

Trouble Shooting Guide - ACE Plus Sevcon Controller Power System

Note: Always follow trouble shooting guide in exact order as listed below. Performing tests out of sequence will cause inaccurate results and lost time in diagnosing electrical system problems.

1) Vehicle Does Not Operate, Forward or Reverse.		
Test	Passed	Failed
Voltmeter positive red lead to battery B+ terminal, Voltmeter negative black lead to battery B - terminal.	Full battery voltage = Good	Less than full battery voltage, verify battery connections, check for corrosion, state of charge and/ or replace batteries.
Turn Tow or Power switch off and then back on . Observe Green LED on controller for flashing pattern. If flashing, count number of flashes and refer to LED diagnostic guide below.	Contactors will close to start charging controller capacitors and open after approximately 30 seconds.	If contactor does not close, check fuse and wiring to coil. Replacement of a defective controller should always be confirmed by verification that other faults have been eliminated first. Controllers must be factory programmed to specific VIN, axle, tire size and vehicle voltage.
No Power to Controller		2005 (and later) vehicles may be equipped with a charger interlock. The green charger wire connects to red wire #15 in main harness and only provides power to system when charger is unplugged from AC power source. (See Rev 3 wiring diagram)

LED Diagnostic Guide for Sevcon PRO-99050 Controller

The Sevcon Controller Flash Code Diagnostic Guide can be used to get an initial indication of a problem. In some cases, there are multiple possible causes for a fault in that category. The causes and verification steps for some fault codes related to system input or circuitry for the drive system are listed. These obvious faults may not require use of the handset or computer interface. In order to perform complete specific fault diagnosis, a Sevcon Controller Customization Utility Handheld Calibrator PN 79001-04, or Computer Interface 79003-04, may be required. Training is required to use these tools.

2) Vehicle Operation is Inoperative, Intermittent, Erratic, Slow, or Balky			
Green LED Flashes	Possible Fault Condition	Handset ID #	Cause/ Test/ Failure
0 Flash (No Green LED)	Internal MOSFET/ Contactor		No power to Pin 1 from Run/Tow or Power Switch Also see charger interlock possibility above.
			No power to contactor coil connections
			No power from Main Contactor to Controller B+
			Controller Connector wiring open circuit
			Controller Connector pin not in place
			Dielectric Break Down at Connector (Wet/Shorted)
1 Flash	Personality (CRC) out of range	23/24/25	Internal controller fault, MOSFET problem. Replacement of controller may be required.
2 Flash	Illegal start condition	16/17	Incorrect range settings: requires HandSet/Computer or Replacement of Controller
		Various	The wire harness controller connector pins may develop an open or intermittent connection which can also result in these faults. Check pins and crimps.
		7	Seat switch not closed on accel depress (when equipped)
		8	Accel switch (pedal) needs to be recycled after a direction change.
		9	Pedal depress when key turned on
		10	Wiring fault - two directions selected
		11	Forward/ Reverse switch turned on at power up
3 Flash	MOSFET short circuit	11	Speed switch out of adjustment (see section 3)
		11	Micro switch not open with pedal up
			External Strobe (Flasher) light caused fault. Wiring polarity reversed on flasher. (Rovr/IS only)
		22	Armature circuit short detected or other intermittent electrical short such as brush dust, etc.
		26	Internal controller fault

* Fault indication will be cleared by re-initiating the start sequence after the cause of the fault has been removed. *

Green LED Flashes	Possible Fault Condition	Handset ID #	Cause/ Test / Failure
4 Flash	Contactor Fault or Motor open circuit	18	Contactor failed or stuck. Bench test contactor.
		19	Main post to battery corroded.
		19	Test switched side of contactor
		19	Test 24 Volt small terminal coil (verify correct coil voltage)
		21	Motor Open Circuit or Brushes
5 Flash	Motor Stall Fault	14	Motor Stall Condition detected.
6 Flash	Accelerator Fault	4	Input wire disconnected (white/ black Lead)
		5	Speed (Pot Box) adjustment needed (see section 3)
		5	Pedal depressed at Power up (see 2 flash)
		13	End of charge cycle with Power Switch left on. Check for BDI Scan Sweep.
7 Flash	Low or high battery voltage	12 / 13 / 15	Battery voltage has fallen to or risen: 24 Volt system 15 V Low -- 36.5 V High 36 Volt system 22.5 V Low -- 50 V High 48 Volt system 30 V Low -- 65 V High
8 Flash	Over Temperature or Timed Cut out.		Defective Controller replacement may be required.
		1	Due to excessive Temperature/ Heat sink
		3	Current Cut-Back
9 Flash	Monitor Tripped	2	F1 or A1 out of Range Boundaries 125%
10 Flash	Auto Zero Fault		Contactor Coil Disconnected
		34	May be controller internal fault
		34	Contactor did not operate properly

Fault indication will be cleared by Power-up sequence after cause for fault has been removed.

