UNIT [ENTER]=OK
```

then



```
CALIBRATE          3/9
MAX SPEED: 24
SEE BOOM NAMEPLATE
```

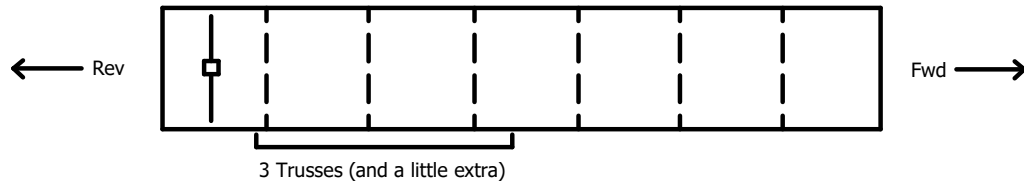
Joe wants maximum speed to be 24, so he leaves this screen as-is.

He presses [Enter]



```
CALIBRATE          4/9
REV < > FWD
[ENTER] = STOP
NEED 3 TRUSSES SPACE
```

Now it's time to actually run the calibration. Joe has to make a choice. The boom needs room to calibrate: 3 trusses' worth, not including the wall. Joe's boom has room to calibrate in the forward direction,



So he chooses forward

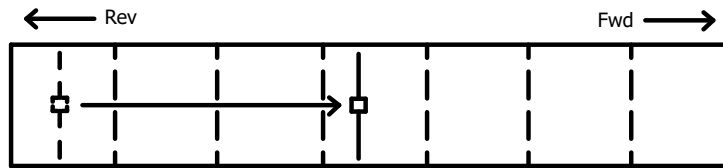


```
CALIBRATE          5/9
PLEASE WALK WITH
YOUR BOOM
[ENTER] = STOP
```

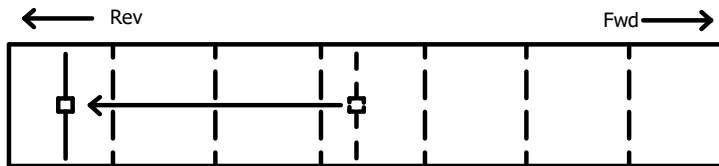
Note: Only calibrate if you know ahead-of-time which direction is forward/reverse, and that you have enough space.

```
CALIBRATE          6/9
CALIBRATING...
[ENTER] = STOP
```

Joe's boom begins to move. It moves forward at top speed through 3 trusses, then suddenly turns off the motor and drifts to a stop:



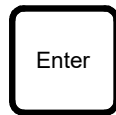
Then it moves in reverse at top speed back through the same 3 trusses, and stops:



The calibration is successful*, and Joe sees this screen:

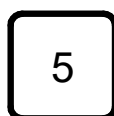
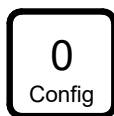
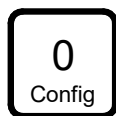
```
CAL DONE!           7/9
[ENTER] = OK
```

Joe presses



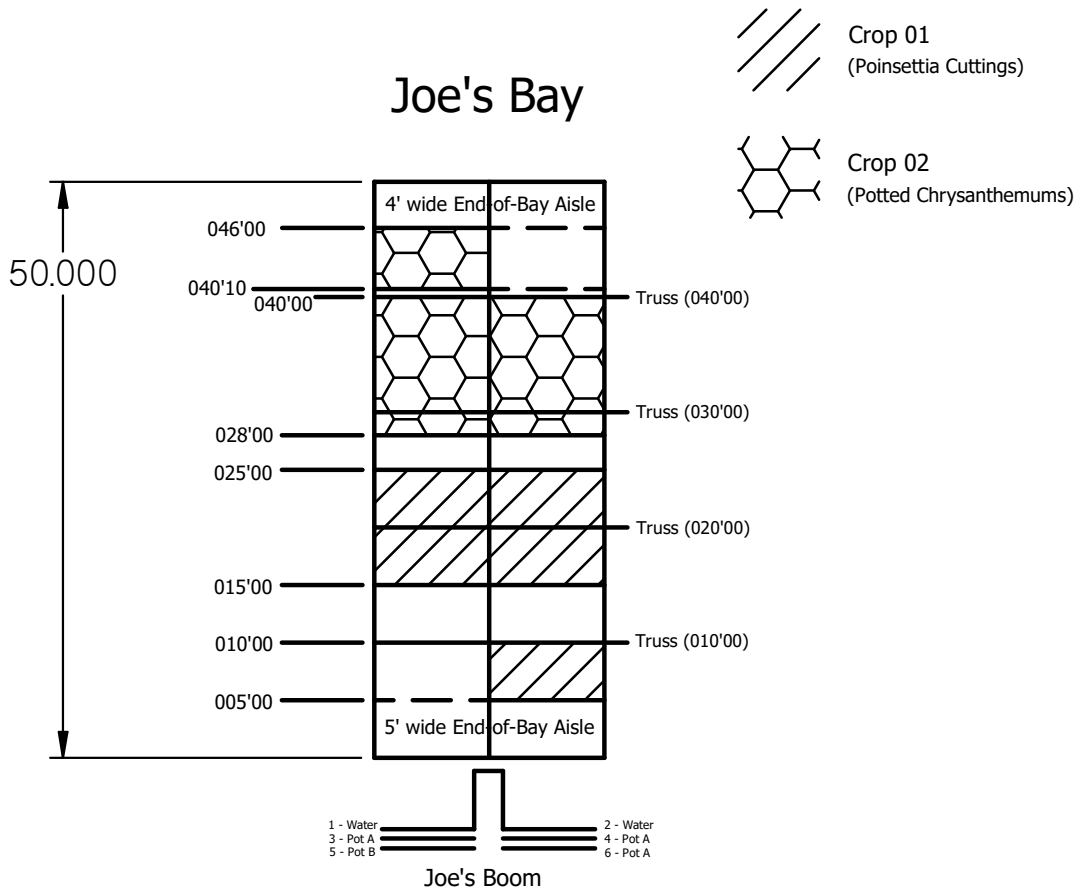
```
CALIBRATE           8/9
LOW STOP: 002'00
HIGH STOP: 094'00
1ST TRUSS: 012'00
```

His bay is 50ft long, with a 5' aisle at the low end, and a 4' aisle at the high end.



```
CALIBRATE           8/9
LOW STOP: 005'00
HIGH STOP: 046'00
1ST TRUSS: 010'00
```

*If calibration fails, see page 17




Joe wants the boom to stay out of both aisles so it doesn't collide with carts. His first end aisle is from the wall (0ft) to 5ft, so for the low stop, he enters:



```

CALIBRATE 8/9
LOW STOP: 005'00
HIGH STOP: 094'00
1ST TRUSS: 012'00
    
```


and presses  to move to the "High Stop" field on the screen.

Then he types  to enter 046'00

```

CALIBRATE 8/9
LOW STOP: 005'00
HIGH STOP: 046'00
1ST TRUSS: 012'00
    
```

(he doesn't enter zeros for the inches because there are already zeroes there)

and presses  to move to the "1st Truss" field on the screen.

