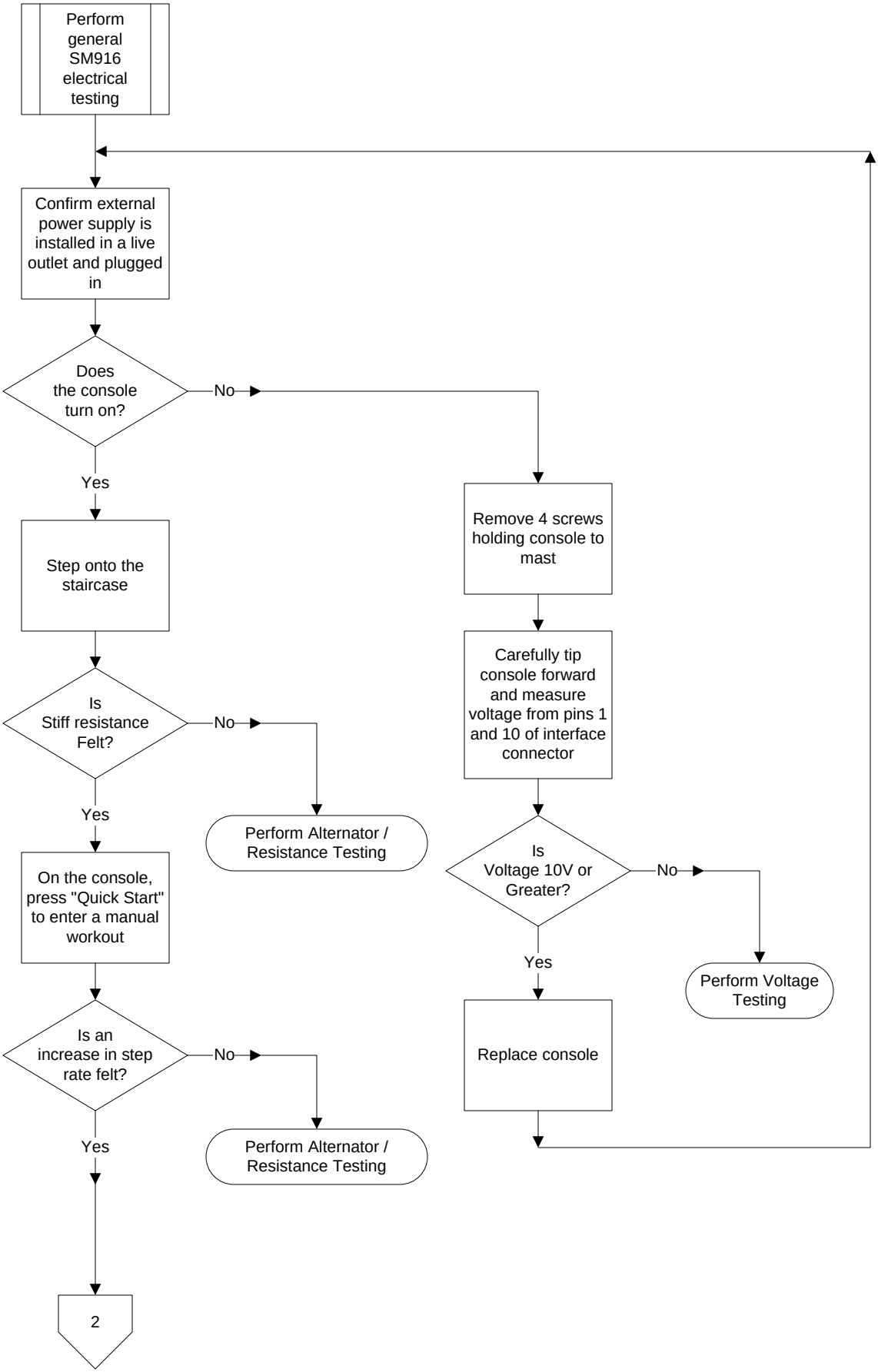
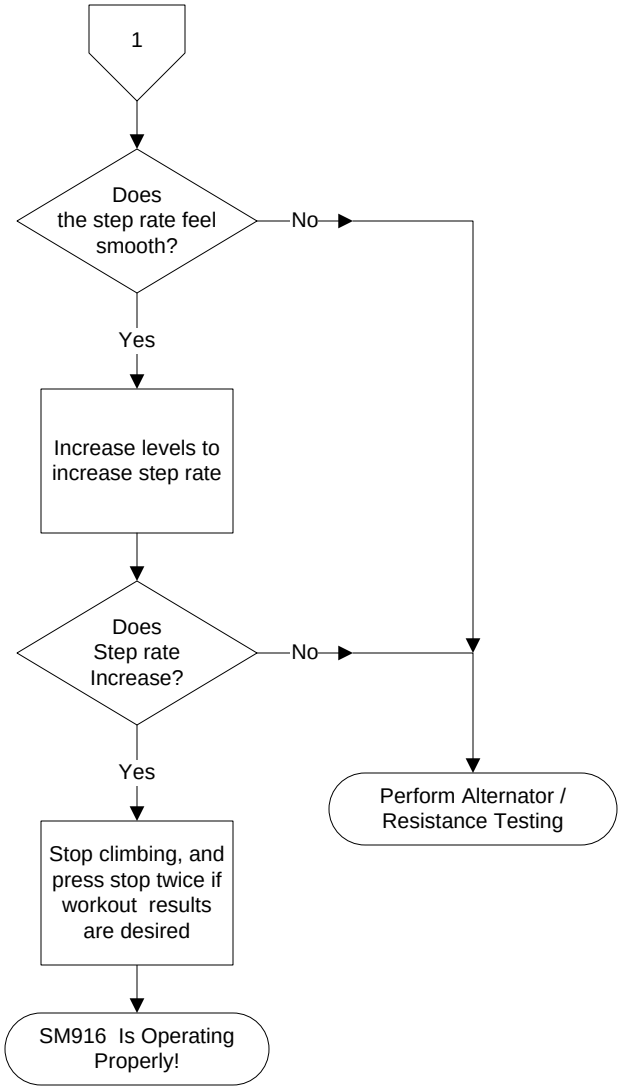
