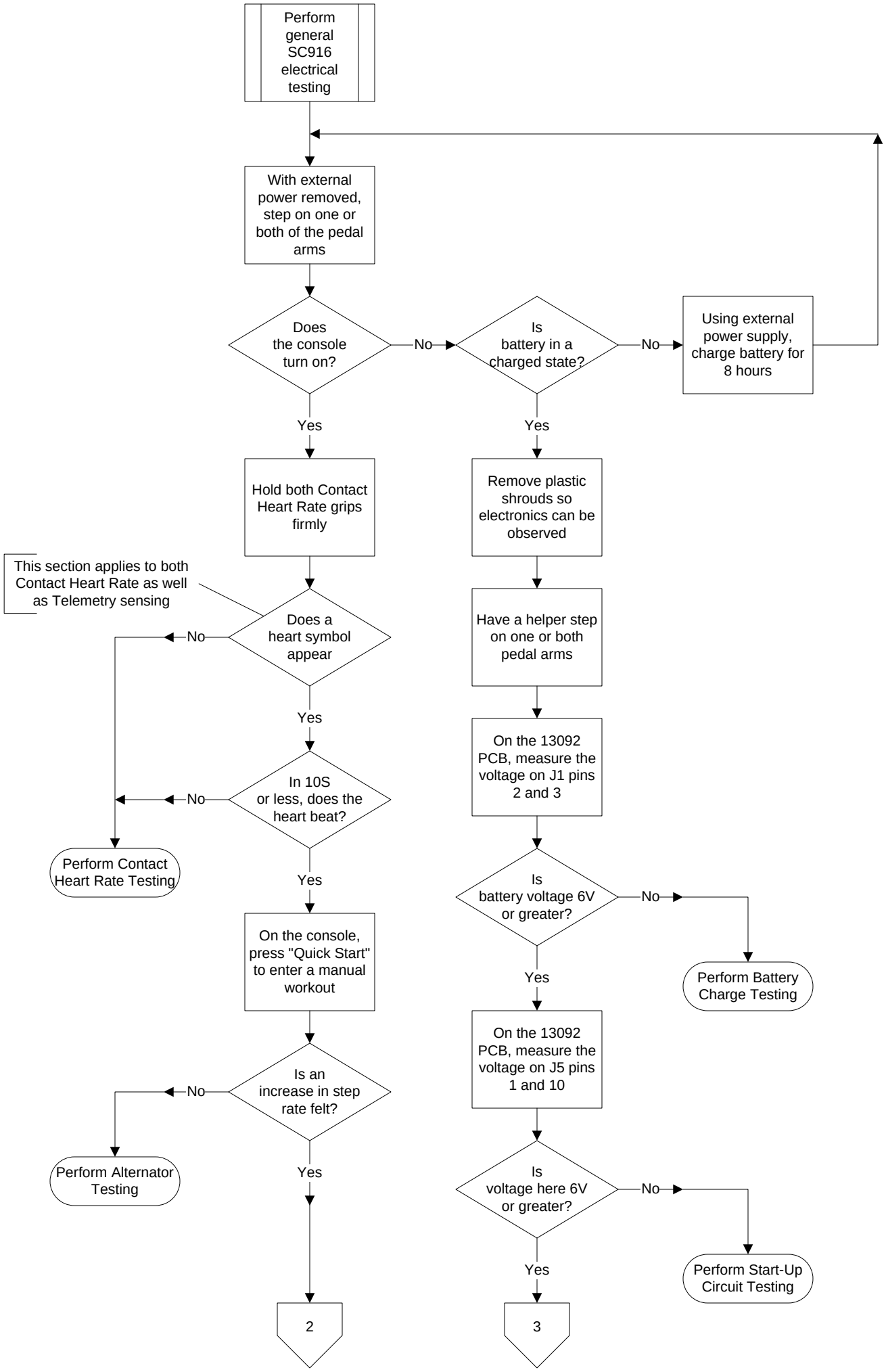
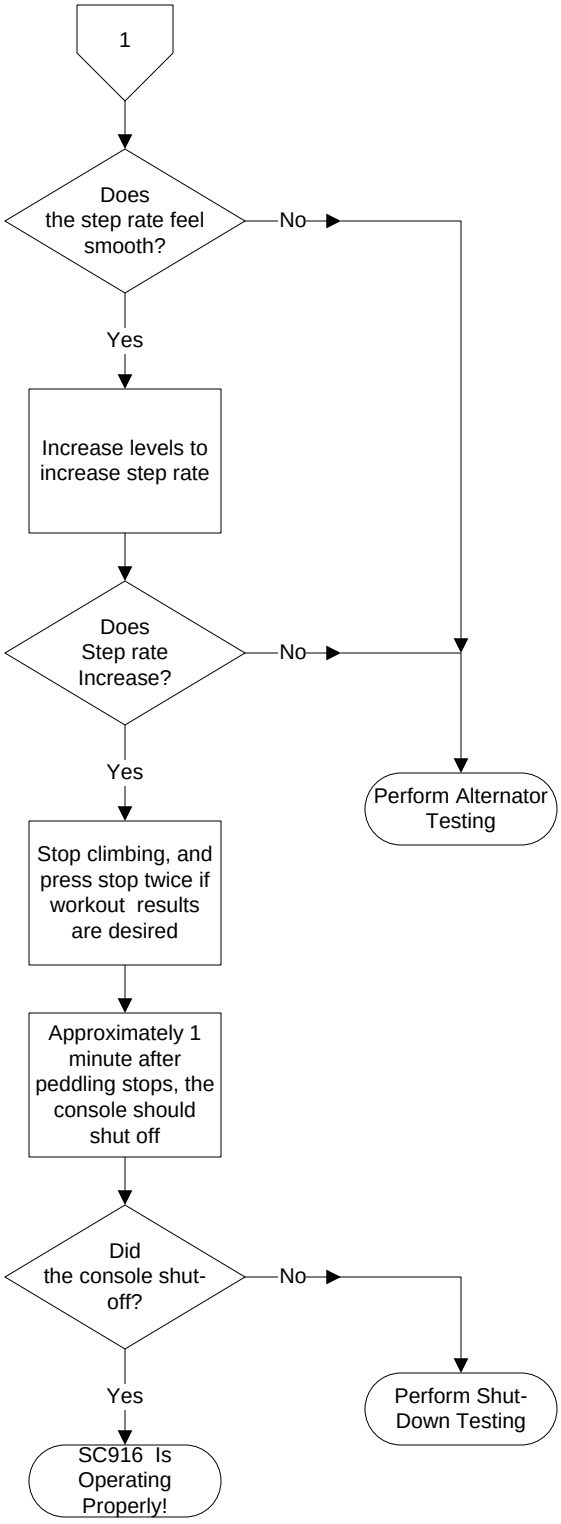
