EMP 400IU Pulse Generator

Caution: Hearing protection should be considered when discharging this device.

Disclaimer

This Product has no interlocks or protective housings to prevent accidental contact with lethal amounts of electricity. Improper use can cause death and serious injury. Any experimentation is done at the risk of the user. The manufacturer assumes no responsibility regarding proper or improper use of this device. All purchases or rentals must initially include a signed hazardous equipment affidavit with proof of identification.

The results obtained with this device will be dependent on how the purchaser utilizes the device. We can only make claims on the electrical parameters the device will produce. This device is sold for research only.

Applications

The 400 J Pulse Source is a system which is very flexible. You can use it as a single event fast rise, high peak current pulse source of variable energy from 300 to 400 Joules. You can pump 40 to 60 Kv at 60 to 75 Ka in to desired target Load. It can be used as a strip line geometry (Low Inductance) discharge system that can also work as a kilo ampere linear injector. You can also use it as a Bridge Wire Exploder by Connecting a Wire between the two open ends. It can be setup as a EMP Generator dumping a fast rise pulse of seed current into a flux compression generator exciting a resonant circuit with a properly coupled radiator, wave guide or parallel plate geometry. It can also be used for vaporization, nano-particle formation etc.

Product description

The Pulse Generator is essentially a source of stored energy where we charge a capacitor and discharge it through a low loss spark switch into a target load, bridge wire etc.
The system is supplied as a two part device consisting of the CONTROL SECTION with all controls and metering. The second part is the DISCHARGE SECTION along with the storage capacitors, spark switch, voltage multiplier, and trigger transformer.

Circuit description

The charging electronics reference figure 1 schematic steps up 115 /230 volts AC to over 15,000 volt at 25 kHz via a half bridge MOSFET switching circuit. This high frequency energy is fed to the x 5 multiplier board in the discharge section where it charges the storage capacitors through a high voltage de-coupling resistor. This voltage is multiplied to an open circuit value of over 75 kv. You will note that the charging current of the capacitors is controlled by the leakage inductance of the transformer in the charging and control section. This method eliminates power robbing resistors and charges the system quickly and efficiently.

The triggering electronics reference figure 2 schematic consists of an inverter that is located in the control section. This inverter generates 600 volts dc that is necessary for charging the trigger capacitor located in the discharge section along with the triggered silicon switch. The actual trigger signal is generated from an external source via the ”BNC” connector located on the front panel of the control section. An internal trigger signal is via a push button switch designated as “FIRE” on the front panel.

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An umbilical cord connects the various functions between the control and discharge sections. Connections and function identifications are noted on the schematic.

Unpacking

Verify the crate is in its upright position and proceed to unpack. Verify any visible damage and contact the factory. The unit is on castors for mobility.

Setup for Initial Test

DANGER: this device **does not** have protective interlocks that remove power when the protective panels are removed. Use extreme caution

1. Locate the unit away from any sensitive electronic equipment. Place the CONTROL BOX behind the unit as far as the umbilical leads will allow. Plug the cable into the header jack at the rear of the DISCHARGE section. The high voltage banana plug is inserted under the multiplier section.
2. For added safety it is suggested to attach a stranded #14 grounding wire from the DISCHARGE section frame to a dedicated earth ground.
4. Verify all switches are in the off position and the capacitor are discharged via the safety shorting cable.
*5. Attach a piece of aluminum or # 30 copper wire across the output terminals as shown figure 3. You will note three 1/4" brass screws for connections on each terminal. Only use one of these screws for this test.
6. Remove the safety shorting lead across the main capacitor if any.

Operation (reference front panel functions reference figure 4)

7. Plug unit in to a proper three wire 115 Vac outlet
8. Verify that the E CONTROL is full CCW
9. Rotate the KEY SWITCH to first position and note the NEON indicator illuminating.
10. Turn on the CHARGE and IGNITOR READY switch and note the meter immediately increasing to 30 kv and stopping.
11. Slowly rotate the E CONTROL knob a few degrees and now depress the RECHARGE switch noting the kilovolt meter jumping to a higher value. Note that at any time the ABORT switch will deactivate this charging function cycle. IF THE METER HAS A 0 TO 5 SCALE IT WILL BE NECESSARY TO MULTIPLY BY TIMES 2. YOU CAN READ DIRECT ON A 0 TO 10 SCALE
12. Repeat steps 11 until the meter reaches and reads the voltage value you desire up to **60 kv.** This may take a few times to get the require final charge. You may mark the position of the E CONTROL knob for future settings. **Note undesirable flashover may occur over 60 kv and damage to the elec tronics may occur.**

*If the unit contains a conic antenna you can connect the test wire between the spheroid electrodes

13. Quickly depress the FIRE button and note a loud explosion will occur as the bridge wire detonates. Note that the spark switch might not trigger at a charge voltage below 30 kv.
14. Once the Gun is fired ensure that the capacitor is completely discharged. To ensure no recharging of the capacitor occurs (unless you want to fire once more) turn the CHARGE switch off. To discharge the capacitor completely, use the safety discharge lead by connecting it to the upper High potential rail reference figure 3.

    DANGER: Do not short out the capacitor with the safety probe if the voltage is over 5000 volts. Either recycle triggering or allow capacitor to discharge with time.
    It is important to discharge the Pulse Gun and keep a shorted wire across the capacitor terminals when working on any part of the system.

NOTE: **It is the nature of "the beast" to damage field effect semiconductors (FET) due to fast rise impulse fields etc. Once in a while you might knock out Q1, Q2 and the IR2153 driver chip in the charger section. These are easily replaced as they are mounted in screw sockets and do not require soldering to change . Note to always replace the entire three pieces. We have included spares for replacement**

NOTE. When the system is triggered the energy in the capacitor is discharged in the Antenna, through the Triggered Spark gap or explodes the bridge wire disrupting the LCR circuit. Any radio frequency energy generated can be propagated in a parallel beam due to a *Conic Reflector* or other suitable radiator. Once the energy is fired a loud discharge will be heard. Certain electronic objects in front of the radiator will reset or can be permanently destroyed. Proximity of less than 1 meter can permanently damage the mother chip (Processor) of most computers.
Using different type of radiating antennas can be very helpful for better ranging. We have heard reports from some customers that this model has been used with especially proprietary tuned antennas for ranges beyond 30 meters It has been found that the most suitable disturbances are done in equipments having plastic enclosure and non metallic enclosures. Normal range with a properly tuned antenna can be 2 to 8 meters for generating interfering and damaging electric fields. This influence can reset PCs, lab tops or any other devices using sensitive gate charge devices. Exposure can obviously cause permanent damage.

NOTE: Three capacitors are parallel connected to reduce discharge inductance

NOTE: Aluminum is used for the discharge circuit as four paralleled and sandwiched strips of 1/16" thickness. 1/4" plate is used for individual connection to the capacitors. Skin depth is greater in aluminum than copper but we find very little or no difference in the peak discharge current as the inductance is the controlling element in the equation.

DANGER : Never attempt to dismantle the source as, many parts cannot be repaired. Always contact the factory for repairs .

Don’ts for Pulse Source

a) Never plug into a higher rated input voltage.
b) Never fire near explosive materials.
c) Never touch metal parts when in a charged condition.
d) **Do not fire around personal unless they have hearing protection.**
e) Never attempt to dismantle the device as, many parts cannot be repaired. Always contact the factory for repairs.

Do’s for the Pulse Gun.

a) Always verify the capacitors are discharged and the safety shorting cable is in place.
b) Always treat the system as it is on before making any changes.
c) All components are modular in nature and fault finding is usually easy by referring to the circuit diagram provided.
d) Maximum effort has been taken to provide minimal high voltage exposed parts. The output circuitry consisting of the COMMON RAIL return ground and OUTPUT bars are enclosed due to dangerous potentials.

Applications

This source is used for pulsed wire detonics, Bridge wire explosion, EMP generation, Vaporization, Nano particle formation etc.

The EMP generators are sold as tools for the researcher for use in the field of EMP generation and related studies. The units generates a single event high energy pulse that can be used for current charging a LCR circuit and disrupting it with a exploding wire bridge, producing the seed current for a flux compression generator, generating a pulsed electro magnetic wave using a wave guide or other suitable antenna.

We normally do not offer engineering approaches to developing a radiated pulse as much of this research is proprietary. so can not answer. The only thing we can offer is the pulser being obviously a very valuable tool in this research. Several research facilities have generated some very interesting results but unfortunately all information is classified as "their" proprietary research on this EMP research.

