



## ACM (Aerator Control Module) Diagnostic Worksheet & Aeration Field Reference Guide

**Product: ProCore® Aerators**

**April 18, 2017**

**Updated** – Deleted Damper  
Deflection Test

Affected Units:	Models:	Serial Numbers:
<b>ProCore 648 Aerator</b>	09200	240000101-400099999
<b>ProCore 864</b>	09715	280000101-400099999
<b>ProCore 1298</b>	09716	280000101-400099999

Troubleshooting tools are available for use in diagnosing and documenting electrical system and hole appearance/quality issues with the ProCore 648.

The following will assist in communicating and resolving technical issues.

1. **Electrical System Worksheet** -- for use when diagnosing electrical complaints [specific to the ProCore 648](#). It is a tool to record and compare ACM (Aerator Control Module) lights lit compared to the designed light indications relative to operating mode. It contains explanation of the symbols used to identify the diagnostic LED lights. (page 4)
  2. **Aeration Field Reference Guide** -- for evaluating after coring hole appearance issues that pertain to all aeration equipment Toro currently markets. This document is designed to establish common descriptive terms for various turf conditions and hole quality appearance. It discusses the possible failure or damaged items relative to turf appearance resulting in 2 broad categories: over the length of the run, and at entry and/or exit from the aeration run. (page 5&6)
  3. **Hole Spacing/Speed Test** – To verify correct traction speed. (page 7)
345. **Down Pressure Kit** – This kit will help in turf lifting situations. There are two configurations; for 2004-2006 units use Down Pressure Kit (108-6842), 2007 & up; order individual springs and plates. (See page 8)

Please contact your local Toro Commercial Products Distributor for assistance or further information in the use of this document regarding your ProCore Aerator.

Reference Service Bulletin Specialty 00-01 when making your inquiry.

# ACM Diagnostic Worksheet

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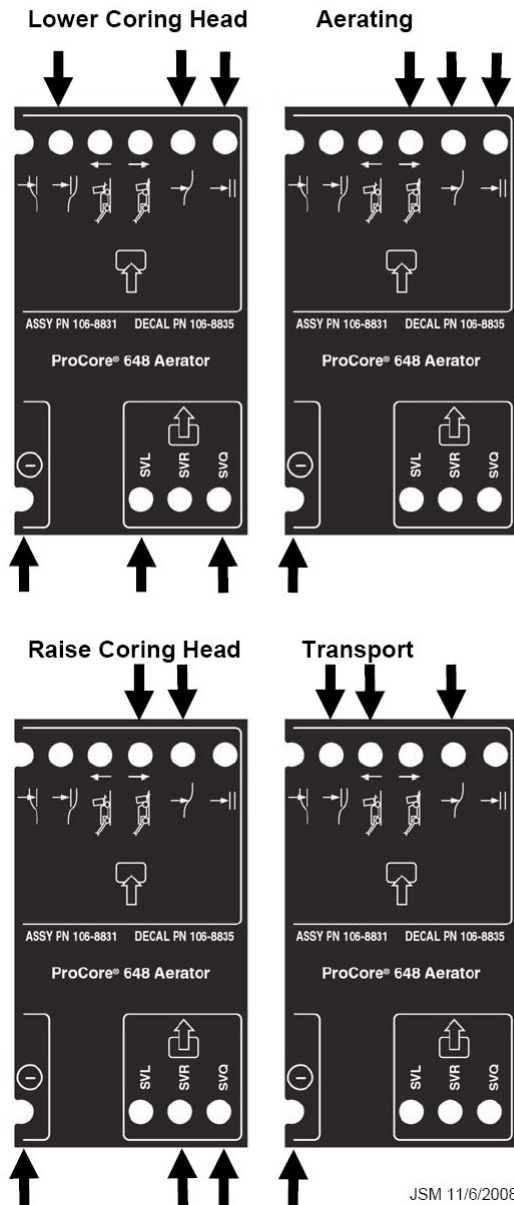
Case: _____
Serial: _____
Hours: _____
Customer: _____
Date: _____

**PC648 ACM Troubleshooting Worksheet**

The arrows in the diagram indicate the LED lights normally illuminated during the 4 listed operating conditions; Mark the white circles to indicate the lights lit on the machine you are diagnosing for the given operating condition.

