



ALTERNATOR SYSTEM AND ACB TECHNICAL CERTIFICATION TRAINING

Field Engineering | 2009

LifeFitness
WHAT WE LIVE FOR

Course Objectives

» Topics to be covered in this section:

- ◆ Alternators
- ◆ Application in Life Fitness Products
- ◆ Alternator Control PCB (ACB)
- ◆ Alternator Systems Common Issues

Theory of Operation

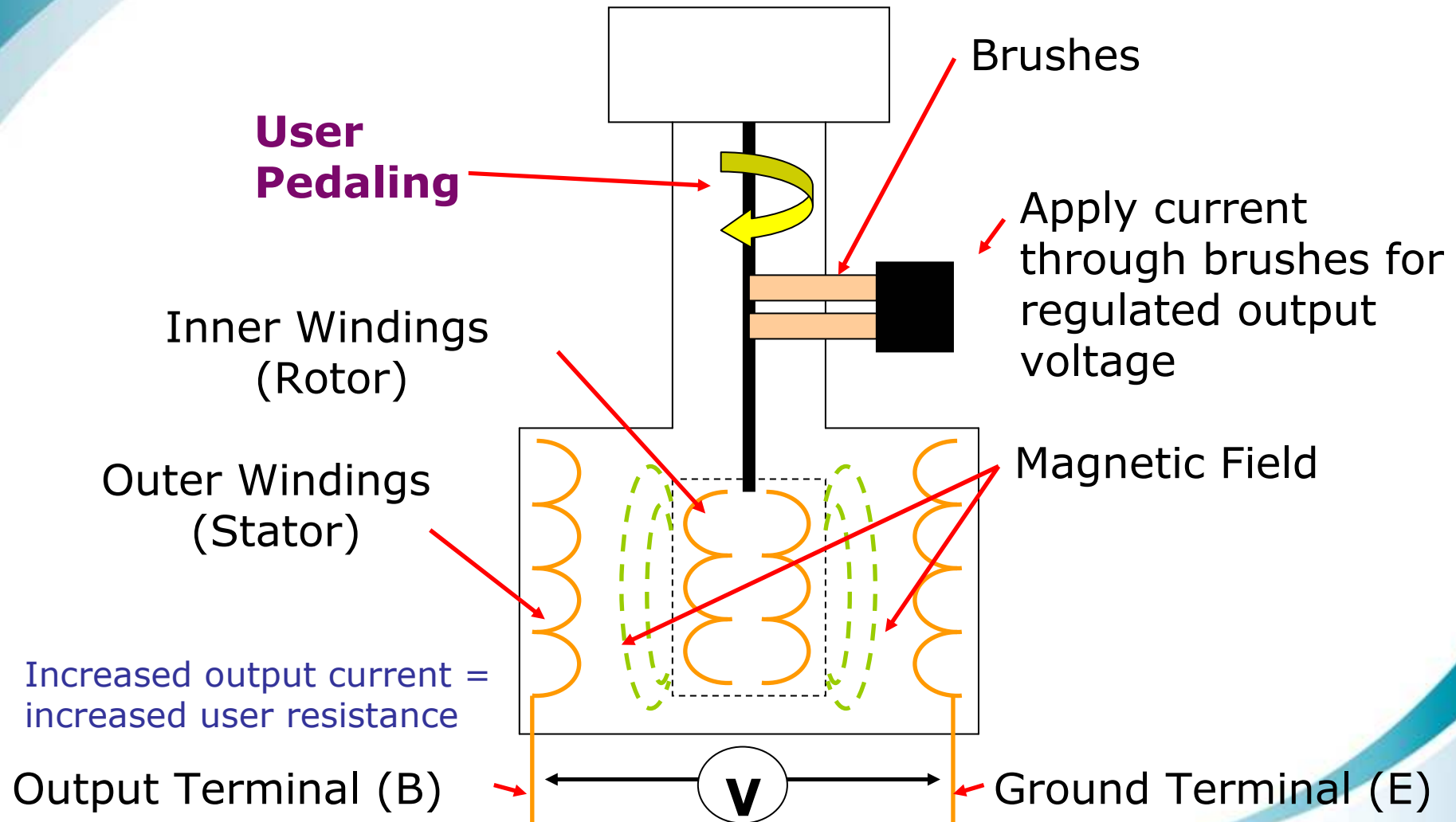
- Movement of the pedals or pressing the Start button activates a circuit which powers up the console to allow Stationary Programming.
- At a minimum pedal speed (25-35 RPM), the alternator provides power to the console, battery, and load resistor through the Alternator Control Board.
- The Alternator Control Board (ACB) regulates the output voltage (V_{alt}) from the alternator, controls the Load current based on commands from the console (load duty cycle), and provides the battery charge current.