Figure 1 EMP400IU Series Programmable charger and Ignitor

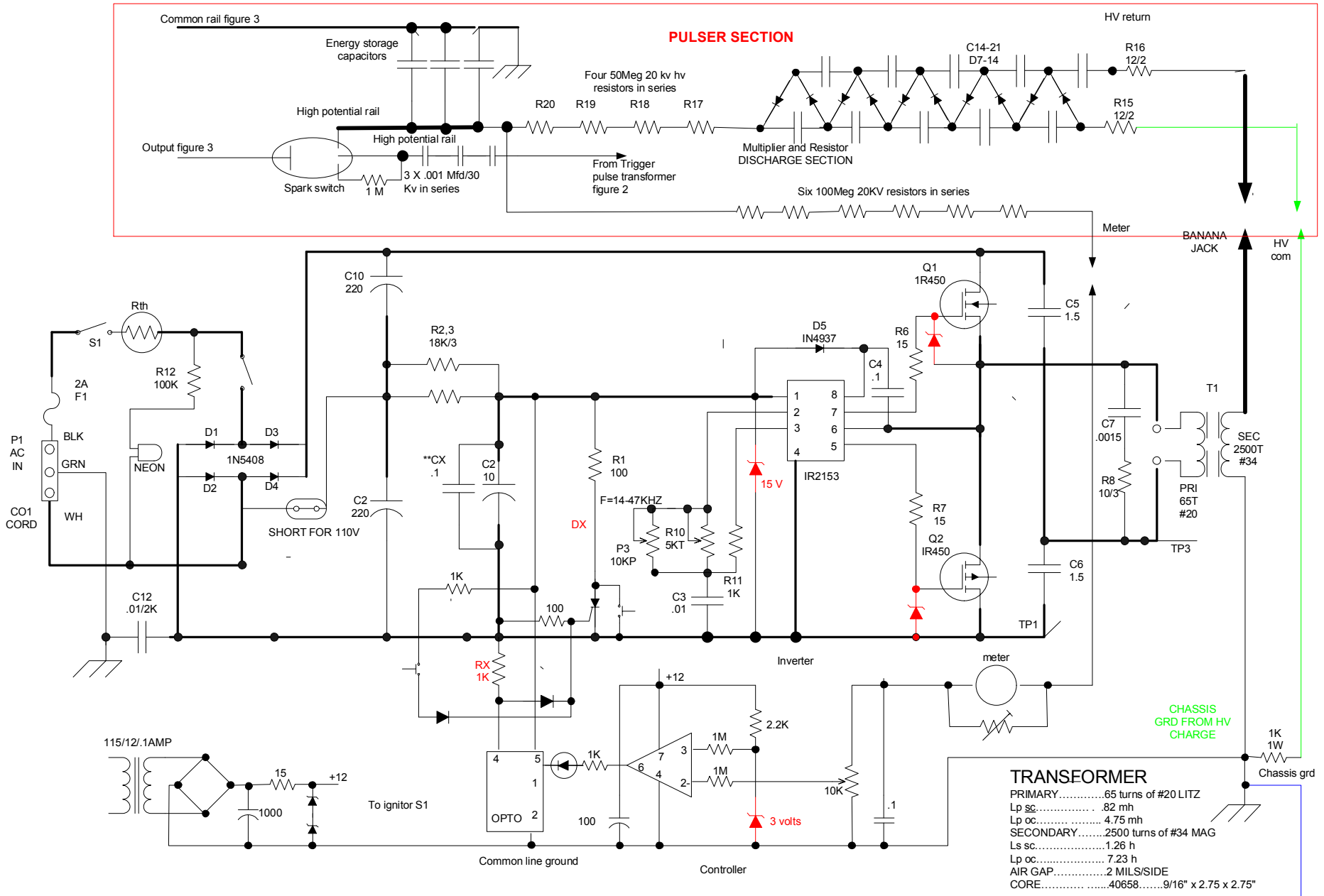
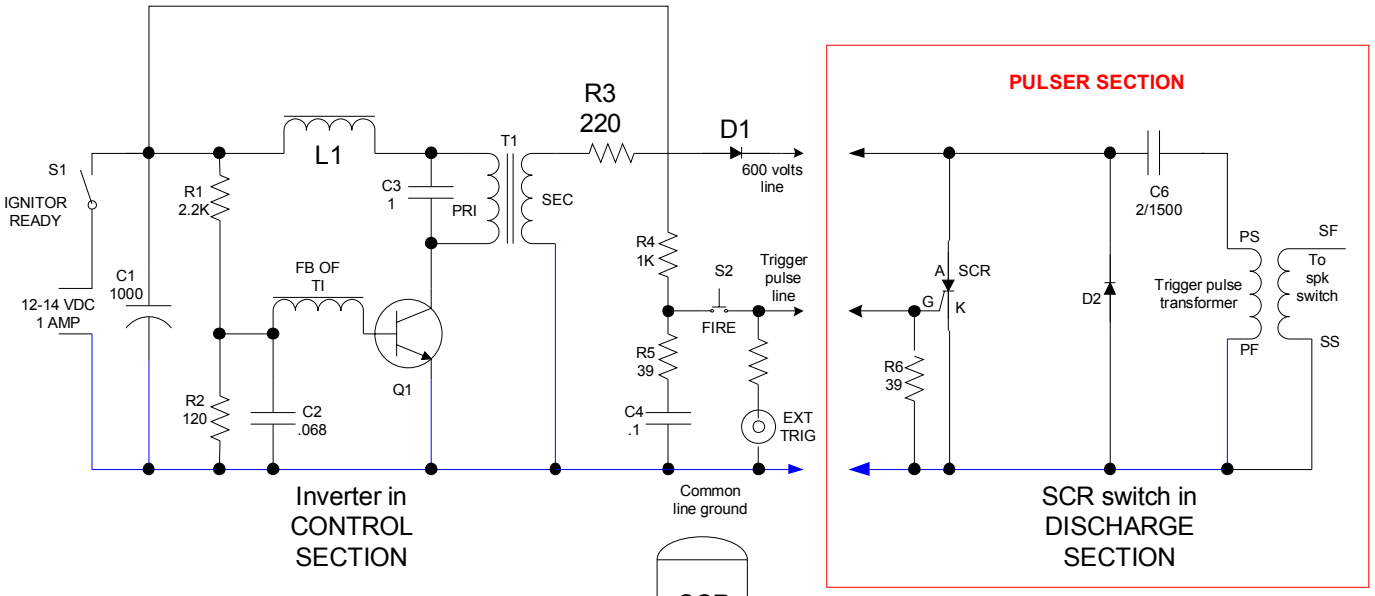
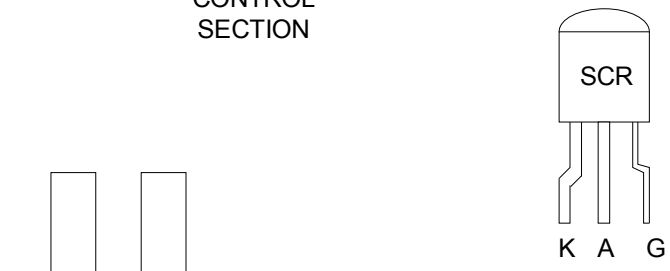
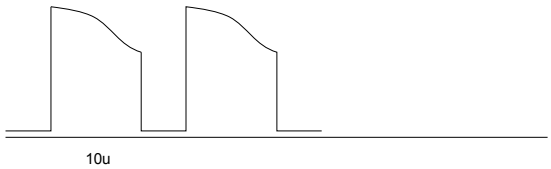


Figure 2 Ignitor for Spark Switch EML400IU





Wave shape Q1
beginning of charging cycle



Wave shape Q1
end of charging cycle

Figure 3 Overall major

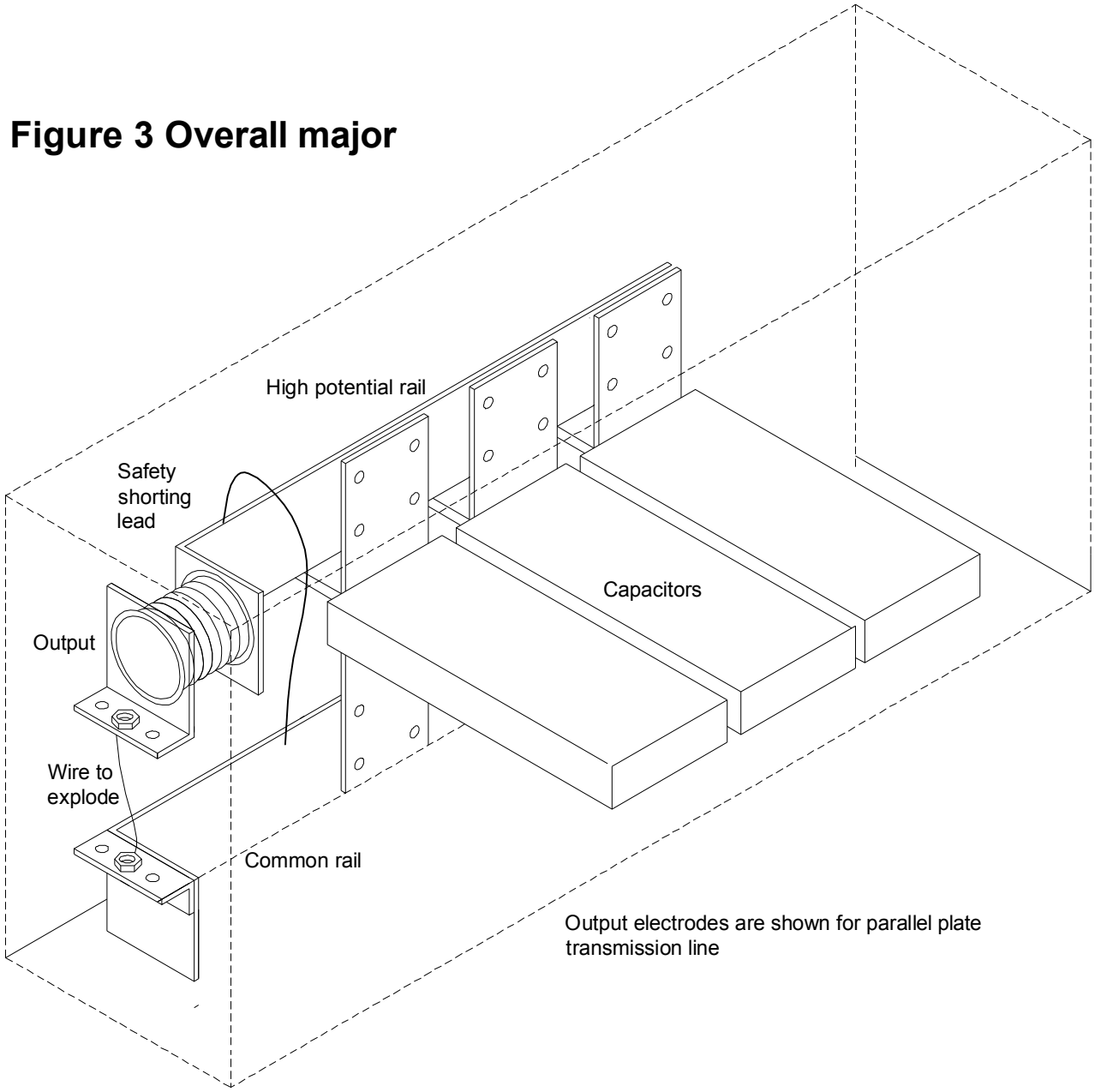
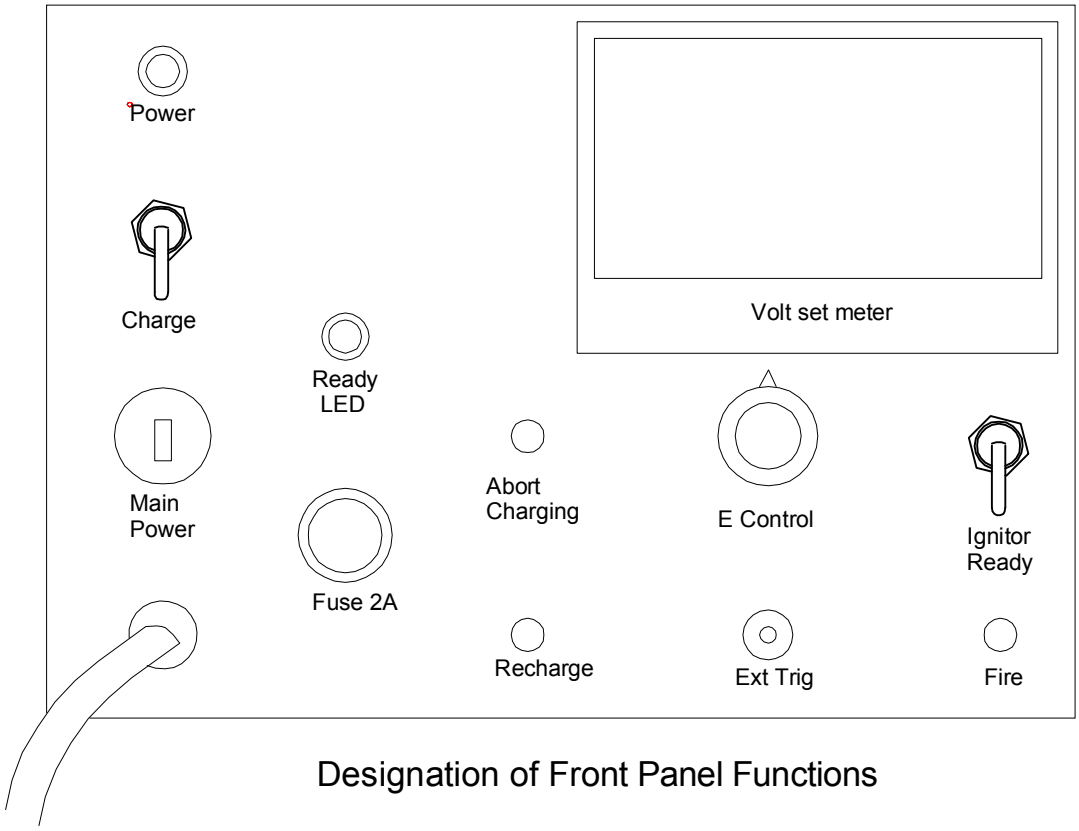


Figure 4 Front panel functions



Designation of Front Panel Functions

POWER - Neon lamp indicates MAIN POWER key switch is "on"

CHARGE - Initiates the charging function programmed by the E CONTROL

READY LED - Flashes when charge voltage reaches the programmed value.
NOTE that once the programmed voltage is reached the unit cease charging until the RECHARGE switch is again pushed

ABORT - switch stops the charging cycle at anytime. Starts again by again pushing the RECHARGE button.

E-CONTROL - Preset the voltage of the charge cycle interval.

IGNITOR READY - Charges the ignitor capacitor. Charge voltage is 600 volts and occurs in seconds.

FIRE - Internal manual triggering of the event

EXT TRIG - External controlled triggering of the event

METER - Notes accumulated charge voltage on the capacitors.

