Bronson Files Volume #6, F013 Cotton, MetaNotation Log:

5/21/2015 - start
The first and momentous Hamby data run of F013.
Partly overcast and calm condition.
The CropCircles were 104 cm above the bed height
The CropCircles were 100 cm above the crop height
The CropCircles were 118.5 cm above the flat ground
The crop was about 4 cm tall

Hamby GPS offsets measurements in cm, as distance from GPS receiver position to the sensor position, where positive values are - forward (F) and right (R) and down (D) from the GPS.

1. IRT1 (#1200, Forward_30, Front) - D291, F178.5
2. IRT2 (#1201, Nadir, Rear) - D291, F172
3. Air Temperature - D291, F170.5, R-1
4. CropCircle1 (New, #2, in Front, 590, 800, 730) – D241, F137.5
5. CropCircle2 (#3, in Rear, 550, 670, 530) – D241, F105.5
6. Honeywell – D241, F124, R6
7. MaxBotix1 – D241, F118, R-6.5
8. MaxBotix2 – D241, F125.5, R-6.5
9. IMU – D230, F169

Active air temperature sensing, or measuring an aspirated thermocouple junction within an enclosure, mounted low at the IRT height provides a high quality ambient thermal trace to coincide with the two non-contact surface thermometer returns, one being in nadir view and one facing forward.

5/28/2015 - Thursday

Hamby Run #2, in Span 6
Clear and calm condition, warming to 100 F by 1300
Soil tubes are being installed and cultivation between the rows was started in Span 1 but then stopped because tubes were in the way. The plan is to cultivate Monday.

The crop was about 7 cm tall
The furrows were 10 to 13 cm deep
The height from sensor standard level to canopy top was 99 cm
The height from sensor standard level to bed top was 105.5 cm
The height from sensor standard level to furrow bottom was 119 cm
The height from sensor standard level to road was 117 cm

CropCircles were leveled and spot checked on a white panel to be value 1 (not re-calibrated)
Run started at 0930
Note the sonic heights were not calculated correctly on the logger so a calibration needs to be applied to the logged voltages in order to calculate correct distances.
We had some intermittent GPS signal issues where the NMEA return would cut out and the receiver LED would go Red for a few seconds and then return Green with a good location return.
Out of 50241 lines collected, there were 47558 good GPS values meaning 2683 GPS lines were dropped or about 5%. I think we can interpolate the location values between drops since the sensors were still being logged (see image below).

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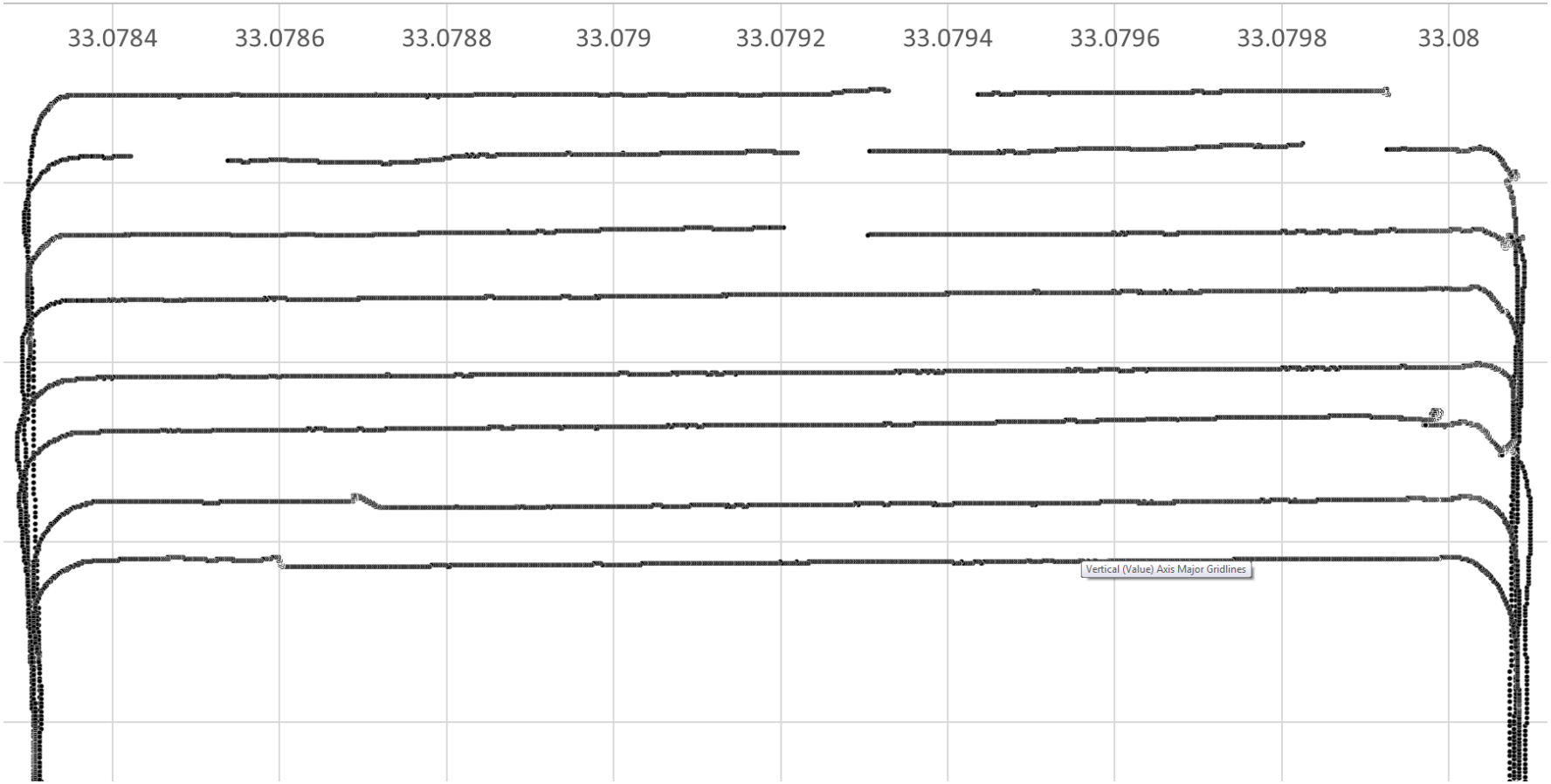
8. MaxBotix2 – D241, F125.5, R-6.5
9. IMU – D230, F169