Alternators - Functions

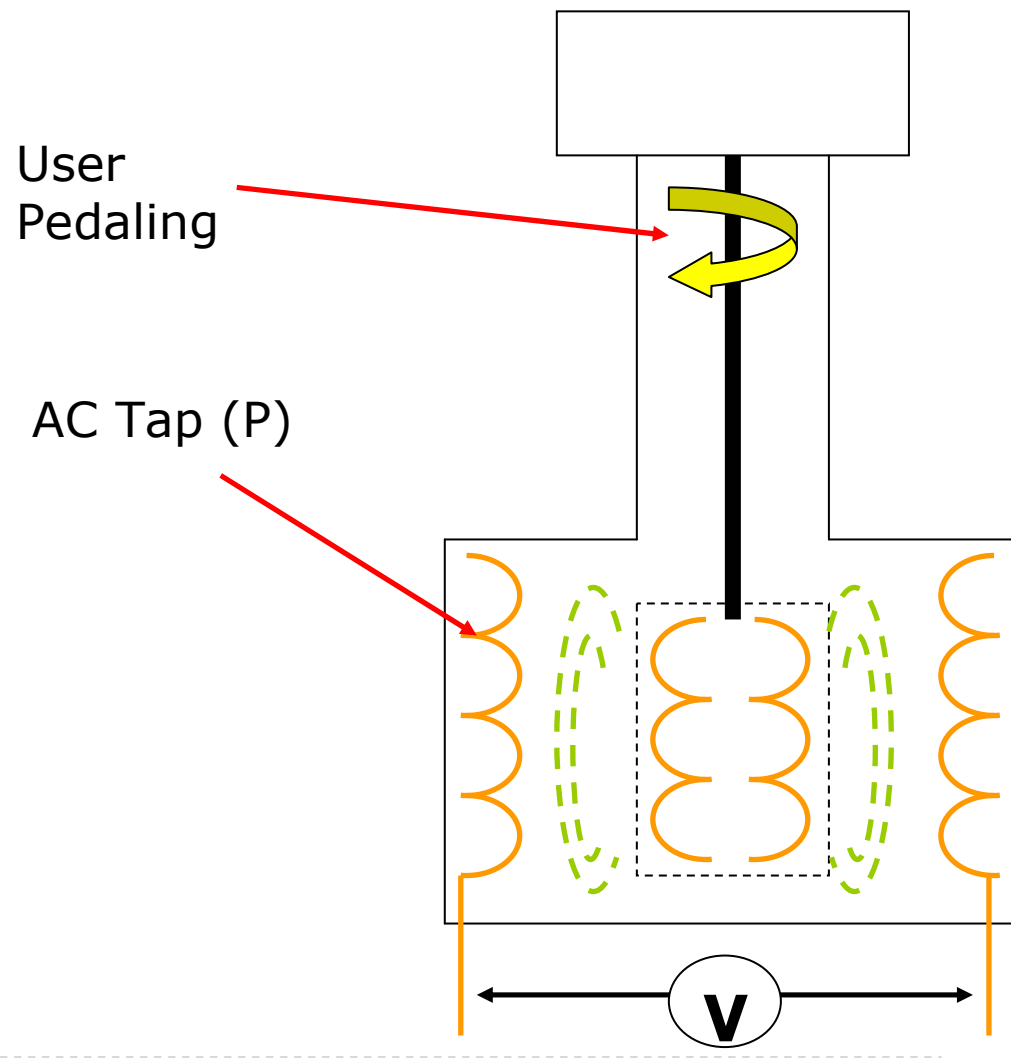
- » For Self-Powered units:
 - ◆ Provide **Electrical Power** for the system through the ACB
 - > Console Power
 - > Load Resistor
 - > Battery charging
 - ◆ Provide **RPM Signal**

- » For Plug-in units (using external power supplies):
 - ◆ Provide **Electrical Power** for the Load Resistor through the ACB
 - ◆ Provide **RPM Signal**

