



LED CONSOLES TECHNICAL CERTIFICATION TRAINING

Field Engineering | 2010

LifeFitness
WHAT WE LIVE FOR

Course Objectives

- » General LED Console Information
 - » An Introduction of Classic LED consoles
 - » Classic Console – an Introduction
 - Main PCB, Lower PCB
 - Keypads in Classic Consoles
 - » Integrity Consoles – an Introduction
 - Added functionality
 - Removed functionality
 - Important Installation and Service Points
 - » Achieve LED consoles – an Introduction
 - » Achieve Console
 - Overlay and Keypad
 - Achieve Console Main PCB
 - » Common Issues
 - » Summary
-

General LED Console Information

- » LED consoles: one PCB with a microcontroller to control the entire console.
 - LCD consoles: have multiple PCB's with their own processors/microcontrollers.
 - Note: in this presentation microcontroller = processor
- » LED consoles:
 - » Presently, two different colors of LEDs: Red and Amber, depending on model.
 - » Very old LED can have green LEDs.
- » LED consoles use membrane (under the overlays) or touch-sensitive keypads implementing user interface.

Classic LED consoles – an Introduction

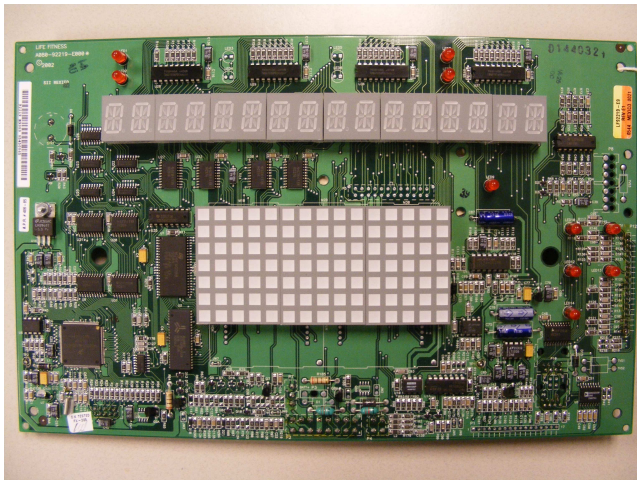
» **Classic Console** (similar to 95 series products):

- **Universal console**
 - Some models: no lower PCB, overlays can be different
 - **Club Series Consumer products are derivatives of these.**
 - The Bike and CT difference: 2wire vs. 4wire LifePulse™ HR system, on the PCB. Not interchangeable.
- **Treadmill console** has a different PCB, plastics, and overlays.
- **Tombstone console**
 - The same PCBs as the Universal console, but different plastics and overlays.

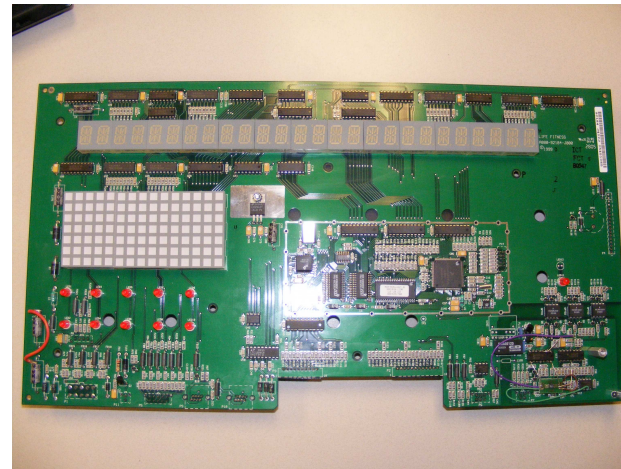


Classic Console Main PCB

- » The Non-Treadmill Console Board:
Designed to work with the Alternator Control Board (**ACB**).
ACB used in Classic products like: Bikes, Cross Trainers, Steppers, and Summit Trainers.
- » The Treadmill Console PCB: designed to work with the Motor Controller in Treadmills.
- » Classic Consoles: only one processor in the console handling the Keypad input, refreshing the LEDs: Status, Data Display, and Profile Display Matrix.



