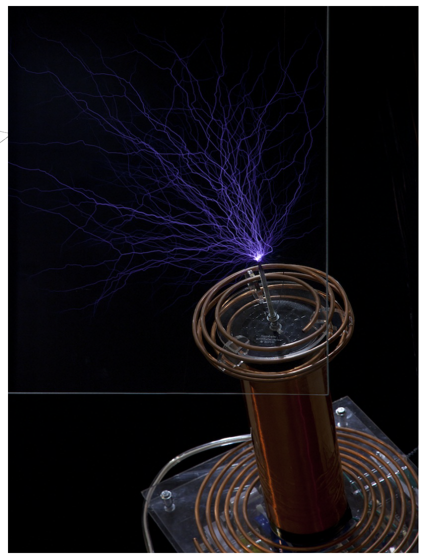


IMPACTS @ PHI, June 2012

IMPACTS
INSTALLATION
TECHNICAL RIDER

rev 1.3 OCTOBER 2012
1.2 AUGUST 2012
1.1 JULY 2012
1.0 JUNE 2012

THIS RIDER IS PROVIDED AS A BASIS FOR IMPLEMENTATION. SPECIFIC DETAILS ARE TO BE SET IN FUNCTION OF THE CONTEXT FOR THE INSTALLATION

THE PRESENTER PROVIDES

A. Venue and presentation workflow

1. a blacked-out and silent space (of which at least 2 walls must be matte and black or very dark gray; see plan)
2. subtle, cut & focussed lighting (w dimmers) — 5 or 6 lamps total; 20W/lamp is more than enough
3. a mechanism to ensure no one gets near the installation without having been informed of the risks

B. Electrical

1. enough 3-conductor AC wire black Ø1.5mm / AWG14 (exact length TBD based on plan; we needed about 250m in montreal.)
2. ten (10) female IEC C13 connectors (coils end)
3. five (5) male IEC C13 connectors (variac end)
4. five (5) male local AC connector (electronics)
5. a few power bars with interruptors
6. one (1) 13A circuit for computers and controllers
7. one (1) 30A circuit -OR- two (2) 15A circuits for tesla coils (in addition to anything required for lighting and support)

C. artwork preparation and presentation

1. eleven(11) panes of 3mm glass with holes cut as per Annex 2 of the rider (quantities: 2*B1, 4*C1, 2*D, 1*B2, 2*C2). IMPORTANT: glass must be good quality, even, with no visible deformation in the reflections
3. three (3) cans of black, matte, heat resistant spray paint (like for the outdoor BBQs)
4. one (1) can of compressed air
5. wooden platforms on the floor (or other solution to delimit and frame the works — to be discussed)
6. rods, hooks and rigging hardware to adapt our suspension to your grid (to be discussed)
7. black camera tape, paint, and other touchup supplies

D. Miscelaneous

1. one (1) mac intel computer with i5 or better processor (+keyboard, screen, etc)
2. internet connectivity optional but highly recommended for the duration of the exhibit (remote support, etc.)
3. for the setup time only: 2 light supports such as manfrotto (to support teslas whilst they are suspended)
4. Any personel required by the Setup and Preparation

E. Hotel specs

1. Single rooms
2. In-room Internet (paid for if needed)
3. Breakfast until 11AM (or compensation)
4. Gym or other exercising facility
5. Effective and flexible transportation to/from venue

THE ARTIST PROVIDES

1. six (6) teslas coils (1 backup)
2. one (1) mac intel laptop
3. one (1) ethernet switch
4. eight (8) ethernet controllers for the tesla coils
5. two (2) kinect cameras
6. two (2) active USB extensions for kinect cameras
7. two (2) manfrotto arms & clamps to rig the kinects
8. forty-two (42) turnbuckles (to adjust height)
9. forty-two (42) carabiners (to hook on turnbuckles)
10. forty-two (42) fast chain link (to hook the turnbuckles onto your suspension system)
11. one breaker box with 4 circuits
12. black suspension wire
13. fiber optic cables
14. ethernet cables
15. toolkit
16. four (4) 240V 5A Variable AC Transformers (Variacs)

CONTINGENCIES

The current shipping setup does not allow for spare Variacs. The units are quite heavy (about 10kg each) and do not cost so much to replace. We ask the presenter to locate, beforehand, a local source of such transformers, in the advent of a break in transportation.

