Effective Date: 12/8/2010	Service Bulletin	Revision B
Warranty: Depends on Install Date	**Troubleshooting 02A0 Errors on Matrix Treadmills**	**Revised Date:** 12/21/10
Time Required: Varies	**Models Affected:** T5x, T7x, & T7xe Treadmills	**Prepared by:** Kevin Oeltjenbruns

DESCRIPTION

Some Matrix customers have seen error code 02A0 on Matrix treadmills for a variety of reasons.

SOLUTION

The troubleshooting procedure outlined in this instruction should help to identify and resolve issues relating to an 02A0 error. The specific cause of the 02A0 can likely be deduced by how old the treadmill is and if the error code is erratic or constant. For example:

Newer Treadmills (less than 6 months old) – The likely issue is a, b, or f below.

Older Treadmills (more than 6 months old) – The likely issue is c below.

Erratic or Occasional Issues – The likely issue is d or e below.

a. A faulty speed sensor.
b. Intermittent or faulty cable connections.
c. Worn and high friction deck / running belt conditions.
d. Unclean AC power with voltage dropouts, spikes, and / or noise disturbances.
e. Treadmills not on their own dedicated AC power circuit (Matrix treadmills must be on a 20 amp dedicated circuit with dedicated ground and neutral wiring).
f. A faulty MCB.

TOOLS REQUIRED

While no part will solve every possible cause of the 02A0 error, updating the software version in the console to the 3.0 BETA software version will help when troubleshooting the issue causing the 02A0 error. Early software allowed many different system faults to be grouped under the 02A0 error code. The 3.0 BETA software version breaks these system faults down into many additional console error code categories (see the MCB Error Table on pages 2-3).

PROCEDURE

1. Turn off power to the treadmill and remove the power cord from the wall outlet and machine.
2. Remove the 2 screws holding the motor cover to the frame and remove the cover (Figures A & B).

Figure A

Figure B

3. Re-connect the power cord and turn the treadmill on.
4. Begin a Manual workout. Test the treadmill at various speeds and determine if the treadmill will stop and display an error code on the screen.

IF THE UNIT DOES ERROR OUT:

1) Check the flash rate of the diagnostic LED's on the MCB (LED1, LED2, and LED3 – Figure C) by counting the number of times the 3 LED's flash simultaneously between pauses.

2) Review the MCB Error Table below for a description of how the MCB interprets the error condition (these blink codes should directly correspond with a new console error code if the 3.0 BETA software version is loaded on the console). The MCB flash code and / or the BETA software version error code should be utilized for identifying areas to investigate to confirm what the root cause of the 02A0 error is.

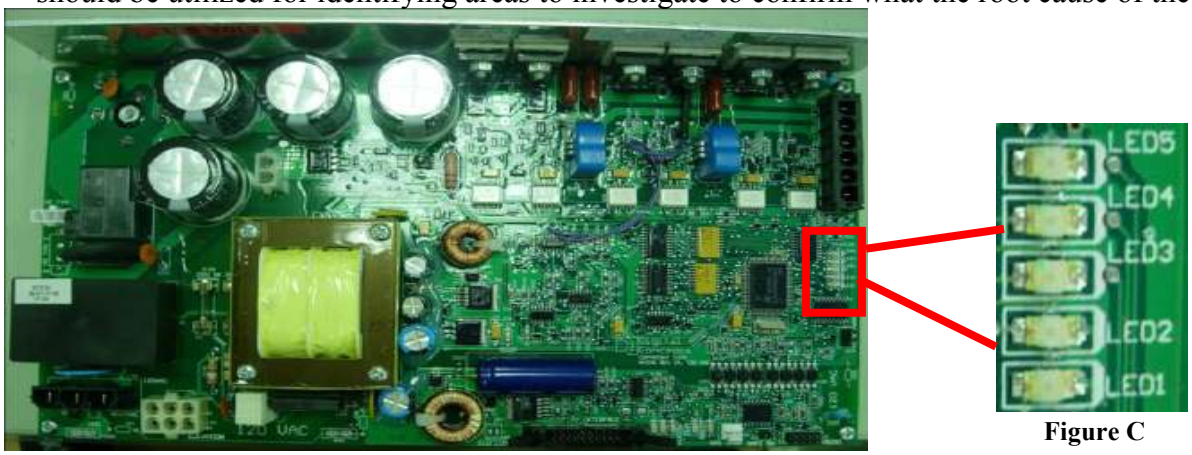

Figure C

MCB Error Table (continued on Page 3)