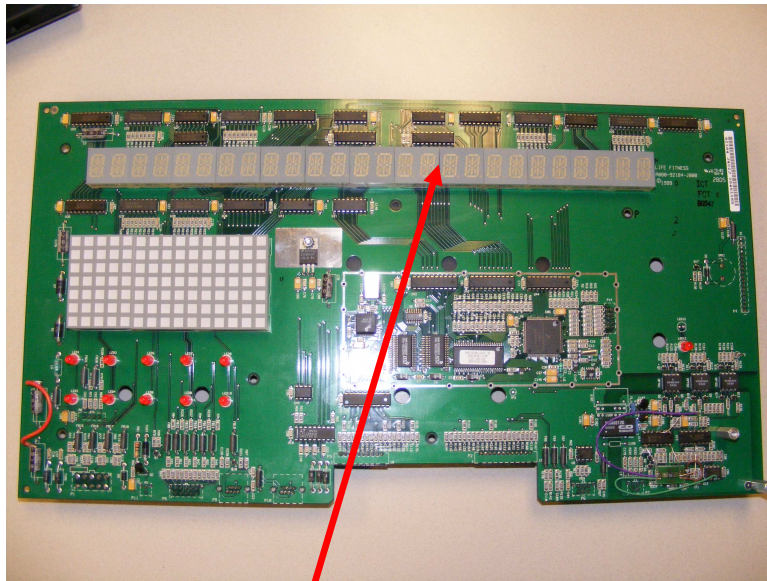
Non-Treadmill's



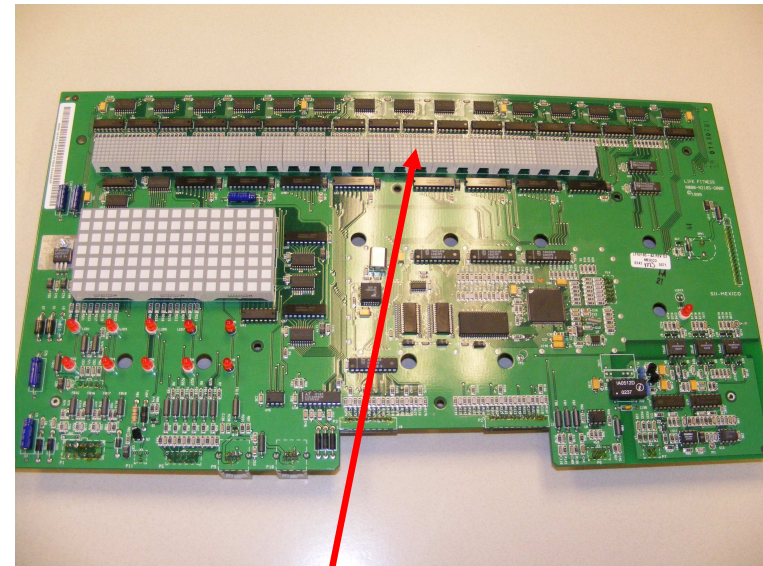
Treadmill

Classic Treadmill Console Main PCB

- » Treadmill Console PCB: either a 14-segment alpha-numeric displays or Complex Character Displays (CCD, 5x7 pixels per block) for its Message Center.
 - CCD: display katakana characters (Japanese market)



Alpha-Numeric
Message center



CCD Message center

Classic Console Lower PCB

- » No processor, connects directly to the Main PCB with a cable. This PCB only has LED's, and Displays.

