

	Troubleshooting Guide: Console Cable	
Prepared by: Emilie McWilliams	Date Prepared: 4/9/2015	Models Affected: AFG, Livestrong, Horizon, and Vision treadmills (2001 – 2010)

DESCRIPTION

Use this guide to troubleshoot an OPP analog console cable on an AFG, Livestrong, Horizon, or Vision treadmill.

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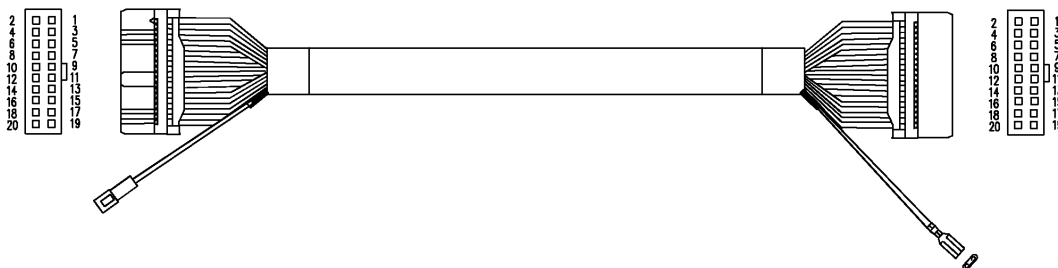
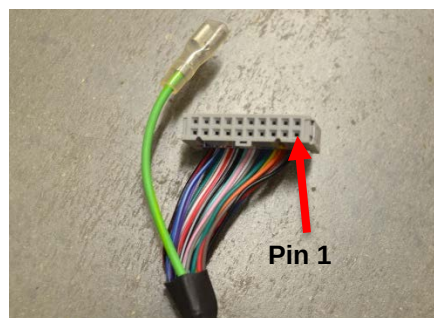
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20-Pin Analog Cable

This chart shows the voltage that you are expected to read from the lower board to the console cable (where known):

PIN#	Description	Electrical Characteristics
1	Console Ground	0.0 V
2	Motor Current	Unconfirmed
3	Incline Ref Ground	0 - +5 V
4	Incline Pot Wiper	0 - +5 V
5	Incline Ref Vol	+5 V
6	Speed Signal	0 - +5 V Pulse
7	Console Ground	0.0 V
8	Console Ground	0.0 V
9	Speed Command (PWM)	Unconfirmed
10	VCON	+12.6 V
11	VCON	+12.6 V
12	VCON	+12.6 V
13	Incline Up	Unconfirmed
14	Incline Down	Unconfirmed
15	E-Stop	Unconfirmed
16	TX Out (Reserve)	Unconfirmed
17	Reserve	Unconfirmed
18	RX In (Reserve)	Unconfirmed
19	Error Signal	Unconfirmed
20	Console Ground	0.0 V



12-Pin Analog Cable

This chart shows the voltage that you are expected to read from the lower board to the console cable:

PIN#	Pin Name	Description	Electrical Characteristics	Physical Symptoms If Wire Cut
1	Incline Power	DC Power Output	+2.5 V	After Start pressed, constant down incline, down LED remains on. In Hardware Test, the motor moves down but not up, and the value remains at the maximum.
2	Incline Pot	Incline Pot	+2.5 V at 0.0% incline, +0.5 V at max incline. Voltage changes with each change in incline.	After Start pressed, constant down incline, the down LED remains on. In Hardware Test, the motor moves down but not up, value always at maximum.
3	Incline GND	Incline Ground	0.0 V	Constant up incline. In Hardware Test, the motor moves up and down. Incline values start low and move down to 0 but do not move up past 10. Value changes very slowly.
4	Digital GND	Digital Ground	+2.5 V, grounded at MCB not UCB.	If one is removed, no issue. If both are removed, the UCB does not turn on, both incline lights are on, and incline motor hums and becomes hot quickly.
5	Digital GND	Digital Ground	0.0 V	
6	RPM	RPM	+5 V when open (sensor not aligned to magnet)	Everything works in normal mode but the console does not register a speed in Hardware Test or Auto Calibration.
7	Power to UCB	Power to UCB	+15-17 V	If one removed, no issues. If both removed: UCB does not turn on. At UCB RPM (green) measures +0.46 V, drive motor relay (white) measures +1.4 V, all others measure 0.0 V.
8	Power to UCB	Power to UCB	+15-17 V	
9	Speed Command (PWM)	DC Motor Speed Control PWM Output	0.0 V before started, +0.5 V at 0.5 mph, +4.0 V at 10 mph. Voltage changes as speed changes.	No belt movement, MCB relay clicks. LCD 1 lights. When measuring MCB voltage, there is a slight belt movement, then it stops.
10	Drive motor relay	Drive Motor relay	+4.3 V before started, 0.0 V after started	No belt movement, no click from MCB relay. LED 1 does not turn on.
11	Incline Down	Incline Down	0.0 V before started, 0.0 V while inclining, +1.9 V while declining. Voltage constant while inclining and declining.	Incline motor goes up but not down. LEDs function for up, not for down. If incline then declines, motor does not move again until past incline point. Ex: If incline to 2.0%, then back down to 0%, the motor will not move until 2.5%. In Hardware Test, only incline up. Value increases, does not decrease.
12	Incline Up	Incline Up	0.0 V before started, +1.9 V while inclining, 0.0 V while declining	Incline motor goes down but not up. LEDs function for down but not up. In Hardware Test, incline down functions until value at 0, incline up does not function.



9-Pin Analog Cable

This chart shows the voltage that you are expected to read from the lower board to the console cable:

PIN#	Pin Name	Console Cable Voltage (No Wires Cut)	Voltage at UCB (After Wire Cut)	Voltage at MCB (After Wire Cut)	Physical Symptom If Wire Cut
1	Incline Up	0.0 V before started +1.9 V while inclining, 0.0 V when declining. Voltage constant while inclining/declining.	+2.5 V before start, +5.0 V after start.	+3.7 V before start, 0.0 V after start.	Incline motor goes down but not up.
2	Incline Down	0.0 V before started, 0.0 V while inclining, +1.9 V while declining. Voltage constant while inclining/declining.	+2.5 V before start, +0.8 V after start.	0.0 V before start, +0.1 V after start.	Incline motor goes up but not down.
3	GND	0.0 V	0.0 V	0.0 V	Console does not turn on.
4	Power Voltage to UCB	+15.0 V constant range.	0.0 V	+14.55 V	Console does not turn on.
5	Drive Motor Relay	+1.6 V before started, 0.0 V after started.	+1.4 V before start, 0.8 V after start.	0.0 V before start, +1.4 V after start.	No belt movement.
6	Stop	Constant +0.53 V-0.69 V. +3.6 V when the safety key is removed. Will remain at +3.6 V until start is pressed.	+5.0 V safe off, +1.3 V safe on, +1.7 V running, +1.9 V paused.	+16.6 V safe off, +0.0 V safe on and running.	No physical symptoms.
7	Incline Pot/VREF+	+2.5 V at 0.0% incline, +0.5 Vat max incline. Voltage changes with each change in incline.	+2.5 V	+3.7 V before start, +5.0 V after start.	If the incline is changed from 0.0%, the motor will move up constantly until the incline on the console is returned to 0.0%. It will then stop in place and NOT go down.
8	Incline VCC/ELE	+2.5 V constant.	+3.8 V before start, +4.8 V before start.	+2.5 V	Incline constantly moves up as soon as Start is pressed. Incline will work in Hardware test.
9	RPM	When the speed sensor is aligned to the magnet: 0.0 V, short. When the speed sensor is not aligned: +5.0 V, short.	+5.0 V	0.0 V	Console will use default PWM value or auto-cal values. Will not auto-cal, will not show speed in Hardware Test.