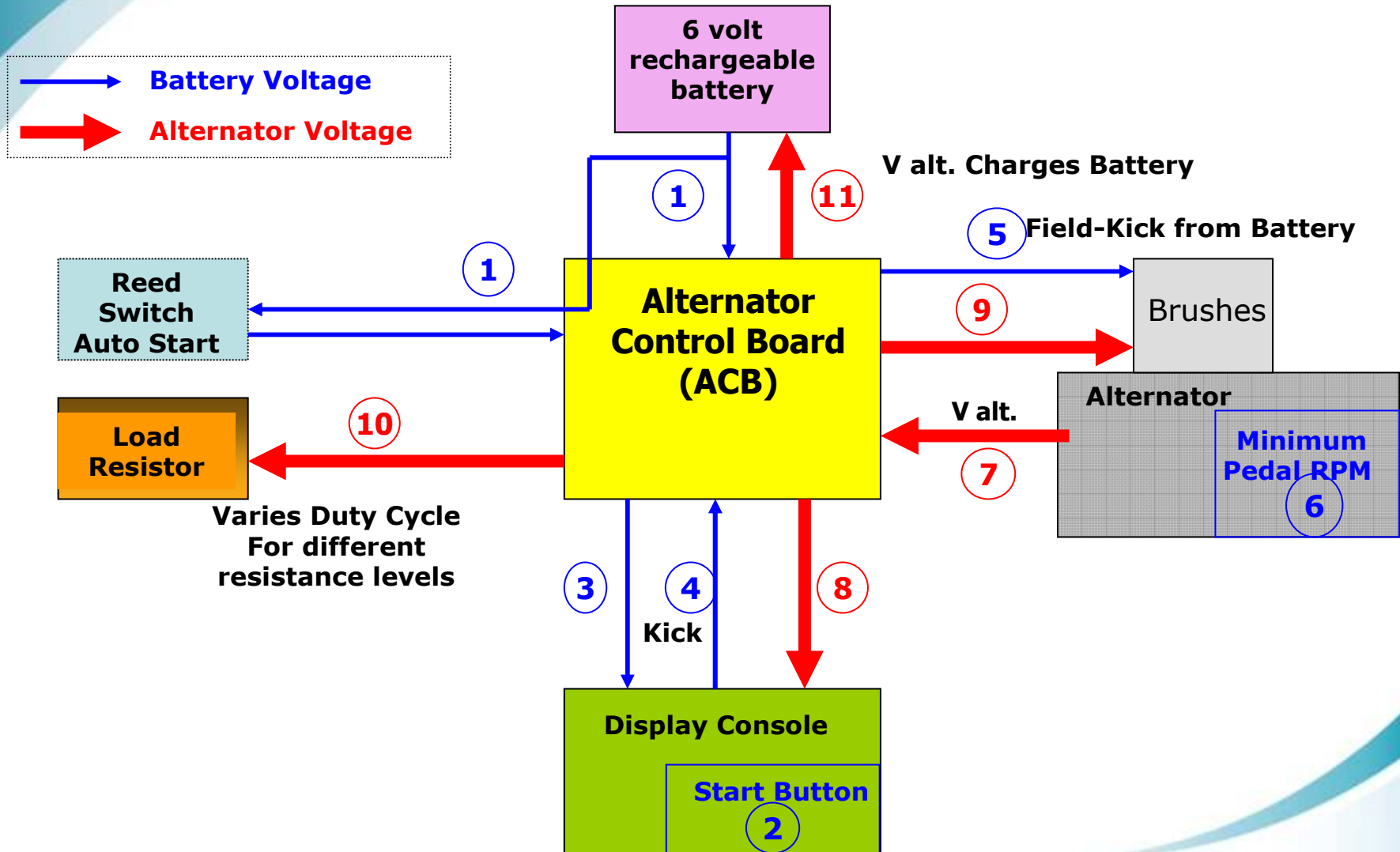
ALTERNATOR: Electric POWER



ALTERNATOR: RPM

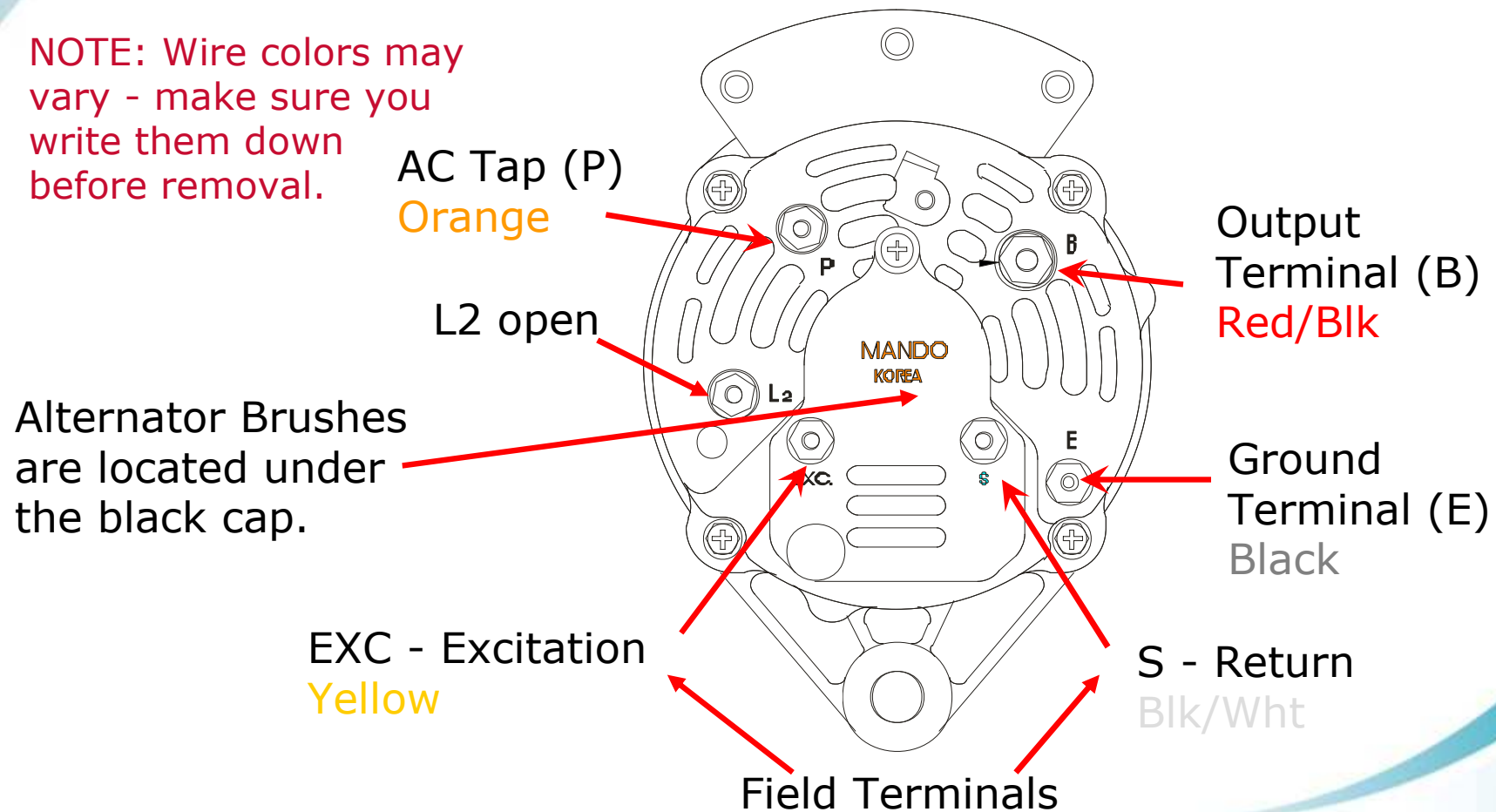


Voltage Diagram *Self Powered Products*



Alternator Wire Diagram

NOTE: Wire colors may vary - make sure you write them down before removal.



Alternator Voltage Measurements

Note: Voltage measurements with alternator spinning.

