STORM SEED TREATER
TROUBLESHOOTING INSTRUCTIONS
MAY 2, 2014

The STORM should be operated within an acceptable temperature range, with a consistent and sufficient power source.

Best results are obtained when ambient, seed, and treatment temperature are above 10 degrees Celsius, powered by a **dedicated** 15A power source that delivers between 100 and 120 VAC **(measured at the STORM Control Box plug)** during full operation.

Extension cords should be 12 gauge or heavier and should not exceed 150 feet in total length. Use a 3000 watt generator if power availability is limited.

Ensure that extension cord ends are not worn or damaged to ensure a dependable power supply. Intermittent power due to worn or damaged extension cords can lead to erratic Control Box function and inaccurate seed treatment results.

1.1. TROUBLESHOOTING ISSUES

Table 2 lists issues related to the STORM seed treatment section.

Table 2 Seed Treating Section Issues

Issue Type	Common Issues	Page Number
Seed delivery issues	seed delivery is outside of the expected +/-5%	page 3
Pump issues	pump won't prime	page 3
	pump output is fluctuating	page 3
	pump output is inconsistent and outside of the expected +/-5%	page 3
	pump is difficult to calibrate	page 3
	pump won't turn, or turns erratically	page 3
Seed coverage issues	seed coverage is poor	page 6
Treatment build-up issues	excessive build-up in application chamber	page 6
	build-up of treatment on metering conveyor belt	page 6
Conveyor speed issues	system won't operate at higher conveyor speeds	page 7

1.3. SEED DELIVERY ISSUES

SEED DELIVERY IS OUTSIDE OF THE EXPECTED +/-5%

1. **Conveyor intake wiper is out of adjustment:**

Check orientation and seating of the wiper, and ensure wiper height is 1-5/8”. The bevelled corners of the intake wiper should be directed upwards and the flat section should be resting flush on the plastic wear strips on either side of the seed flow area.

2. **Cleated conveyor belt is slipping on the drive rollers:**

- Adjust belt tension and tracking. Ensure side bearing mount plates are free to slide as required.
- Ensure that the cleat travel is not being impeded by an object protruding into the seed travel area.

3. **Drive chain is slipping:**

Check condition of chain and drive sprockets. Adjust chain tension.

4. **Inconsistent grain feed rate to conveyor:**

- During operation, ensure that the metering convey cleats are full by checking the inspection window on the top of the conveyor.
- Check for blockage of the conveyor intake grating.
- Ensure that the seed supply gate is fully opened and completely flooding the intake of the conveyor.
- Center the conveyor intake under the seed supply opening.
- If the conveyor is not being flood fed, like when supplying the conveyor from a truck with a rear opening, the height of the grain in the intake must be the same as the height of the fully deployed and flooded intake hopper.

5. **Electronics not achieving proper conveyor motor speeds:**

Consult Table 3 on page 7 for the expected conveyor speed for the seed type that is being utilized.

- Check Conveyor Drive ratio. It should be 15:33. If not adjust.
- For March 24, 2014 software, ensure that the Seed Flow Correction is set at 1000.
- For software versions newer than March 24, 2014, the Seed Flow Correction number may have been inadvertently adjusted. Return the seed flow correction number to 1000 if it was not been adjusted on purpose (such as “Consistent metering inaccuracy:” below.

6. **Consistent metering inaccuracy:**

Metering inaccuracies may occur due to manufacturing differences or bin feed conditions and results in the metering conveyor being consistently inaccurate to the same degree.

For software versions newer than March 24, 2014 the seed flow correction can be adjusted when the meter is consistently delivering a different amount than the electronic display indicates. All other options should be explored before making this adjustment.

The default value of 1000 indicates that the meter is delivering 100% of the expected seed flow. A higher number slows the conveyor. A lower number speeds up the conveyor.

If the conveyor consistently over-meters seed (delivers more seed than the STORM electronic display indicates), increase the seed flow correction by the percentage amount the unit is out.

