

SSQ-2F v3.10 Instruction Manual Addendum

July 15, 2012

ADAPTING THE SSQ-2F V3.10 FOR USE AS A CONTACT DEVICE

The SSQ-2F v3.10. 10 may be used as a voltage source for a contact device by reducing the output power of the RF amplifier and adding an external adapter. This document details the required steps.

Is necessary to reduce the voltage applied to the RF amplifier PWR terminal block to a lower voltage than is normally used. The DC voltage required to power the amplifier section of the SSQ-2F v3.10 will depend upon the RF output voltage you wish to achieve.

If a DC supply voltage of +19 volts is applied to the PWR terminal block on the SSQ-2F v3.10 an RF output voltage of approximately 45 to 50 V will be output on the RF OUT terminal block.

If the DC supply voltage of +38 V is applied to the PWR terminal block of the SSQ-2F v3.10 an RF output voltage of approximately 90 to 100 V will be output on the RF OUT terminal block.

In order to achieve a rapidly rising RF pulse is necessary to have the correct load resistance across the RF output of the SSQ-2F v3.10. Without a plasma tube connected to the SSQ-2F v3.10 we must replace the load of the tube with a set of resistors, which will absorb the RF power. This device is commonly called a "Dummy Load."

Connecting the terminals of the dummy load resistor across the RF OUT terminal block of the SSQ-2F v3.10 provides the proper load resistance from the SSQ-2F v3.10, maintains the correct waveform, and stabilizes the output voltage during operation.

Such a dummy load may be obtained commercially from companies such as MFJ, or you may construct one yourself. The dummy load must be capable of dissipating a continuous power of 20 watts.

The schematic diagram at the end of this document shows a connections for a dummy load and contact adapter.

The dummy load may be placed in the same box as the rest of the components, however it will be necessary to provide plenty of cooling air for the dummy load, especially if the SSQ-2F v3.10 is operated at +38 V applied to the RF PWR terminal block. Ideally, the dummy load should be assembled in a well ventilated metal enclosure. The remaining components, resistors, light bulbs, etc., may be assembled in either a plastic or metal enclosure.

Because you will not have a plasma tube connected to the output of the SSQ-2F v3.10 to tell you when the system is producing RF power, it is convenient to install a simple monitoring circuit consisting of a resistor and a small incandescent light bulb. This indicator network is connected directly across the RF output of the SSQ-2F v3.10.

The brightness of the bulb will vary depending upon the modulation duty cycle you are using. The higher the modulation duty cycle percentage, the brighter the lamp will be. The lamp chosen for this adapter requires 12 V at 60 mA for full brightness. Because it draws very little power, it does not load down the output of the SSQ-2F v3.10.

Some method of controlling the current going to the contact electrodes is necessary. This is conveniently provided by the use of a 10,000 ohm variable resistor that is placed in series with the RF output of the SSQ-2F v3.10 in the line with one of the electrodes.

Besides using a variable resistor for current adjustment, it is also advisable to install another lamp of the same type in series with the variable resistor and the contact electrodes. All of the RF current going to the electrodes will pass through this lamp. This lamp will normally be very dim or not visibly illuminated during normal operation. However, should the contact electrode current increase above approximately 20 mA, the lamp will begin to illuminate dimly.

Should a condition occur where the circuit through the contact electrodes begins to permit excessive current to flow, the lamp will illuminate brilliantly, indicating that something is wrong and needs to be corrected. The lamp will limit the current to slightly more than 60 mA in a worst-case situation. If the current increases beyond that point, the lamp will quickly burn out, opening the circuit and disconnecting the RF power from the contact electrodes.

The following picture that includes Figure 13 from the SSQ-2F v3.10 operating manual, shows a chart of the RF output voltages versus the DC power supply voltage of the SSQ-2F v3.10.

This figure shows the peak RF output voltage available for different PA PWR input DC voltages when the SSQ-2F v3.10 is used as a contact device driver.