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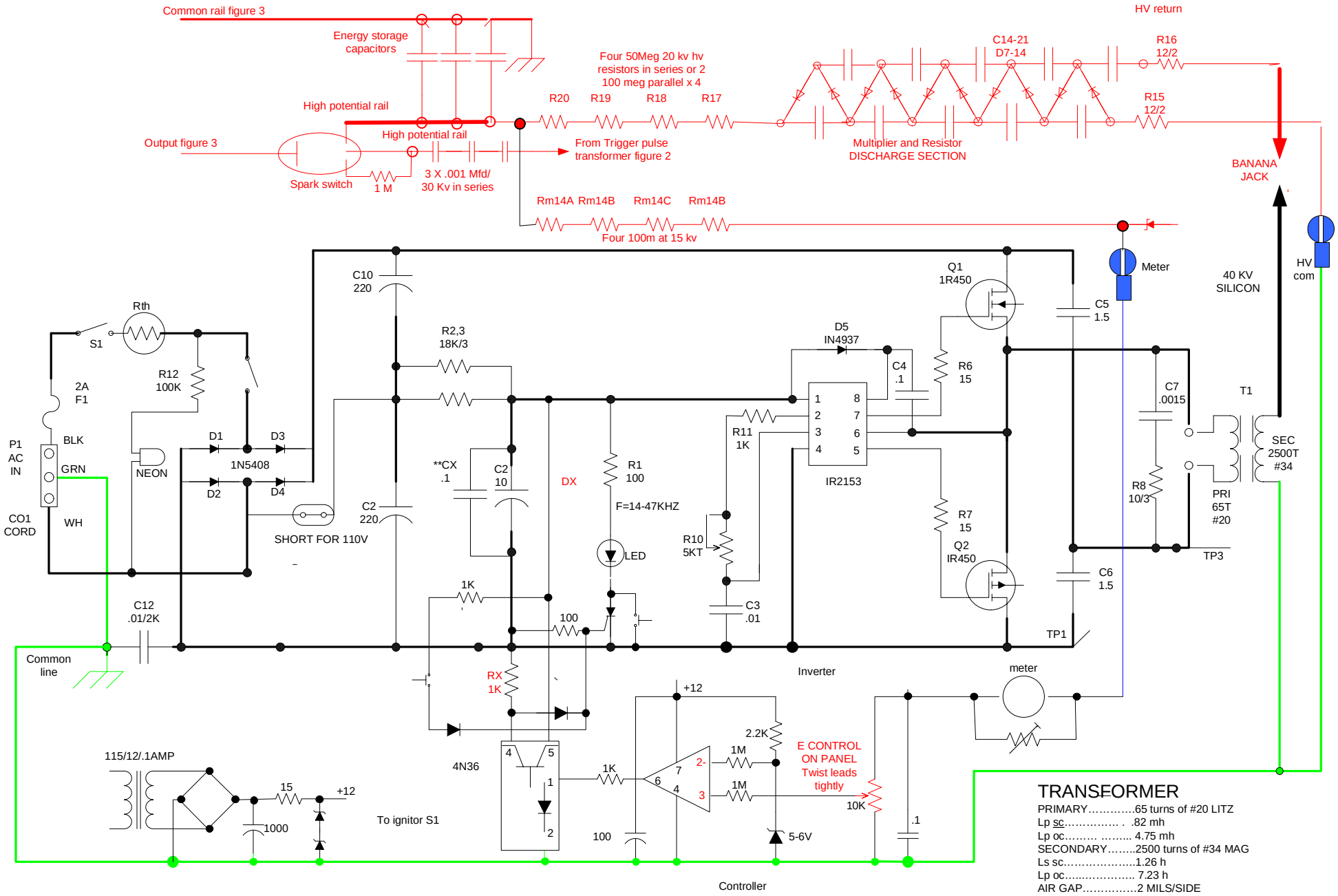
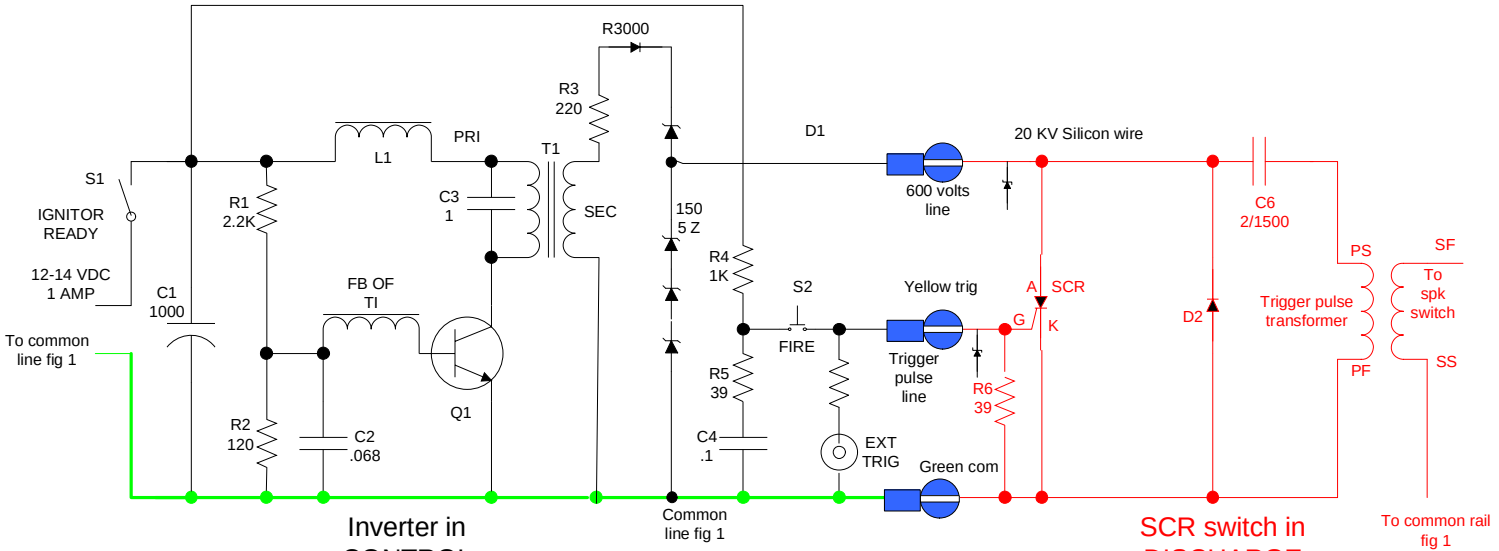
Figure 1 EMP400IU Series Programmable charger and Ignitor

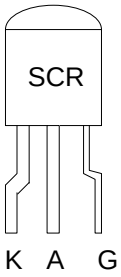


TRANSFORMER

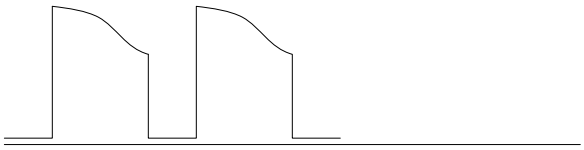
PRIMARY……65 turns of #20 LITZ
Lp sc…… . .82 mh
Lp oc…… …… 4.75 mh
SECONDARY……2500 turns of #34 MAG
Ls sc……1.26 h
Lp oc…… 7.23 h
AIR GAP……2 MILS/SIDE
CORE…… ……40658…….9/16" x 2.75 x 2.75"

Figure 2 Ignitor for Spark Switch EML400IU

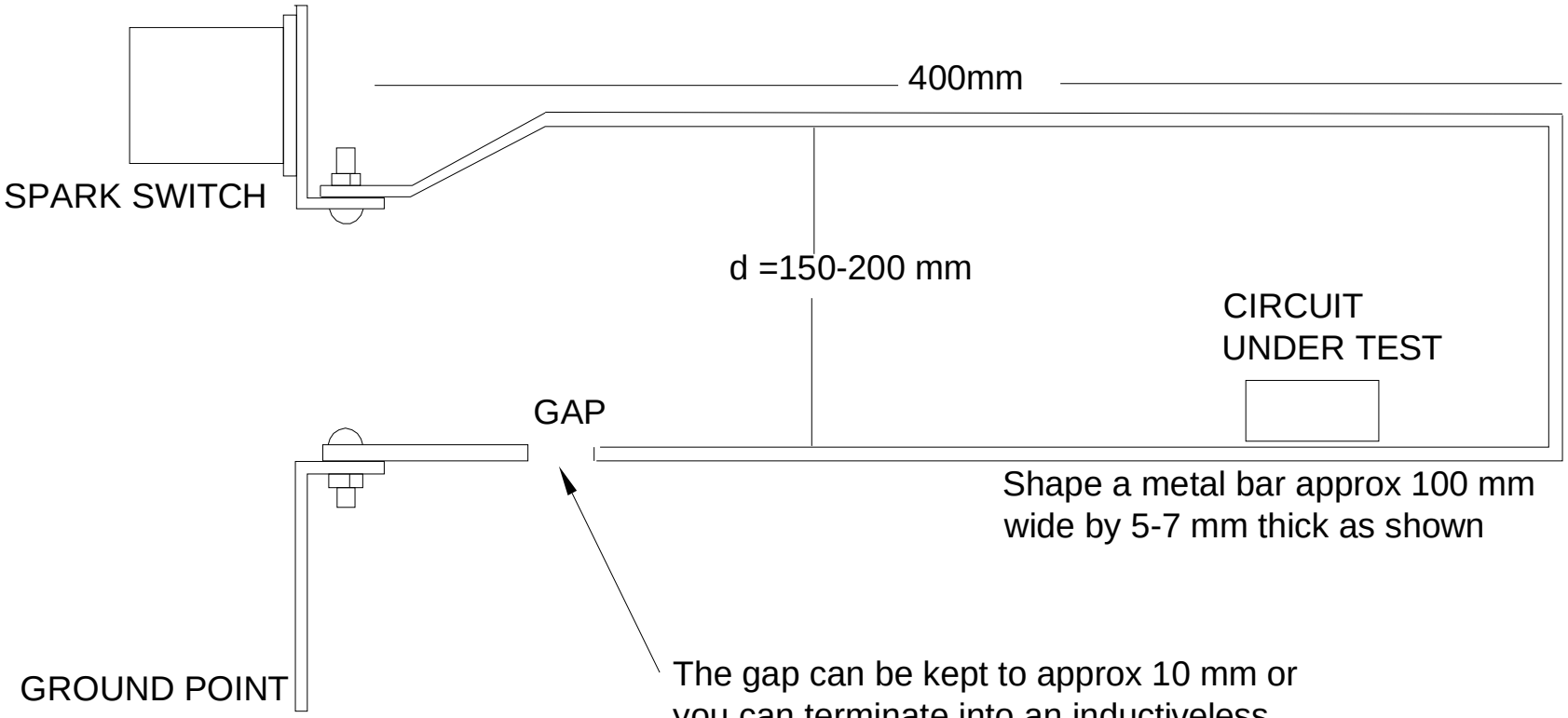




Wave shape Q1
beginning of charging cycle



Wave shape Q1
end of charging cycle



Potential gradient = voltage/d(seperation)

