

## 5 Troubleshooting the Tornado

### 5.1 Troubleshooting the Tornado with ACS

If a problem occurs with the wheelchair, then please proceed as follows:

- Identify the possible cause of the fault by using the troubleshooting tables below.
- Check the Status Display on the remote. Identify the error code if it is flashing.
- Perform the necessary checks and repairs as recommended in the table below.

#### 5.1.1 Diagnosing driving faults

PROBLEM	OTHER SYMPTOMS	POSSIBLE CAUSE	SOLUTION	REFERENCE
<b>Wheelchair will not drive</b>	Status display on remote lights up normally and does not show an error code	Drive motors may be disengaged	<ul style="list-style-type: none"> <li>• Engage the drive motors</li> </ul>	See User Manual
	Status display on remote does not light up	Batteries may be defective	<ul style="list-style-type: none"> <li>• Replace the batteries</li> </ul>	See "Replacing batteries" on page 29
		Batteries may be completely discharged	<ul style="list-style-type: none"> <li>• Charge the batteries</li> </ul>	See User Manual
		Power supply to the remote may be interrupted	<ul style="list-style-type: none"> <li>• Check the main fuse</li> </ul>	See "Replacing the main fuse" on page 34
			<ul style="list-style-type: none"> <li>• Check cables between modules for loose connections or damage</li> </ul>	See "Checking the cables" on page 36
	Remote may be defective	<ul style="list-style-type: none"> <li>• Exchange the remote on the wheelchair for a different one to eliminate the possibility that the remote may be the cause.</li> </ul>	See "Replacing the remote" on page 38	
Status display on remote is flashing	Various causes	<ul style="list-style-type: none"> <li>• Identify the error code</li> </ul>	See "REM24 Error Codes and Diagnostic Codes" on page 18	

PROBLEM	OTHER SYMPTOMS	POSSIBLE CAUSE	SOLUTION	REFERENCE
	Status display on remote flashes 2x, drive mode display shows "U"	Speed reduction switch on the lifter may be defective or disconnected	<ul style="list-style-type: none"> <li>Replace cable or switch</li> </ul>	See "Adjusting and replacing the speed reduction switch" on page 40
<b>Wheelchair does not drive smoothly</b>	None	Batteries may be defective (voltage not stable)	<ul style="list-style-type: none"> <li>Replace the batteries</li> </ul>	See "Replacing batteries" on page 29
		Drive motor(s) may be defective	<ul style="list-style-type: none"> <li>Replace the drive motor(s)</li> </ul>	See "Replacing the drive motors" on page 24
<b>Batteries cannot be charged</b>	None	Batteries may be defective	<ul style="list-style-type: none"> <li>Replace the batteries</li> </ul>	See "Replacing batteries" on page 29
	LEDs on the charger are flashing	Charger may be defective	<ul style="list-style-type: none"> <li>Replace the charger</li> </ul>	See User Manual of the charger
<b>Wheelchair drives too slowly</b>	Status display on remote flashes 2x, drive mode display shows "U"	Seat lifter is not in driving position (either too high or too low), and has activated the automatic speed reduction.	<ul style="list-style-type: none"> <li>Return seat lifter to driving position</li> </ul>	See User Manual
		Speed-reduction micro-switch on the seat lifter may be badly adjusted	<ul style="list-style-type: none"> <li>Adjust the micro-switch</li> </ul>	See "Adjusting and replacing the speed reduction switch" on page 40
	None	Remote may be defective	<ul style="list-style-type: none"> <li>Replace the remote</li> </ul>	See "Replacing the remote" on page 38
		Batteries may be defective	<ul style="list-style-type: none"> <li>Replace the batteries</li> </ul>	See "Replacing batteries" on page 29

**5.1.2 Diagnosing problems with electric actuators**

In case an electric actuator will not function, identify the source of the problem using the following table:

<b>PROBLEM</b>	<b>OTHER SYMPTOMS</b>	<b>POSSIBLE CAUSE</b>	<b>SOLUTION</b>	<b>REFERENCE</b>
Electric Actuator does not function	Remote displays a flashing "E", status diode on the CLAM does not go out, even if the remote is switched off or disconnected	CLAM is defective	<ul style="list-style-type: none"> <li>• Replace the CLAM</li> </ul>	See "Replacing components of the ACS or Shark electronics" on page 27
	None	Cable may be disconnected or damaged	<ul style="list-style-type: none"> <li>• Check that the cable is not disconnected or damaged. If necessary, replace the cable</li> </ul>	See "Checking the cables" on page 36
		Electric actuator may be defective	<ul style="list-style-type: none"> <li>• Test the actuator</li> </ul>	See "Testing an actuator motor" on page 39
		Remote may be defective	<ul style="list-style-type: none"> <li>• Exchange the remote on the wheelchair for a different one to eliminate the possibility that the remote may be the cause.</li> </ul>	See "Replacing the remote" on page 38

5.1.3 REM24 Error Codes and Diagnostic Codes

The drive electronics are capable of rectifying some errors automatically. In this case the status display will cease to flash. Please switch the remote on and off several times. Wait approx. 5 seconds each time before switching the remote on again. If this does not rectify the error, locate the error using the flash codes shown below.