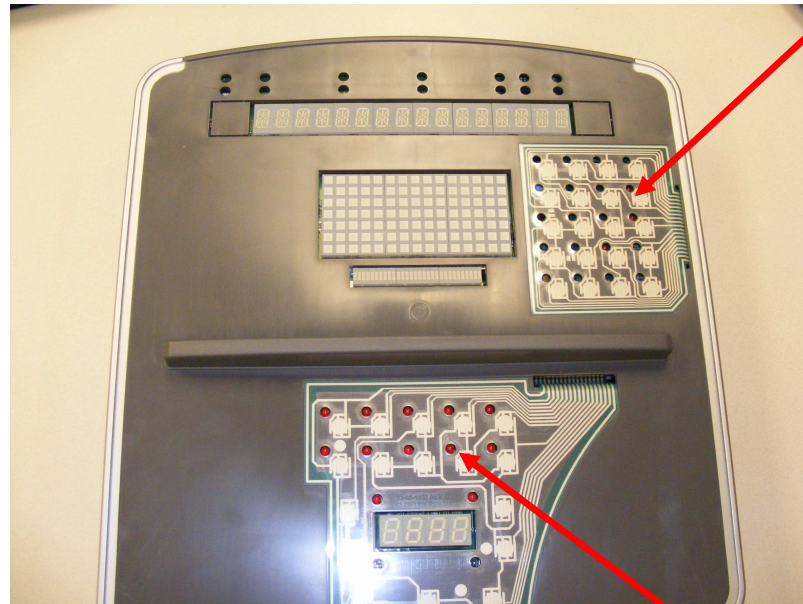


Lower PCB and keypad

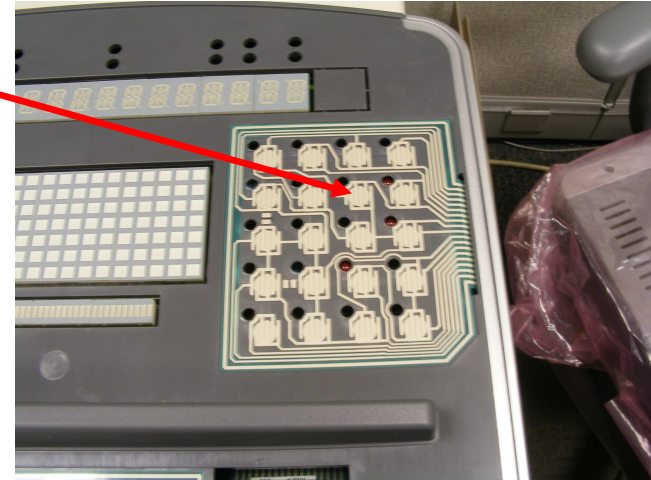


No Lower PCB or keypad, only overlay

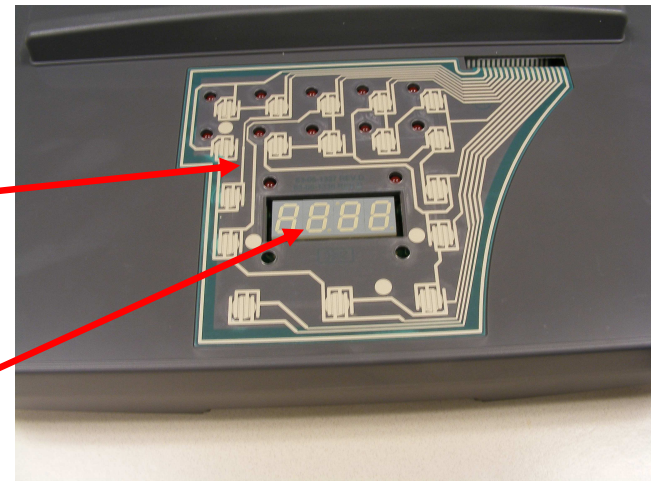
Keypads in Classic Consoles



Upper Keypad



Lower Keypad



Lower PCB (with LED's and Numeric Display)

Integrity Consoles – an Introduction

- » Integrity Consoles: different bezels for Treadmill and non-Treadmills. **PCB hardware: different for Treads and non-Treads.**
- » **Software** for Integrity Consoles: **different for Treadmills and non-Treadmills.**
- » **Amber LEDs.**
- » **Added functionality:**
 - Integrated iPod Control
 - Integrated TV Control (commercial units)
- » **Removed functionality:**
 - Widget BDM updates
- » **New color of the console bezel:**
 - Shadow Gray
- » **Important installation points**



Integrity Consoles – Added Functionality



Integrity Consoles – Added Functionality

» iPod functionality

The iPod is connected to the console by virtue of a custom-made cable.

The iPod rests in the iPod holder.

Replaceable components (iPod perspective):

- The iPod holder (0K86-01003-0200)
- The iPod pad (0K86-01005-0700)
- The iPod cable (AK86-00001-0201)

The holder is secured to the console by four screws (3223501)

The iPod cable is attached to the console's plastic by means of a panel access plastic (0K86-01004-0200) which is secured to the console by two screws (0017-00101-1811).

Integrity Consoles – Added Functionality

» iPod functionality (cont.)