DCI MCB Flash Code (LED1, 2, & 3 all Flash simultaneously)	Hex code displayed in the Daughterboard Environment Log	New Console Error Code	Error Condition
	mc_error_code1		
1	0x0001	02BD	2.5 Vdc Ref Status
2	0x0002	02BD	1.65 Vdc Ref Status
3	0x0004	02A5	Phase B Current Sensor
4	0x0008	02A4	Phase A Current Sensor
5	0x0010	01A6	Phase C Circuit Open
6	0x0020	01A5	Phase B Circuit Open
7	0x0040	01A4	Phase A Circuit Open
8	0x0080	029F	DCLink Bus Overvoltage (MAx_VDC1)
9	0x0100	02A2	Critical DCLink Bus Overvoltage (MAX_VDC1)
10	0x0200	0241	DCLink Bus Undervoltage
11	0x0400	029F	Illegal Speed Command
12	0x0800	02A7	Phase Over Current (RMS)
13	0x1000	02A0	Faulty Speed Sensor
14	0x2000	02AD	MCB Heat Sink Over Temperature
15	0x4000	0141	Over Temp on Motor
16	0x8000	029F	Reserved

MCB Error Table - Continued

	mc_error_code2		
17	0x0001	02A3	Brake Gate Driver Fault
18	0x0002	029F	Phase A Low Gate Driver Fault
19	0x0004	029F	Phase B Low Gate Driver Fault
20	0x0008	029F	Phase C Low Gate Driver Fault
21	0x0010	02AA / 02A8	Output Peak Over Current
22	0x0020	029F	Phase A High Gate Driver Fault
23	0x0040	029F	Phase B High Gate Driver Fault
24	0x0080	029F	Phase C High Gate Driver Fault
25	0x0100	02A2	DCLink Bus Overvoltage
26	0x0200	02A6	Phase C Current Sensor
27	0x0400	029F	Reserved
28	0x0800	029F	Reserved
29	0x1000	029F	Reserved
30	0x2000	029F	Reserved
31	0x4000	029F	Reserved
32	0x8000	029F	Reserved

IF THE UNIT DOES NOT ERROR OUT:

1) The first area to investigate is the speed sensor and possible connection issues (or if Flash Code 13 is present on the MCB).

- Check the position and integrity of the speed sensor cable connection at the MCB. The speed sensor should be plugged into the MCB connector labeled SPD SNSR (Figure D). The cable connection should be secured to the connector header with a small bead of hot glue to keep it securely attached in place.
- Verify that the optical disk (Figure E) for the speed sensor is not loose and will not wiggle on the motor shaft. It needs to be tight and secure to prevent any movement on the shaft and must be positioned so that there is clearance within the speed sensor optical gap.

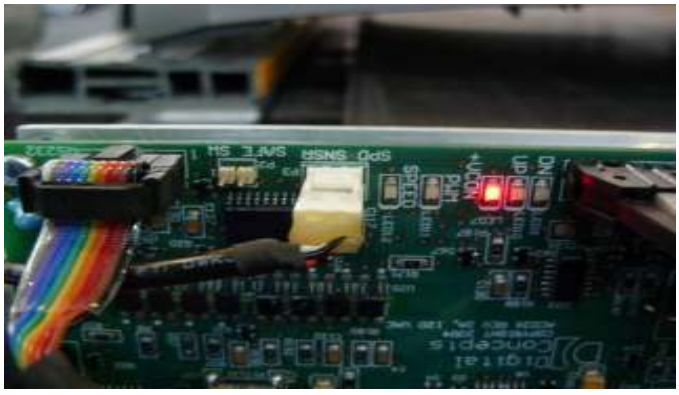

Figure D

Figure E

- The function of the speed sensor can be verified by manually moving the running belt (with the treadmill power on). The red SPEED LED (LED12 – Figure F) on the MCB next to the speed sensor cable connection should flash as the belt moves. If it does not, replace the speed sensor.