Flash code:	Meaning:	Solution:	Notes
1 x flash	Module defective	Replace defective module	See "Replacing components of the ACS or Shark electronics" on page 27
2 x flashes	Accessory error (e.g. actuator short-circuit)	<ul style="list-style-type: none"> <li>Check accessory connections, check accessories</li> </ul>	See "Testing an actuator motor" on page 39
	Lifter raised or lowered too far (seat not at driving height)	<ul style="list-style-type: none"> <li>If lifter is raised, lower in stages until the status display stops flashing. If lowered too far, raise lifter in stages until the status display stops flashing. If at all possible, only drive when the seat is at driving height.</li> </ul>	See User Manual
3 x flashes	Fault in right-hand motor. Connection loose/defective or motor defective	<ul style="list-style-type: none"> <li>Check connecting plugs</li> <li>Check motor</li> </ul>	See "Checking the cables" on page 36 See "Replacing the drive motors" on page 24
4 x flashes	Fault in left-hand motor. Connection loose/defective or motor defective	<ul style="list-style-type: none"> <li>Check connecting plugs</li> <li>Check motor</li> </ul>	See "Checking the cables" on page 36 See "Replacing the drive motors" on page 24
5 x flashes	Fault/brake fault on right-hand motor. Connection loose/defective or motor defective	<ul style="list-style-type: none"> <li>Check connecting plugs</li> </ul>	See "Checking the cables" on page 36 See "Replacing the drive motors" on page 24
6 x flashes	Fault/brake fault on left-hand motor. Connection loose/defective or motor defective.	<ul style="list-style-type: none"> <li>Check connecting plugs</li> </ul>	See "Checking the cables" on page 36 See "Replacing the drive motors" on page 24

<b>Flash code:</b>	<b>Meaning:</b>	<b>Solution:</b>	<b>Notes</b>
<b>7 x flashes</b>	Completely discharge battery	<ul style="list-style-type: none"> <li>• Pre-charge battery</li> </ul>	See User Manual
<b>8 x flashes</b>	Battery voltage too high	<ul style="list-style-type: none"> <li>• Switch lights on to lower battery voltage</li> <li>• Check battery charger</li> </ul>	See User Manual of battery charger
<b>9 or 10 x flashes</b>	Faulty data transmission between modules	-	Remove all electronic modules except the Power Module and the Remote. Re-attach modules one by one to determine which one is causing the fault.  See "Replacing components of the ACS or Shark electronics" on page 27
<b>11 x flashes</b>	Motors overloaded / overheated	<ul style="list-style-type: none"> <li>• Switch remote on and off / wait if necessary</li> </ul>	-
<b>12 x flashes</b>	Module used has compatibility problems	<ul style="list-style-type: none"> <li>• Remove incorrect module</li> </ul>	See "Replacing components of the ACS or Shark electronics" on page 27

## 5.2 Troubleshooting the Invacare® Tornado with Shark Remote

If a problem occurs with the wheelchair, then please proceed as follows:

- Identify the possible cause of the fault by using the troubleshooting tables below.
- Check the Status Display on the remote. Identify the error code if it is flashing.
- Perform the necessary checks and repairs as recommended in the table below.

### 5.2.1 Diagnosing driving faults

PROBLEM	OTHER SYMPTOMS	POSSIBLE CAUSE	SOLUTION	REFERENCE
<b>Wheelchair will not drive</b>	Status display on remote lights up normally and does not show an error code	Drive motors may be disengaged	<ul style="list-style-type: none"> <li>• Engage the drive motors</li> </ul>	See User Manual
	Status display on remote does not light up	Batteries may be defective	<ul style="list-style-type: none"> <li>• Replace the batteries</li> </ul>	See "Replacing batteries" on page 29
		Batteries may be completely discharged	<ul style="list-style-type: none"> <li>• Charge the batteries</li> </ul>	See User Manual
		Power supply to the remote may be interrupted	<ul style="list-style-type: none"> <li>• Check the main fuse</li> </ul>	See "Replacing the main fuse" on page 34
			<ul style="list-style-type: none"> <li>• Check cables between modules for loose connections or damage</li> </ul>	See "Checking the cables" on page 36
	Remote may be defective	<ul style="list-style-type: none"> <li>• Exchange the remote on the wheelchair for a different one to eliminate the possibility that the remote may be the cause.</li> </ul>	See "Replacing the remote" on page 38	
Status display on remote is flashing	Various causes	<ul style="list-style-type: none"> <li>• Identify the error code</li> </ul>	See "Shark Error Codes and Diagnostic Codes" on page 22	