AC Tap (P) - RPM Signal
0V here=No RPM signal

L2 open

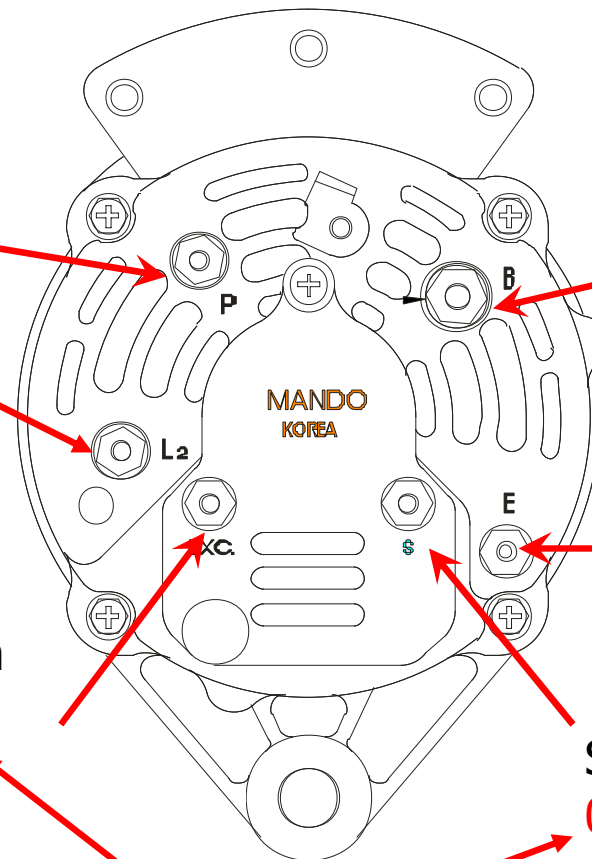
EXC - Excitation
Approx. ½ Valt

Field Winding

S - Return
0V for EXC

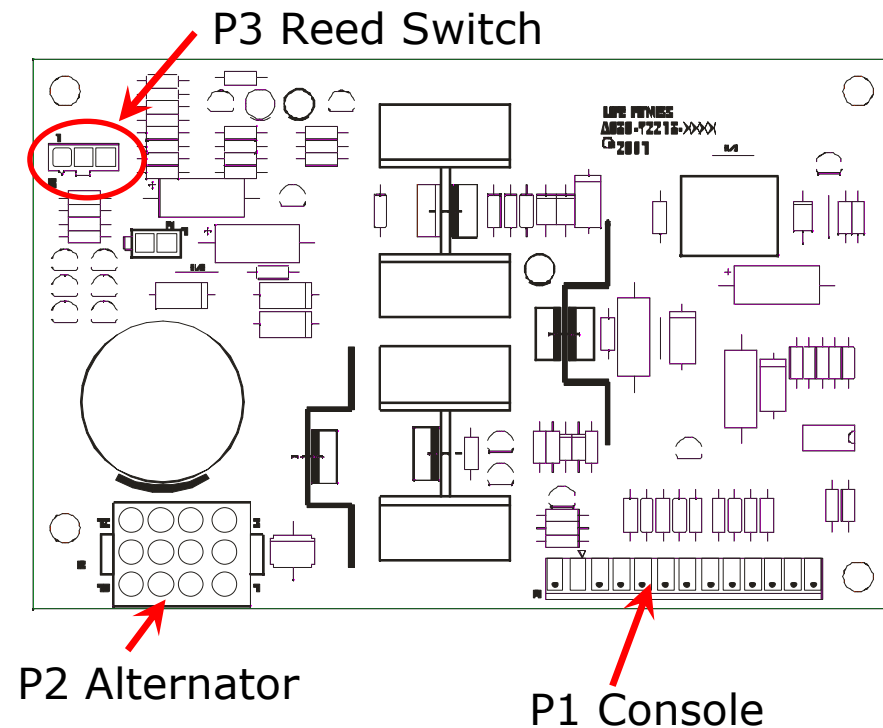
Output Terminal (B)
Valt = 9-10 VDC

Ground Terminal (E)
GND = 0 VDC



Alternator Control Board

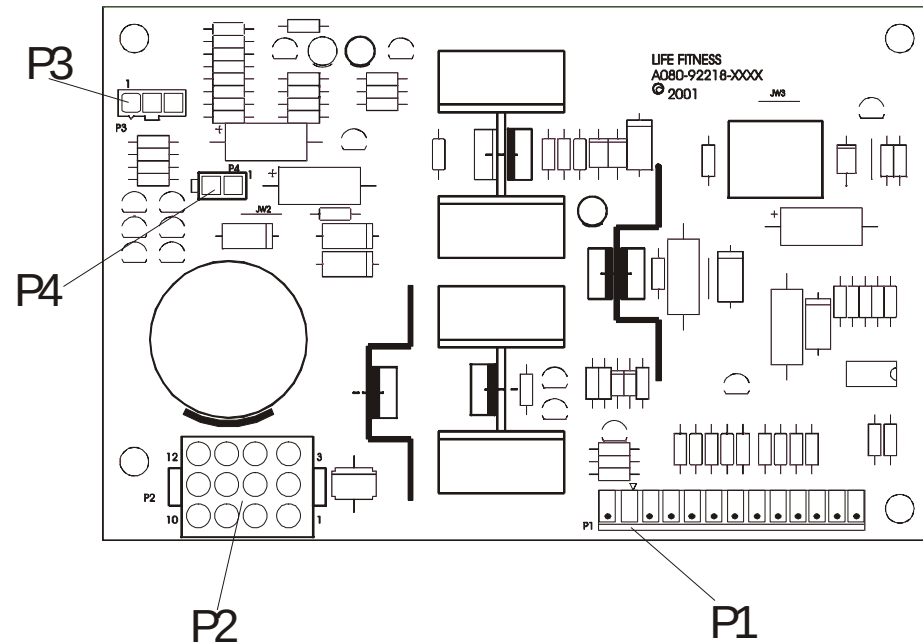
- » The Alternator Control Board has the following functions:
- It regulates the Alternator output voltage by modulating the field current.
 - It passes the RPM signal from the Alternator to the Console.
 - It creates an Auto-start signal for the console, from its Reed Switch input.
 - It modulates the current (power) from the Alternator into the Load Resistor.
 - The ACB also provides supply voltage for the Console, while charging the system Battery.