If the conveyor consistently under-meters seed (delivers less seed than the STORM electronic display indicates), decrease the seed flow correction by the percentage amount the unit is out.

For example:

The STORM unit is consistently inaccurately metering jobs to the same degree for all jobs.

In the last job, the weight of seed was determined to be 19,500 lbs, but the STORM display indicates it was 20,000 lbs. The unit is under-metering. Multiply the seed flow correction of 1000 by 19,500 lbs and divide by 20,000 and enter the value of 975 as the new seed flow correction.

1.4. PUMP ISSUES

See Table 2 for common pump-related issues, and lists of possible problems.

Table 2 Common Pump Issues

Common Pump Issues	Possible Problem
pump won't prime	1. Pump shoe is not fully engaged: 2. Pump occlusion dial set incorrectly: 3. There is an air leak in the fittings on the intake line: 4. The line is restricted on the intake or output side of the pump: 6. Pump is operating too slowly:. 9. Product condition is inconsistent: 10. Product is too thick to meter properly: 11. The pump is damaged:
pump output is fluctuating pump output is inconsistent and outside of the expected +/-5%	1. Pump shoe is not fully engaged: 2. Pump occlusion dial set incorrectly: 3. There is an air leak in the fittings on the intake line: 4. The line is restricted on the intake or output side of the pump: 5. Pump is operating at too high of a pressure: 6. Pump is operating too slowly: 7. Pump is operating too fast: 8. Calibration was performed at a different treating speed than the operational speed. 9. Product condition is inconsistent: 10. Product is too thick to meter properly: 11. The pump is damaged:

Table 2 Common Pump Issues

Common Pump Issues	Possible Problem
pump is difficult to calibrate	1. Pump shoe is not fully engaged: 2. Pump occlusion dial set incorrectly: 3. There is an air leak in the fittings on the intake line: 4. The line is restricted on the intake or output side of the pump: 7. Pump is operating too fast: 9. Product condition is inconsistent: 10. Product is too thick to meter properly: 11. The pump is damaged:
pump won't turn, or turns erratically	6. Pump is operating too slowly: 11. The pump is damaged:

1. Pump shoe is not fully engaged:

Check that the pump lever is fully engaged in the lever catch.

2. Pump occlusion dial set incorrectly:

Adjust the pump occlusion dial on the top of the pump as far clockwise as possible.

3. There is an air leak in the fittings on the intake line:

- Check that the dry break couplers are fully engaged. Reengage if required.
- Check the condition of the pump hose, especially inside of the pump and on the intake side of the pump. Ensure it is not cracked.
- Check for loose connections on the intake side of the pump. Tighten loose fittings and hose clamps. Check for cracked fittings or fittings that may not be have been assembled with pipe thread sealant. Replace and reassemble as necessary.
- Ensure the container attached to the pump is free of air leaks, including the connector assembly and drop tube.

4. The line is restricted on the intake or output side of the pump:

- Check the condition of the pump hose. Ensure it has not collapsed, become plugged, or excessively worn.
- Check filter and nozzles for plugging.
- If in freezing conditions, check for frozen deposits in the lines.
- If using a slurried product, check for product settling in the lines.

5. Pump is operating at too high of a pressure:

Ensure system is operating at 20 psi or lower. Lower treating parameters, such as treating speed, to reduce system pressure.

6. Pump is operating too slowly:

Some application rates, combined with low seed densities and slow treating speeds can result in slow pump operating speeds.

- Pump speeds under 35 rpm can result in inconsistent flows. If possible, increase product application rate by diluting in order to increase pump speeds.

- Increase treating speed to increase pump speed if operating below 30 bushels per minute.

7. Pump is operating too fast:

Viscous (thick) products with high application rates, combined with high seed densities and high treating speeds can result in the pump operating inefficiently. Pump speeds over 400 rpm can result in inconsistent flows. Decrease treating speed to reduce pump speed.