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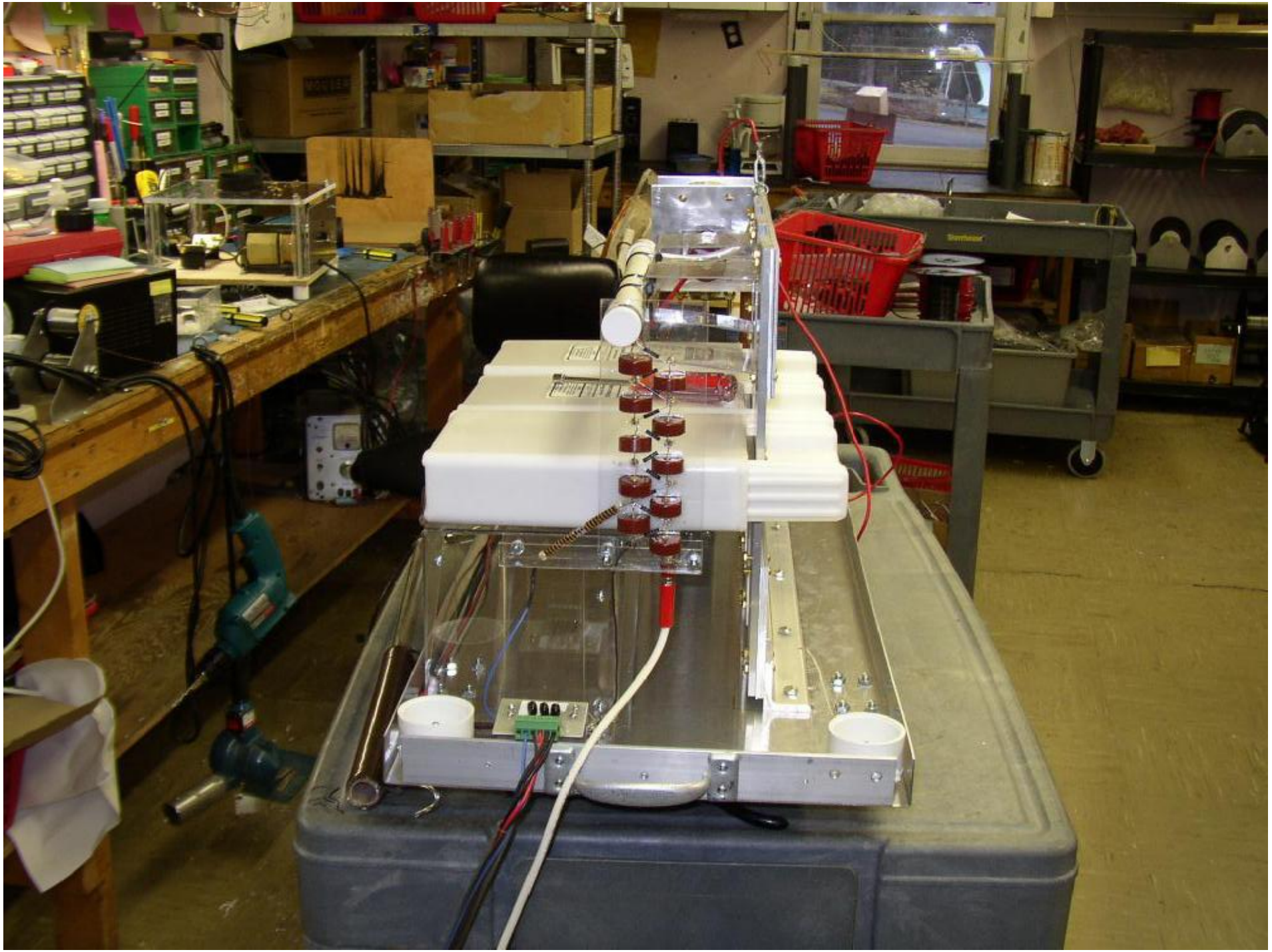