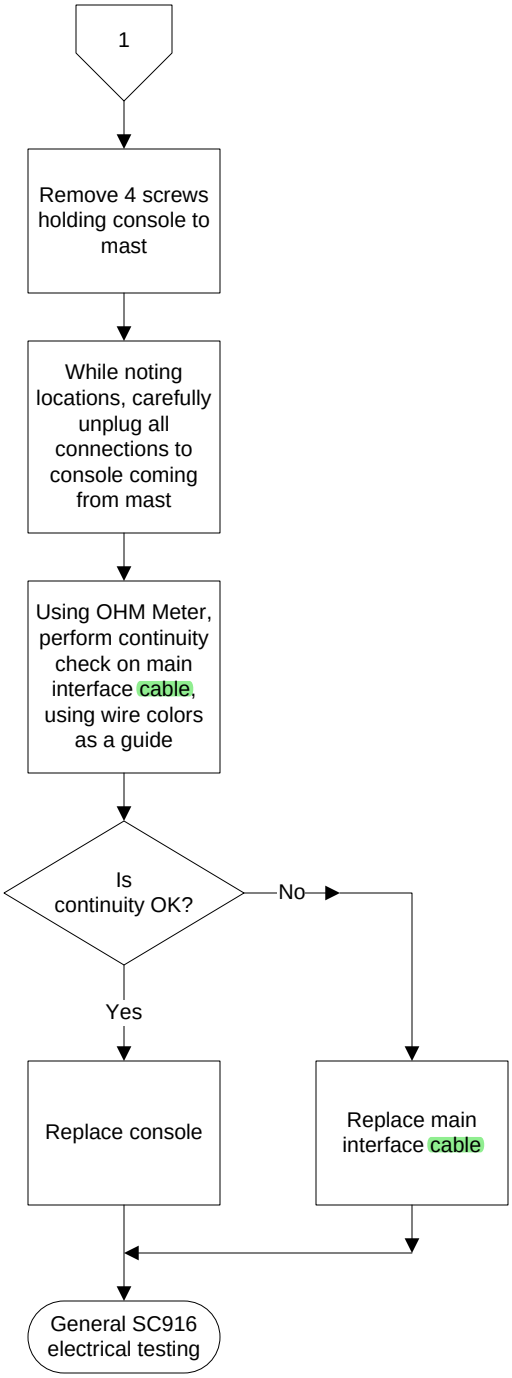