SETUP AND PREPARATION SEQUENCE

1. preparing for the suspension system (simple to complex depending on your ceiling) — refer to Annex 4 and pictures to prepare a correct plan for your venue
2. painting the glass matt (one side of «2» templates)
3. running AC wires from the control cabinet to each coil (2 AC per coil) (see Annex 3)
4. fitting the connectors on the AC wires
5. running USB extenders from the control cabinets to the kinects positions
6. linechecking everything
7. suspending the coils and glass panes; adjustments
8. rigging of the kinects; calibration
9. artistic adjustments
10. opening
11. artistic adjustements

LAYOUT OF EQUIPEMENT

In Montréal we installed the control equipment (computer, variacs, controllers) in the main room exhibit. Two reasons for that: 1) it exposes all elements of the work, removing the «backstage magic» aspect of it and 2) it simplifies setup, as during calibration and in-situ artistic adjustments, a direct line-of-sight must be established between the control equipment and the variacs.This shall be discussed further depending on the venue.

SCHEDULE

i need 1 day to rebuild and test the tesla coils. this can happen anywhere with electricity. while i'm doing this it's probably a good idea to have technicians work in parallel on steps 1-4. also note that if coming from a transatlantic flight i need 1 day to recover (it's not a good idea to work on high voltage instruments with a hazy brain).

also need 1 complete day with everything running in order to calibrate and prepare the work for the opening.

the opening will probably be more electrically intense than the rest of the exhibit; it the works survives that, we're good to go. nevertheless i would recommend keeping me around 24-48h to make sure nothing develops. also, i will need some time with the personnel to transmit instructions — startup/shutdown, but also logical troubleshooting steps, etc. (we might think we'll have time before the opening, but really, it will happen only the day after).

CALENDAR EXAMPLE

Of course the different tasks may overlap or take more time depending on the venue and available personel; this is one possibility:

DAY -6: arrival
DAY -5: rigging and preparation
DAY -4: wiring
DAY -3: suspension and rigging
DAY -2: (buffer)
DAY -1: artistic work (incompressible)
DAY 0: opening
DAY 1: documentation, glass replacement

Glass replacement is required for the B1, C1 and D glass sheets as these get «used» over time — and pretty quickly during intense moments such as openings. basically when it gets hots, the plasma eats the glass and eventually goes through it. in montreal, 2 out of the 3 had to be replaced after the day of the opening, hence the spares.

RISK ASSESSMENT

The installation ran 5 daysa week for over 4 months in at PHI Center, a freely-accessible space in downtown Montréal. During that period, no security or safety incident occured, and no technical problems prevented the installation for runing.

Nevertheless, it is a delicate and dangerous setup. High-voltage, high-frequency, RF-noisy machines are left accessible to the public. This calls from some precautions. Here are some background of the four main risks identifieid with the work.

[a] entering the electromagnetic fields

the coils emit a strong field that decays quickly. it can light a neon tube up to about a meter. the concrete, measurable impacts are unknown, but common sense dictates that fragile or life-ciritical electronic circuits should not be brought in that field. specifically, pace-maker wearers should not get close. there is no published documentation on how far they should stay, and it is really difficult to measure the actual field (because the arc pulses are very short, a few nanoseconds, making them difficult to capture on any sensor equipment).

in montréal, our receptionist had a stack of little lockers for people to let their phones or whatever, letting them deciding to take or not the risk. about 75% percent of the people chose to walk with their devices, and we have no reported incident (the worst that could occur on a phone is to corrupt the flash or eeprom memory or perhaps crash the running programs (à la solar storm), but no physical damage can occur from the electromagnetic field.

[b] touching the glass

the plasma arc carries electricity, but as a static charge. the glass acts as a deflector, but if a nice ground source gets near it (such as a human hand connected to a human body) the arc will flow through the glass — without piercing it; the specific physical explanation for that eludes me — and hit the hand. concretely this means that you get a strong static shock, which over time can get numbing, but not lethal as the energy does not flow through the body. so it is not a good idea to touch the glass, but some people appear to like it, for fun or other personal reasons.