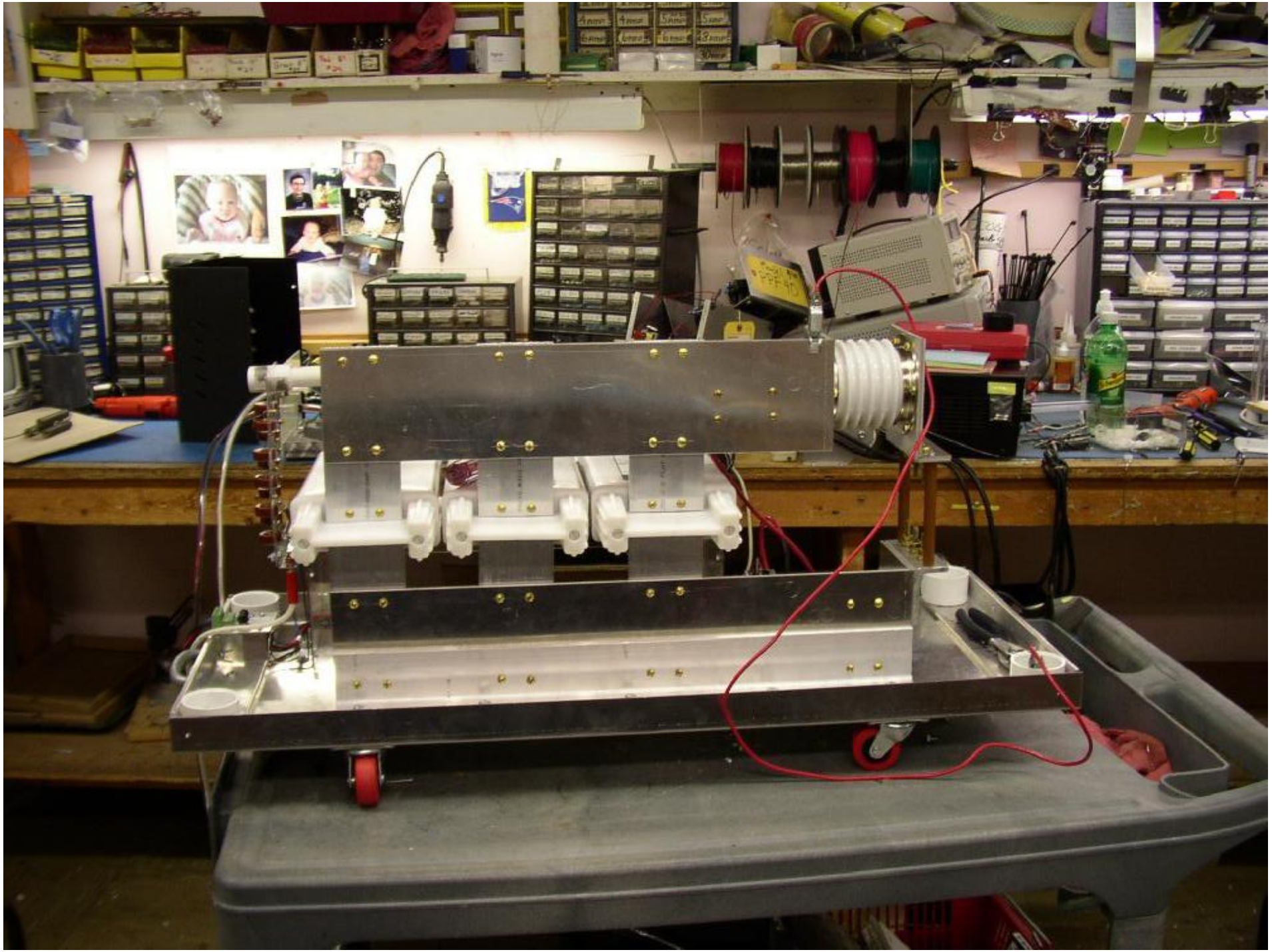

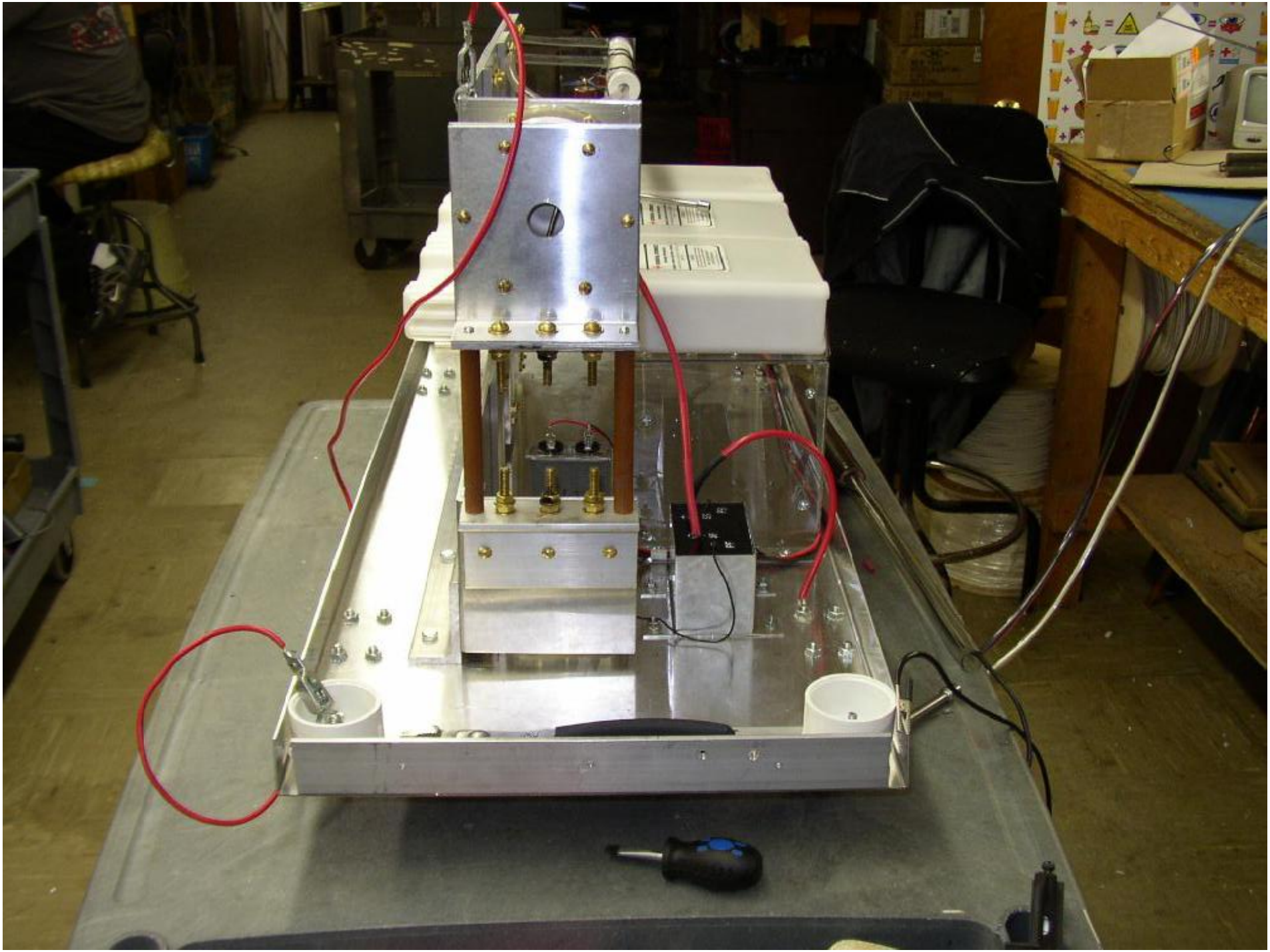

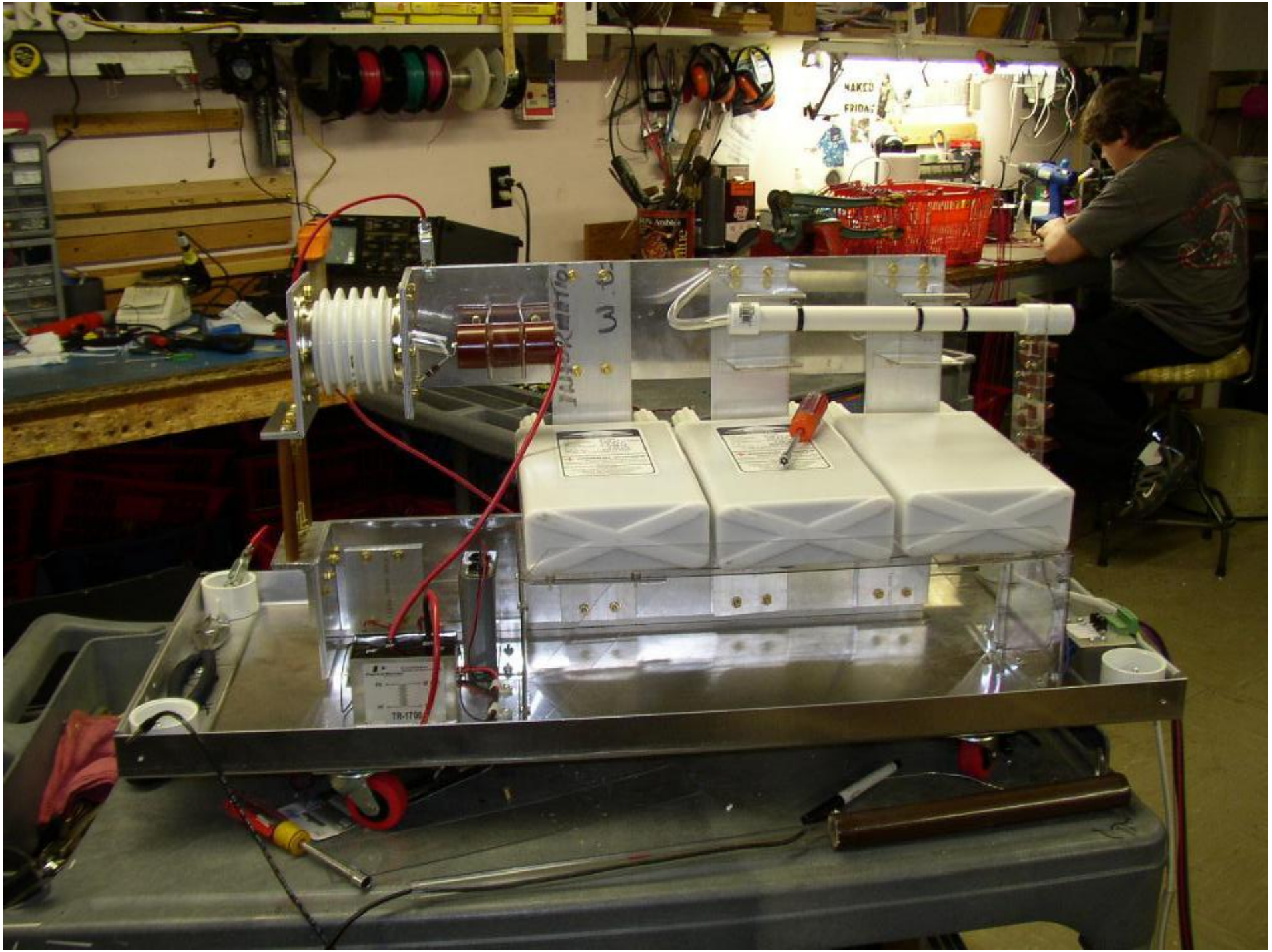
NAKED
FRIDA


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μA
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