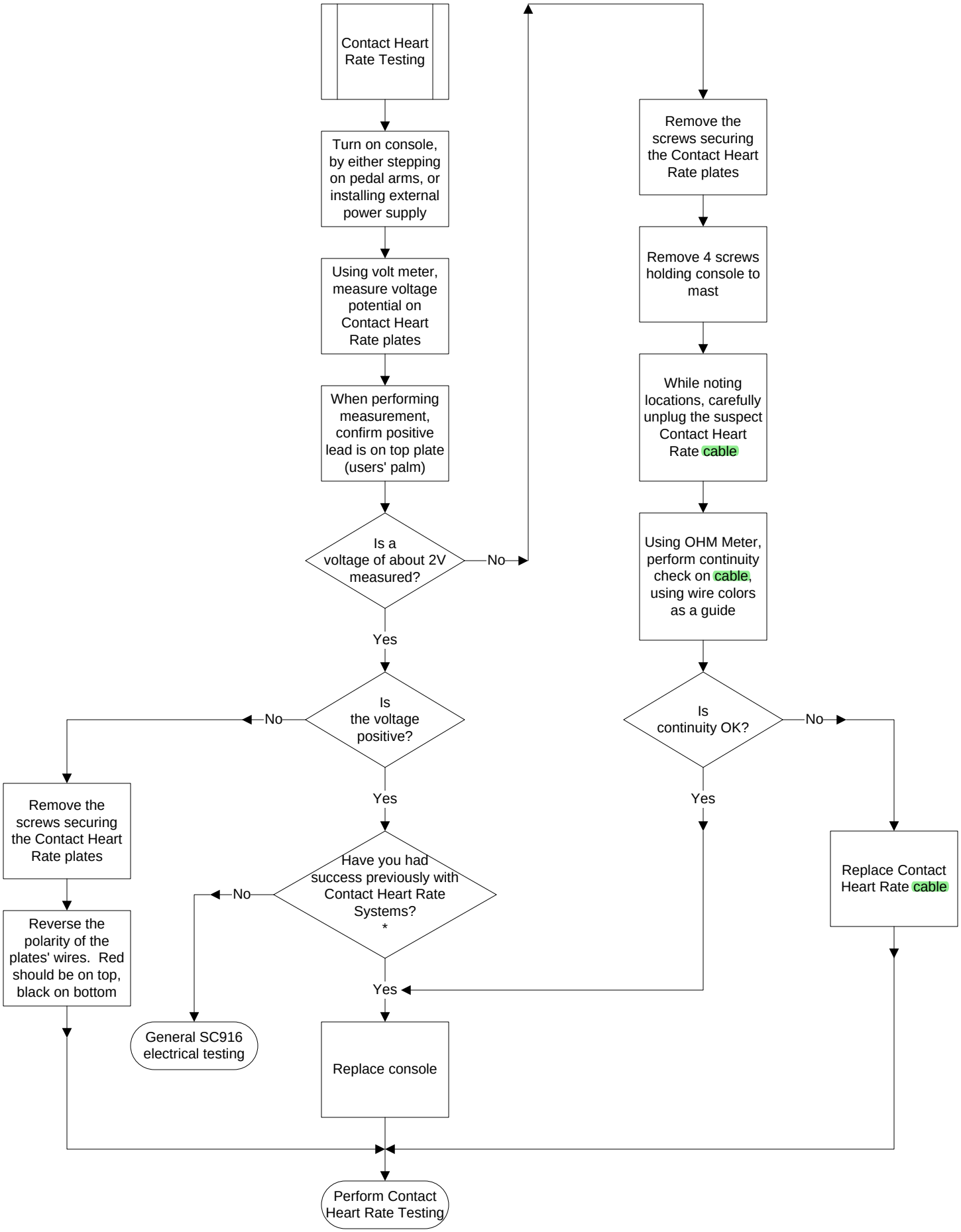
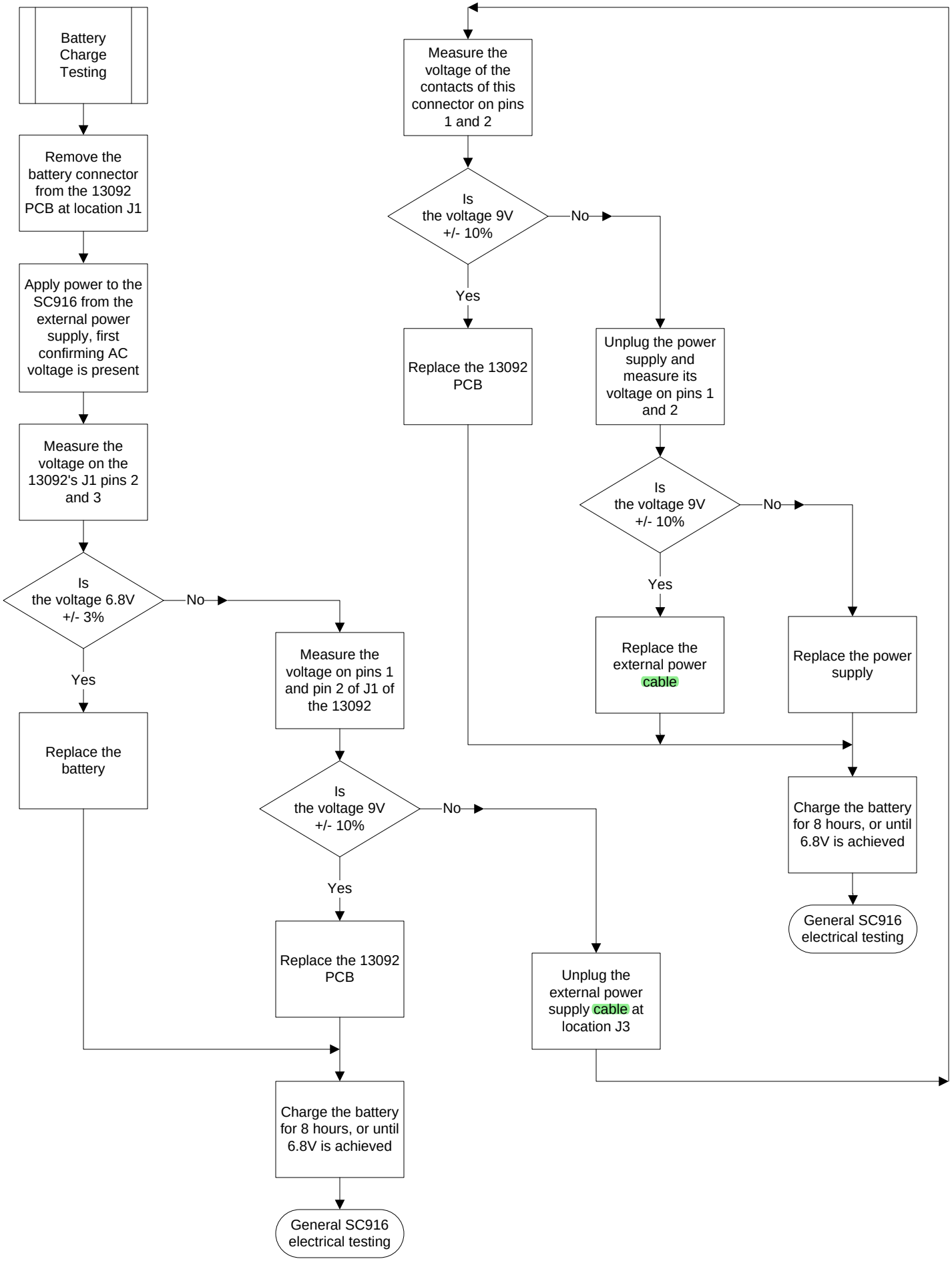