8. Calibration was performed at a different treating speed than the operational speed.

Operate the STORM at the same treating speed as the pre-configured desired treating speed set in the job parameters.

9. Product condition is inconsistent:

- Inadequate mixing may result in product stratification. Ensure that the product has been properly mixed prior to pumping the product with the STORM.
- Over-mixing can cause some products to foam. Consult with the product manufacturer for proper handling recommendations

10. Product is too thick to meter properly:

- Dilute product, if possible, to reduce viscosity. Recalibrate as required to ensure accuracy of application.
- Some treatment products change in viscosity with temperature. Ensure calibrations are performed for the conditions at the time of treating.

11. The pump is damaged:

- Pump may be damaged or warped. Test by removing hose and spinning by hand. If binding is evident in rotation of rotor or rollers inside the pump, then adjust mounting screws to relieve problem. Replace the pump if required.
- Ensure that the pump coupler is installed correctly.

1.3. SEED COVERAGE

SEED COVERAGE IS POOR

1. Nozzles are plugged:

Check for plugged nozzles, and clean as required.

2. Nozzle(s) are misdirected:

Ensure nozzles are oriented correctly and spraying the full grain curtain.

3. Nozzle(s) are not creating a spray pattern:

Excessively low pump flow (800 ml/min or lower per nozzle) can result in a poor spray pattern, depending on the treatment type (this issue can commonly affect treatment of barley and oats). Increase treating parameters to gain an improved spray pattern. If product application rates are low, consider combining flows or diluting product to increase flow rate through the nozzles.

4. Application Rates are lower than 300 ml/100 kg of seed:

- Consider increasing dilution of treating product or use second pump (if not being utilized) to add water to application.
- Coverage is best for Wheat, Barley and Oats at application rates of 400 to 600 ml/100kg.

5. Application rates are not being obtained:

Check seed delivery and pump rates and ensure they are being met.

6. Seed condition is affecting coverage:

Dusty seed, dry seed, and frozen seed can affect coverage of many seed treatments.

7. Treating speed is not optimal for mixer speed:

Running the mixer (boot flight) too quickly can result insufficient mixing and result in poor coverage. Reduce the auger throttle until coverage improves.

8. Treatment product is too thick:

Thick treatment products may not cover seed adequately. Consult treatment product manufacturer for recommendations and dilute to reduce viscosity if possible.

1.4. TREATMENT BUILDUP

EXCESSIVE BUILD-UP IN APPLICATION CHAMBER

1. Seed condition is poor (dusty, dry, etc.):

Dirty or dusty seed will cause build-up. Avoid using excessively dirty or dusty seed.

2. Treatment product is too thick:

Thick treatment products can increase build-up. Consult treatment product manufacturer and dilute treatment if possible.

BUILD-UP OF TREATMENT ON METERING CONVEYOR BELT

1. Treatment is flowing when seed is not:

Do not operate the pumps with no seed flowing, or treatment will splash up onto the conveyor belt.

2. Seed is dusty:

Seed treatment will readily bind to the dust in the seed. These airborne particulates may stick to the conveyor belt.

3. Nozzle(s) are misdirected:

Ensure nozzles are oriented correctly and spraying the full grain curtain.

1.5. CONVEYOR SPEED ISSUES

SYSTEM WON'T OPERATE AT HIGHER CONVEYOR SPEEDS

1. Pump speed limit of 650 rpm has been met:

Lower product dilution if possible, or split treatment application between two pumps.

2. Insufficient power supply:

Check advanced diagnostics tab during operation for voltage condition. If low (less than 100 VAC), ensure that the power supply is sufficient.

Extension cords should be 12 gauge or heavier and should not exceed 150 feet in total length. Utilize a 3000 watt generator if power availability is limited.

3. Conveyor out of adjustment causing excessive drag:

An improperly adjusted conveyor can increase power requirements. Adjust conveyor tension and/or tracking.

1.6. EXPECTED CONVEYOR MOTOR SPEED

See Table 3 for the expected conveyor motor speeds.