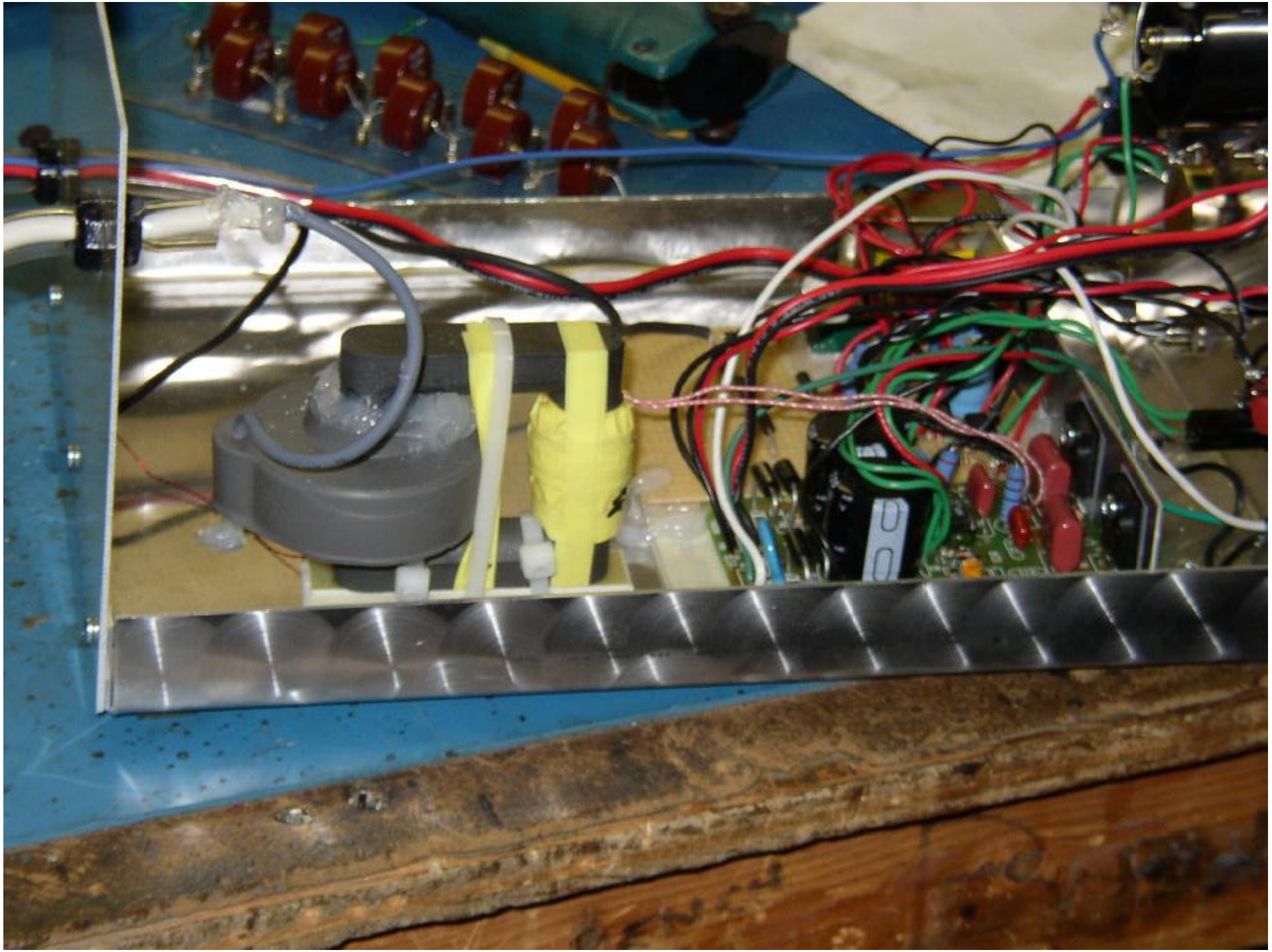
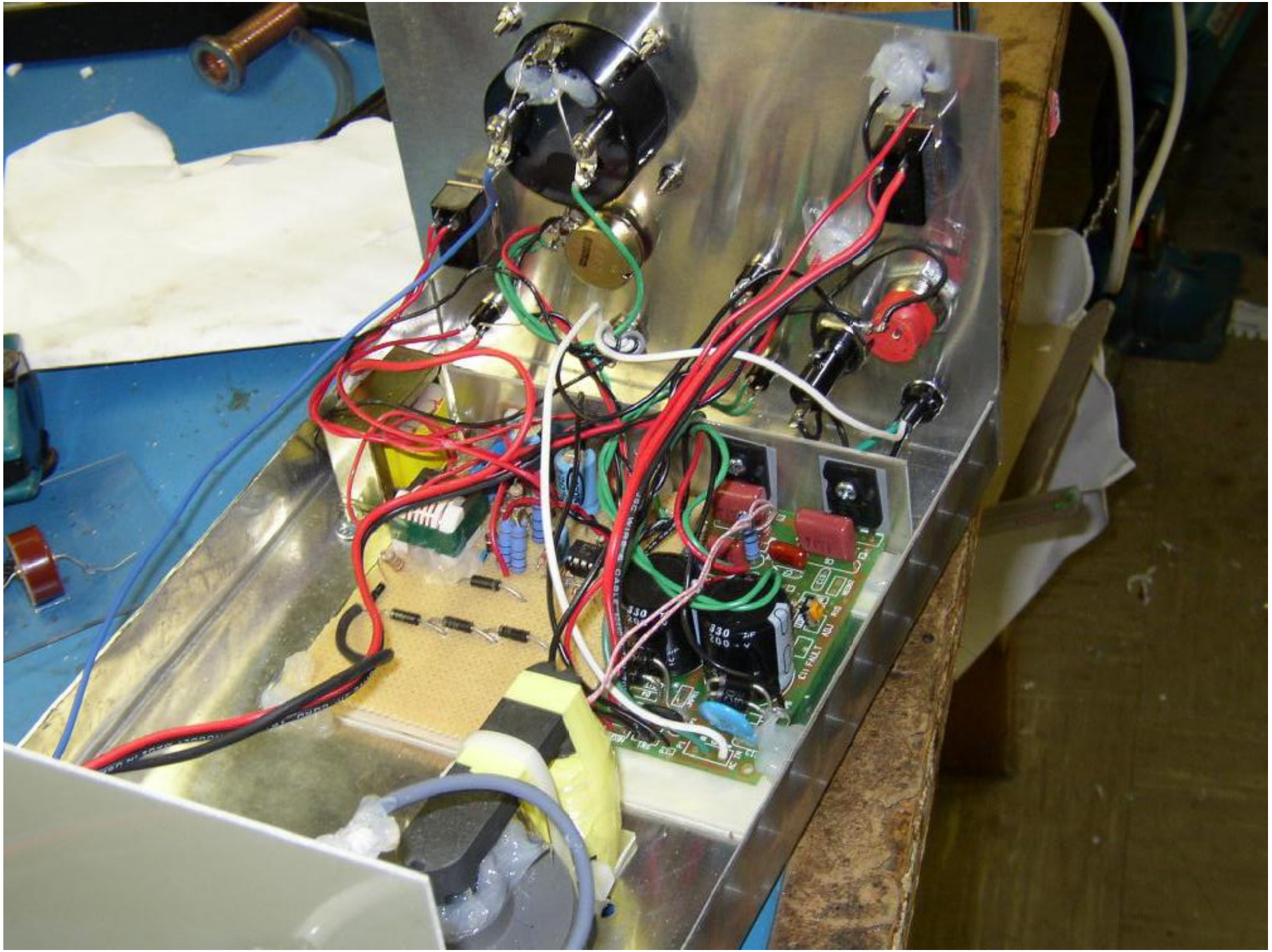
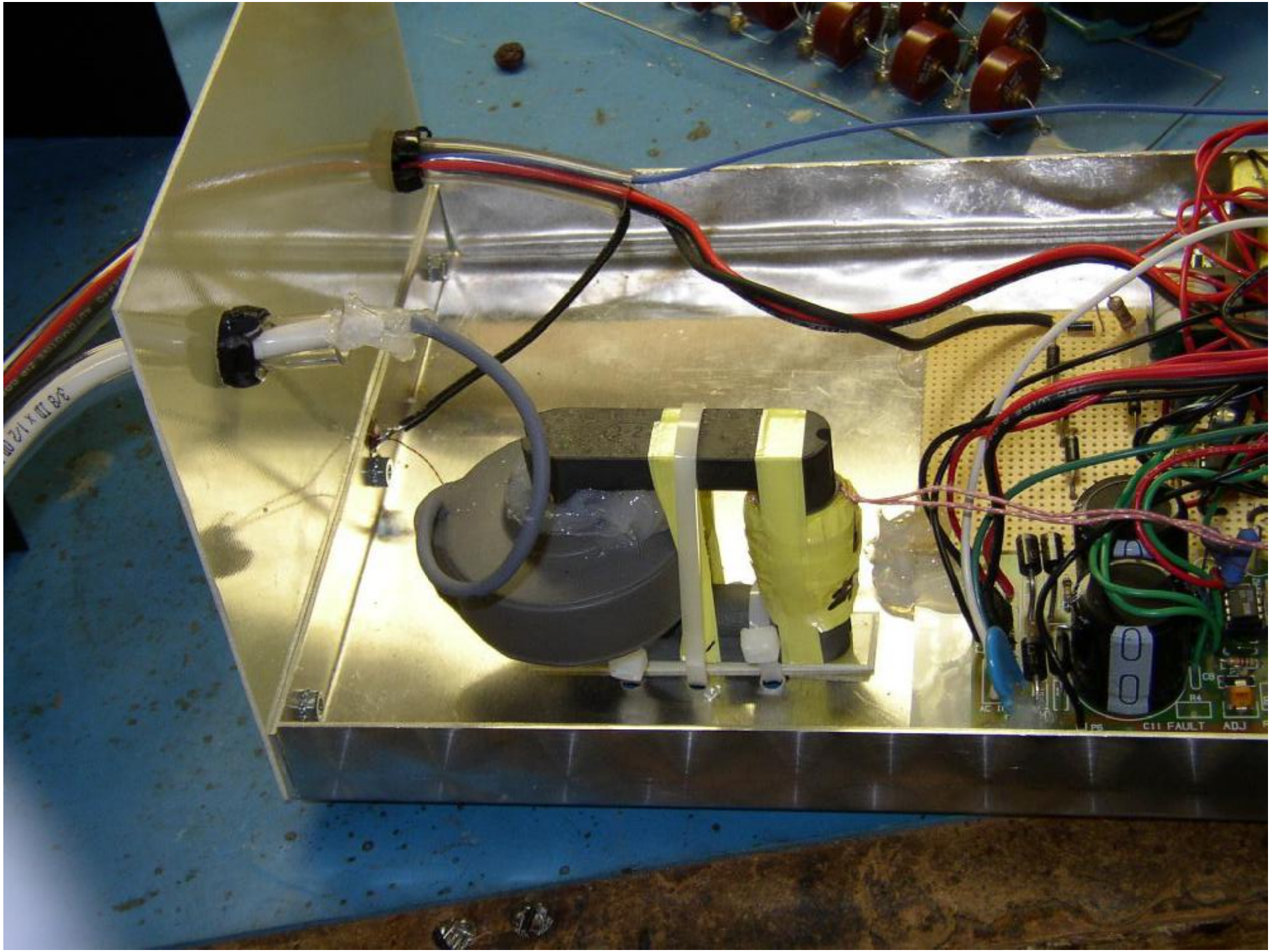
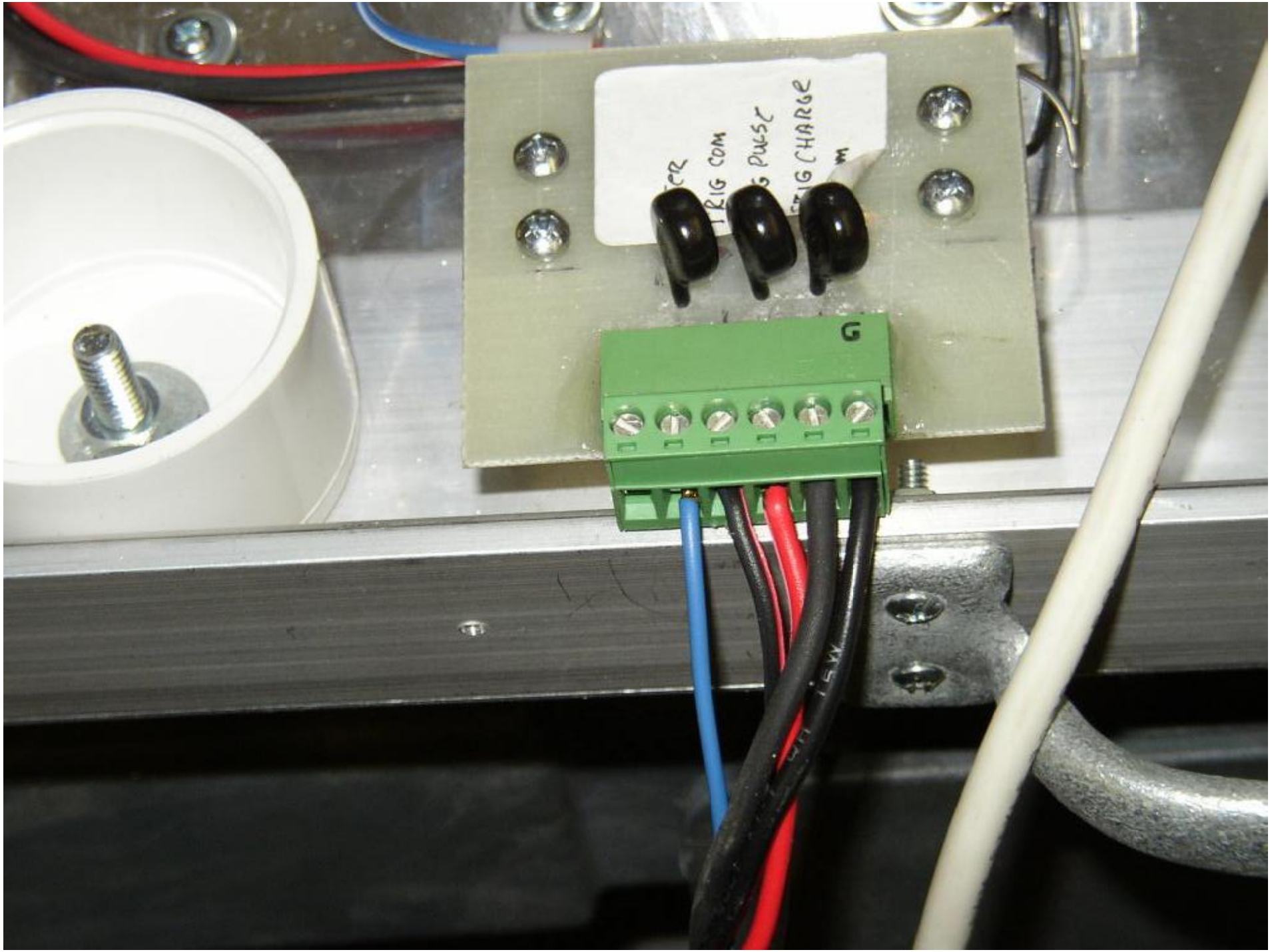
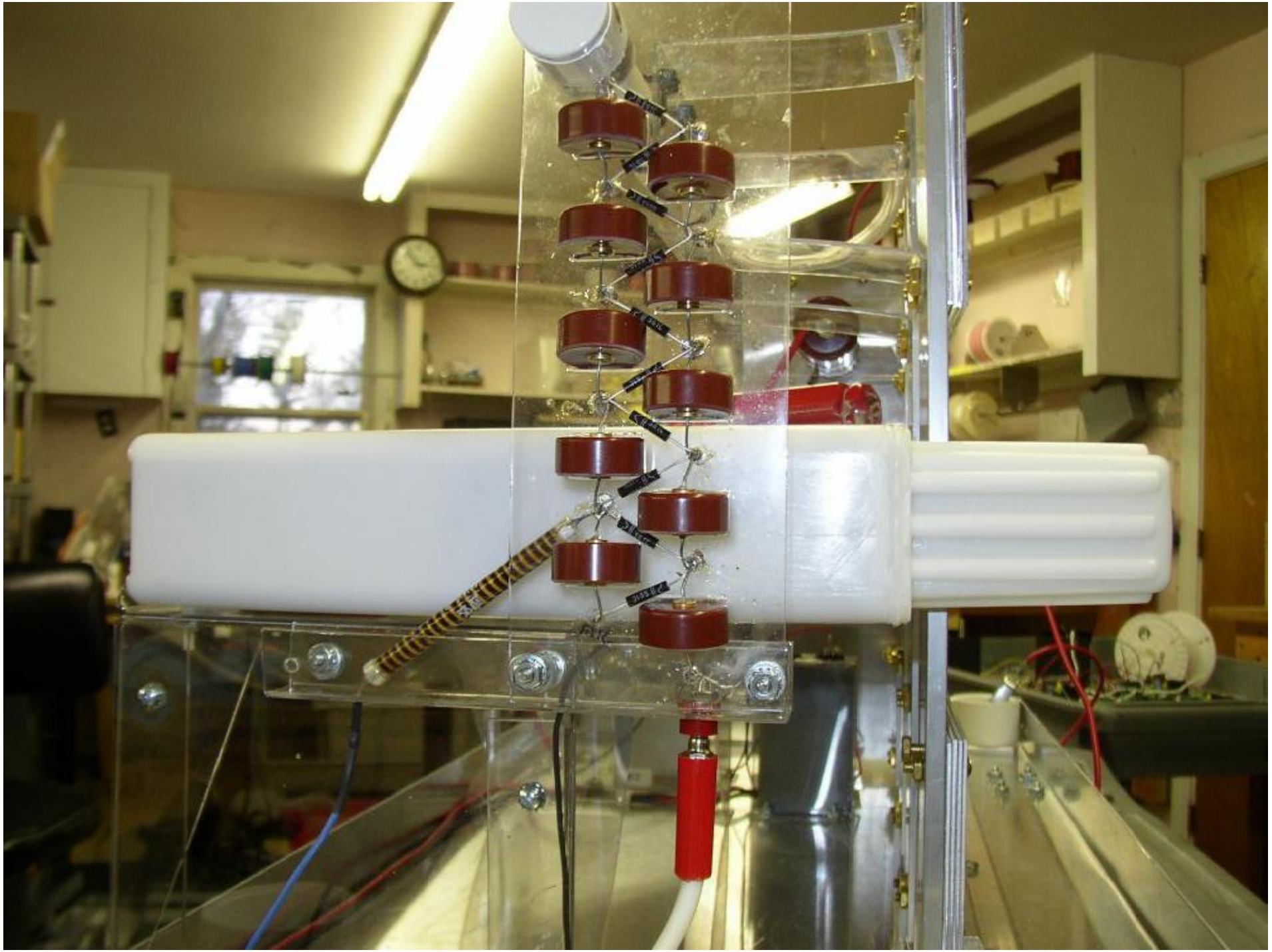
FUSE
R