<b>PROBLEM</b>	<b>OTHER SYMPTOMS</b>	<b>POSSIBLE CAUSE</b>	<b>SOLUTION</b>	<b>REFERENCE</b>
<b>Wheelchair does not drive smoothly</b>	None	Batteries may be defective (voltage not stable)	<ul style="list-style-type: none"> <li>• Replace the batteries</li> </ul>	See "Replacing batteries" on page 29
		Drive motor(s) may be defective	<ul style="list-style-type: none"> <li>• Replace the drive motor(s)</li> </ul>	See "Replacing the drive motors" on page 24
<b>Batteries cannot be charged</b>	None	Batteries may be defective	<ul style="list-style-type: none"> <li>• Replace the batteries</li> </ul>	See "Replacing batteries" on page 29
	LEDs on the charger are flashing	Charger may be defective	<ul style="list-style-type: none"> <li>• Replace the charger</li> </ul>	See User Manual of the charger
<b>Wheelchair drives too slowly</b>	None	Batteries may be defective	<ul style="list-style-type: none"> <li>• Replace the batteries</li> </ul>	See "Replacing batteries" on page 29

**5.2.2 Shark Error Codes and Diagnostic Codes**

The drive electronics are capable of rectifying some errors automatically. In this case the status display will cease to flash. Please switch the remote on and off several times. Wait approx. 5 seconds each time before switching the remote on again. If this does not rectify the error, identify the error using the flash codes shown below.

FLASH CODE	Meaning	Solution	Notes
1	User error	<ul style="list-style-type: none"> <li>Ensure that the joystick is in the neutral central position (simply release the joystick) and switch on again.</li> </ul>	
2	Battery error	<ul style="list-style-type: none"> <li>Check battery and supply cable.</li> </ul>	See "Checking the cables" on page 36
		<ul style="list-style-type: none"> <li>Charge batteries. If you switch the wheelchair off for a few minutes, the batteries can often recharge to such an extent that a short run is still possible. However, you should only do this in an emergency, as this causes the batteries to discharge excessively.</li> </ul>	See User Manual
		<ul style="list-style-type: none"> <li>Replace batteries</li> </ul>	See "Replacing batteries" on page 29
3	Fault on left-hand motor (M2)	<ul style="list-style-type: none"> <li>Check motor cable and connecting plugs.</li> <li>Check motor.</li> </ul>	See "Checking the cables" on page 36 See "Replacing the drive motors" on page 24
4	Fault on right-hand motor (M1)	<ul style="list-style-type: none"> <li>Check motor cable and connecting plugs.</li> <li>Check motor.</li> </ul>	See "Checking the cables" on page 36 See "Replacing the drive motors" on page 24
5	Error on left-hand (M2) wheel lock	<ul style="list-style-type: none"> <li>Check cable and connecting plugs.</li> </ul>	See "Checking the cables" on page 36
6	Error on right-hand (M1) wheel lock	<ul style="list-style-type: none"> <li>Check cable and connecting plugs.</li> </ul>	See "Checking the cables" on page 36
7	Error in Shark remote	<ul style="list-style-type: none"> <li>Check remote bus cable and all connecting plugs.</li> <li>Replace remote.</li> </ul>	See "Checking the cables" on page 36 See "Replacing the remote" on page 38



FLASH CODE	Meaning	Solution	Notes
8	Error in Shark power module	<ul style="list-style-type: none"> <li>• Check all cables and connecting plugs in the Shark system.</li> <li>• Replace power module</li> </ul>	<p>See "Checking the cables" on page 36</p> <p>See "Replacing components of the ACS or Shark electronics" on page 27</p>
9	Communication error in Shark system	<ul style="list-style-type: none"> <li>• Check all cables and connecting plugs in the Shark system.</li> <li>• Replace remote.</li> </ul>	<p>See "Checking the cables" on page 36</p> <p>See "Replacing the remote" on page 38</p>
10	Unknown error	<ul style="list-style-type: none"> <li>• Check all cables and connecting plugs.</li> </ul>	<p>See "Checking the cables" on page 36</p>
11	Incompatible remote	<ul style="list-style-type: none"> <li>• The wrong remote type is connected. Ensure that the power module type code matches the remote type code.</li> </ul>	<p>See "Replacing the remote" on page 38</p> <p>See "Replacing components of the ACS or Shark electronics" on page 27</p>