Perform general SC916 electrical testing
With external power removed, step on one or both of the pedal arms
Does the console turn on?
No
Is battery in a charged state?
No
Using external power supply, charge battery for 8 hours
Yes
Yes
Hold both Contact Heart Rate grips firmly
Remove plastic shrouds so electronics can be observed
This section applies to both Contact Heart Rate as well as Telemetry sensing
Does a heart symbol appear
No
Yes
Have a helper step on one or both pedal arms
In 10S or less, does the heart beat?
No
On the 13092 PCB, measure the voltage on J1 pins 2 and 3
Perform Contact Heart Rate Testing
Yes
Is battery voltage 6V or greater?
No
Perform Battery Charge Testing
On the console, press "Quick Start" to enter a manual workout
Yes
On the 13092 PCB, measure the voltage on J5 pins 1 and 10
Is an increase in step rate felt?
No
Perform Alternator Testing
Yes
Is voltage here 6V or greater?
No
Perform Start-Up Circuit Testing
Yes
2
3


1
Does the step rate feel smooth?
No
Yes
Increase levels to increase step rate
Does Step rate Increase?
No
Yes
Perform Alternator Testing
Stop climbing, and press stop twice if workout results are desired
Approximately 1 minute after peddling stops, the console should shut off
Did the console shut-off?
No
Yes
Perform Shut-Down Testing
SC916 Is Operating Properly!