### Symbol Key

	12 VDC Power On
	Outputs
	<b>S</b> olenoid <b>V</b> alve <b>L</b> ower
	<b>S</b> olenoid <b>V</b> alve <b>R</b> aise
	<b>S</b> olenoid <b>V</b> alve <b>Q</b> uick
	Inputs
	Head Low (#4 switch)
	Head High (#3 switch)
	Transport (#1 switch)
	Aerate (#2 switch)
	Ground Following
	OK To Lower



# Aeration Field Reference Guide

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<b>Aeration Field Reference Guide</b>	
<b>ProCore 648/864/1298</b>	
<b>Troubleshooting Questions</b>	
<b>(A)</b> Rotalink Damper stiffness	<i>Perform damper stiffness test (see attached test process) . Do any dampers have stiffness variation?</i>
<b>(B)</b> Bent Tine Head	<i>Is the tine head bent? Inspect tine head mounting plate for flatness.</i>
<b>(C)</b> Bent Tine(s)	<i>Are one or more tines bent?</i>
<b>(D)</b> Rotalink Damper Position	<i>Are dampers configured the same? For pulled over the run: remove spacer or decrease forward hole spacing; Heaving: adjust up and increase forward spacing; for pushed over the run: adjust spacers down or increase forward hole spacing.</i>
<b>(E)</b> Bumper Stop (648 only)	<i>All bumper stops are forward with spacers removed and rearward with spacers installed.</i>
<b>(F)</b> Tine Size/Density (too many tines in too small of an area)	<i>Decrease tine size, decrease number of tines, increase hole spacing, decrease depth.</i>
<b>(G)</b> Coring Head Operating Speed Reduction (10-15%, Needle Tines)	<i>Try engine speed reductions (648: 2700-3100 engine RPM; 864/1298: 460-486 PTO RPM) (648 – rear roller kit).</i>
<b>(H)</b> Traction Issues (slippage, interal/external)	<i>Are the tires spinning due to incline or slippery conditions? Verify transmission functionality. 648 – Check down pressure spring, verify the machine is not "walking" on the tines. Check springs – consider installing weight kit.</i>
<b>(I)</b> Hard Sub-Soil at Aeration Depth	<i>Is there a shallow soil "cap" with hard pan base (rock), compacted soil, or Calciche soil? Has the area been recently irrigated?</i>
<b>(J)</b> Clutch/Belt Slippage Engagement Timing (648 only)	<i>Verify drive belt spring tension. Verify clutch functionality. 648 – verify clutch timing (switch kit orifice).</i>
<b>(K)</b> Side Eject Tine Orientation	<i>Rotate eject windows to sides to minimize hole edge degradation. Try top ejects.</i>
<b>(L)</b> Ground Following Adjustment (648 only)	<i>Verify ground following functionality.</i>
<b>(M)</b> Exceeding Root Strength/Depth	<i>Are any of the turf properties different from previous aerations? Try going shallower or use fewer tines/smaller tines/longer spacing. Be less aggressive.</i>
	<b>Questions: Whole</b>

# Aeration Field Reference Guide

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Issue Name	Issue Description	Other Terms	Questions: Less Than All Tine Heads	Questions: Whole Machine (all tine heads)
<b>Hole Quality - Across Pass of Aeration Run</b>				
Pushed Holes	Rear edge (opposite of the direction of travel) of the hole is deformed	Elongates, slotted, dimple	A, B, C, D, E	A, D, E, G, H, I
Pulled Holes	Leading edge (same as the direction of travel) of the hole is deformed	Elongates, slotted, dimple	A, B, C, D, E	A, D, E, G, H, J
Tufted Holes	Edge of the turf at the hole is "flicked" up	Flicked up, or picked canopy, tufting	B, C, D, E	A, D, G, K, L
Lifting of Whole Pass	Turf has been lifted off the soil	Lifted, luffed, puffed, whole surface or spading, perforated, torn	A, F, D	A, F, K, M
<b>Hole Quality - Entrance and Exit of Aeration Pass</b>				
Pushed Holes	Rear edge (opposite of the direction of travel) of the hole is deformed	Elongated, slotted	A, D, E, H, J	A, H, J
Pulled Holes	Leading edge (same as the direction of travel) of the hole is deformed	Elongated, slotted	A, D, E, H, J	A, H, J
Tufted Holes	Edge of the turf at the hole is "flicked" up	Flicked up, or picked canopy, scratched, rake	D - if different from others E - same K	E, G, J
Heaving	Turf has been lifted off the soil	Spading, shoveled, shingles, wedged tine head section moved	A, B, C, D, F, M	D, F, I, J, M