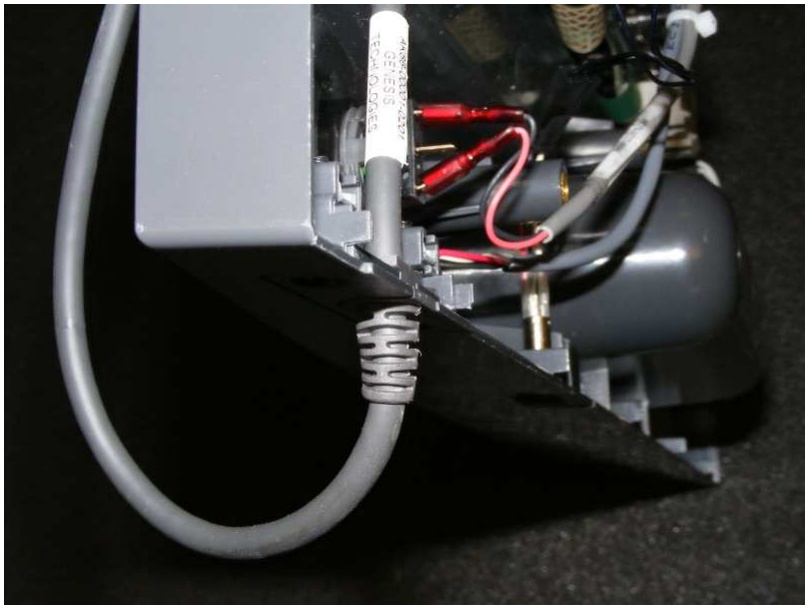
iPod holder

Note: turn the iPod connector as shown to remove it from the holder



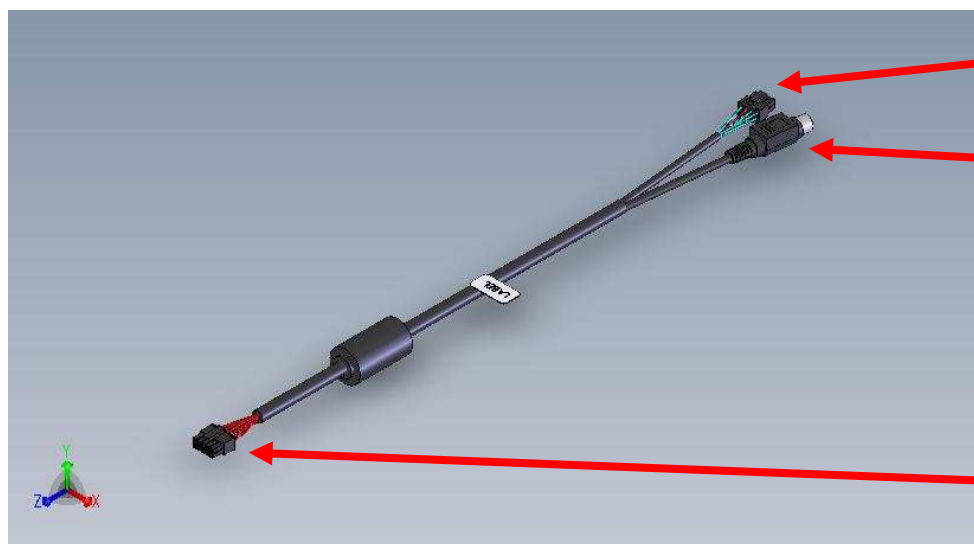
Integrity Consoles – Added Functionality

- » iPod functionality (cont.)
iPod cable (installed)



Integrity Consoles – Added Functionality

- » 17" LCD TV IR Control
- » Very similar to the solution existing on the Elevation Series LCD consoles
- » The cables that connects the console to the TV have been assigned the following part numbers:
 - AK86-00002-0000 (non-treadmill consoles)
 - AK86-00002-0001 (treadmill consoles).



TV's IR remote

TV's S-Video input

Connected to
the console

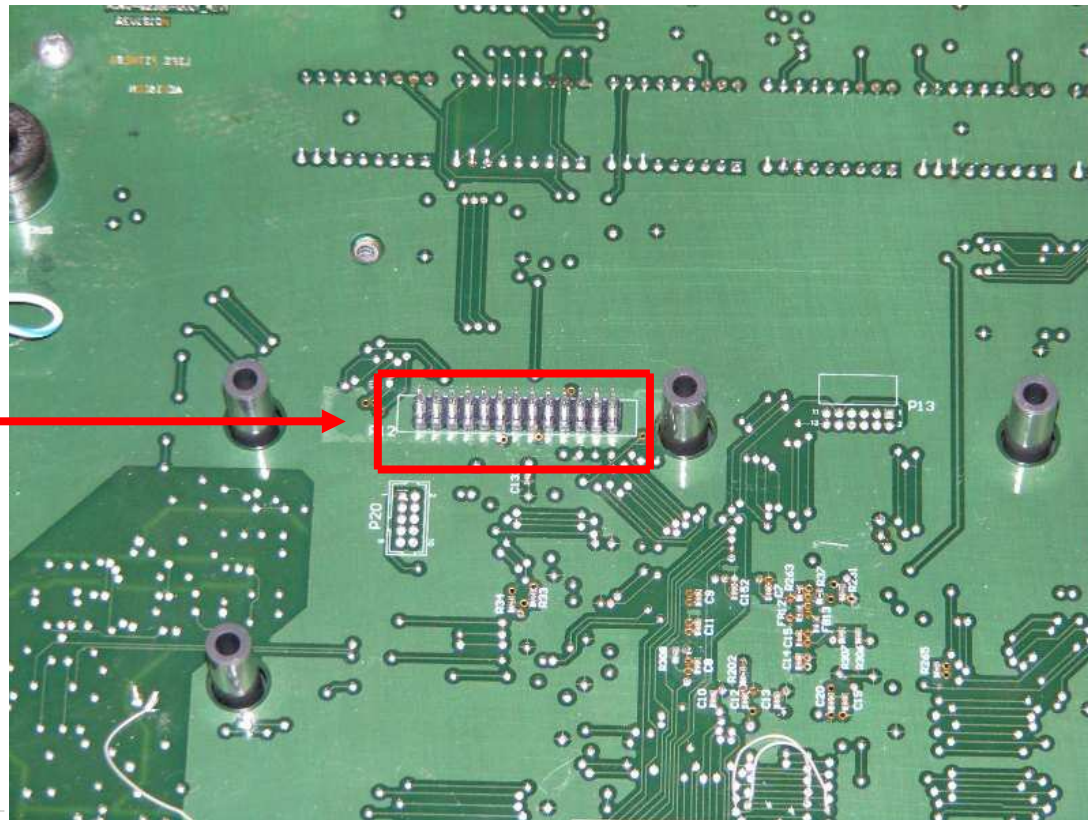
Integrity Consoles – Removed Functionality