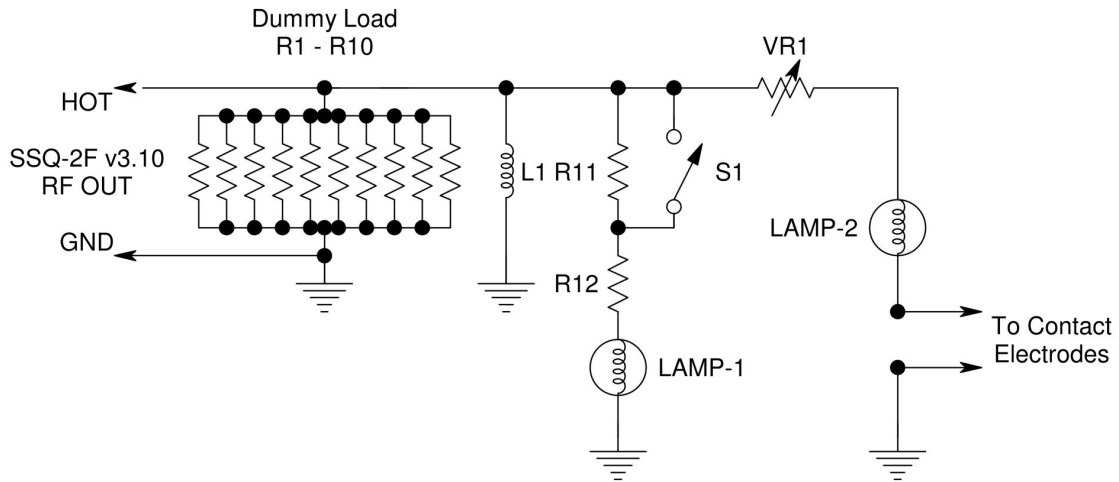
PA PWR DC VOLTS	PEAK RF VOLTS OUTPUT
15	38
18	47
20	51
24	61
28	72
30	77
36	92
48	123
50	129
56	143
60	160
70	176

Figure 13

As you can see from this table, the SSQ-2F is capable of producing dangerous RF voltages. It is strongly recommended that you do not use a DC supply voltage higher than necessary to avoid injury or damage.

Note that the RF output of the SSQ-2F v3.10 is AC and is referenced to the ground/earthed/negative side of the DC supply voltage for both of the voltages connected to the PWR and PA PWR terminal blocks. If galvanic isolation between the equipment and the subject is required, it will be necessary to use approved power supplies that are life safety rated.

Contact Device Adapter
 for SSQ-2F v3.10
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Notes:

+19 V on the SSQ-2F v3.10 RF amplifier PWR input results in 50 V RF output.
 +38 V on the SSQ-2F v3.10 RF amplifier PWR input results in 100 V RF output.

L1 - 4.7 uHy ferrite core inductor

R1 - R10 - 510 ohm 2 W 5% metal film resistor, Yageo RSF200JP-73-510R
 1) SPACE RESISTORS 5 MM APART AND ALLOW PLENTY OF COOLING AIR.

R11 - 270 ohm 1 W 5% metal film resistor, Yageo RSF100JB-73-270R

R12 - 150 ohm 1 W 5% metal film resistor, Yageo FMP100JR-52-150R

S1 - SPST toggle switch.

1) Closed for SSQ-2F v3.10 RF amplifier voltage of +19 V. Open for +38 V.

VR1 - 10k linear potentiometer for current limiting.

LAMP-1, LAMP-2 - 12 V 60 mA panel lamp, RadioShack 272-337A (green) or 272-332 (red).

1) LAMP-1 indicates RF output present. Brightness varies with duty cycle.

2) LAMP-2 provides absolute current limit of 60 mA to Contact Electrodes.

3) LAMP-2 reduces Contact Electrodes voltage by 12 V at full brightness.