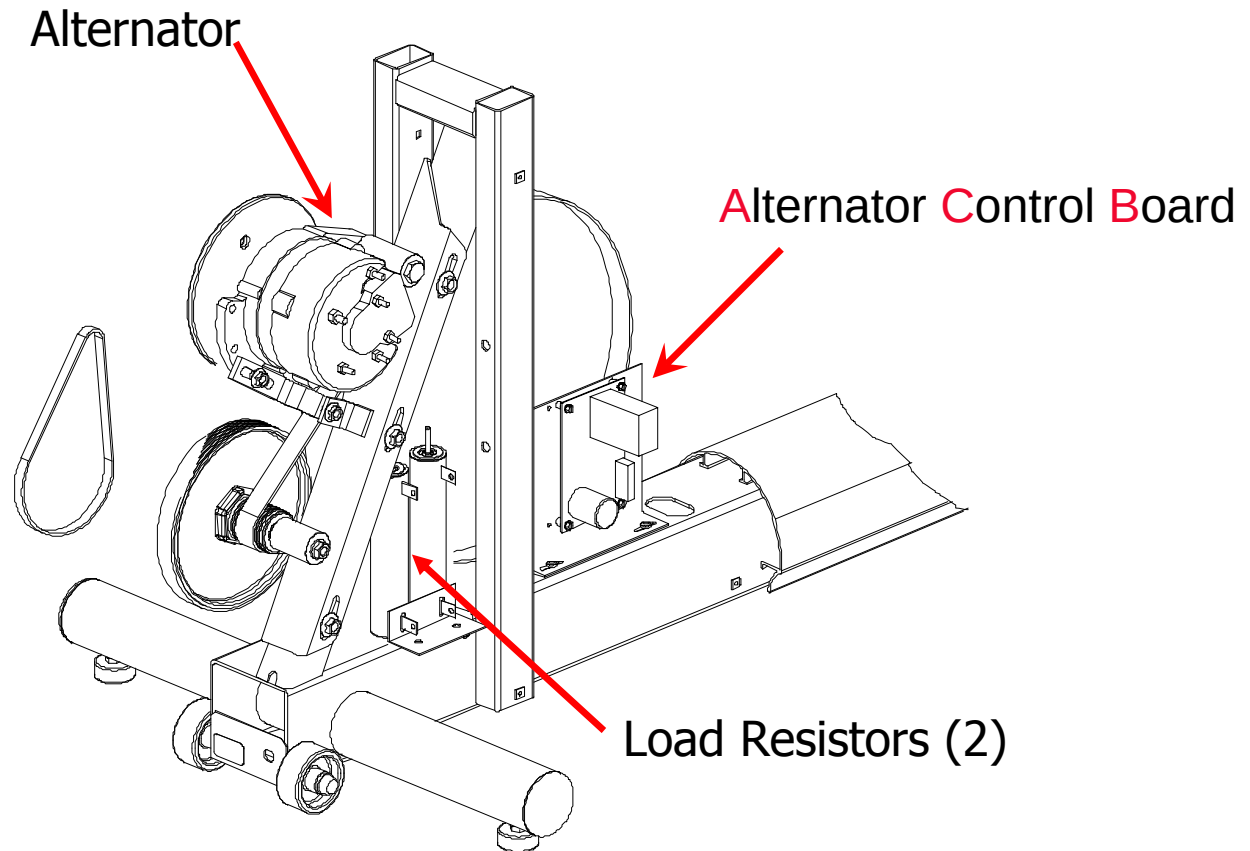
Alternator Control Board

» Interface connections:

- **P1 is a 13-pin connector that connects to the console and battery**
- **P2 Connector is a 12 pin Molex connector that connects to the Alternator**
- **P3 is a 3 pin connector that connect to the reed Switch**
- **P4 is only used for units with optional external power supplies attached.**