Table 3 Expected Conveyor Motor Speeds (RPM)

Treating Speed bu/min	Wheat (RPM)	Barley (RPM)	Oats (RPM)	Peas (RPM)	Lentils (RPM)
15	1353	1370	1340	1379	1309
17.5	1588	1619	1525	1625	1532
20	1846	1891	1777	1908	1776
22.5	2128	2184	2097	2230	2041
25	2434	2501	2483	2588	2328
27.5	2763	2839	2938	2985	2637
30	3116	3201	3459	3419	2966

1.4. SEED DENSITY

Table 4 provides seed densities based on the use of a standard 0.5 L cup filled by a cox funnel according to standard practice.

Data for Wheat, Barley, Oats, and Flax has been obtained from the Canadian Grains Commission and is corrected for grain compaction. For further information consult www.grains-canada.gc.ca.

Data for wheat that is shown in red is based on predicted values of the Canadian Grains Commission data. Actual values may vary.

Table 4 Seed Density (Based on Avery Bushel Measure)

Measured	Peas & Lentils	Wheat	Barley	Oats	Flax	Measured	Peas & Lentils	Wheat	Barley	Oats	Flax
g/0.5 L	lbs/bu	lbs/bu	lbs/bu	lbs/bu	lbs/bu	g/0.5 L	lbs/bu	lbs/bu	lbs/bu	lbs/bu	lbs/bu
179	28.7			32.0		**250**	40.1		41.6	43.3	43.6
180	28.9			32.1		**251**	40.3		41.8	43.4	43.7
181	29.0			32.3		**252**	40.4		42.0	43.6	43.9
182	29.2			32.4		**253**	40.6		42.1	43.8	44.0
183	29.4			32.6		**254**	40.7		42.3	43.9	44.2
184	29.5			32.8		**255**	40.9		42.5	44.1	44.3
185	29.7			32.9		**256**	41.1		42.6	44.2	44.5
186	29.8			33.1		**257**	41.2		42.8	44.4	44.6
187	30.0			33.2		**258**	41.4		43.0	44.5	44.8
188	30.2			33.4		**259**	41.5		43.1	44.7	44.9
189	30.3			33.6		**260**	41.7		43.3	44.9	45.1
190	30.5			33.7		**261**	41.9		43.5	45.0	45.3
191	30.6			33.9		**262**	42.0		43.6	45.2	45.4
192	30.8			34.0		**263**	42.2		43.8	45.3	45.6
193	31.0			34.2		**264**	42.3		44.0	45.5	45.7
194	31.1			34.4		**265**	42.5		44.1	45.7	45.9
195	31.3			34.5		**266**	42.7		44.3	45.8	46.0
196	31.4			34.7		**267**	42.8		44.5	46.0	46.2
197	31.6			34.8		**268**	43.0		44.7	46.1	46.3
198	31.8			35.0		**269**	43.1		44.8	46.3	46.5
199	31.9			35.2		**270**	43.3		45.0	46.5	46.6
200	32.1			35.3		**271**	43.5		45.2	46.6	46.8
201	32.2			35.5		**272**	43.6		45.3	46.8	46.9
202	32.4			35.6		**273**	43.8		45.5	46.9	47.1
203	32.6			35.8		**274**	43.9		45.7	47.1	47.3
204	32.7			35.9		**275**	44.1		45.8	47.3	47.4
205	32.9			36.1		**276**	44.3		46.0	47.4	47.6
206	33.0			36.3		**277**	44.4		46.2	47.6	47.7
207	33.2			36.4		**278**	44.6		46.3	47.7	47.9
208	33.4			36.6		**279**	44.7		46.5	47.9	48.0
209	33.5			36.7		**280**	44.9		46.7	48.1	48.2
210	33.7			36.9		**281**	45.1		46.8	48.2	48.3
211	33.8			37.1		**282**	45.2		47.0	48.4	48.5
212	34.0			37.2		**283**	45.4		47.2	48.5	48.6
213	34.2			37.4		**284**	45.5		47.3	48.7	48.8
214	34.3			37.5		**285**	45.7		47.5	48.8	48.9
215	34.5			37.7		**286**	45.9		47.7	49.0	49.1
216	34.6			37.9		**287**	46.0		47.8	49.2	49.3
217	34.8			38.0		**288**	46.2		48.0	49.3	49.4
218	35.0			38.2		**289**	46.4		48.2	49.5	49.6
219	35.1			38.3		**290**	46.5		48.3	49.6	49.7