- » Cannot be BDM'd using the current production widget if one wanted to connect the widget's BDM cable to this board

The Life Fitness' widget is being phased out anyway

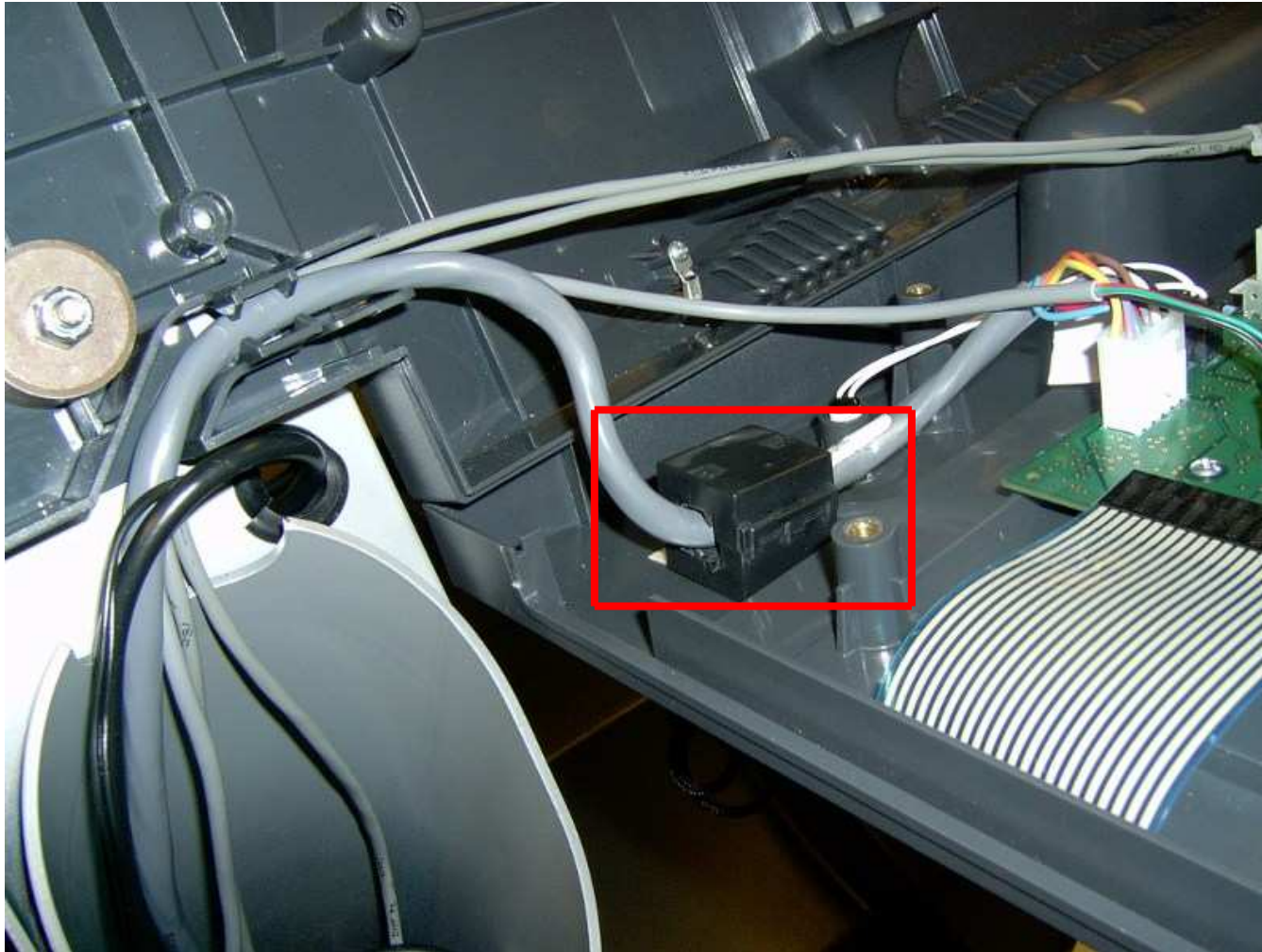
The BDM connector is much different than the one used in previous designs (26 pins, not 10)

Note the width



Integrity Consoles – Important Installation Points

» In-console ferrite



Achieve LED Consoles – an Introduction

- » Achieve Consoles: different bezels for Treadmill and non-Treadmills. **PCB hardware: the same for both.**
- » **Software** for Achieve consoles: **different for Treadmills and non-Treadmills.** Personality of CT, Recumbent or Upright Bike is set in diagnostics.
- » An additional PCB for **Life Pulse ESD** protection purposes connects to the main Console PCB.
- » **Amber LEDs**