[c] sticking a finger in the power electronics

the circuit «behind» the coils is connected through 2 AC cords to the mains supply as well as the variacs. this AC is lethal (just like any household equipment's AC). for a mixture of artistic and practical reasons, the electronics are in plain sight. clear polycarbonate shields the critical high-voltage components from casual touching / exploding components, but some 240VAC leads are still exposed. this means that while it's kind of difficult to actually touch the circuits, for someone who wants to do it is a attainable goal. we have to strike a balance between safety and intent. in montreal DHC built the low-profile platforms you see on the photos to determine the limit to each work (and also sort of frame it's space). these platforms are 8' x 8' (for the duo) and 8'x16' (for the trio). they prevent the casual walker from crashing in the work, and keeps the back of the electronics more than an arm's length. i think it's a good solution, perhaps a bit bulky, but if you think of another approach it would be nice to compare.

[d] breathing ozone and other gases

some gases, mostly ozone, are produced by the coils' physical reaction. it is not toxic per se, and smells strongly. ozone exposure is harmful on the long term mostly because it replaces oxygen. this means the venue must simply be ventilated, in a normal manner. in montréal the room has basic ventilation, and keeping it at the «low» setting (less noisy) prevent any substantial gas accumulation, even for the people working there. some people like the smell, which reminds them of thunderstorms.

On the Internet you can find contradicting information about the safety of Tesla coils. My personal experience is that the devices are very safe, very predictable and very stable, but they should be treated as dangerous equipment and the public must be informed about it.