```
CALIBRATE      8/9
LOW STOP: 005'00
HIGH STOP: 046'00
1ST TRUSS: 012'00
```

Joe's bay has trusses every 10 feet. In particular, the first truss away from the wall at the "low end" of the bay is exactly 10ft from that wall.

So Joe enters

0
Config

1

0
Config

```
CALIBRATE      8/9
LOW STOP: 005'00
HIGH STOP: 046'00
1ST TRUSS: 010'00
```

Looks good! Joe presses

Enter

```
CALIBRATE      9/9
SET BOOM LOCATION:
000'00
[ENTER] = OK
```

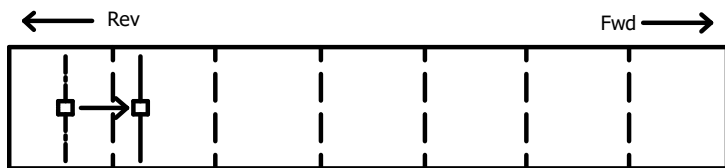
Joe enters 007'00. This is a few inches off, but the boom should accurize and correct this small error, since it is way less than one-half of the truss spacing (10 ft)

He presses

Enter

ACCURIZING

The boom moves forward (since that is the direction in which it just finished calibrating) past the nearest truss.



And the boom is finished calibrating!

- 1) SET CLOCK
 - 2) BOOM DEFAULTS
 - 3) SYSTEM CONFIG
 - 4) CALIBRATE

Home & Purge

After Calibration, Joe wants to set up the boom's Home and Purge Locations. Home is where the boom goes when it is not busy, and Purge Location is where it goes to purge / charge the water lines with a different chemical mixture.

After Calibration, Joe is at the Config menu*:

- | |
|------------------|
| 1) SET CLOCK |
| 2) BOOM DEFAULTS |
| 3) SYSTEM CONFIG |
| 4) CALIBRATE |

From here, he presses **2** (Boom Defaults) to see:

- | |
|--------------------|
| 1) FOOT DISTANCE |
| 2) SPEED DEFAULTS |
| 3) NUMBER OF CROPS |
| 4) MISC SETUP |

then **1** (Foot Distance):

- | |
|-----------|
| 1) UNITS |
| 2) BAY |
| 3) PLACES |
| 4) TACH |

then **3** (Places):

PLACES
HOME: 005'00
PURGE: 093'00

**(if not, he could just press*

0
Config

from any mode's main screen to get here).

Joe wants home to be at 5ft, so he types



```
PLACES
HOME: 005'00
PURGE: 093'00
```

then



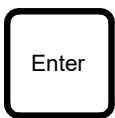
to move the cursor to the next field (Purge)

Joe wants his purge location to be at 26'-6" where there are no plants, so he enters



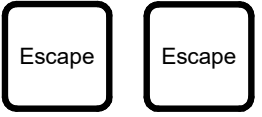
```
PLACES
HOME: 005'00
PURGE: 026'06
```

Looks good. Joe presses



- 1) UNITS
2) BAY
3) PLACES
4) TACH

He's finished setting Home and Purge, so he escapes back out to the Manual Mode Main Screen.



```
MANUAL DAY4 23:07
BOOM IDLE
PRESS DAILY PROGRAM
C01 B1 L012'00 T00
```

Valve Pretriggers

Water takes a while to reach the soil after the valve output has been turned on in the controller. The valve solenoid must actuate, opening the valve. Then the bar (which still contains some water) must pressurize to the pressure rating of the nozzle check valves. Then the water has to travel down to the soil surface.

Starting at the Manual Mode Home Screen

```
MANUAL    DAY4 23:07
BOOM IDLE
PRESS DAILY PROGRAM
C01 B1 L000'00 T00
```

Joe presses

0
Config

```
1) SET CLOCK
2) BOOM DEFAULTS
3) SYSTEM CONFIG
4) CALIBRATE
```

then

2

```
1) FOOT DISTANCE
2) SPEED DEFAULTS
3) NUMBER OF CROPS
4) MISC SETUP
```

4

```
1) WHISKER OFFSET
2) PURGE SETTINGS
3) DRIFT DISTANCE
4) VALVE PRE-TRIGGER
```

4

```
VALVE PRE-TRIGGER:
ON: 0250
OFF: 0950
IN ms
```

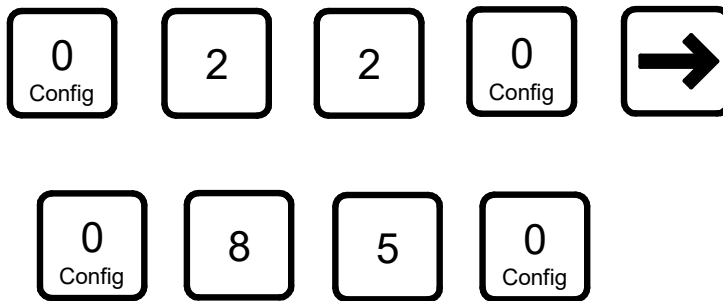
The default values are:

250ms pretrigger for turning water on
950ms pretrigger for turning water off

It takes the water longer to stop flowing than to start. That's why there are separate valve on and off pre-triggers. The default values are reasonable, but they don't match Joe's boom.

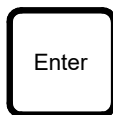
He wants the water to turn on and off a little bit later, so he wants smaller pretrigger values so that the valves are triggered "less-ahead-of-time".

Joe enters 220ms for the valve on pretrigger and 850ms for the valve off pretrigger:



```
VALVE PRE-TRIGGER:  
ON: 0220  
OFF: 0850  
IN ms
```

Looks good. Joe presses



```
1) WHISKER OFFSET  
2) PURGE SETTINGS  
3) DRIFT DISTANCE  
4) VALVE PRE-TRIGGER
```

Then

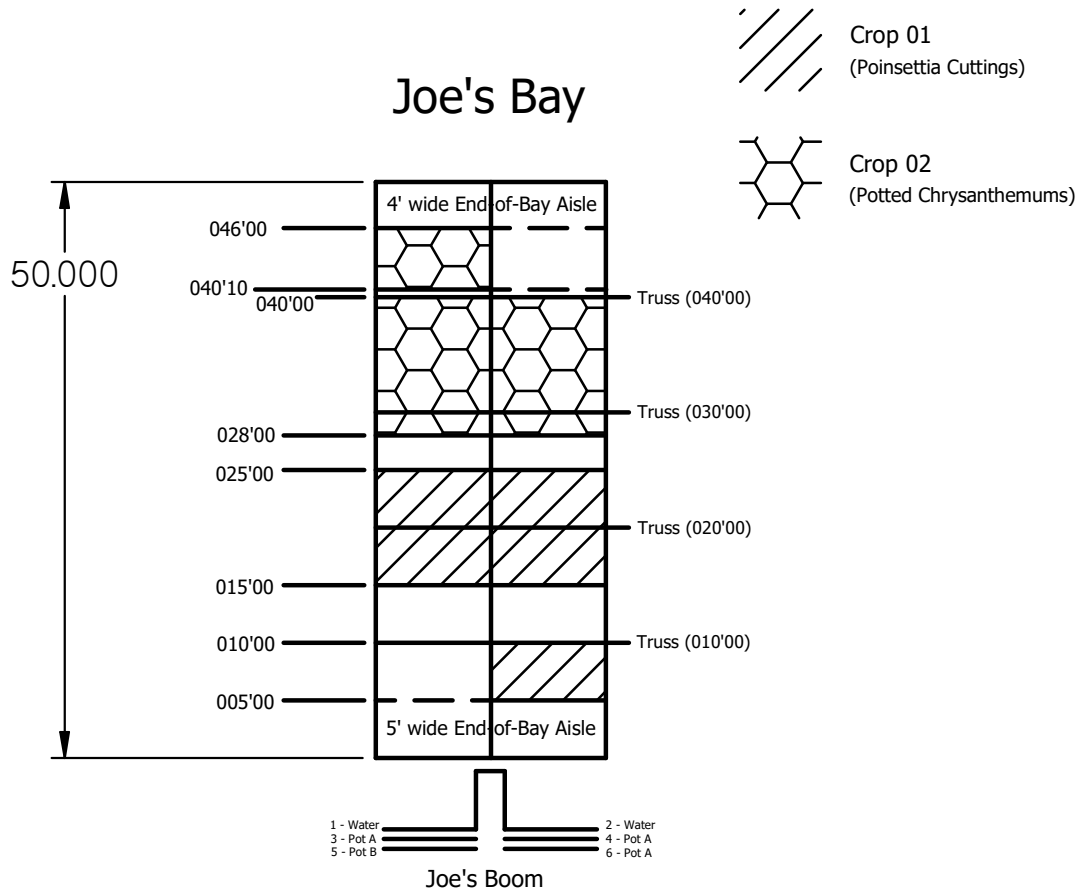


back out to the Manual Mode Main Screen

```
MANUAL DAY4 23:07  
BOOM IDLE  
PRESS DAILY PROGRAM  
C01 B1 L000'00 T00
```

To Change Total Number of Crops

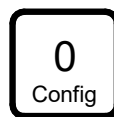
Joe wants to have a second crop in his bay:



Starting at the manual mode base screen