Achieve Console – Overlay and Keypad

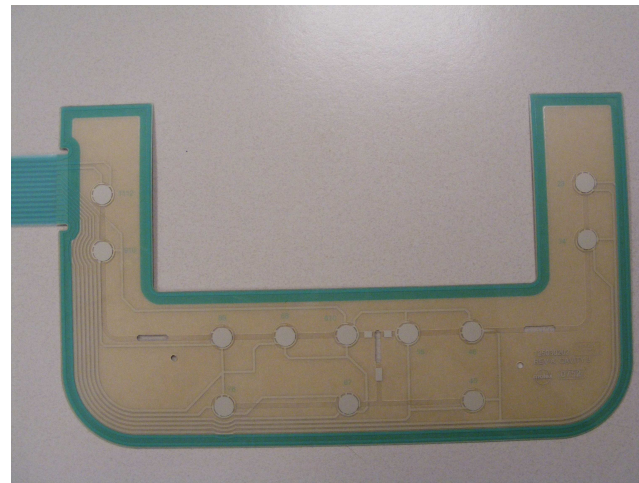
Very analogous to the Classic Series Consoles.

The keypad: placed on the plastic front bezel, plugs into the Main PCB.

The overlay: placed over the keypad and its buttons line up with the buttons on the keypad.



Overlay



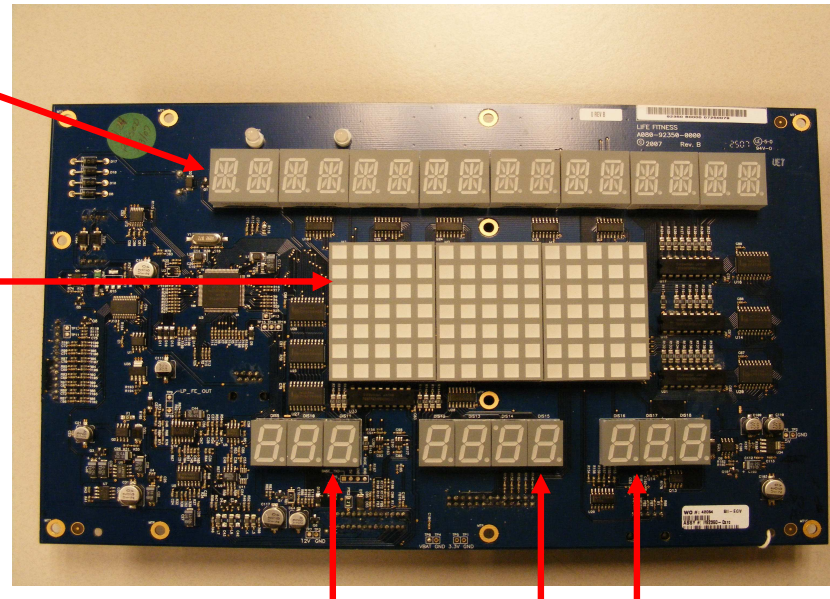
Keypad

Achieve Console Main PCB

- » This Console Board is designed to work in conjunction with the Generator Board Controller (**GBC**) and the treadmill's Motor Controller.
- » Reads: the keypad, Polar, LifePulse.
- » Refreshes: Status LEDs, Data Display, Numeric Display, and Profile Display Matrix.
- » **Separate** software builds for the treads and non-treads.