1
Remove 4 screws holding console to mast
While noting locations, carefully unplug all connections to console coming from mast
Using OHM Meter, perform continuity check on main interface cable, using wire colors as a guide
Is continuity OK?
No
Yes
Replace console
Replace main interface cable
General SC916 electrical testing



* Contact Heart Systems perform properly on roughly 87% of the population, according to latest data from Salutron. Many factors affect the pulse strength at the user's palms.



Due to requiring many pieces of test equipment, this procedure does not test the complete functionality of the charger but rather its final "float" state. If the battery voltage is less than 3V, no more than 50mA is applied. From 3V to 6.8V current control applies nearly .5A until voltage control or float state is entered.

Batteries can only be tested under load. Even if it measures 6V or more unloaded, it can still produce little or no voltage under load as a defective battery's internal impedance increases.

Alternator Testing

To minimize the complexity of the flowchart, this section will best be described in terms of system theory.

The colored connections to the alternator are as follows:
White-B+, Alternator output voltage
Brown-Field, Alternator Control Current
Black-Ground, Alternator return

Prior to proceeding with tests below, perform continuity checks on the alternator cable, and confirm cable is securely fastened to the alternator and the 13092.

Resistance over gravity is performed by the alternator in the SC916. When a user first steps on the pedal arms, and prior to starting a workout, the console should be enabling full field current to the alternator. Field current is enabled by asserting the signal at TP11 to 5V. At this time, initial field current is provided by the internal battery.