```
MANUAL    DAY4 23:07
BOOM IDLE
PRESS DAILY PROGRAM
C01 B1 L000'00 T00
```

Joe presses



to open the config screen:

- 1) SET CLOCK
- 2) BOOM DEFAULTS
- 3) SYSTEM CONFIG
- 4) CALIBRATE

Then

2

(Boom Defaults):

```
1) FOOT DISTANCE
2) SPEED DEFAULTS
3) NUMBER OF CROPS
4) MISC SETUP
```

Then

3

(Number of Crops):

```
TOTAL CROPS:01
TOTAL NUMBER OF
CROPS (1-16)
```

He enters

0
Config

2

```
TOTAL CROPS:02
TOTAL NUMBER OF
CROPS (1-16)
```

and presses

Enter

which saves the new number of crops,

and brings him back to the "Boom Defaults" screen:

```
1) FOOT DISTANCE
2) SPEED DEFAULTS
3) NUMBER OF CROPS
4) MISC SETUP
```

He's done setting the number of crops, so Joe presses

Escape

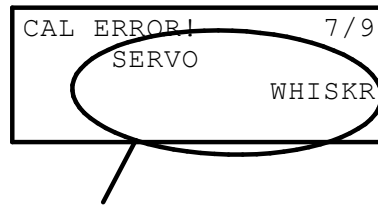
a few times,

until he ends up at the manual mode base screen:

```
MANUAL      DAY4 23:19
BOOM IDLE
PRESS DAILY PROGRAM
C01 B1 L000'00 T00
```


If Calibration Fails

If calibration fails, look at the error code - it should help you find out what happened:



Error Codes

(This might be different depending on which errors were logged during calibration)

Here are the CS3's error codes and what they mean:

0001	Truss Error	(Not reading trusses properly, uneven truss spacing)
0002	No Motion Error	(Boom unable to move / not properly detecting motion)
0004	I-Limit Error	(Motor drawing too much current / I-Limit set too low)
0008	Collision Error	(Boom collided with something / Collision loop not closed)
0010	Temperature Error	(Board too hot)
0020	Out of Bounds Error	(Boom out of bounds - never happens during calibration)

If you encounter any of these, please call GTI tech support!

To Change Units

Over in Europe, Joe's friend Jacques wants to use the Common Sense 3 boom, but his greenhouse is 100% metric in every dimension, and Jaques, being Euro(tm), is a big fan of metric. To change units,

(Starting from the Manual Mode Home Screen):

```
MANUAL    DAY4 23:19
BOOM IDLE
PRESS DAILY PROGRAM
C01 B1 L000'00 T00
```

Jacques presses

0
Config

to open Config:

```
1) SET CLOCK
2) BOOM DEFAULTS
3) SYSTEM CONFIG
4) CALIBRATE
```

then

2

(Boom Defaults):

```
1) FOOT DISTANCE
2) SPEED DEFAULTS
3) NUMBER OF CROPS
4) MISC SETUP
```

then

1

(Foot Distance):

```
1) UNITS
2) BAY
3) PLACES
4) TACH
```

then

1

(Units):

```
UNITS
REF. OFFSET: FT
REF. SPACING: FT
EVERYTHING ELSE: FT
```

Note:

1. Stops refers to the "High Stop" and "Low Stop" , which limit boom movement

2. "1st Truss" is the location of the first truss from the "Zero Wall"

3. "Everything Else" includes location, pot spacing, etc - the numbers you want to see every day

```

UNITS
1ST TRUSS: FT
TR SPACING: FT
EVERYTHING ELSE: FT
    
```

Jacques is on the Units screen, with the cursor on the

"FT" unit symbol next to "1ST TRUSS". To toggle between "FT" (feet) and "M" (meters),

Jaques presses



, and Voila!

```

UNITS
1ST TRUSS: M
TR SPACING: FT
EVERYTHING ELSE: FT
    
```

Note: This changes the units for The "1ST TRUSS" in the

Config > [2] Boom Defaults > [1] Foot Distance > [2] Bay Screen

To metric (with two decimal places - centimeters)

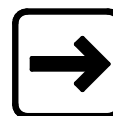
```

BAY
LOW STOP: 002'00
HIGH STOP: 094'00
1ST TRUSS: 003.66
    
```

The apostrophe becomes a decimal point, and the foot-distance value is converted to metric.

LOW STOP: 002.99

To adjust units for "1ST TRUSS", Jacques presses



to move the cursor,

and



to toggle the unit from "FT" to "M"

```

UNITS
1ST TRUSS: M
TR SPACING: M
EVERYTHING ELSE: FT
    
```

Note: This changes the units for "Tr Spacing" in the

Config > [4] Calibrate > Screen 2/9

```

CALIBRATE                2/9
TR SPACING: 003.66

```

The apostrophe becomes a decimal, and the foot-distance value is converted to metric.

And finally he repeats this process for the "EVERYTHING ELSE" units field:



```

UNITS
1ST TRUSS: M
TR SPACING: M
EVERYTHING ELSE: M

```

This is for the numbers you see every day - it changes the units for Home, Purge, Crop Blocks (locations), Pot Mode Row Spacing, etc.

```

PLACES
HOME: 000.91
PURGE: 028.35

```

```

002.00 - 010.00
-----
01 MANUAL                1/2

```

```

002.00 - 010.00
-----
-----
01 POT                    1/2

```

```

PASSES: 02
WATER TIME: 010
POT SPACING: 001.00
01 POT                WATER

```

When he's done, Jaques presses



to save and exit

- 1) UNITS
- 2) BAY
- 3) PLACES
- 4) TACH

and



x 3 to escape back out to the Manual Mode Home Screen:

```
MANUAL    DAY4 23:19  
BOOM IDLE  
PRESS DAILY PROGRAM  
C01 B1 L000'00 T00
```

He's done!

We leave Jaques to his growing, and return to North America where Joe is still using old-fashioned feet and inches.

Manual Mode - Setup Crops

Joe is ready to set up his 2 crops. The menus are mostly the same as in all Common Sense booms:

From the home screen

```
MANUAL    DAY4 23:07
BOOM IDLE
PRESS DAILY PROGRAM
C01 B1 L000'00 T00
```

he presses

Setup
Learn

This is the Manual Mode Setup Menu:

```
1) START
2) DISPLAY CROP
3) DISPLAY PASSES
4) EDIT CROP
```

He presses

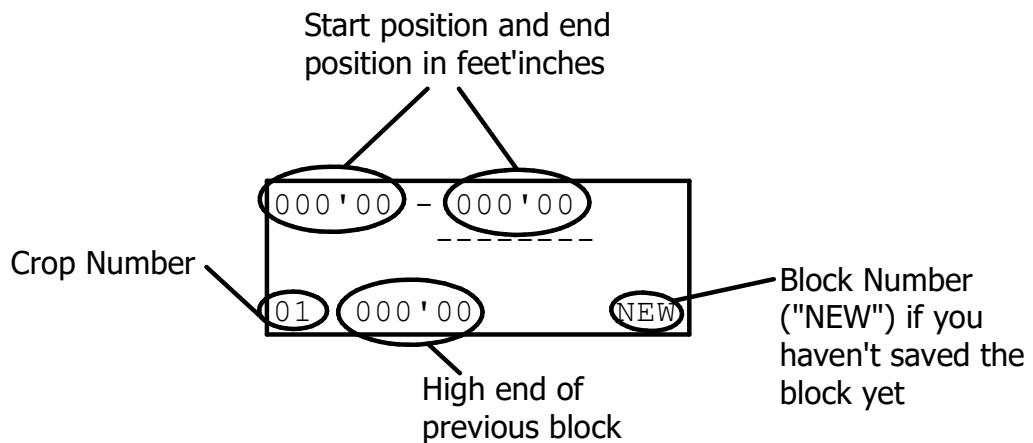
4

to edit crops

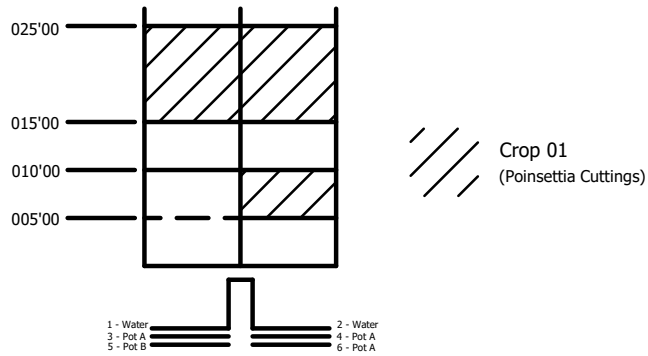
```
ENTER CROP NUMBER TO
EDIT: 01
MANUAL MODE
```

And since he wants to edit Crop 01. If he wanted to edit another crop,

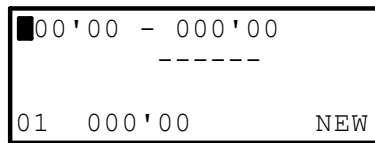
This is the Block screen. It tells your boom WHERE to water.



Crop 01 is in these two locations:

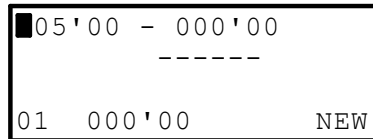


Joe wants to program the first block by just typing the numbers in, and the second block using the new GTI Crop Learning functionality.



Crop 01's first block starts at 5ft,

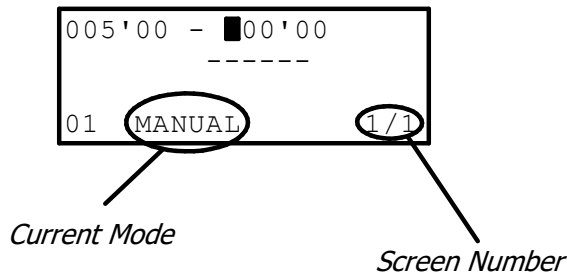
So he enters



Then he presses

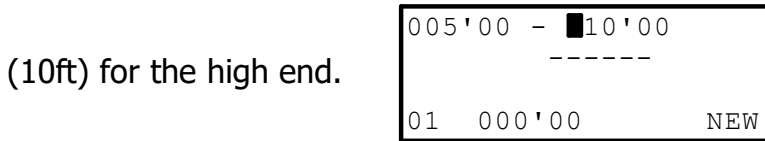



to move the cursor to the block high end:

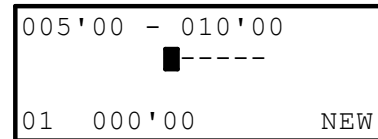



He types in

0 Config 1 0 Config 0 Config 0 Config




Joe presses  to move the cursor down to the valve toggles

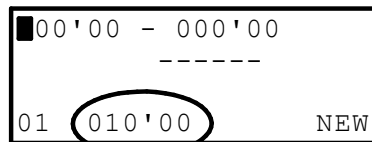


And presses  to toggle valve 2 on:

005'00 - 010'00

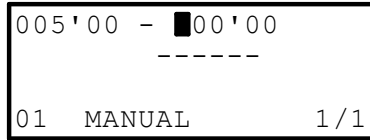
01 000'00 NEW


And  to save the block + bring up a new block:

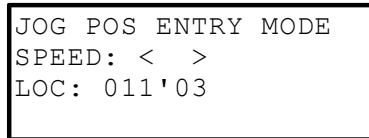


(This number tells you the previous block high end in case you need it for reference)


Joe could enter numbers (much like in the zone-based Common Sense Controller), but there's an even better option - Crop Learning. On the edit screen, the cursor is on the "Block Low End" field:



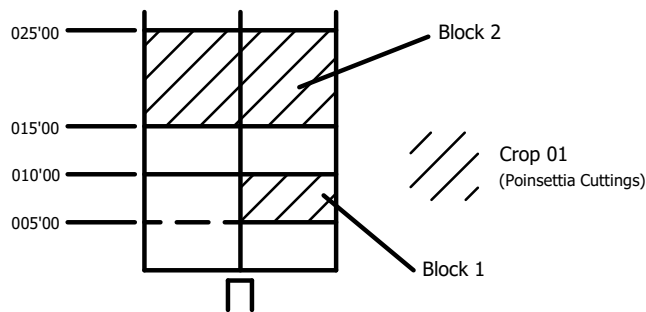
Joe presses  to enter the block low end using Crop Learning.





Note: This screen looks and works just like the regular jog screen (except for the title)

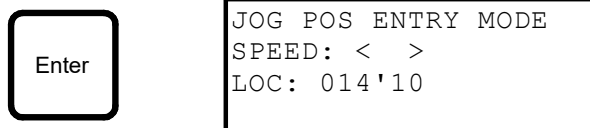
Now he presses  to start moving forward

toward the actual, physical "low edge" of the "second block" of Crop 01 plants, near 015'00




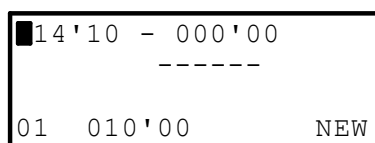
and he presses   to adjust speed while the boom is moving.

When the boom's spraybars are near the lower edge of Crop 01, Joe presses



Two inches is too small of a distance for the boom to jog effectively. But Joe has a cool new tool up his sleeve: The "Nudge".

He presses  to pop back out of "Learn Jog" into the Block screen:



To check whether the boom really is above the crop edge, Joe presses  (spritz).


This spritzes the water from all of your default purge valves.

Note: Since it doesn't spritz the crop valves, you still have to keep in mind the exact valves that you want to use, and where the water from those spraybars is hitting.

Note: to change your default purge valves, go to:

Config > [2] Boom Defaults > [4] Misc Setup > [2] Purge Settings

The water from the spraybars that Joe wants to use for this crop is landing on the low side of the edge of the block of plants by about 1-2" - but again, this is too small of a distance to jog effectively,

So he presses  to "nudge" the boom forward 1 or 2 times,

until the spray bars he wants to use for this block are over the block edge.

```
█15'00 - 000'00
-----
01  010'00      NEW
```

Then **Test Spritz** again to confirm that he's over the edge of the crop.

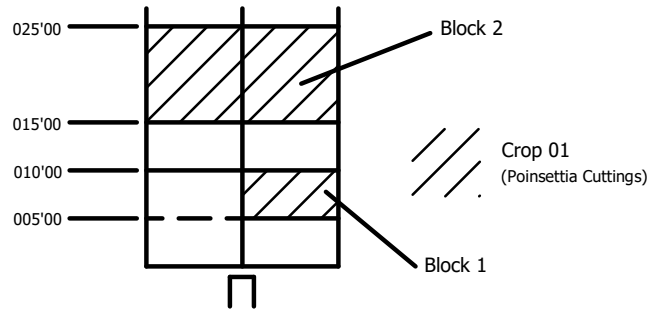


Good. Now Joe presses  to move the cursor over to the end position:



```
015'00 - █00'00
-----
01  MANUAL      2/2
```

He presses **Setup Learn** again, and jogs the boom as close to the block's upper edge,



Stops it, and presses **Escape**

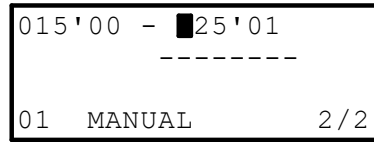



```
015'00 - █25'02
-----
01  MANUAL      2/2
```


He's not quite on target, so he presses **Manual |<|** a couple of times:

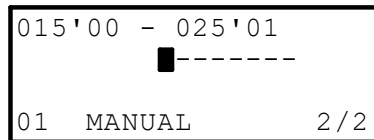



to move in reverse, to get as close to the block high edge (at 025'00 feet), as he can.

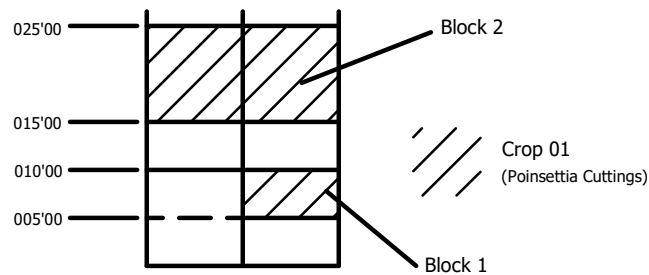
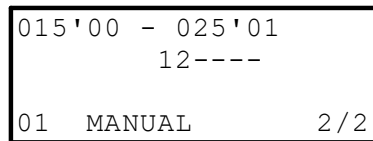


then presses  to spritz the spray bars to see where the boom watering edge is.

Joe presses  to move the cursor over to set valves for this block.



Joe presses   to toggle valves 1 & 2 on:



He presses  to save this block.