Table 4 Seed Density (Based on Avery Bushel Measure)

Measured	Peas & Lentils	Wheat	Barley	Oats	Flax
g/0.5 L	lbs/bu	lbs/bu	lbs/bu	lbs/bu	lbs/bu
220	35.3			38.5	
221	35.4			38.7	
222	35.6			38.8	
223	35.8			39.0	
224	35.9			39.1	
225	36.1			39.3	
226	36.2			39.5	
227	36.4			39.6	40.0
228	36.6			39.8	40.2
229	36.7			39.9	40.3
230	36.9			40.1	40.5
231	37.0			40.2	40.6
232	37.2			40.4	40.8
233	37.4			40.6	40.9
234	37.5			40.7	41.1
235	37.7			40.9	41.2
236	37.9			41.0	41.4
237	38.0			41.2	41.6
238	38.2			41.4	41.7
239	38.3			41.5	41.9
240	38.5			41.7	42.0
241	38.7		40.1	41.8	42.2
242	38.8		40.3	42.0	42.3
243	39.0		40.5	42.2	42.5
244	39.1		40.6	42.3	42.6
245	39.3		40.8	42.5	42.8
246	39.5		41.0	42.6	42.9
247	39.6		41.1	42.8	43.1
248	39.8		41.3	43.0	43.2
249	39.9		41.5	43.1	43.4
321	51.5	53.0	53.5		54.5
322	51.6	53.1	53.7		54.6
323	51.8	53.3	53.9		54.8
324	52.0	53.5	54.0		55.0
325	52.1	53.6	54.2		55.1
326	52.3	53.8	54.4		55.3
327	52.4	53.9	54.5		55.4
328	52.6	54.1	54.7		55.6
329	52.8	54.3	54.9		55.7
330	52.9	54.4	55.0		55.9
331	53.1	54.6	55.2		56.0
332	53.2	54.8	55.4		56.2
333	53.4	54.9	55.5		56.3
334	53.6	55.1	55.7		56.5

Measured	Peas & Lentils	Wheat	Barley	Oats	Flax
g/0.5 L	lbs/bu	lbs/bu	lbs/bu	lbs/bu	lbs/bu
291	46.7	48.1	48.5	49.8	49.9
292	46.8	48.3	48.7	50.0	50.0
293	47.0	48.5	48.8	50.1	50.2
294	47.2	48.6	49.0	50.3	50.3
295	47.3	48.8	49.2	50.4	50.5
296	47.5	48.9	49.3	50.6	50.6
297	47.6	49.1	49.5	50.8	50.8
298	47.8	49.3	49.7	50.9	50.9
299	48.0	49.4	49.8	51.1	51.1
300	48.1	49.6	50.0	51.2	51.3
301	48.3	49.7	50.2		51.4
302	48.4	49.9	50.3		51.6
303	48.6	50.1	50.5		51.7
304	48.8	50.2	50.7		51.9
305	48.9	50.4	50.8		52.0
306	49.1	50.6	51.0		52.2
307	49.2	50.7	51.2		52.3
308	49.4	50.9	51.4		52.5
309	49.6	51.0	51.5		52.6
310	49.7	51.2	51.7		52.8
311	49.9	51.4	51.9		52.9
312	50.0	51.5	52.0		53.1
313	50.2	51.7	52.2		53.3
314	50.4	51.8	52.4		53.4
315	50.5	52.0	52.5		53.6
316	50.7	52.2	52.7		53.7
317	50.8	52.3	52.9		53.9
318	51.0	52.5	53.0		54.0
319	51.2	52.7	53.2		54.2
320	51.3	52.8	53.4		54.3
378	60.6	62.2			
379	60.8	62.3			
380	60.9	62.5			
381	61.1	62.7			
382	61.3	62.8			
383	61.4	63.0			
384	61.6	63.1			
385	61.7	63.3			
386	61.9	63.5			
387	62.1	63.6			
388	62.2	63.8			
389	62.4	63.9			
390	62.6	64.1			
391	62.7	64.3			