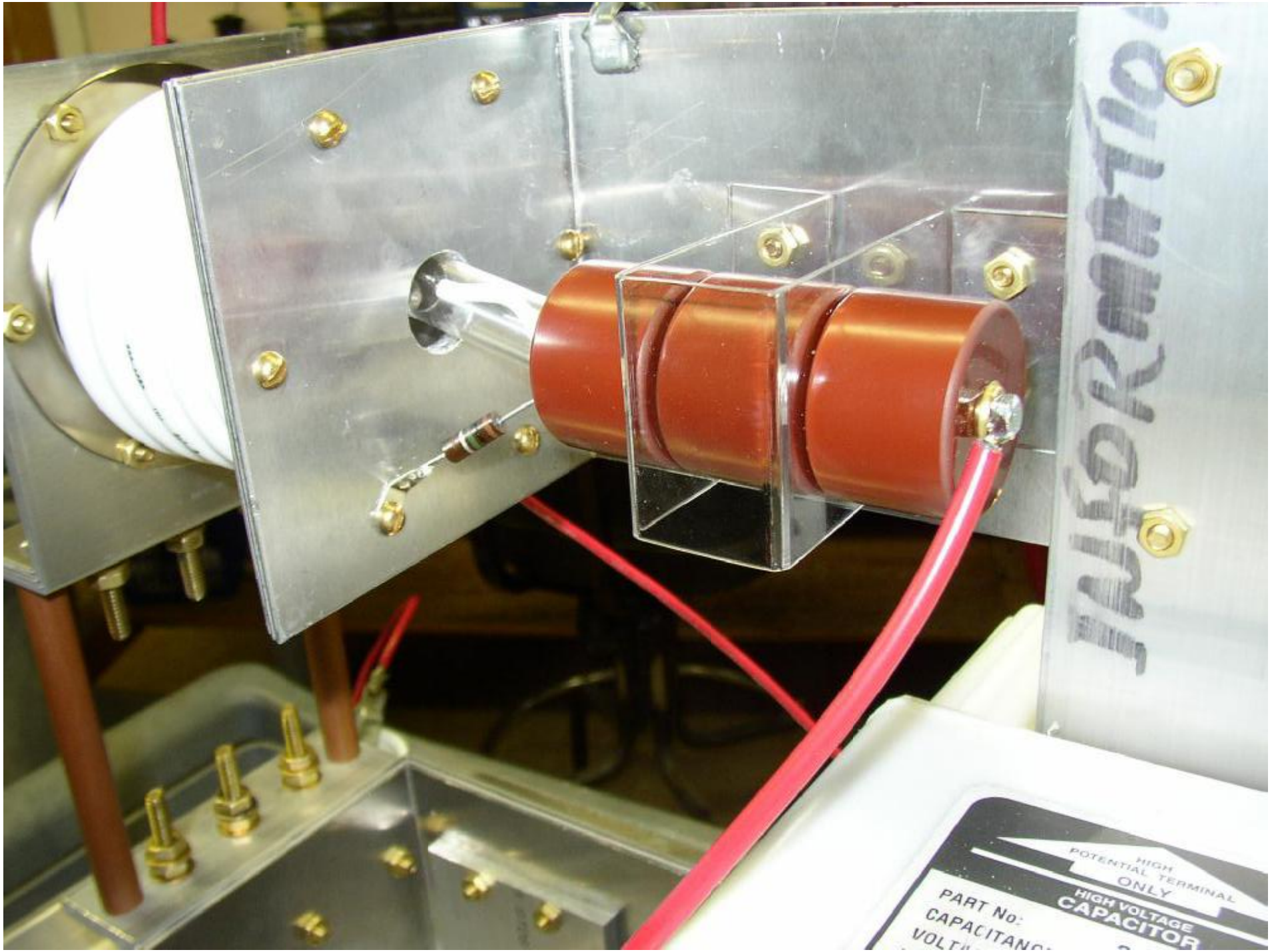


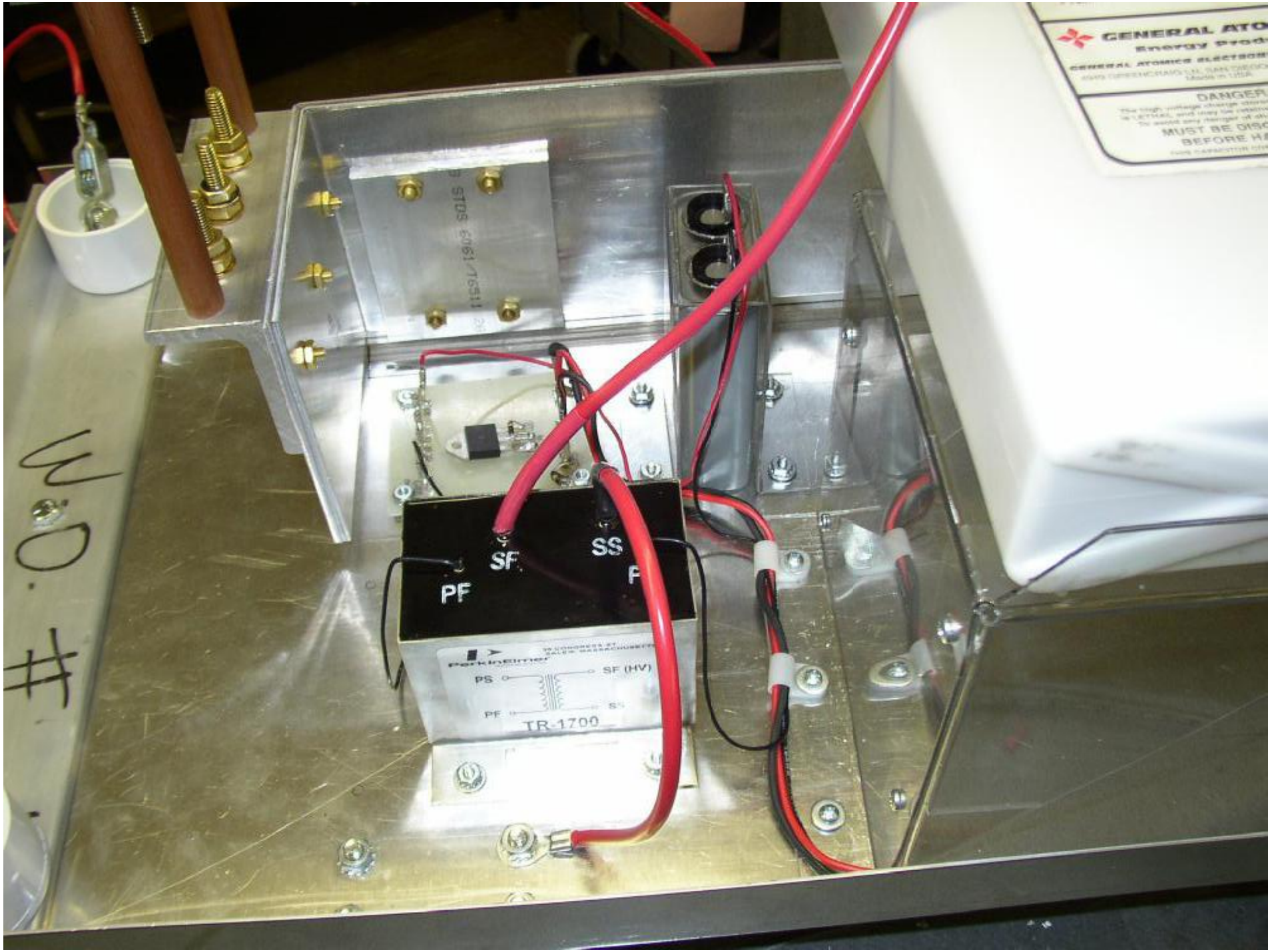



FAULT
ADJ

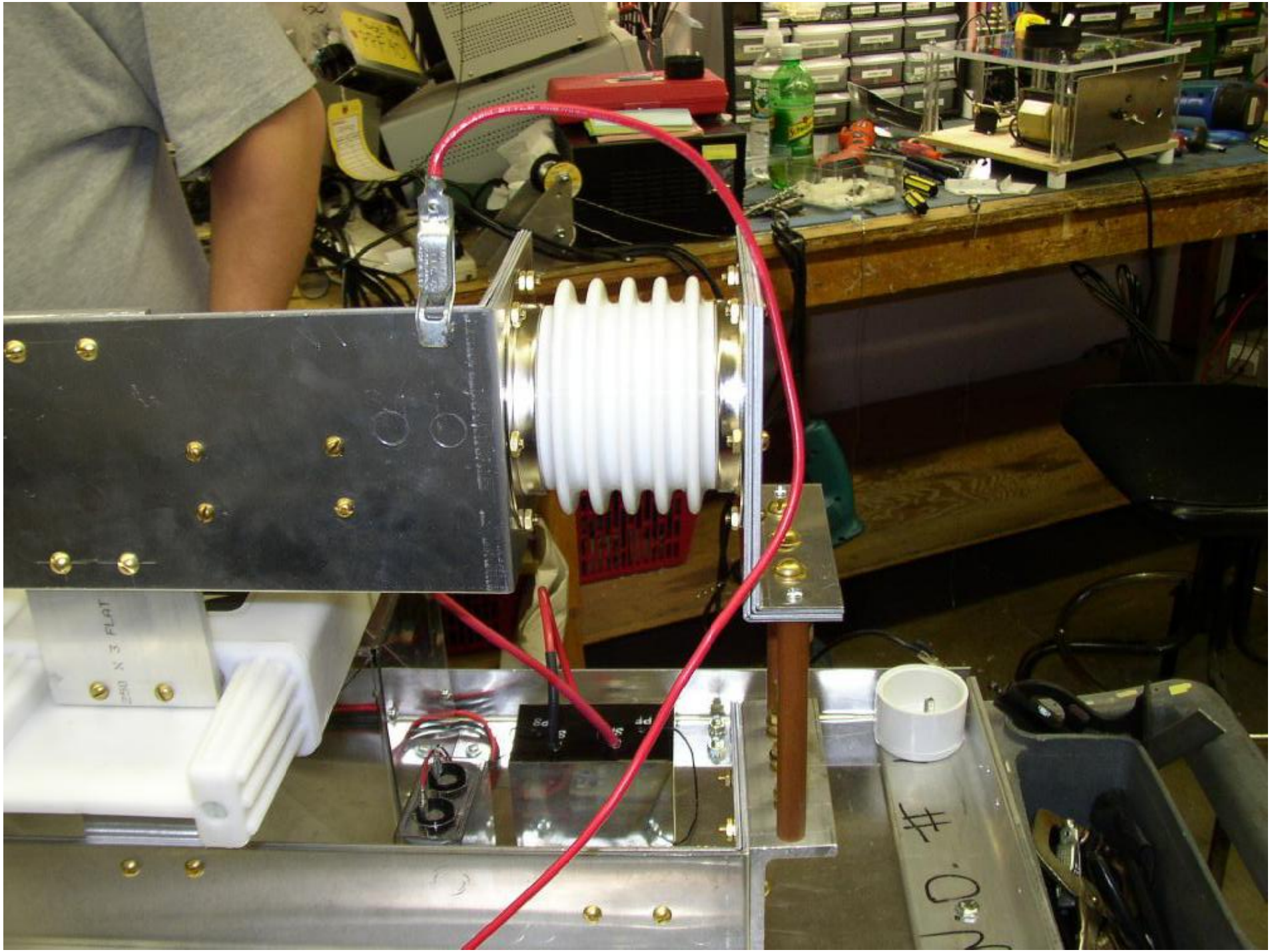

G

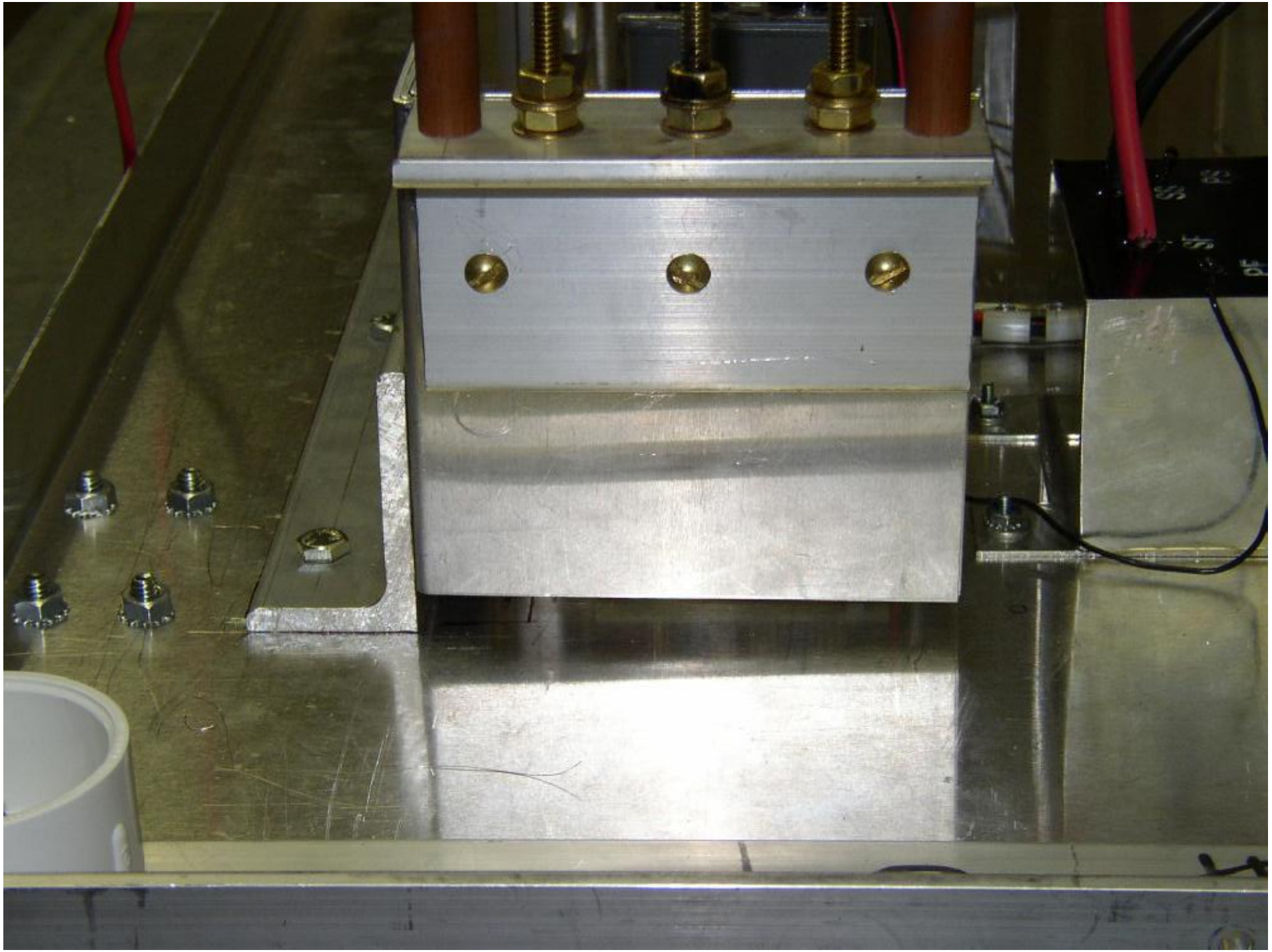


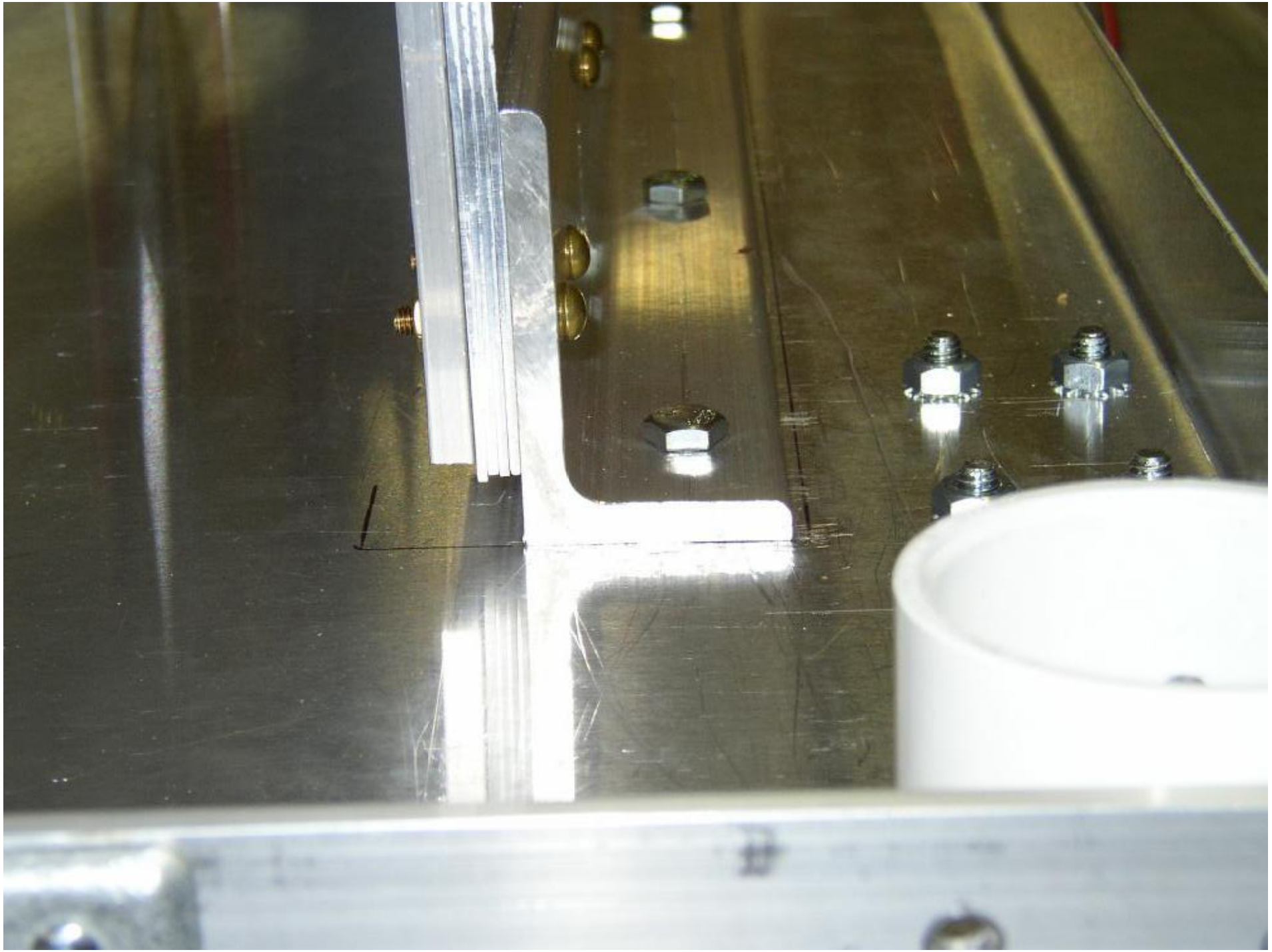

HIGH VOLTAGE
HIGH
POTENTIAL TERMINAL
ONLY