Parts on Classic CT

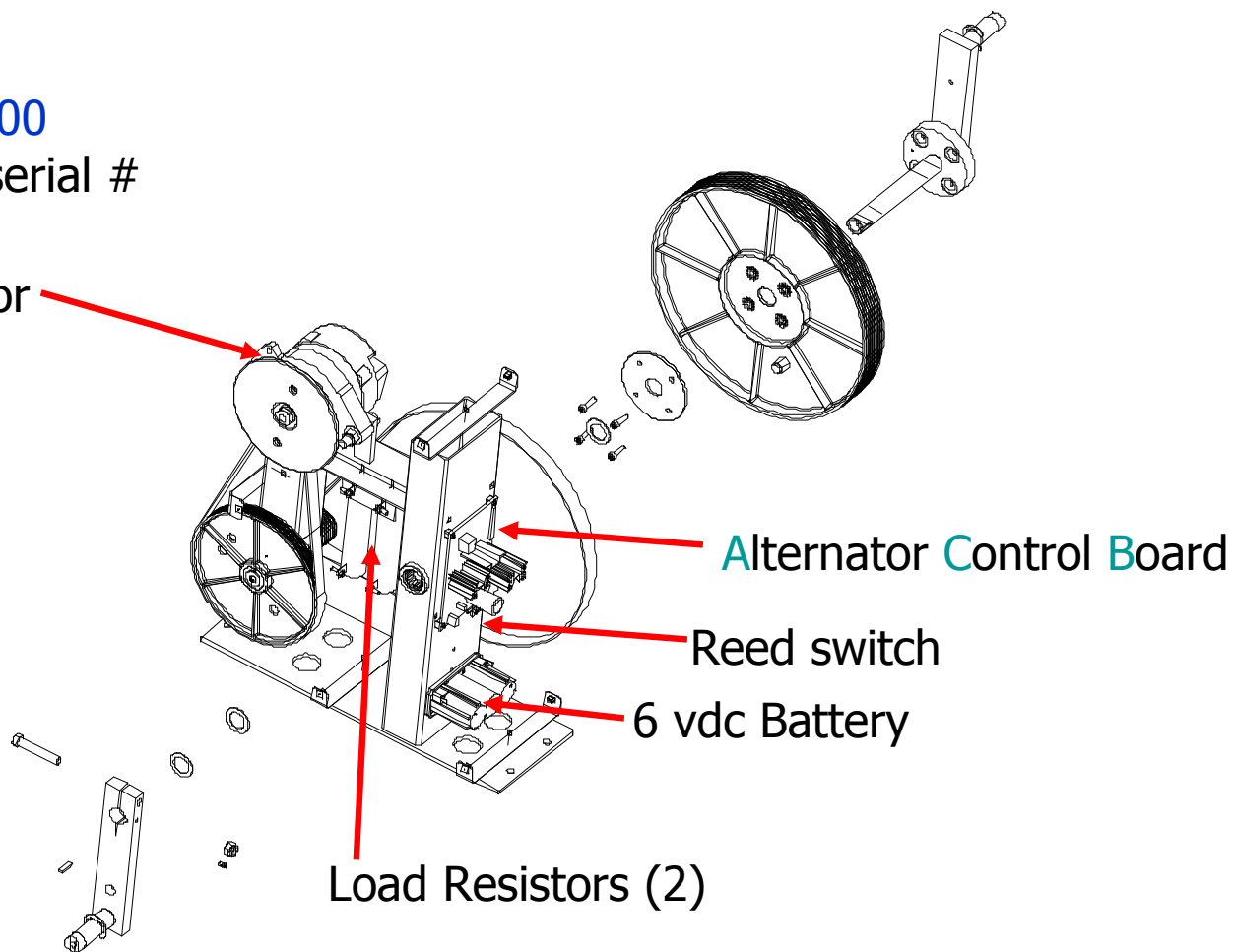


Parts on 95X-01

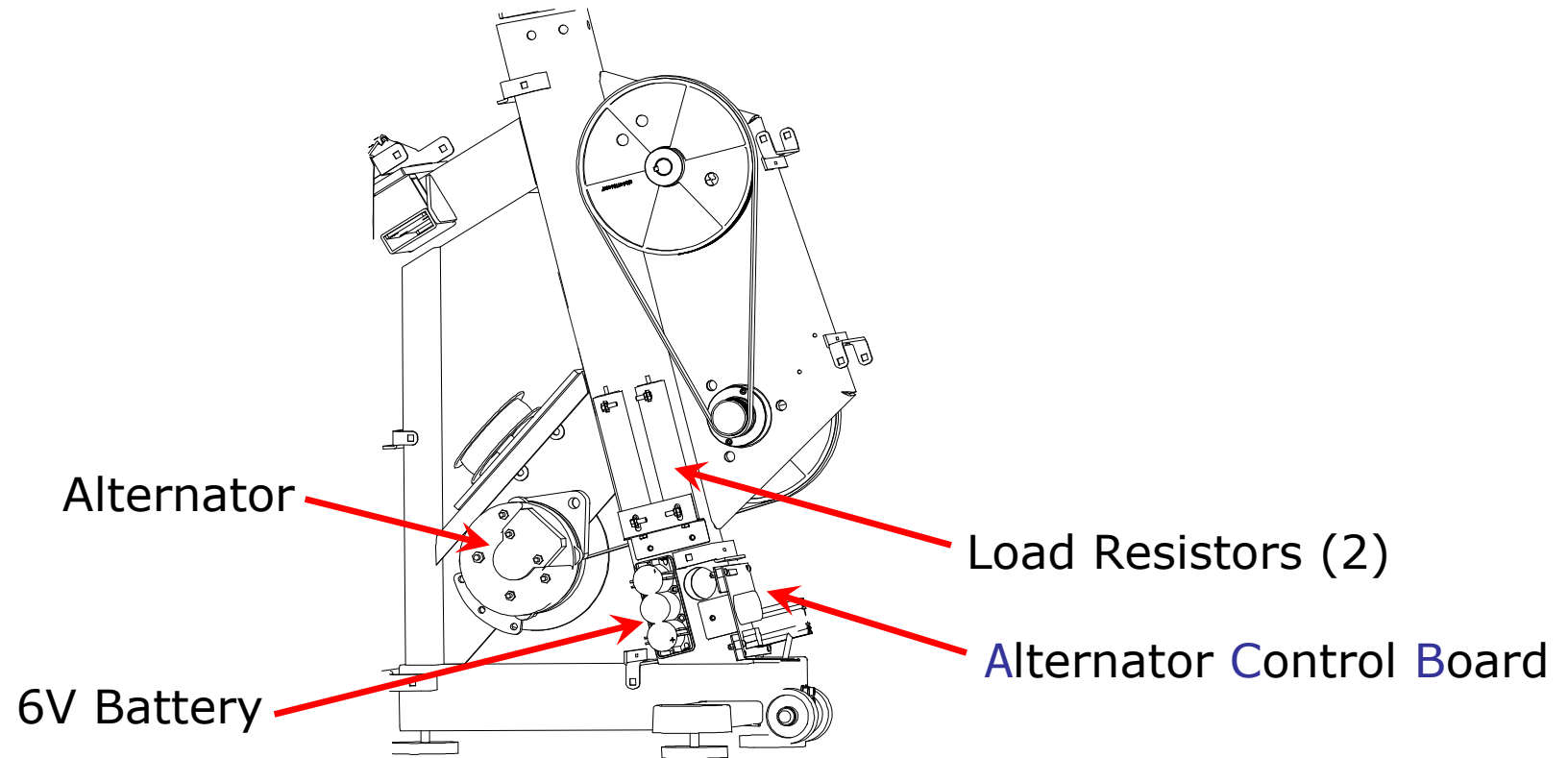
XTD100000

Starting serial #

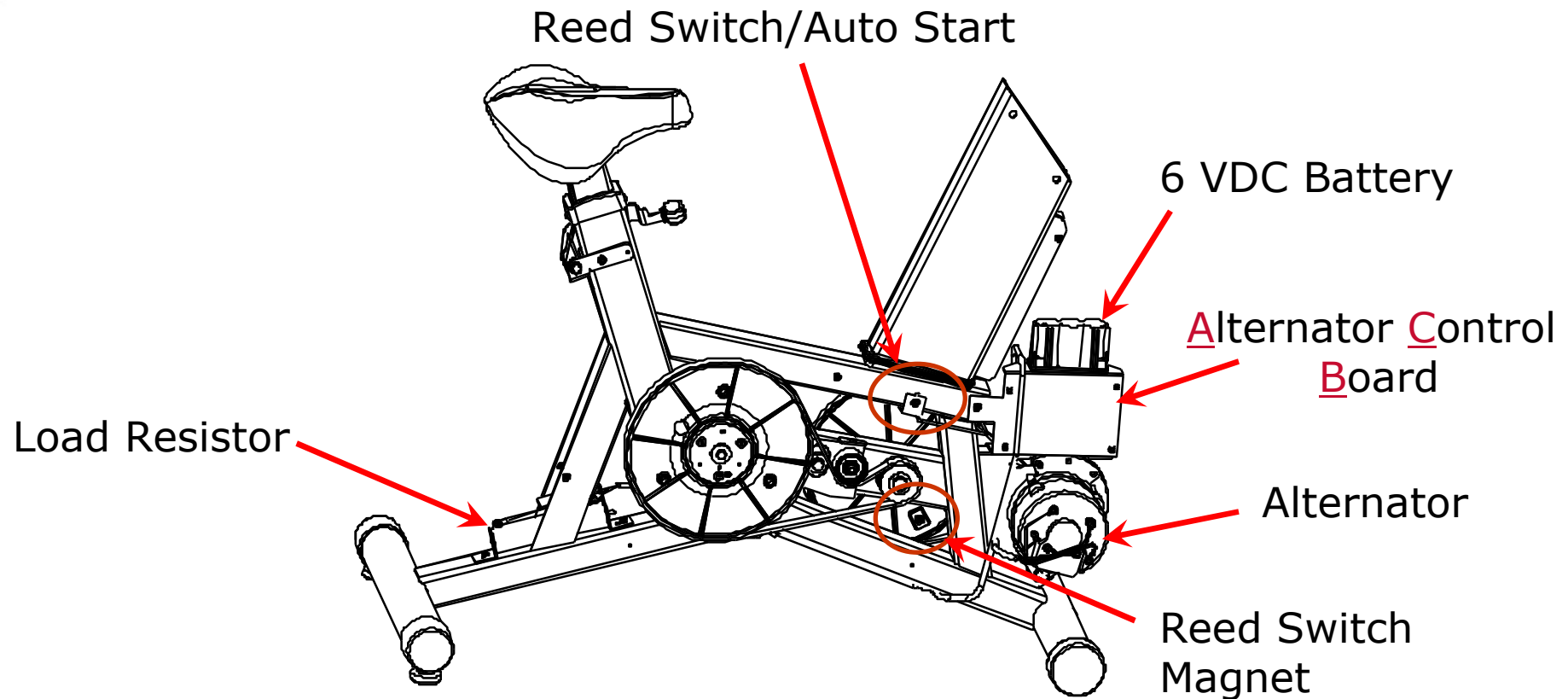
Alternator



Parts on Summit Trainer



Parts on Classic Bike



Alternator System Common Issues

Cross Trainers

Silver Bullet
Arctic Silver
95X Series
20" ellipse



SN#  NexGen (9500)
CT95 Series 18"
ellipse



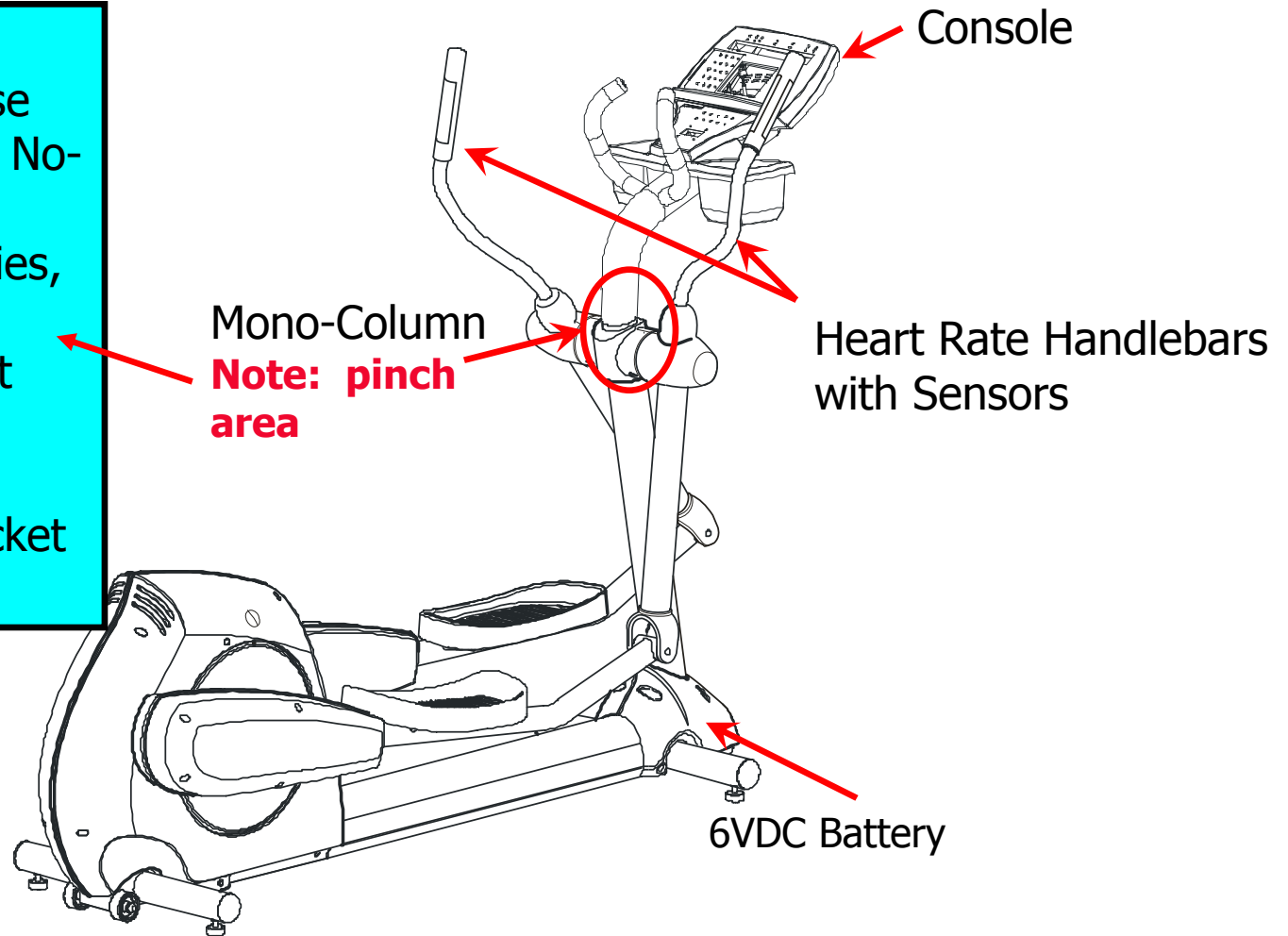
Arctic Silver
91X series

SN#



Parts ID

Pinched cable in Monocolumn can cause many failures such as No-power, dropping into Pause, drained batteries, etc. Problem may manifest years from install. Must use caution with installing console bracket into mono-column.



Cross-Trainer Noise Issues

Symptom

Noisy operation in the rear of the unit.

Model

All

Questions To Ask

Has the alternator been inspected?

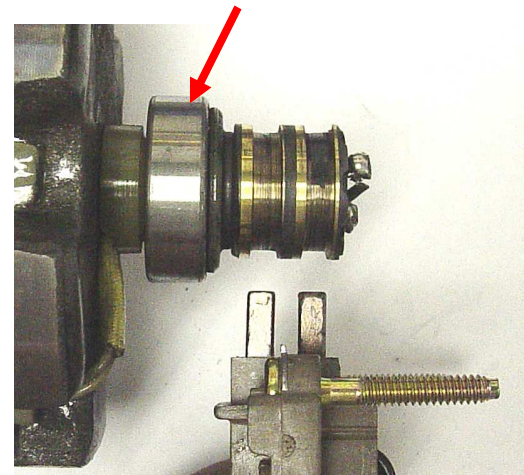
Probable Cause

Faulty alternator.

Possible Solutions