33.0784
33.0786
33.0788
33.079
33.0792
33.0794
33.0796
33.0798
33.08
Vertical (Value) Axis Major Gridlines

7/13/2015

Run 9 in border 6 of Field 13

We calibrated the sensors cold on the SC1 box before the run.
We were having trouble getting a full 5Hz on the CR1000 once we installed the IMU. After talking to Campbell, it appears we are near the limit of the logger in both processing power and also measurement time. We have tried several different fixes such as using the GPS command, removing logic etc. However, it appears the best approach will be to slow sequence the IMU to under 5Hz and leave the rest of the program the same. This program this run (V20_slow) has full 5Hz on everything with only 1Hz on the IMU. The IMU slower recording is output to its own file.
Note that the UTC time can be derived from the logger TimeStamp which is UTC time adjusted to Arizona time.
Note that the CropCircle #3 appears to have a bad calibration.
Note that MaxBotix #2 appears to need a +4.5 cm adjustment due to a small delay in the measurement between the two sensors which are fired at the same time. This adjustment will be put in to the code for next run.

Note on vertical offset and field condition…

7/14/2015
F013 Span 6 Run 10

Second run this week, we ran yesterday too.
Clear condition, no wind, slight breeze, overflight today, neutrons happening
It looks like there was some water stress with leaves drooping on the south side of the field. There was also a depressed spot about two thirds south across the field.
We are using the GPS instruction so use the logger timestamp as the UTC time. In the Excel “CS_Data” file I rebuilt the UTC timestamp as an example.
We re-calibrated CropCircles and are testing thermal drifting and panel checkbox mode (see additional notes).
The distance from sensor to bed was 169 and 173 cm for sensor 2 and 3 respectively.
The distance from the sensors to road was 187 cm.
We lifted the arms so that there was 12 cm on the piston and at the end of the run there was still 12.
We added the 4.5 cm offset to Max#2 output to adjust for its measurement delay.
Note that the IMU is outputting a raw string which is recorded as the last variable. The variable is a comma separated string of the nine values.

HambySetup_V26.CR1 program

7/22/2015
F13 Hamby Run 11

CropCircle is correct but there is no Campbell data for this run!
Clear condition, breeze, warm
Crop canopy height ranged from 67 to 93 cm with an average of about 83 cm
The furrow depth was 12 cm
The distance from CropCircle to bed was 183 cm

We started the run at 0830
There was another GPS drop on the Campbell logger only. Compare the TimeStamp on the Campbell logger to the UTC time in the raw string from the start of the run when the signal was good and apply that incrementally to the rest of the dataset after the signal was dropped. The GeoScout side was good all the way through. Data appears to be salvageable.
We traced the issue to the GPS DB9 connector adaptor. We hardened the connector, and added strain relief. The system was tested and was working this afternoon without any GPS drops.
Also, the Campbell GPS read instruction seems to be underperforming. I have reverted back to reading all the serial strings in a raw format. See the "DataDemoV32" Excel file for an example of the new output with all strings written in raw form. This will require subsequent parsing of the strings. Use the NMEA string standard to identify the embedded variables.
We also installed a hose clamp on the throttle cable because it came loose last week.
I would like to be involved in next week's run to help ensure quality.

7/28/2015
F013 Hamby Run 12

Using program version 32, now stable and full output with raw string recording.
Partly cloudy, warm, slight breeze
We started the run about 0830

The distance from the bed to the CropCircles was 184.5 and 185 cm
The distance from the CropCircles to the ground was 196.5 cm
The furrow was about 12 cm deep.
The Canopy height was about 84 cm tall.

8/5/2015
F013 Hamby Run 13

Warm condition, partly high clouds, no field activity
We installed wheel fenders on three wheels. There was no bracket to install the fourth on the rear right side tire.
We calibrated the CropCircles on the SC-1 without panel checked and in a cold condition.
We began the run at 0900
Matt H. drove the rig

The crop canopy height ranged from about **75 to 100 cm** with an average of about **90 cm**
The distance from the CropCircles to the bed was **190 cm**
The distance from the CropCircles to the road was **203.25 cm**
The furrow was about **18 cm** deep.
The piston was extended 12.5 cm (quality check on boom drop).
See images taken

8/17/2015
F013 Hamby run #13

The CropCircles were dismounted for calibration at 0820, 72F. They were calibrated on the SC-1 box at 0832 with the sensors at 77 degrees F. Both CCs were reading about 1.01 across the channels. When sensors returned from the field they were at about 104F so there could have been thermal drift.

At 0858 we started in the field
CC distance to bed was **182 cm**
CC distance to road was 194.25 (south road) and **192 cm** (north road).

Kevin determined that the sensor height was too low relative to last week's run so the run was stopped, the CS data was deleted and another run was started.
We tested the Garmin GLO on the roof with a custom shade and it worked well as a tracker.

The file Data.xlsx has all the data inside on multiple tabs. Just combine the CC and CS tabs for the full set.
UNKNOWN height on second run please include heights here