NOTE: LED Diagnostic Guide for Newer Sevcon (Beta) 633T45303 6 Post Controller

Vehicle Operation is Inoperative, Intermittent, Erratic, Slow, or Balky

Green LED Flashes	Possible Fault Condition	Handset ID #	Cause/ Test/ Failure
O Flash (No Green LED)	Internal MOSFET/ Contactor		No power to Pin 1 from Run/Tow or Power Switch Also see charger interlock possibility above.
			No power to contactor coil connections
			No power from Main Contactor to Controller B+
			Controller Connector wiring open circuit
			Controller Connector pin not in place
			Dielectric Break Down at Connector (Wet/Shorted) Internal controller fault, MOSFET problem. Replacement of controller may be required.
1 Flash	Personality (CRC) out of range	17 / 18	Incorrect range settings: requires HandSet/Computer or Replacement of Controller
2 Flash	Illegal start condition	Various	The wire harness controller connector pins may develop an open or intermittent connection which can also result in these faults. Check Pins and Crimps.
		7	Seat switch not closed on direction select or accel depress (when equipped)
		8	Accel switch (pedal) needs to be recycled after a direction change.
		9	Pedal depress when key turned on
		10	Wiring fault - two directions selected
		11	Forward/ Reverse switch turned on at power up
		11	Speed switch out of adjustment (see section 3)
3 Flash	MOSFET short circuit		External Strobe (Flasher) light caused fault. Wiring polarity reversed on flasher. (Rovr / IS only)
		23	Armature circuit short detected or other intermittent electrical short such as brush dust, etc.
		27	Internal controller fault

Fault indication will be cleared by Power-up sequence after cause for fault has been removed.

Green LED Flashes	Possible Fault Condition	Handset ID #	Cause/ Test / Failure
4 Flash	Contactor Fault or Motor open circuit	19	Contactor failed or stuck. Bench test contactor.
		20	Main post to battery corroded.
		20	Test switched side of contactor
		20	Test 24 Volt small terminal coil (verify correct coil voltage)
		22	Motor Open Circuit or Brushes
5 Flash	Motor Stall Fault	15	Motor Stall Condition detected.
6 Flash	Accelerator Fault	4	Input wire disconnected (white/ black Lead)
		5	Speed (Pot Box) adjustment needed (see section 3)
		5	Pedal depressed at Power up (see 2 flash)
7 Flash	Low or high battery voltage	13 / 16	End of charge cycle with Power Switch left on. Check for BDI Scan Sweep.
		12 / 13 / 16	Battery voltage has fallen to or risen: 24 Volt system 15 V Low -- 36.5 V High 36 Volt system 22.5 V Low -- 50 V High 48 Volt system 30 V Low -- 65 V High
		14	Capacitor voltage is too high
8 Flash	Over Temperature or Timed Cut out.		Defective Controller replacement may be required
		1	Due to excessive Temperature/ Heat sink
		3	Current Cut-Back
9 Flash	Monitor Tripped	2	F1 or A1 out of Range Boundaries 125%
10 Flash	Auto Zero Fault		Contactor Coil Disconnected
		34	May be controller internal fault
		34	Value out of range

Fault indication will be cleared by Power-up sequence after cause for fault has been removed.

3) Speed Switch (Pot Box) Testing

Test	Passed	Failed
Disconnect white and black lead wires from wire harness to speed switch under front body. Switch volt/ohm meter to ohms scale. Capable of measuring 0 to 100 ohms. Connect volts/ohm meter leads to white and black wires from speed switch. Do not depress accelerator. Leave key in off position.	0 to 50 ohms resistance = Good	Greater than 50 ohms, refer to Pot Switch Adjustment, Service Manual 99496-96, or enclosed section on adjustment. If adjustment does not correct, replace pot switch or speed switch assembly.
Leave ohm meter leads connected to white and black leads (speed switch). Switch ohm meter to a scale capable of measuring up to 6,000 ohms (K ohms). Slowly depress accelerator and monitor change.	Ohms of resistance should rise gradually to a maximum of 4,500 to 5,500 ohms.	-- If rise in resistance is erratic or skips as pedal is depressed, replace speed switch (pot box) assembly. -- If maximum resistance is less than or greater than 4,500 to 5,500 ohms, adjust pot switch to correct. Refer to Service manual or enclosed section on adjustment.

For details regarding speed control (pot box) adjustment or repair, refer to your Service Manual or section on speed switch (pot box) adjustment.