Relieve tension on the alternator belt and spin the flywheel to check for smooth operation. Thumping indicates a faulty alternator.
Replace the alternator.

Possible Bad Bearing



Classic Bike

» 2002



» 2004



Difficult To Pedal

- » 1. Before unit initializes?
 - Inspect mechanical drive components for proper operation and wear.

Note: To defeat “Auto-Start”, for mechanical trouble-shooting, disconnect the Display Console.

- » 2. After pressing “Start” or unit generates an “Auto-Start”?
 - These problems are “electronic” in nature.

Start vs. Run functions

» START (Operation)

Operation occurs when the Auto-Start magnet passes by the Reed Switch. This sends the Battery voltage to the console and will turn “on” the alternator when pedaling exceeds 35 RPM.

When the unit is started (console ON) and being pedaled less than 35 RPM, the power for the machine is supplied by the Battery.

» START (Trouble-shooting)

If the unit does not Auto-Start, press the “Start” button (twice on Bikes).

If the unit powers up, you have a bad Auto-start system (reed sensor, magnet, or cable).

If not, inspect the battery (voltage and connections).

Start vs. Run functions

» RUN

After the unit is started (Auto-Start or Start button) and pedaling remains above 35RPM, the machine then runs on power from the **ALTERNATOR**

Functionality in Run mode is controlled by the ACB and Console.

Bike Is Difficult To Pedal

- » Ask the question... When does it happen?

Indicates what parts could be defective.

Certain parts function at certain times.

- » Remember...

Mechanical vs. Electronic

Start vs. Run

Summary – Alternator System

Is there a pinch point on the Classic Cross Trainer/Elliptical?

Does the Alternator need a Field-Kick?

How does this system create additional load to the user?

How can you start up the console for stationary programming?

What is the function of the battery in the alternator systems?

What determines the RPM of the unit?

Questions





THANK YOU!

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