## Aerator Hole Spacing/Speed Test

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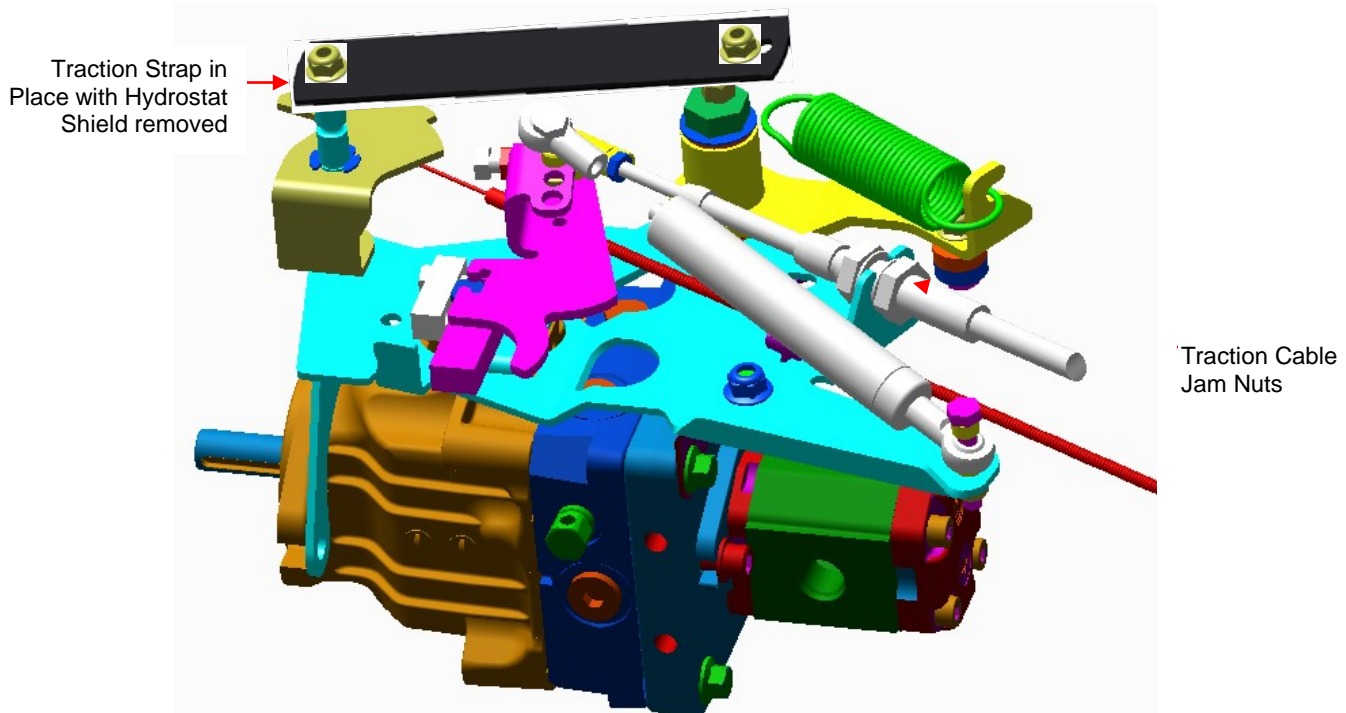
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The specification for Pro Core 648 traction speed or hole spacing; The machine will travel 50' (12.7 m) in 34 seconds when adjusted to 2" spacing. (@ 3400 rpm)

### Test Procedure;

1. Verify correct tire inflation; 12 psi (0.82 Bar or 0.84 Kg/cm)
2. On a paved surface, mark a straight line distance of 50 feet (12.7 m)
3. Adjust the hole spacing control to 2" and verify engine speed to be  $3400 \pm 50$  rpm.
4. Perform a "running start", meaning the unit should be rolling up to normal speed at the time it crosses the start point in the 50' course.
5. Time the machine with a stop watch or other suitable instrument capable of measuring 1 second resolution. Perform 3 runs of the course and average the times recorded. The machine will travel 50' in  $34 \pm 0.5$  seconds if adjusted correctly.
6. If the machine does not meet this specification, follow the process in the Operator's Manual for Hole Spacing adjustment, located in the Maintenance Section.