Alpha-Numeric
Display

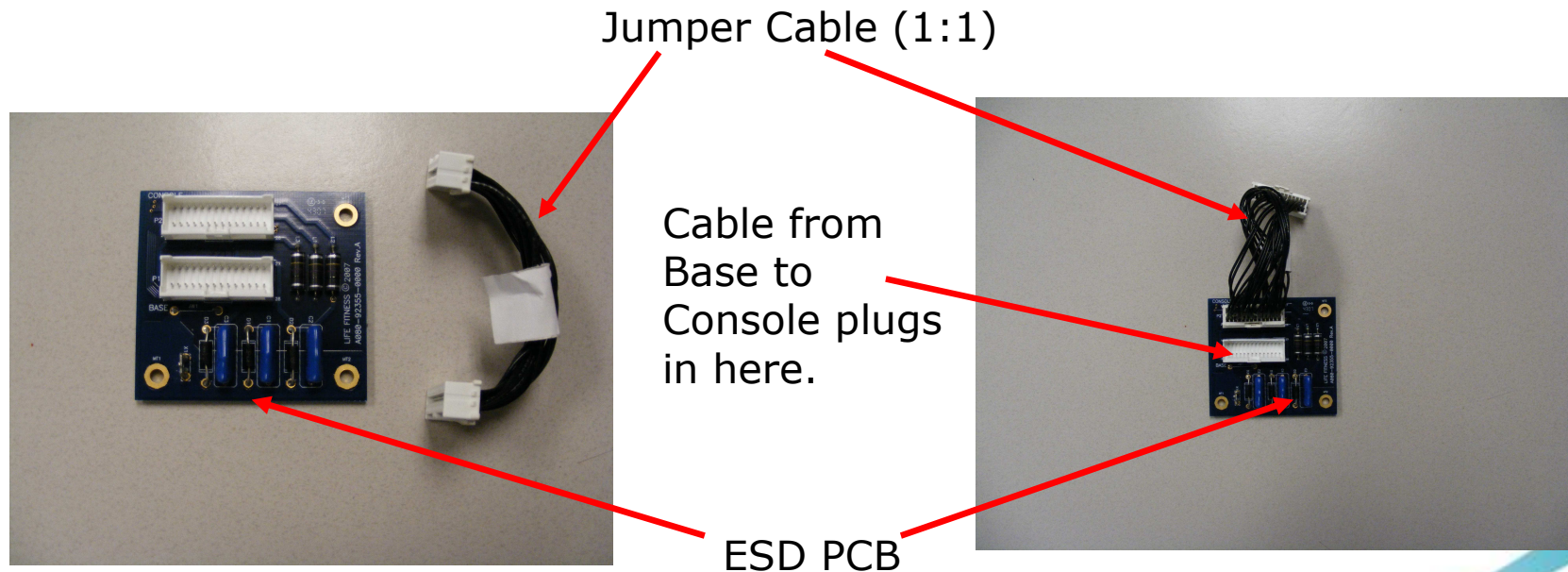
Profile Display



Numeric Displays

Achieve Console ESD PCB

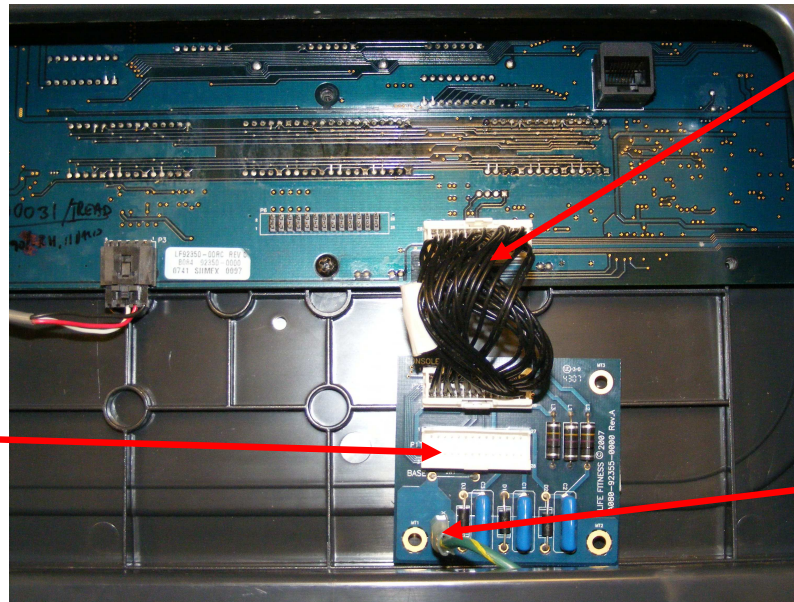
- » Purpose: better ESD protection of the Life Pulse subsystem.
- » In console attachment method: double sided foam tape.
- » A 1:1 jumper cable from the board to the Main Console PCB.



Achieve Console (Connections)

- » The opening in the back bezel looks as shown below. **Always connect the ESD board.**
- » **Important Note:** The ground wire (green) must be connected to the ground terminal of the ESD PCB.