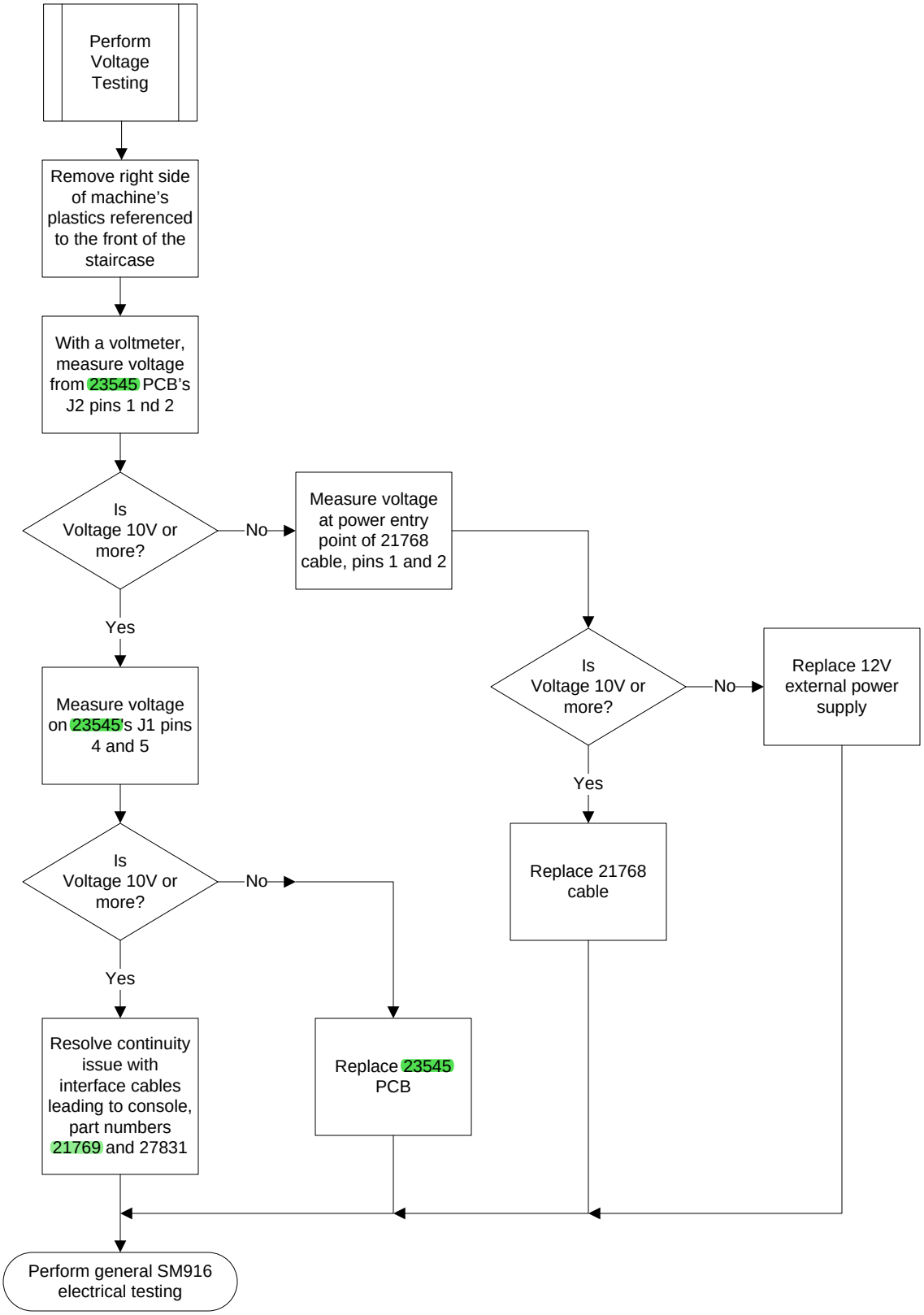