HIGH VOLTAGE
CAPACITOR
PART No:
CAPACITANC

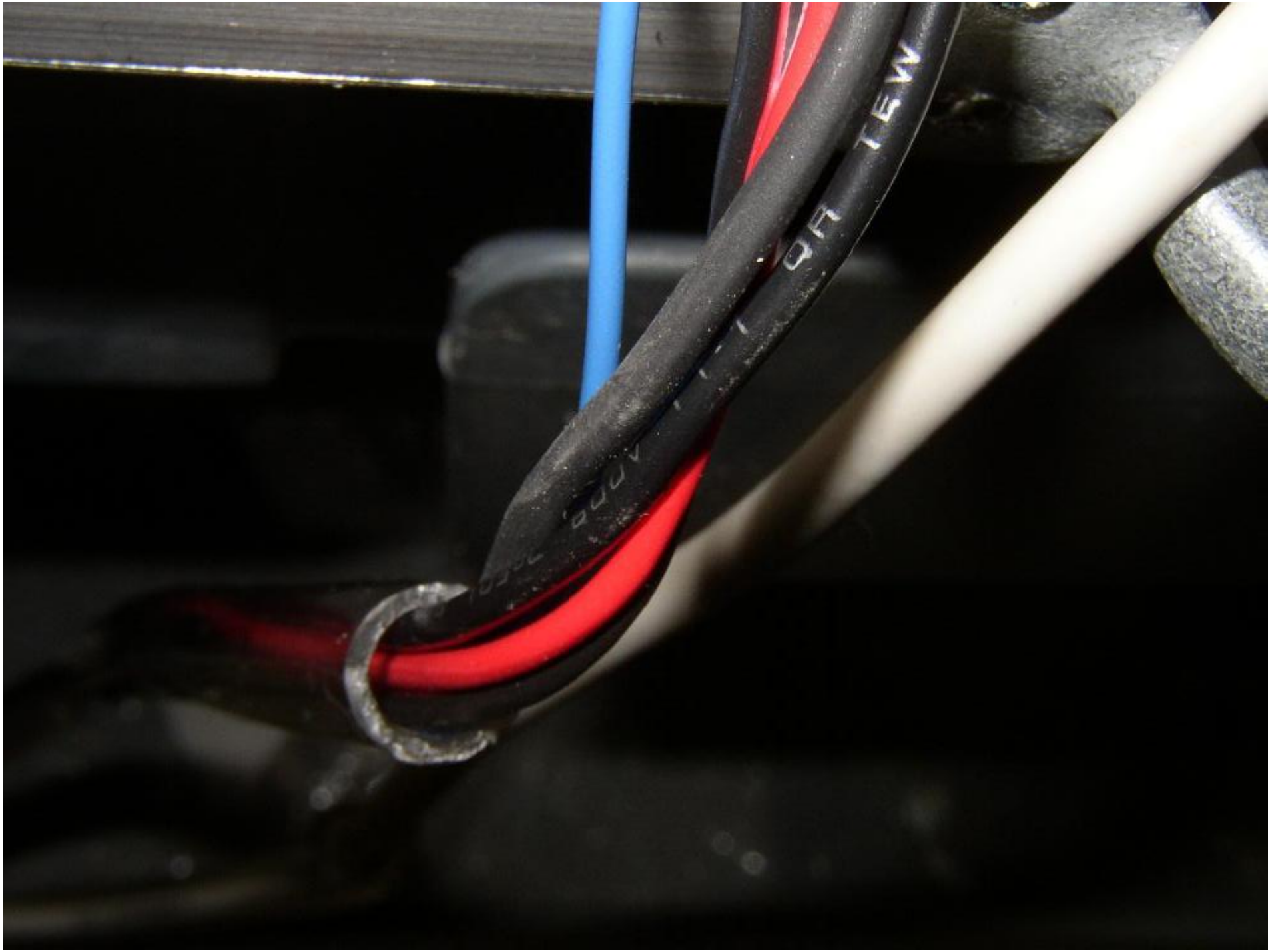

PF
SF
SS
PS
SF (HV)
PF
TR-1700
GENERAL ATO
DANGER

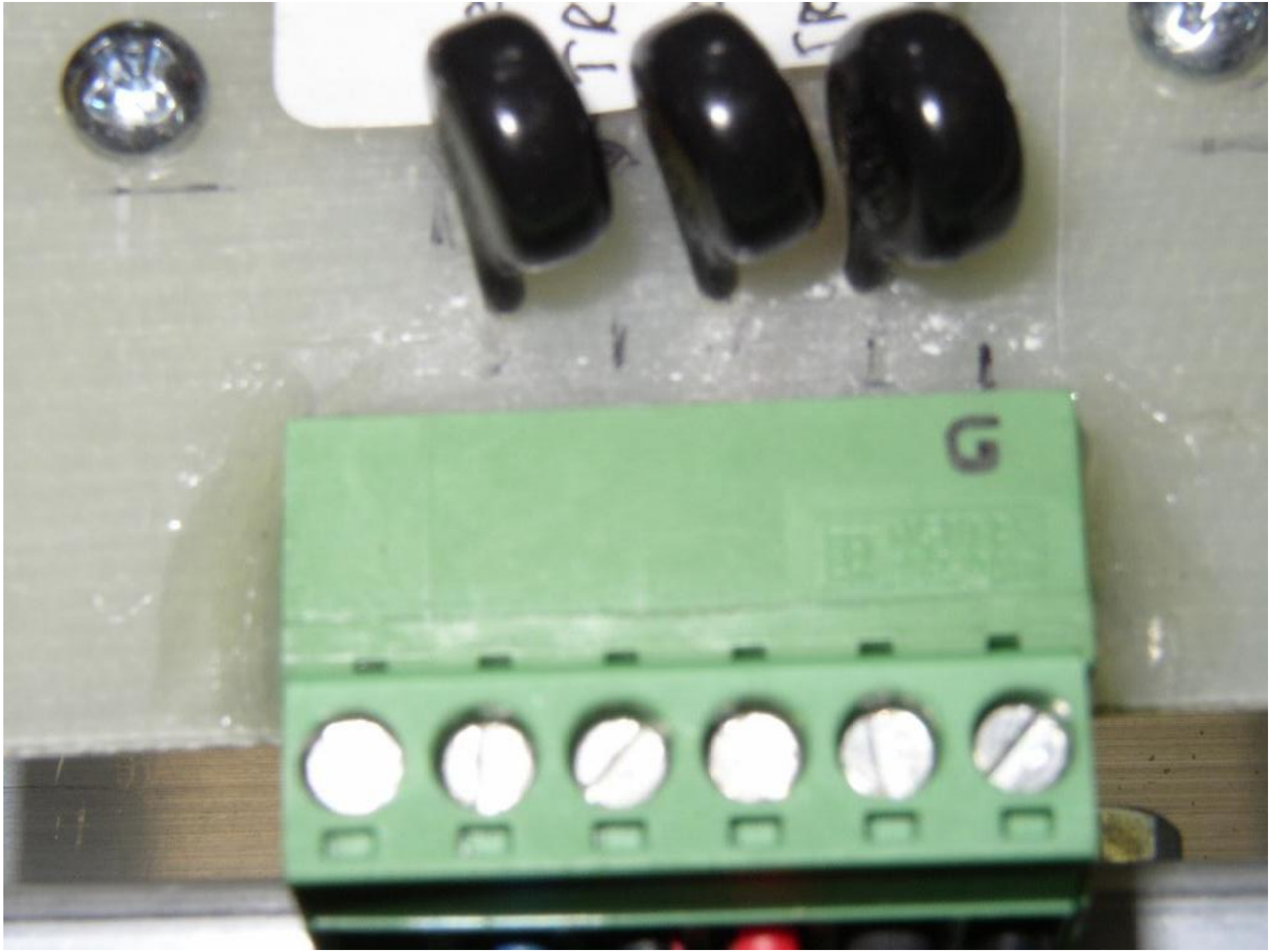

NAKED
FRIDAY


X 3 FLAT






QR TEW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