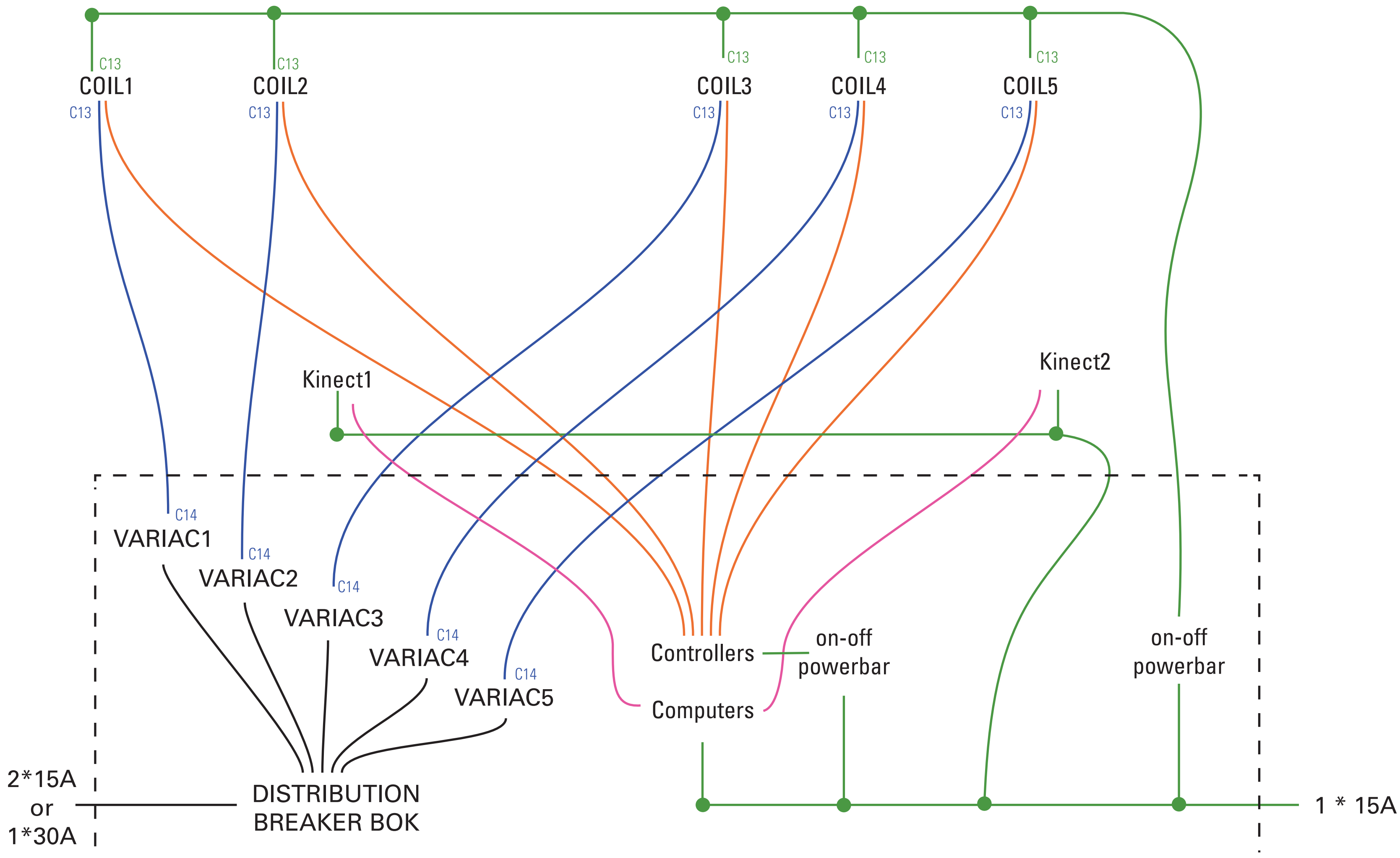
ANNEX 2

Principal Wiring schematic

Tesla AC (blue wires) should not be laid parallel or in bundle with other cabling.. calbe crossings should be perpendicular and limited to the strict minimum.

provided by the presenter {
- AC-tesla (3 conductor AWG14 Ø1,5mm)
- AC-control (3 conductor AWG16 Ø 1,25mm) shared circuit

provided by the artist {
- Fiber-control (ST/ST 62nm fiber, single mode)