Perform general SM916 electrical testing
Confirm external power supply is installed in a live outlet and plugged in
Does the console turn on?
No
Yes
Remove 4 screws holding console to mast
Carefully tip console forward and measure voltage from pins 1 and 10 of interface connector
Is Voltage 10V or Greater?
No
Perform Voltage Testing
Yes
Replace console
Step onto the staircase
Is Stiff resistance Felt?
No
Perform Alternator / Resistance Testing
Yes
On the console, press "Quick Start" to enter a manual workout
Is an increase in step rate felt?
No
Perform Alternator / Resistance Testing
Yes
2


1
Does
the step rate feel
smooth?
No
Yes
Increase levels to
increase step rate
Does
Step rate
Increase?
No
Yes
Perform Alternator /
Resistance Testing
Stop climbing, and
press stop twice if
workout results
are desired
SM916 Is Operating
Properly!


Perform Voltage Testing
Remove right side of machine's plastics referenced to the front of the staircase
With a voltmeter, measure voltage from 23545 PCB's J2 pins 1 nd 2
Is Voltage 10V or more?
No
Measure voltage at power entry point of 21768 cable, pins 1 and 2
Yes
Measure voltage on 23545's J1 pins 4 and 5
Is Voltage 10V or more?
No
Yes
Resolve continuity issue with interface cables leading to console, part numbers 21769 and 27831
Replace 23545 PCB
Is Voltage 10V or more?
No
Replace 12V external power supply
Yes
Replace 21768 cable
Perform general SM916 electrical testing

Alternator / Resistance 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
Blue-Tachometer, velocity signal back to console

Resistance over gravity is performed by the alternator in the SM916. When the console senses a user with staircase movement, the console should be enabling full field current to the alternator. Field current is provided from the external power supply, through the console, into the 23545 and wired into the alternator's field terminal. Under this condition, the console should also be driving the 23545's J1 pin 1 low, switching the .5ohm load resistor onto the alternator's B+.

The alternator's B+ should rise as a result of field current, but its voltage will depend on the weight of the user and resulting velocity. 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. But, with the large gear ratio and full field current applied, the resistance should be maximum, and the step rate should be minimum.

Once a user starts a workout, the console controls the alternator's field current attempting to maintain the desired step rate. This signal is Pulse Width Modulated (PWM) from 0V to 12V, the level of the loaded external supply. If the step rate is fast, the console will deliver field current longer, if the step rate is slow, it will deliver less field current.

The only situation where no field current would be be present 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 field current off, or no induced resistance.

During workouts the alternator's B+ increases as a function of speed and user weight. For high level workouts with heavy weight users, B+ levels of 20V could be witnessed.

If no resistance is felt, regardless of whether the console is powered, remove the plastic shroud on the right side (with respect to the staircase entry). The 23545 PCB should be visible, along with the load resistor, and alternator. Prior to proceeding with tests below, perform continuity checks on the alternator connections, load resistor connections, and confirm these connections are secure into the 23545 PCB. Confirm the load resistor measures .5ohm.

Power entry is at the bottom of the unit. The 12V 2.5A supply enters via cable part number 21768, and enters into the 23545 PCB via J2. LED2 indicates power is present, but 12V should still be confirmed with a volt meter. Power and control interface to the console is provided at location J1. The cable to the console is made up of two sections for assembly, part numbers 21769 and 27831. 12V is provided up to the console at J1 pin 4, and GND pin 5.

In addition to alternator field current, the console controls the loading of the alternator's B+ with the .5ohm resistor which is switched by the 23545's relay. When the console detects a user has stepped on the staircase, it immediately applies full field current, and turns on the power relay to load B+ with .5ohm. LED1 is an indicator the console is attempting to close the relay, but this should be confirmed with a VOM.

If no resistance is felt, confirm 10V to 12V is being applied to the alternator's field. This should always be present once a user is detected, and before a workout has begun. Confirm the additional load is being switched also, which is controlled by a low voltage on J1 pin 1. The operation of the power relay can be confirmed by unplugging the unit, and removing the console connection at J1. Install external power again, and an ohmmeter should show continuity from B+ to field on the 23545's terminal strip. With a test jumper, connect J1 pin 1 to J1 pin 5, and the ohmmeter should now show continuity from the terminal strip's B+ to RES. If this test passes with no resistance felt, and full field current has been confirmed, replace the alternator. If the above test fails, replace the 23545 PCB. If no field current is detected, or LED1 does not light when a user steps on the staircase, check the interface cable continuity to the console. If this checks, replace the console.

If no increase in step rate is detected when instructed by the console, confirm the field line is not at 12V continuously. If the field is continuously at 12V, the console's field control has probably shorted.