The alternator's B+ should rise as a result of this, but its voltage will depend on the weight of the user. Resistance is achieved by the oppositions of internal magnetic fields when field current is applied. The user's weight will affect the alternator's RPM under this condition, and under full field current conditions the voltage is not controlled. For an average weight user, a 6V to 8V level on B+ would be a normal condition.

Once a user starts a workout, the console controls the alternator's field current attempting to maintain the desired step rate. Again, this accomplished on TP11, and this signal is Pulse Width Modulated (PWM) from 0V to 5V. If the step rate is fast, the console will assert TP11 high longer, if the step rate is slow, it will assert TP11 low longer.

When TP11 is high, the alternator field current is limited current limited to 3.25A. So regardless of the voltage measured at B+, 3.25A is the maximum field current available. When TP11 is low, no field current should flow.

The only situation where a PWM signal would not be present on TP11 during a workout, is if a very light weight person was attempting to achieve a step rate that could not be achieved by their weight overcoming the frictional resistance of the system. In this case, the console would keep TP11 low (no field current, or no induced resistance).

During workouts when step rates of 25 Steps/Minute are targeted, the alternator's B+ increases as a function of speed and user weight. For high level workouts with heavy weight users, B+ levels of 40V could be witnessed. Once B+ exceeds 7V, battery maintenance and self-sustaining power console power will be provided.

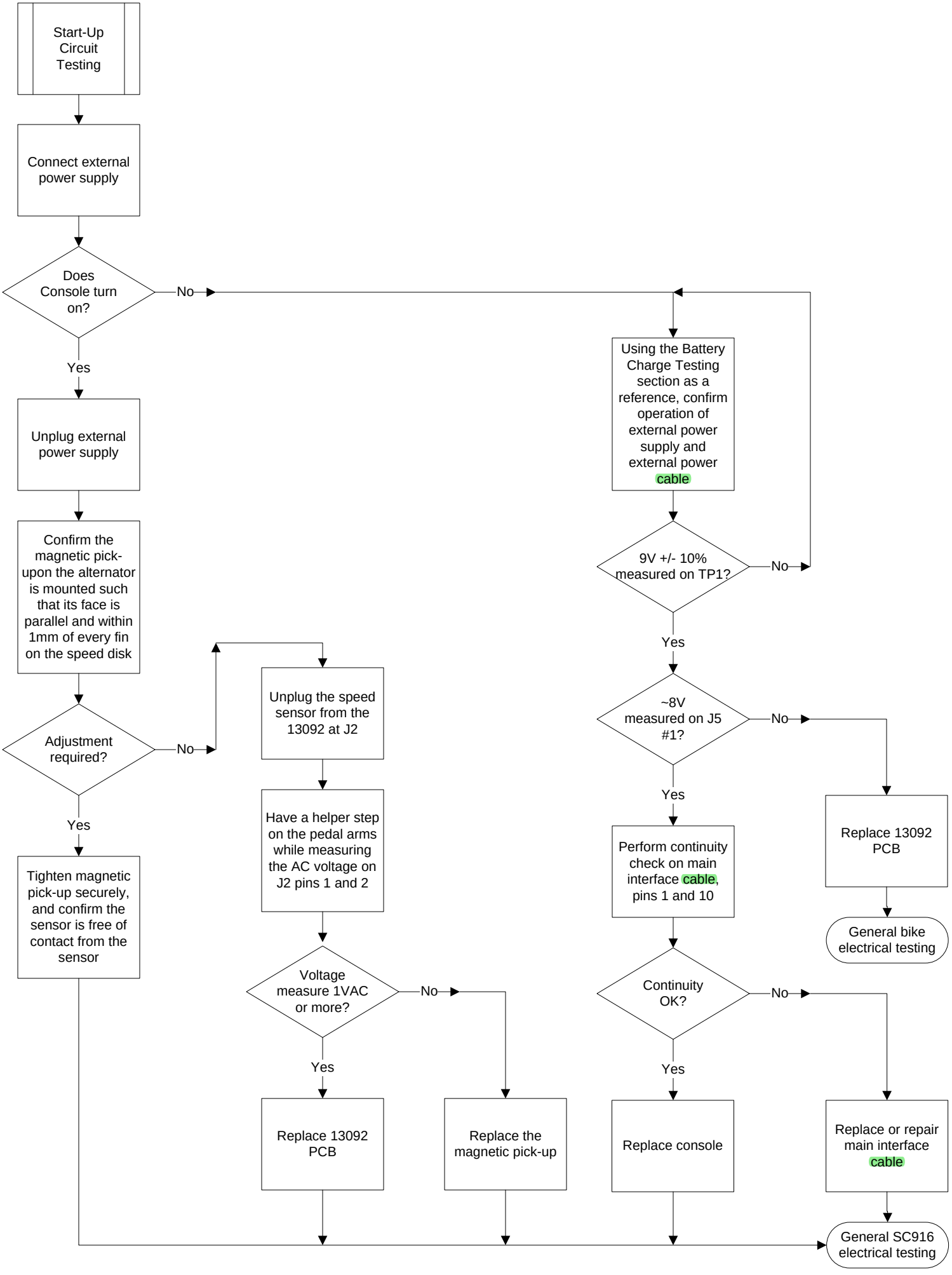
If the alternator's B+ is not powering on but the console is, first confirm TP11 is 5V. If it is, and no resistance is felt, measure the field voltage with respect to ground. If this is 5V or greater with no B+, replace the alternator.