```

00'00 - 000'00
-----
01  025'01      NEW

```

Crop 01 has only two blocks, so Joe is done creating blocks and presses



here.

This brings him to the Water screen. It tells your boom HOW to water :

```

PASSES: 0
DIRECTION: 2-WAY
SPEED: 12
01 MANUAL      WATER

```

Note: A pass is a single movement over a crop - back and forth = 2 passes.

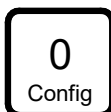
Note: Pass direction comes into play with more than one pass:

2-way: water back-and-forth (each "back" or "forth" counts as one pass)

1-way: water in one direction, move back to the beginning, repeat.

Note: Speed is between 1-24. If you set max speed to 24 inches per second, this number represents inches per second, which is easy to work with. We recommend it.

Joe enters





for the number of passes


and presses




to move the cursor down

And presses  to move the cursor down to "Direction":


```
PASSES: 02
DIRECTION: ■-WAY
SPEED: 12
01 MANUAL      WATER
```

This is a toggle field. Joe presses  once to toggle from "2-way" to "1-way"

```
PASSES: 02
DIRECTION: 1-WAY
SPEED: 12
01 MANUAL      WATER
```

then presses  again to toggle back because, on second thought, 2-way is a better fit.

```
PASSES: 02
DIRECTION: 2-WAY
SPEED: 12
01 MANUAL      WATER
```

He leaves the speed as is, and presses  to save the pass/direction/speed data.

He's finished programming crop 1 for Manual Mode. Telling the boom to water crop 01 works the same as it always has - from the manual mode base screen, use the Daily Program menu, go to "Quick Pass", pick crop 01, set speed and passes, and let it go.

Manual Mode - Run Crops

1. Run all crops with Setup > Start

Joe starts at the Manual Mode Boom Idle Screen:

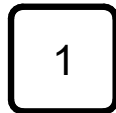
```
MANUAL      DAY4 23:19  
BOOM IDLE  
WAITING FOR NEXT CMD  
C01 B1 L000'00 T00
```

he presses



- 1) START
- 2) DISPLAY CROP
- 3) DISPLAY PASSES
- 4) EDIT CROP

then



to start watering.

2. Run some crops with Daily Program > Quick Pass

Starting at the Manual Mode Boom Idle Screen:

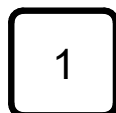
```
MANUAL      DAY4 23:19  
BOOM IDLE  
WAITING FOR NEXT CMD  
C01 B1 L000'00 T00
```

Joe presses



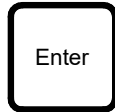
- 1) RUN QUICK PASS
- 2) JOG BOOM
- 3) PURGE

Then



```
ENTER CROP NUMBER TO  
EDIT: █1  
  
MANUAL MODE
```

Joe may pick any of his crops from this screen. So far only crop 01 is programmed, so he presses



```
PASSES: █0
DIRECTION: 2-WAY
SPEED: 12
04 MANUAL      WATER
```

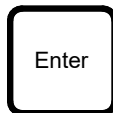
In quick pass, Joe can change any of these parameters, and the changes aren't saved and don't overwrite the values he programmed earlier. Instead, it's one-and-done. The boom waters with the changed parameters, then forgets them.

Joe enters:

3 passes
2-way
speed 23

```
PASSES: 03
DIRECTION: 2-WAY
SPEED: █3
01 MANUAL      WATER
```

He presses



```
ENTER CROP NUMBER TO
EDIT: █2

MANUAL MODE
```

The boom is asking if Joe would like to water Crop 02 during this Quick Pass. If Joe had a few crops programmed, he might have selected another couple of crops and tweaked them for this Quick Pass. But Joe doesn't have anything programmed for any crops other than Crop 01, so he presses



and the boom is off to water Crop 01

Auto Mode - Setup Crops

Joe wants to put crop 01 on a schedule. His boom is at the Manual Mode main screen:

```
MANUAL      DAY4 23:07
BOOM IDLE
PRESS DAILY PROGRAM
C01 B1 L000'00 T00
```

He presses



to put it in auto mode:

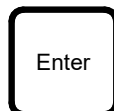
```
AUTO      DAY1 23:18
NO CROP REQUESTED
START DELAY: 03
C01 B- L000'09 T00
```

Then he presses



```
LEAVE AUTO MODE?

[ENTER]=YES
[ESC]=NO
```

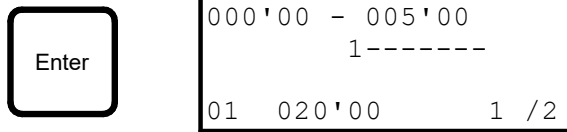


```
1) DISPLAY CROP
2) DISPLAY SCHEDULE
3) EDIT CROP
```

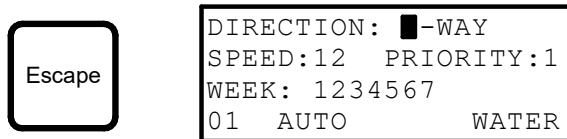
```
ENTER CROP NUMBER TO
EDIT: 01

