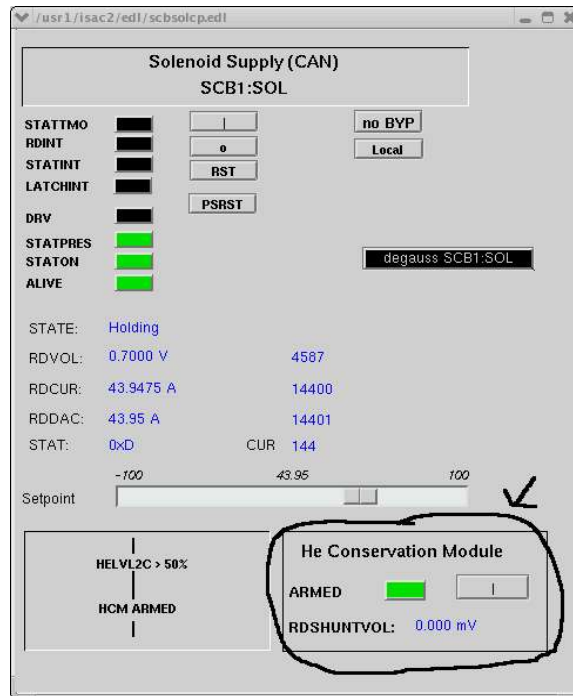


Recovery from a Power Bump / Outage

(Taken from the ISAC Ops manual and updated. V.1.0, November 25, 2009)

(Items marked with * indicates it should be done after power goes out during an outage, or after a bump. Other items are done after power returns.)

1. * Ensure ITW:FC5, ITE:FC7, IMS:FC3, IOS:FC3, and IOS:FC6 are in.
2. * Check that either exhaust fan, EF-12, or backup fan, EF-13, is on, using BSPC. If EF-12 is not on, request us to be defined off and remove proton enable.
 - Confirm locally (at the fan room) that EF-12 or EF-13 is on.
 - If one of the fans is not on, evacuate all exclusion areas (B2 level, all hot cell and service areas, target hall), and lock and rope them off.
 - This must be done before the ISAC-II cryogenics issues are addressed. If there is more than one operator is available, the second operator can attend to the ISAC-II cryogenics at the same time (step 3).
3. * Attend to ISAC-II Cryogenics alarms (it is important this is attended to a.s.a.p., as LHe loss could be substantial if not attended to quickly):
 - Check to see if the Cold Box and/or He Compressor tripped.
 - If either device has tripped, refer to the section, “ISAC-II Cryogenics Emergencies”.
4. * Ensure the SCB solenoid He conservation modules for each SCB module is off.
 - The He conservation module status signals are on SCBx:SOL pages (see picture below), accessible from the “SCB optics” EPICS page.
 - Refer to the “SCB Solenoid Recovery” document for recovery after power returns.



5. **Power outage step only**: Check to make sure the backup diesel generator has started. If not, notify MCR and call Franco Mammarella and Curtis Ballard **immediately** (phone numbers supplied at the end of this document). It is important that the diesel generator be restarted as soon as possible, as both the recovery compressor and EF-13 are powered by it, and loss of LHe should be minimized.
6. * Attend to building alarms, if any, on BSPC, and acknowledge any BSPC alarms.
7. Check the water cooling systems on BSPC and EPICS (ITC page):
 - Raw Water pump – P-1 or P-2 is on (switched on AUTO, on MCC-X).
 - *HALCW – pump MP1 or MP2 is on.
 - *LALCW – pumps P-5 and P-6 are on.
 - Switches are on the wall
 - DDC (BSPC) delay time of 2 min.
 - NALCW – pump P3 or P4 is on. If NALCW pumps require a restart:
 - Close the discharge valve.