Note; when making speed/hole spacing adjustments, it is necessary to secure Traction Strap (108-6836, Item 36) with the fasteners that secure Hydrostat Shield (107-7578-01, item 35) in place. The strap supports the assembly from flexing when the Hydrostat Shield is removed to allow access to the traction cable jam nuts while making speed adjustments.



# Down Pressure Kit

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**Description:**  
Optional kit that contains springs, brackets and turf guard backing plates to allow more pressure to be applied to the turf. **Down Pressure Kit (108-6842) applies to 09200-240000101 through 09200-260099999 only.** The spring mount brackets contained in this kit are not required for units built in 2007 to present. The image on the left below depicts a 2004-2006 installation which includes the spring hanger bracket. Later models have welded bosses to hang the springs. There is no kit available for 2007 and newer machines, order 2 of Extension Spring (66-4270) and 4 of the appropriate Spring-Backing plates for the type of tine head in use.

**Application:**  
Turf disturbance situations where insufficient plant root depth allows displacement or lifting of the turf. The kit installation increases the amount of down force exerted on the turf by the turf guards. The additional down force allows the tines to exit (separate from) the soil without lifting the turf. This is an optional kit to address specific turf conditions.

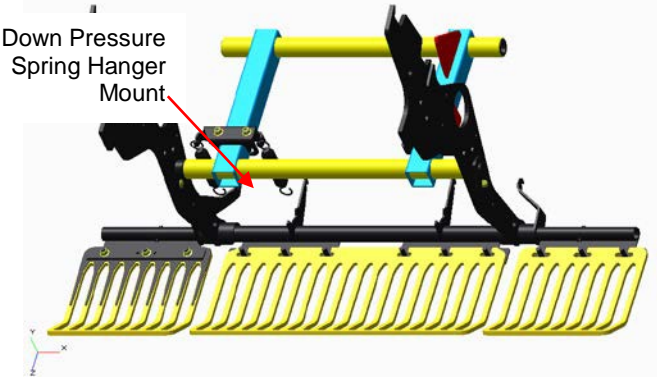
To configure the machine, there are differing requirements depending on the year of manufacture,

Units with serial 240000101-260099999:  
Install Down Pressure Kit (108-6842).  
Select from the following to correspond to the tine head assembly installed;  
Spring-Backing, 6 Tine Head (110-4396)  
Spring-Backing, 5 Tine Head (110-4399)  
Spring-Backing, 4 Tine Head (115-2811)  
Spring-Backing, 3 Tine Head (115-2812)

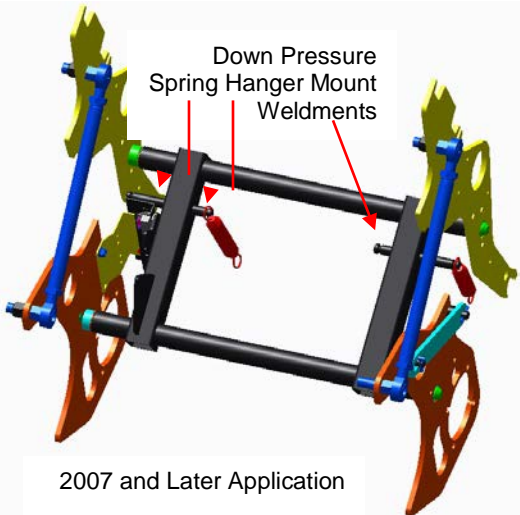
Units with serial 270000101- and later:  
Install 2 of  
Extension Spring (66-4270).  
Select from the following to correspond to the tine head assembly installed;  
Spring-Backing, 6 Tine Head (110-4396)  
Spring-Backing, 5 Tine Head (110-4399)  
Spring-Backing, 4 Tine Head (115-2811)

Spring-Backing, 3 Tine Head (115-2812)

Note: A quantity of 4 Backing Springs are required per installation.



2004-2006 application



2007 and Later Application