- USB (activeextender)



CONTROL AERA (<u>everything at arm's reach, with a line-of-sight to the tesla coils</u>)

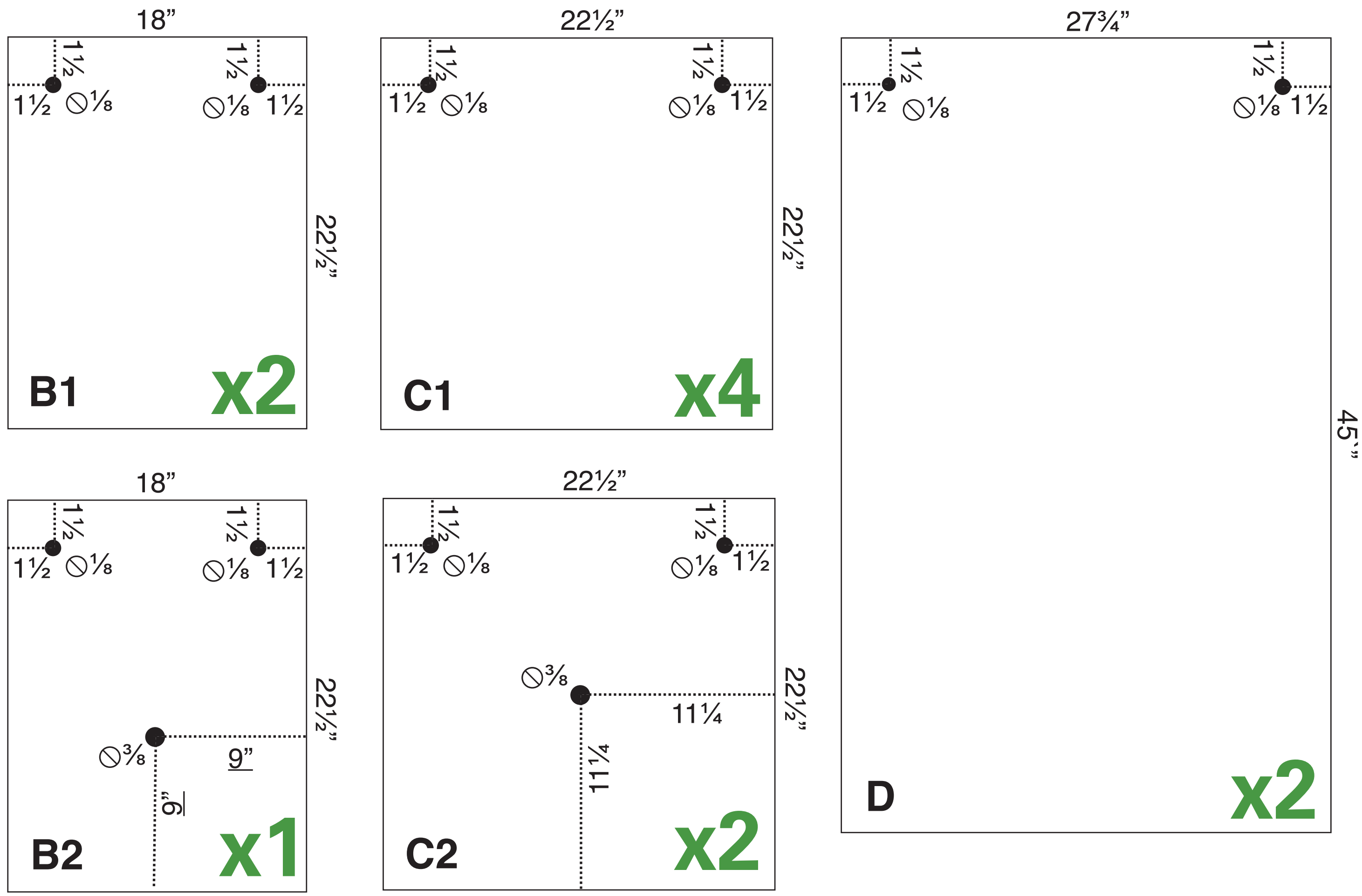
This diagram is meant to provide an overview of the different signals and feeds used by the installation. While the general layout of this diagram makes sense, it is not an accurate spatial reference. A proper schematic should be derived based on the plam of the venue.