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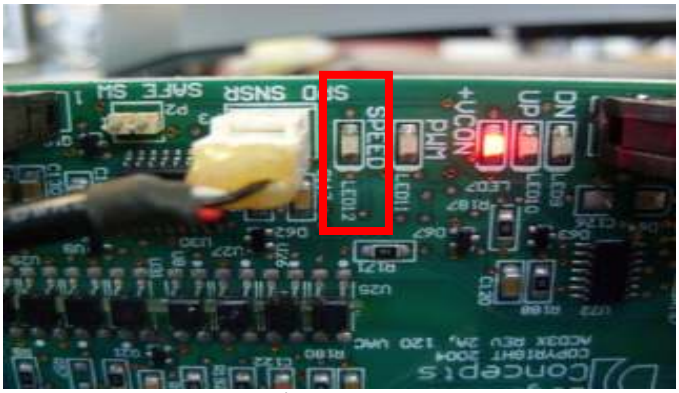

Figure F

- Check that all other MCB and daughter board cable connections are securely attached in place.
- If the checks above identify problems, correct them and then retest the treadmill.
- If no problems are found, then replace the speed sensor with an updated speed sensor to eliminate this as a possible fault (some problematic speed sensors have been seen) and retest the treadmill. If this does not resolve the issue, continue with the steps below.

2) The next area to investigate is worn or high friction deck and running belt conditions (or if Flash Code 12 or 21 is present or the Accumulated Distance / Time exceeds 6000 miles or 1600 hours).
   - With one foot on the treadmill deck side rail and one on the running belt, push the running belt to rotate it. Check to see if the running belt will slide freely on the surface of the deck without the feeling of stickiness or high drag resistance.
   - Check the surface of the deck for smoothness and evidence of wear or grooves where the underside of the running belt comes in contact with the deck at the normal user's walking / running position.
   - Check the underside of the running belt for wear conditions that could expose or create increased friction with the deck surface.
   - Run an AC Amp Draw (see document – How to Run an Amp Draw Test) to help determine if issues with the running belt drive system are impairing movement causing an additional load. With a user 150-200 lbs running at 2mph, the amp draw should be about 5 - 6.5 amps. If the amp draw is significantly higher than 6.5 amps, disconnect the drive belt from the front roller and retest. If the amp draw stays high without the drive belt attached to the front roller, the issue is likely with the motor (especially if it is sluggish or difficult to turn) and it should be replaced. If the amp draw lowers once the drive belt is disconnected from the front roller, the issue is likely with the deck and / or running belt.
   - If the checks above identify problems, correct them and retest the treadmill.

3) If after checking Steps 1 and 2 above the problem still persists, the AC power circuit / line voltage may be unstable or unclean. This is the next area to investigate. (or if Flash Code 8, 9, 10, or 25 is present).

- Check to determine if the treadmill is connected to its own dedicated AC power circuit breaker with an isolated ground and neutral, and that no other items are connected to this same circuit breaker. Isolated neutral / grounding means that each circuit must be "non-looped" with each circuit having a neutral / grounding connection coming from the circuit terminating at an approved Earth ground. In addition to the dedicated circuit requirement, the proper gauge wire must be used from the breaker box to the outlet. If the distance from the circuit breaker box, to each outlet, is 100 feet or less, then 12 gauge wire may be used. For any distance greater than 100 feet from the circuit breaker box to the outlet, 10 gauge wire must be used.
- If there are AC power circuit / line voltage concerns, the circuit may need to be tested with an AC Line Voltage Monitor / Event Recorder at the power outlet that the treadmill is plugged into.
- If the AC power is determined to be correct and the unit is still giving an error, there may be issues with the MCB and it should be replaced.
- If the checks above identify problems, correct them and retest the treadmill.

4) The next area to investigate is the electrical resistance from the motor housing to the treadmill frame ground point that is used to bleed off potential motor charge build up (Figure G). The resistance should be measured with power to the treadmill in the OFF position and should measure approximately 20M ohms (18M – 22M ohms).
   - If the resistance is higher than this, investigate the green wire connections from the motor housing to the treadmill frame grounding stud (a 20M ohms resistor should be enclosed in black heat shrink connected in series on the green wire).
   - If the check above identifies a problem, correct the problem and retest the treadmill.

Figure G

5) If none of the checks above identify a problem and the treadmill is still giving an error (or if Flash Codes are present indicating MCB fault conditions that are not covered above), then the MCB is likely faulty and should be replaced.
   - Replace the MCB and retest the treadmill.