Table 4 Seed Density (Based on Avery Bushel Measure)

Measured	Peas & Lentils	Wheat	Barley	Oats	Flax
g/0.5 L	lbs/bu	lbs/bu	lbs/bu	lbs/bu	lbs/bu
335	53.7	55.2	55.9		56.6
336	53.9	55.4	56.0		56.8
337	54.0	55.6	56.2		57.0
338	54.2	55.7	56.4		57.1
339	54.4	55.9	56.5		57.3
340	54.5	56.0	56.7		57.4
341	54.7	56.2	56.9		57.6
342	54.9	56.4	57.0		57.7
343	55.0	56.5	57.2		57.9
344	55.2	56.7	57.4		58.0
345	55.3	56.8	57.5		58.2
346	55.5	57.0	57.7		58.3
347	55.7	57.2	57.9		
348	55.8	57.3	58.1		
349	56.0	57.5	58.2		
350	56.1	57.7	58.4		
351	56.3	57.8	58.6		
352	56.5	58.0	58.7		
353	56.6	58.1	58.9		
354	56.8	58.3	59.1		
355	56.9	58.5	59.2		
356	57.1	58.6	59.4		
357	57.3	58.8	59.6		
358	57.4	58.9	59.7		
359	57.6	59.1	59.9		
360	57.7	59.3	60.1		
361	57.9	59.4			
362	58.1	59.6			
363	58.2	59.8			
364	58.4	59.9			
365	58.5	60.1			
366	58.7	60.2			
367	58.9	60.4			
368	59.0	60.6			
369	59.2	60.7			
370	59.3	60.9			
371	59.5	61.0			
372	59.7	61.2			
373	59.8	61.4			
374	60.0	61.5			
375	60.1	61.7			
376	60.3	61.9			
377	60.5	62.0			

Measured	Peas & Lentils	Wheat	Barley	Oats	Flax
g/0.5 L	lbs/bu	lbs/bu	lbs/bu	lbs/bu	lbs/bu
392	62.9	64.4			
393	63.0	64.6			
394	63.2	64.8			
395	63.4	64.9			
396	63.5	65.1			
397	63.7	65.2			
398	63.8	65.4			
399	64.0	65.6			
400	64.2	65.7			
401	64.3	65.9			
402	64.5	66.0			
403	64.6	66.2			
404	64.8	66.4			
405	65.0	66.5			
406	65.1	66.7			
407	65.3	66.9			
408	65.4	67.0			
409	65.6	67.2			
410	65.8	67.3			
411	65.9	**67.5**			
412	66.1	**67.6**			
413	66.2	**67.8**			
414	66.4	**68.0**			
415	66.6	**68.1**			
416	66.7	**68.3**			
417	66.9	**68.5**			
418	67.0	**68.6**			
419	67.2	**68.8**			
420	67.4	**68.9**			
421	67.5	**69.1**			
422	67.7	**69.3**			
423	67.8	**69.4**			
424	68.0	**69.6**			
425	68.2	**69.7**			
426	68.3	**69.9**			
427	68.5	**70.1**			
428	68.6	**70.2**			
429	68.8	**70.4**			
430	69.0	**70.6**			
431	69.1	**70.7**			
432	69.3	**70.9**			
433	69.4	**71.0**			