AUTO MODE
```

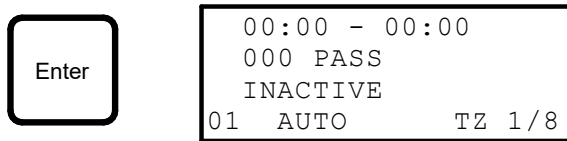
Finally he presses



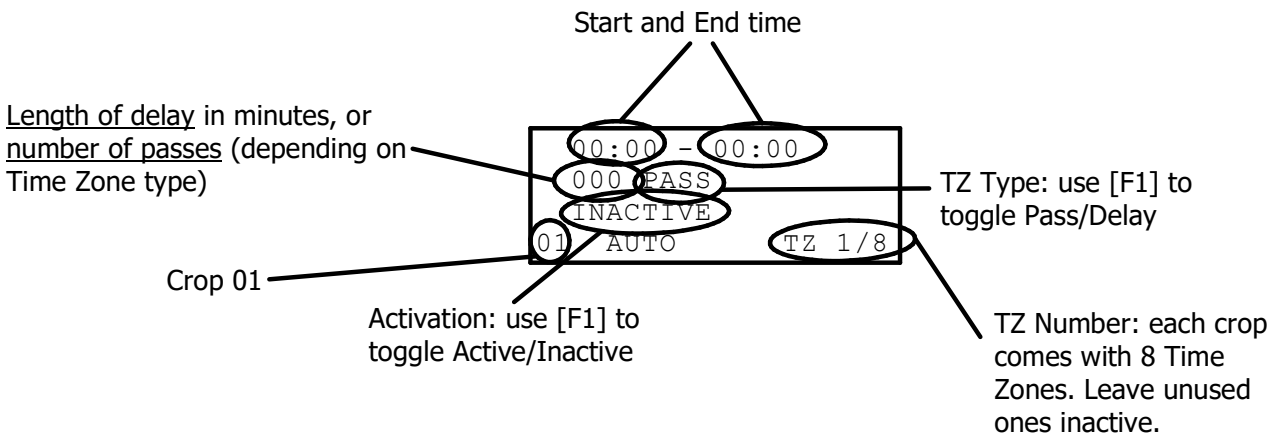
It's the same blocks from manual mode, so he skips them



He notices "Direction". It works the same way here, at least in Pass-based time zones. In Delay-based time zones, the boom does only one pass, and it can be from any direction at any time. Everything looks good, so he presses



This screen is pretty dense - A whole time zone has been distilled into one screen, but it's all the same stuff:



He fills it out to run every 10 minutes between 8am and 4pm

08:00 - 16:00	Enter
010 DELAY	
ACTIVE	
01 AUTO	
TZ 1/8	

00:00 - 00:00
000 PASS
INACTIVE
01 AUTO
TZ 2/8

But Joe only wants one time zone, so he leaves this screen and goes back to the Auto mode main screen:

Escape	AUTO	DAY1 23:18
	NO CROP REQUESTED	
	START DELAY: 03	
	C01 B- L000'09 T00	

There's no "Copy Setup to Daily Program" screen anymore. Joe 's boom is good to go.

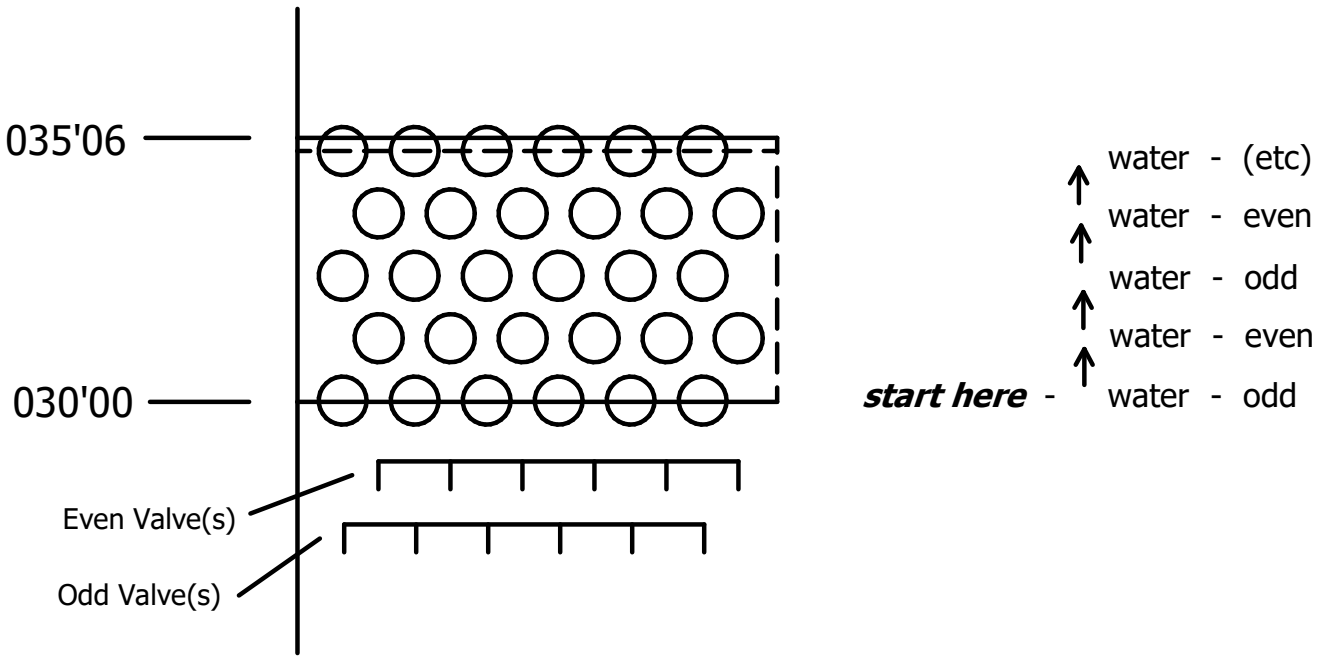
Auto Mode - Run Crops

To run his crops, Joe just puts/leaves the boom in the Auto Mode "No Crop Requested" Screen. Any crops with active time zones should run as soon as the Start Delay finishes counting down.

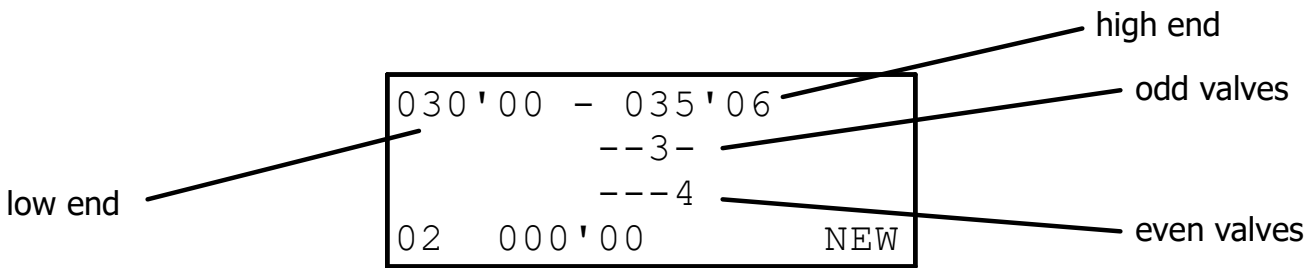
Pot Mode - Setup Crops

How Does Pot Watering Work?

1. The boom starts watering at the block's low end - the centerline of the first row of pots - with the odd valves.



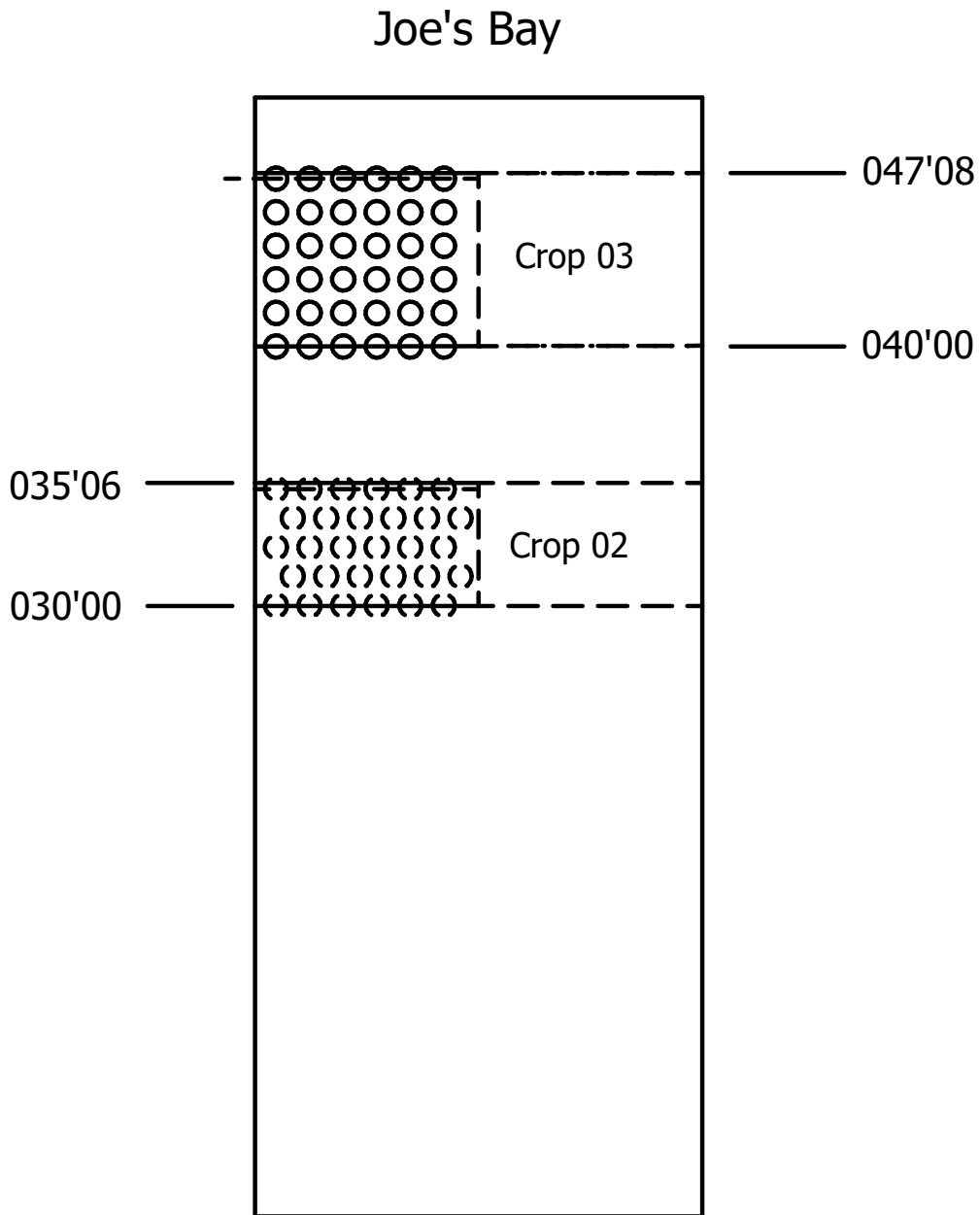
2. The boom steps forward to each row center and waters alternating odd and even valves.



3. The high end *includes* the centerline of the last row of pots, but you want it to be a couple inches past. If you don't give the extra space, you might not water the last row!

Joe's Pots

It's later in the summer, and Joe has started growing pots in this bay. He has two pot crops, Crop 02 and 03. Crop 03 is already placed on the floor, but Crop 02 isn't yet, and Joe wants to use the boom to place Crop 02.



Joe doesn't need to change the configuration; everything is set up already. He jumps right ahead to Setup.

Starting at the Pot Mode idle screen:

```
POT          DAY4 23:19
BOOM IDLE
PRESS DAILY PROGRAM
C01 B1 L000'00 T00
```

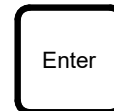
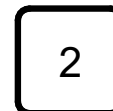
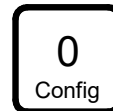


```
1) START
2) DISPLAY CROP
3) DISPLAY PASSES
4) EDIT CROP
```



```
ENTER CROP NUMBER TO
EDIT: █2

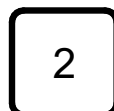
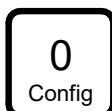
POT MODE
```



Unlike in Manual or Auto mode, in Pot mode, you see the Water screen before the Block screen. If you use step-learn to lay out a block, the 'Pot Spacing' number tells the boom how much to step between rows.

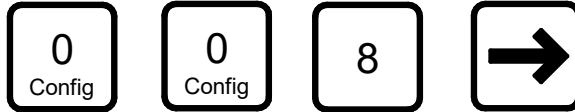
```
PASSES: █0
WATER TIME: 001
POT SPACING: 001'00
02 POT          WATER
```

Joe fills out the screen. He wants the boom to do 2 passes:



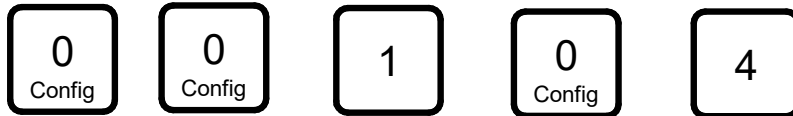
```
PASSES: 02
WATER TIME: █01
POT SPACING: 001'00
02 POT WATER
```

On each of the two passes, he wants the boom to water every row for 8 seconds:



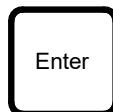
```
PASSES: 02
WATER TIME: 008
POT SPACING: █01'00
02 POT WATER
```

And although the center-to-center between pots in the same row is 1'06", he wants the rows to be offset, and the pot (row) spacing to be 16 inches, or 001'04.



```
PASSES: 02
WATER TIME: 008
POT SPACING: █01'04
02 POT WATER
```

Looks good! Joe presses



and now he's at the block screen:

```
█00'00 - 000'00
      ----
      ----
02  000'00 NEW
```

3 ways to program a Pot Block

1. How to Program a Pot Block by Step-Learn

Use Step-Learn to place your pots and program your crop at the same time, using the boom as the pot-spacer. Here's how:

Joe is here, at an empty (new) Pot Block screen:

```

00'00 - 000'00
-----
-----
02  000'00          NEW
  
```

He presses



```

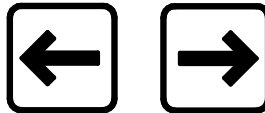
VALVES:  _____
SPEED:  <  >
LOC:  000'00
  
```



```

VALVES:  _____
SPEED:  <12>
LOC:  002'05
                JOGGING FWD
  
```

Adjusting Speed as necessary:



He stops at 030'00:

```

VALVES:  _____
SPEED:  <12>
LOC:  030'00
  
```

and presses



to store the location as the block low end

(that's where his cursor is):

(that's where his cursor is):

```

030'00 - 000'00
      ----
      ----
02  000'00          NEW
    
```

Note: Joe might use



and



here

to more finely position the boom.

Joe presses



and the cursor moves to the 'odd' row valves:

```

030'00 - 000'00
      ----
      █
      ----
02  000'00          NEW
    
```

Ok, so this order is different from Auto or Manual or Remote mode - but there's a reason: you want to tell the boom what valves to use for each row before you start stepping.

He presses



to tell the boom to water odd rows

(the 1st, 3rd, 5th row etc.) with valve 3:

```

030'00 - 000'00
      █-3-
      ----
01  000'00          NEW
    
```

Then



to tell the boom to water even rows

(the 2nd, 4th row etc.) with valve 4:

```

030'00 - 000'00
      --3-
      █--4
01  000'00          NEW
    
```

Joe presses



again to move the cursor to the block high end.

```

030'00 - ■00'00
      --3-
      ---4
01  000'00          NEW
  
```

The boom is physically at the block low end right now (from when Joe saved the location). This is really important!

To Step-Learn, you have to start at the block low end (the centerline of the first row). Otherwise, it doesn't work!

Joe wants to place his first row of pots. He presses



to spritz the valves for this row (This is the first row, so that's valve 3).

The boom spits out a little puff of water out of all the default purge valves. Joe has to identify the valve that he's programmed for the first row, and make sure that the pots are positioned under it.

○○○○○○

Then, Joe presses



to step to the next row:

```

030'00 - ■31'04
      --3-
      ---4
01  000'00          NEW
  
```

The boom steps, and comes to a stop. Joe presses



and the boom spritzes another puff of water out of the default purge valves.

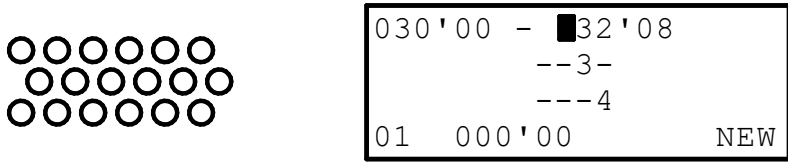
Joe uses the water spritz to place his pots. This row is offset from the first row. Keeping in mind his even row valve(s), he lays the pots under those nozzles.



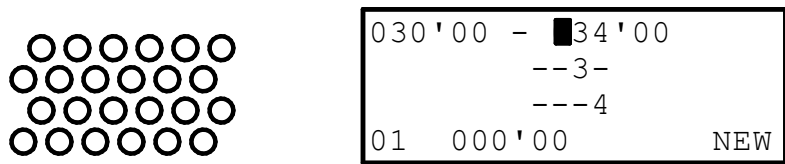
Note: Offset bars are typically forward and reverse of the center of the boom. If you center the pots exactly under the tips, you end up with closer-further-closer-further rows. Your tips are more of a guideline than a ruler in this case. Put your pot centers forward or reverse of the tips as needed.

Joe presses Pot Step to step to the next row, Test Spritz to spritz

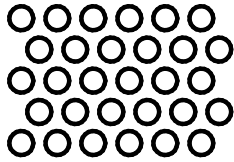
(we're back to an odd row, so valve 3 spritzes), and places pots:



He presses Pot Step then (after the boom stops) Test Spritz again, and places pots:



Again, Pot Step , Test Spritz , places pots:



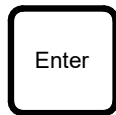
```
030'00 - ■35'04
      --3-
      ---4
01  000'00          NEW
```

Joe has placed all of his pots for crop 02, so he's done. He adds a couple of inches to try and make sure the boom doesn't ever miss the last row (otherwise, that can definitely happen):



```
030'00 - ■35'06
      --3-
      ---4
01  000'00          NEW
```

And he presses



```
000'00 - 000'00
      ----
      ----
02  035'06          NEW
```

Notice the number at the bottom (035'06). This is just a handy way to remind you where the last block for this crop ended, in case you need that for reference. Joe doesn't have any more pots to place, so he doesn't need to create any more blocks for this crop.

He presses



to leave this screen without creating a new block.