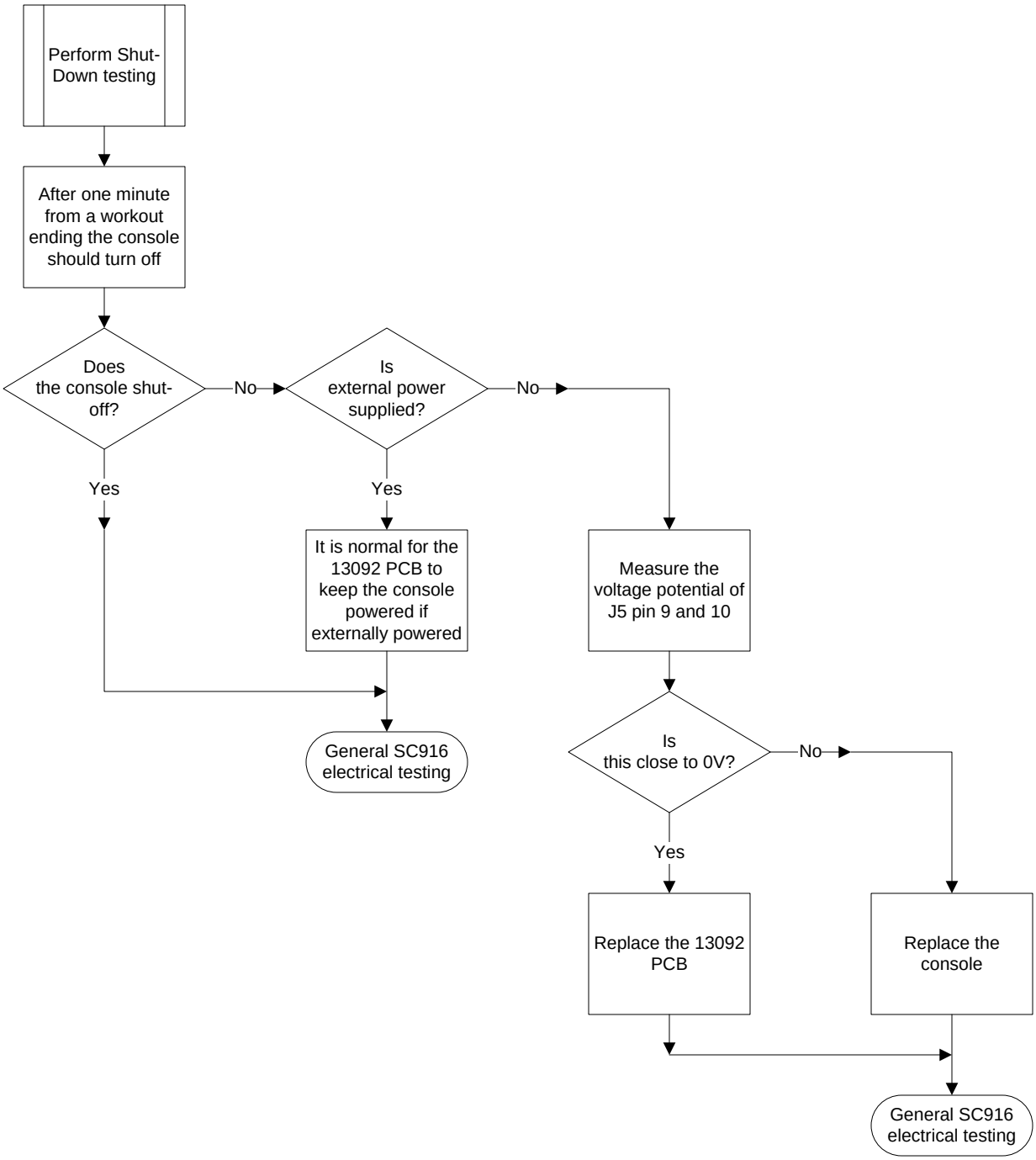
If maximum resistance is always felt, determine if TP11 is ever being driven low. If TP11 is driven low and full field current exists, suspect a defective 13092 PCB. If TP11 never goes low, suspect a bad console or shorted interface cable.