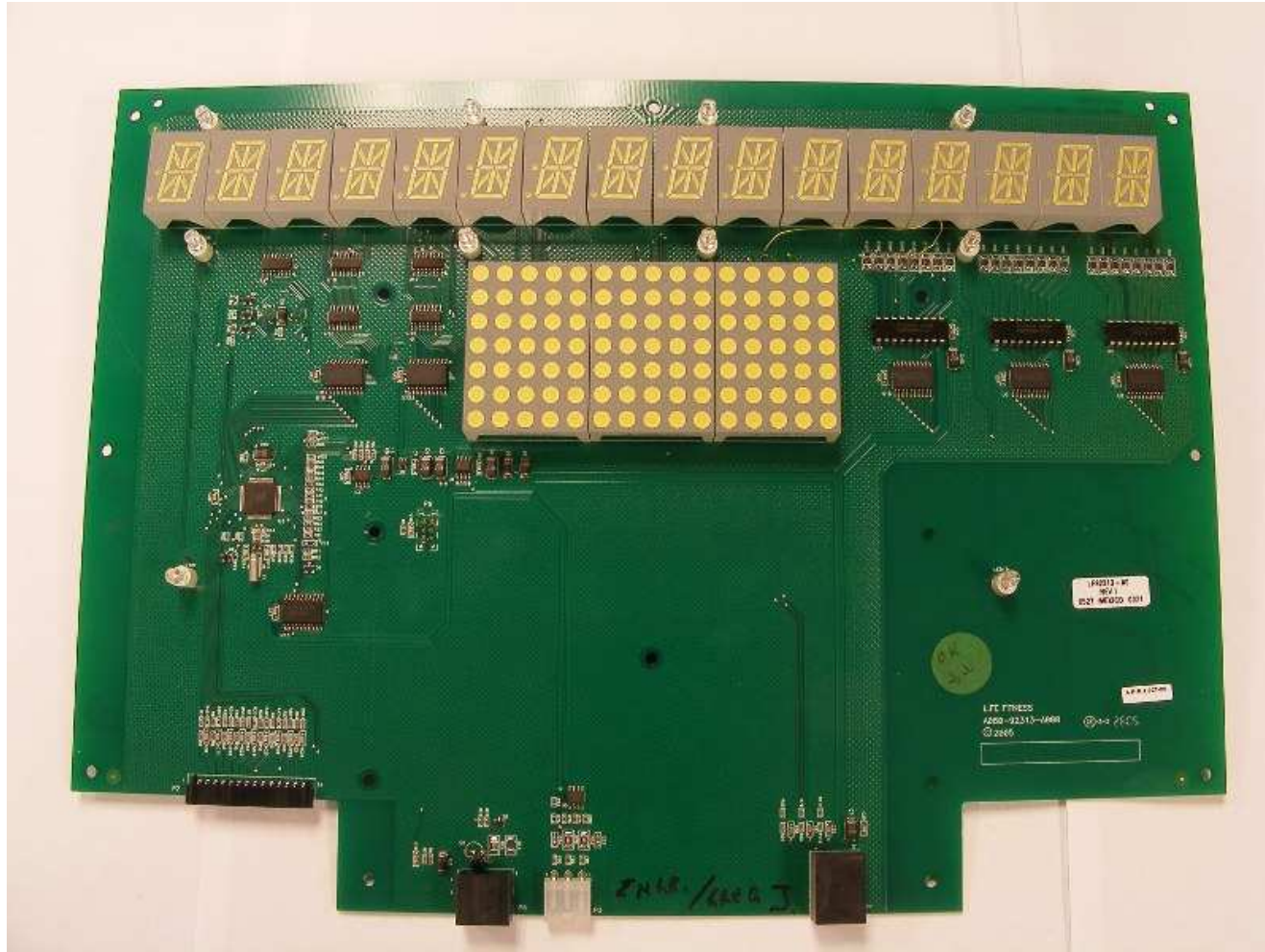
Base cable –
connect here



Jumper cable (should
be connected)

Green ground wire –
connect to fast-on!

Consumer – T5.0 Console



Consumer – T5.0 Console

- » The board was built around a low cost controller not capable of running fast arithmetic instructions necessary for LifePulse® implementation.
- » The keypad used is a mechanically actuated one.
- » Basic displays: message center and profile display.
- » Capable of receiving Polar telemetry signals.

Consumer



Consumer – T5.5/T7.0 Console

- » The board was built around a high performance controller capable of running fast arithmetic instructions necessary for LifePulse® implementation
- » The keypad used is a touch-sensitive keypad. All keys are backlit.
- » Two side displays (numeric) in addition to the message and profile displays.
- » Capable of receiving Polar Telemetry signals.

Common Issues

» **T5.0/T5.5/T7.0** common issues:

Hand-tighten all PCB screws, when attaching the console to the bezel.

Ghost heart rate:

- more often related to the non-coded telemetry sensor; susceptible to EMI.

» **T5.0** specific issues:

Garbled message center display:

- characters shown seem to be random activations of the 14-segment displays.
- issue traced back to a failing serial EEPROM

Blank console:

- the console appears to be dead. Issue traced back to a failing crystal oscillator.

Note:

The T5.0 software not updateable in field.

» **T5.5/T7.0** specific issues:

Very few issues. Product released in early 2006.

Software not updateable in field using a CSAFE port (there is not CSAFE port on the product)

- use widget with the BDM cable to perform software updates.

Common Issues

» Classic Consoles:

Very few issues. Product out in the market for more than 10 years.

In the past, reports related to false keypad actuations and stuck keys. Over time reports of this sort have greatly diminished.

Updatable if a console has a CSAFE port and the higher end microcontroller: 68HC16 Motorola/Freescale or ColdFire.

» Achieve Consoles

A running belt would stop mid-workout. The console would appear to continue with it. Issue traced back to noise on the E-Stop circuitry.

Resolution: update the motor controller with the latest software as well as the console software. Make sure that the units have well-crimped activity zone cables.

Summary

» In this presentation we had discussed the following subjects:

We had discussed the following topics:

Classic Consoles:

Color of the displays different types of displays, commonality in hardware, in-field updatable software.

Achieve Consoles:

Displays: color and various types of those, commonality in hardware, in-field updatable software.

Consumer-specific consoles:

T5.0

T5.5/T7.0

Questions





THANK YOU!

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