```
ENTER CROP NUMBER TO
EDIT: ■3
                                POT MODE
```

2. How to Program a Pot-Block by Jog-Learn

Use "Jog-Learn" to program a pot block if you don't want to step it (maybe you use a spacer with your pots and would rather not use the boom to space them) or maybe if your pots are already there, and you are reprogramming the block.

This works just like block learning from Manual or Auto Mode. You basically use jogging to show the boom the low and high ends of the block. Starting here: (Pot Mode > Setup > Edit Crop):

```
ENTER CROP NUMBER TO
EDIT: █1
POT MODE
```

Joe presses

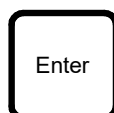


```
PASSES: █0
WATER TIME: 001
POT SPACING: 001'00
03 POT WATER
```

And quickly enters parameters for crop 03: 1 pass, water time = 20 seconds, and pot [row] spacing of 18" (001'06):

```
PASSES: 01
WATER TIME: 020
POT SPACING: █01'06
03 POT WATER
```

He presses



```
█00'00 - 000'00
-----
-----
03 000'00 NEW
```

And this is the block that he wants to program using Jog-Learn.

He presses



```
VALVES: _____
SPEED: < >
LOC: 035'06
```

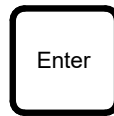
He presses



to jog forward.

```
VALVES: _____
SPEED: <12>
LOC: 037'00
                JOGGING FWD
```

He stops the boom (by pressing



when it's over the center of the first row of pots)

```
VALVES: _____
SPEED: < >
LOC: 040'00
```

Cool, the first row of pots is centered at 040'00 exactly!

He presses



to store this location as the block low end

```
■40'00 - 000'00
      ----
      ----
03  000'00          NEW
```

Since the pots are positioned on a square grid, the even and odd valves are the same:



```

040'00 - ■00'00
      --3-
      --3-
03  000'00      NEW

```

Joe presses



```

VALVES: _____
SPEED: <  >
LOC: 040'00

```

Joe presses



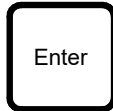
to jog forward

```

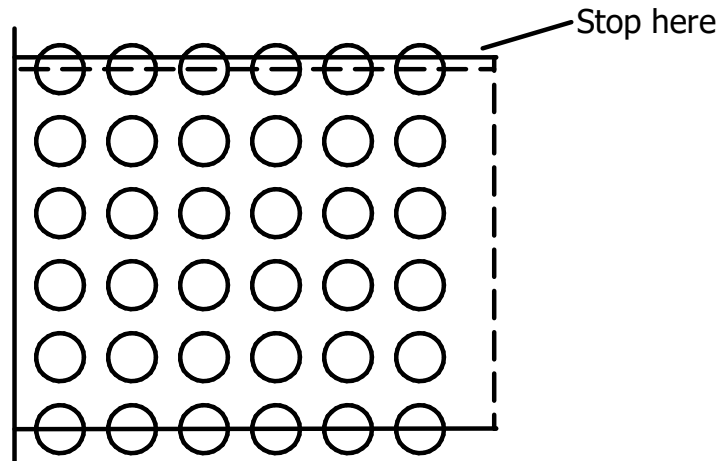
VALVES: _____
SPEED: <12>
LOC: 044'10
                JOGGING FWD

```

He presses



to stop the boom a couple of inches past the centerline of the last row of pots



then



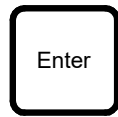
to store the location as the block high end:

```

040'00 - ■47'08
      --3-
      --3-
03  000'00      NEW

```

Joe presses



to save the block.

```
ENTER CROP NUMBER TO  
EDIT: █1  
  
POT MODE
```

3. How to Program a Pot Block by Key-Press Only

If Joe knows all the distances involved, and is confident that his boom is accurate, he can just enter a block in by typing everything directly

Pot Mode - Run Crops

You run crops exactly as in Manual Mode, whether via Setup > Start or Daily Program > Quick Pass.

Remote Mode - Setup Crops

Remote Mode is a lot like Manual mode, with a few differences:

1. There's a screen for entering a network address
2. The Daily Program button does nothing in Remote Mode
3. There's this thing called a "Stagger Delay"

Starting at the Remote Mode "Waiting for Remote Cmd" screen:

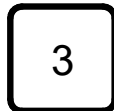
```
REMOTE    DAY4 23:19
BOOM IDLE
WAITING FOR NEXT CMD
C01 B1 L000'00 T00
```

Joe presses



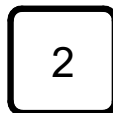
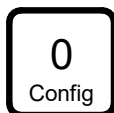
```
1) DISPLAY CROP
2) EDIT CROP
3) EDIT ADDRESS
```

then

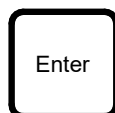


```
DEVICE ADDRESS: █1
SET DEVICE ADDRESS
```

The Common Sense 2 Foot Distance boom only works on a Spooler Network (not a Go-1 network) so it doesn't technically *have* to have a unique address. However, for alarms on the Spooler to work correctly, it helps for each boom to have a unique address. Joe gives this boom the address 02:



```
DEVICE ADDRESS: █2
SET DEVICE ADDRESS
```



```
1) DISPLAY CROP
2) EDIT CROP
3) EDIT ADDRESS
```

2

```
ENTER CROP NUMBER TO
EDIT: █1
REMOTE MODE
```

0
Config

4

```
ENTER CROP NUMBER TO
EDIT: █4
REMOTE MODE
```

Enter

```
█00'00 - 000'00
-----
04 000'00 NEW
```

Joe fills out this block screen:

0
Config

3

8

➔

0
Config

4

4

➔

2

```
038'00 - 044'00
      █2--
04 000'00 NEW
```

then presses

Enter

```
PASSES: █0
DIRECTION: 2-WAY
SPEED: 12
04 REMOTE WATER
```

0
Config

5

➔

F1
Home

➔

0
Config

8

```
PASSES: 05
DIRECTION: 1-WAY
SPEED: █8
04 REMOTE      WATER
```

Enter

```
STAGGER DELAY: █00
04 REMOTE      STAGGER
```

Stagger delay has to do with how a Spooler works. The spooler receives a 24 volt signal (from an environmental system, typically) and sends a command to all the booms on the network to water the corresponding crop. So if it receives a signal on input #4, it sends a message to all the booms to water crop 04, and any boom that has a valid Crop 04 (with blocks, passes, etc.) waters it.

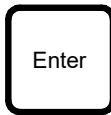
If too many booms water at the same time, water pressure might drop. Stagger delay lets you tell the boom to delay by some number of minutes before watering the crop.

If water pressure loss is a problem in your greenhouse, keep things simple by giving each boom the same stagger delay across all of its crops. So one boom is the 'water right away' boom, another is the 5 minute delay boom, another the 10 minute delay boom, then the 15 minute delay boom, and so on.

Joe presses    for a 5 minute Stagger Delay.

```
STAGGER DELAY: █05
04 REMOTE      STAGGER
```

Joe presses



to save the Stagger Delay.

```
ENTER CROP NUMBER TO
EDIT: █1
REMOTE MODE
```

Since Crop 04 is his last crop, Joe presses



```
1) DISPLAY CROP
2) EDIT CROP
3) EDIT ADDRESS
```

Then



```
REMOTE DAY4 23:19
BOOM IDLE
WAITING FOR NEXT CMD
C01 B1 L000'00 T00
```

Remote Mode - Run Crops

To test any crop on this boom, Joe finds the 24VAC output on the environmental system that corresponds to that crop, then manually switches it on for 1-2 seconds, then off again. The corresponding number on the Spooler 2-number display should flash quickly, then the boom should water this crop, or wait for the stagger delay, then water.

Another great idea is to use a VPD algorithm to determine which should water first.