If no field voltage is detected, and if the console is on and configured as a stepper, measure the alternator's field resistance. Unplug the alternator from the 13092's J4, and measure the resistance from the brown wire to the black wire. 4ohms is typical for Prestolite units. If this is 4ohms or more, replace the 13092 PCB. If it's way less or shorted, replace the alternator.

If the step rates or B+ voltage are sporadic first look for loose connections. This type of problem could be caused by a defective alternator or 13092. If a known-good 13092 unit is available it will be the easiest component to replace. If the problem goes away, confirm the other PCB still causes sporadic behavior, and the problem was not in fact a loose connection.

The external 2.5ohm load resistor acts as a resistive ballast on the alternator. Once B+'s level exceeds 16V, this 2.5ohm load is switched onto B+. The resistance of the load can be confirmed by an ohm meter. If a known workout condition exists that drives B+ above 16V, confirm a voltage is measured across this 2.5ohm load. If it is not, check its cable continuity to the 13092 and B+. If the continuity checks, or if the voltage across the resistor always measures the value of B+ replace the 13092.


Start-Up Circuit Testing
Connect external power supply
Does Console turn on?
No
Yes
Unplug external power supply
Confirm the magnetic pick-upon the alternator is mounted such that its face is parallel and within 1mm of every fin on the speed disk
Adjustment required?
No
Yes
Tighten magnetic pick-up securely, and confirm the sensor is free of contact from the sensor
Unplug the speed sensor from the 13092 at J2
Have a helper step on the pedal arms while measuring the AC voltage on J2 pins 1 and 2
Voltage measure 1VAC or more?
No
Yes
Replace 13092 PCB
Replace the magnetic pick-up
Using the Battery Charge Testing section as a reference, confirm operation of external power supply and external power cable
9V +/- 10% measured on TP1?
No
Yes
~8V measured on J5 #1?
No
Yes
Replace 13092 PCB
General bike electrical testing
Perform continuity check on main interface cable, pins 1 and 10
Continuity OK?
No
Yes
Replace console
Replace or repair main interface cable
General SC916 electrical testing


Perform Shut-Down testing
After one minute from a workout ending the console should turn off
Does the console shut-off?
No
Is external power supplied?
No
Yes
Yes
It is normal for the 13092 PCB to keep the console powered if externally powered
Measure the voltage potential of J5 pin 9 and 10
General SC916 electrical testing
Is this close to 0V?
No
Yes
Replace the 13092 PCB
Replace the console
General SC916 electrical testing