- Flip the motor controller switch from OFF to MANUAL.
 - Open the discharge valve slightly.
 - Flip switch to AUTO. Failure to do this will bypass the pump interlocks.
 - Slowly open the discharge valve completely. Note that this process is very noisy.
8. Check the ITW or ITE vacuum and restart it if necessary, using EPICS.
- If the vacuum is still okay, check that target heaters are still on.
 - If the vacuum is okay, but the cool-down auto-routine started:
 - Abort cool-down immediately.
 - Ramp the heaters up to their running values.
 - Consult the archiver to confirm these values.
9. * Check the UPS units.
- Electrical Services Room
 - Experimental Hall
 - ISAC-2 Power Supplies Room
10. Check other building services on BSPC.
- Heating pump P-16 is on (switch from OFF to AUTO).
 - Boiler is on.
 - EF-9, 10, 11 are on (in summer).
 - Compressed air (analog gauge above OLIS).
11. Check the building HVAC systems, AHU1, AHU2, AHU3, in ISAC-I, and AHU1 and AHU2 in ISAC-II, on BSPC
12. **Power outage step only**: Open the doors to the 8Pi and TIGRESS shacks to allow the temperatures inside to stay cool during an outage. Call Greg Hackman to notify him of the situation.
13. Start up the TRINAT air conditioning.
- Red reset button on the pump. (See picture below.)



14. Start up 8Pi shack air conditioning.

- Back side of the unit, left (North) edge, approximately 1.3m from the floor.
- Flip the DHW switch to OFF, then to ON.
- The “STATUS” LED should flash green.



15. If the TIGRESS AC has tripped off, call Greg Hackman at 604-324-9668.

16. **Power outage step only**: Open the doors to the ISAC-II network room (Room 242) and ISAC-II Power Supply Room (Room 260).
17. * Check the elevators (for operation and in case someone may be trapped inside).
18. Check the vacuum of LEBT, accelerators (RFQ, DTL, SCB), and HEBT. If in doubt about what was under vacuum before the power bump/outage, check with the archiver. When recovering the vacuum, always begin with the largest volume. Start pumping of the RFQ first, and then the beam lines.
 - If it was a short power bump, probably the vacuum is still okay.
 - Check the vacuum gauges.
 - If okay, then any tripped turbo pump can be turned on right away.
 - Turn on ion gauges.
 - If the high vacuum is lost:
 - Rough the system as required.
 - Start the turbos.
 - Turn on ion gauges.
 - When high vacuum is achieved, turn the optics back on.
19. Restore EF-12 operation before running active beam again.
 - Acknowledge BSPC alarms.
 - Allow a half-hour for stable power before switching fans.
20. Restart OLIS (if it was on prior to the power bump/outage).
21. *Perform a walk-around through the ISAC buildings, checking for problems.
22. Resume normal operations.

System Experts:

| Area | Name | Local | Home Number | Pager |
|-------------------------|----------------------|--------------|--------------------|--------------|
| Electricals | Franco Mammarella | 7412 | 604-272-2734 | -- |
| BSPC, Building Services | Rob Walker | 6302 | 604-575-2790 | -- |
| Buildings, General | Curtis Ballard | 6201/7677 | -- | 604-645-0782 |
| Vacuum | Dimo Yosifov | 7524 | 604-321-0437 | 604-601-4271 |
| Targets | Friedhelm Ames | 7581 | 604-221-4129 | 604-641-0439 |
| OLIS | Keerthi Jayamanna | 7493 | 604-205-3576 | 604-222-0992 |
| UPS | Dan Louie | 7320/6350 | Consult MCR | -- |
| ISAC-I, DSB RF | Zheng Ting Ang | 7542 | 604-526-5983 | 604-320-8647 |
| ISAC-II RF | Vladimir Zvyagintsev | 7547 | 604-267-0642 | -- |
| TRINAT | John Behr | 6371 | Consult MCR | -- |
| Experiments | Matt Pearson | 7538 | 604-632-2033 | -- |
| 8Pi, TIGRESS | Greg Hackman | 7441 | 604-324-9668 | -- |

Cryogenics: See Cryogenics Emergencies