ANNEX 3

Class cutting specification

Glass thickness = 3mm

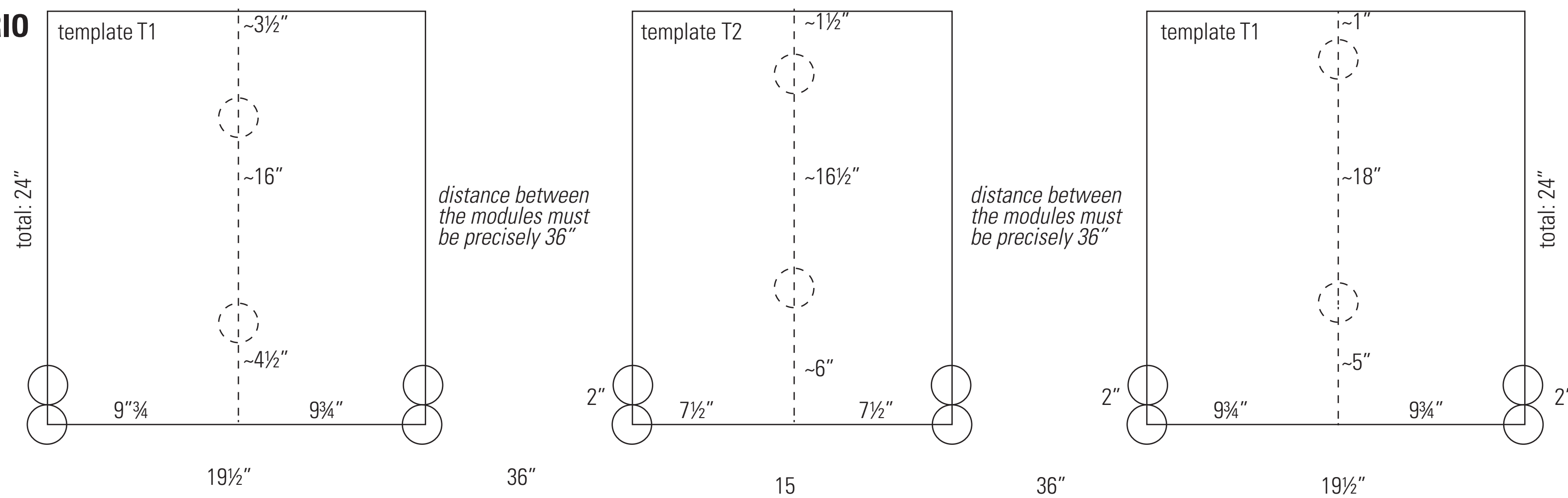
Edges and holes polished



ANNEX 4
grid specifications

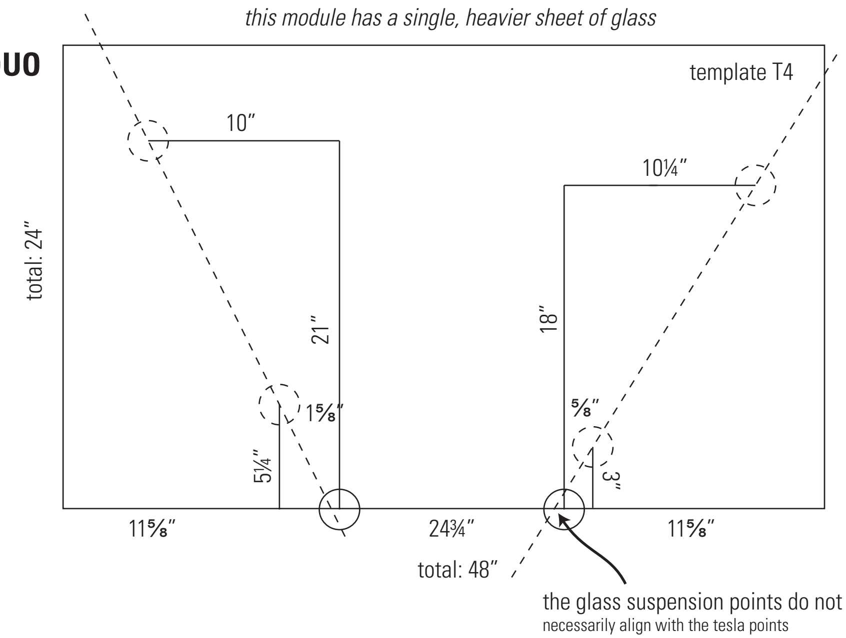
dashed lines and points indicate variable elements

TRIO



this module has a single, heavier sheet of glass

DUO



ANNEX 5

startup

1. allumer powerbar « électronique »

2. allumer powerbar « contrôleurs »

3. mettre contrôleurs en TEST (bouton carré à droite -> bleu)

4. faire le tour des 6 bobines et constater le petit buzz dans chacune

5. éteindre mode test (peser le bouton bleu — qui s'éteint)

6. démarrer les ordinateurs

   (… attendre la fin du démarrage (les petits témoins des contrôleurs doivent être verts et clignoter…)

7. allumer les disjoncteurs — ça devrait crépiter dans la salle

8. vérifier que la ventilation est à LOW

9. allumer disjoncteur éclairage dans le panneau #

10. éteindre lumière de salle

11. tester les 4 zones interactives

12. inspecter visuellement le derrière des 6 bobines et surveiller les court-circuits, flammèches, etc)

shutdown

1. allumer lumière salle

2. couper les disjoncteurs

3. éteindre les 2 ordinateurs (menu Pomme -> shutdown)

4. mettre contrôleurs en mode test (appuyer sur bouton incolore) (bouton à droite devient bleu)

   [TRÈS IMPORTANT]
   … attendre que les bobines se vident (4-5 secondes) …

5. éteindre powerbar « contrôleurs »

6. éteindre powerbar « électronique »

7. inspecter visuellement vitres et bobines pour toute usure suspecte (endroits noircis, fissures, etc.)

8. inspecter tacitement et olfactivement les transformateurs rouges (pour odeur de rôti ou chaleur excessive)

9. éteindre disjoncteur d'éclairage dans le panneau #

EN CAS D'URGENCE:

1. toucher le bouton vert carré -> devient rouge = coupe le contrôle des teslas

2. couper les disjoncteurs

ne touchez en aucune circonstance aux bobines ou aux bases car les condensateurs peuvent être chargés, donc dangereux même si débranchés/inactifs.

Aucune odeur de brulé ou de fumée ne devrait être détectée. Au moindre doute, arrêtez l'installation et contactez-nous.