

Injectors Post Mortem: A Short List for summer '04 2Sep04

criteria: Ideas get on the list based on impact to Operations in the past (this means new systems tend to be excluded) and relevance next year (this means gold-specific needs are excluded). "Small" potatoes are very much included. These activities cannot use up many resources since to the extent the list is relevant, none are presently allocated. "?" means the item's inclusion on list is questionable.

Each item has a number - just for short identification in the following. Next, I attach some resources. These are subject to change, not blessed, just a start. Each item needs to have a champion - charged with developing/stating clearly the specification of the problem and, from an operational point of view, the state we are trying to get to. For now the champion is usually he who made the suggestion. The likely relevant groups are then listed. Someone from each group needs to respond to the champion describing a proposed solution. The "names" necessary for items we agree should be considered are: the champion (to speak for the high level spec), and a representative from each needed group - who would propose his or her group's piece of the solution and (if the solution can be afforded) see the effort through to completion - keeping the champion informed.

Clearly a "work-in-progress", but hopefully better than nothing.

A. TtB: no TtB entries. (Intensity dependent tuning)

B. LtB:

1) BPMs - we had them once. Can/should we recover this system?

Beam Comp Group - Inst - Gassner

Champ: Marr

2) DH1 magnet - make switchable for polarized running to Booster and HEBT polarimeter.

30Aug04: Jim has a plan. The present power supply is the one used for pulsing. The present magnet is not the pulsing magnet, but the old (switchable) magnet is being moved to be physically connectable to the supply. Then testing of the response of the magnet will be done. With that shown acceptable, the old magnet will be positioned in the beam line in place of the present magnet. (This then somewhat eases the idea of running multiple polarized proton pulses in the AGS - beam can still be sent to the HEBT polarimeter.

Champ: Alessi

C. Booster:

1)) Injection Power Supplies – alarm if supply deteriorates (resistor failure).

Circuit to sense that the current output is not right, that the resistor is failing. (Pulsed Power Group). Controls infrastructure to generate an Alarm. *Arleen Zhang is*

aware of the need. JianLin Mi is point engineer, and has plan. Important to realize that the "breaking" resistor acts as a fuse and protects electronics that would take much longer to fix than the resistor. So we don't want the fuse to go away, we just want to quickly know if it has blown.

16aug04 Warburton working on this. (Keith)

Champ: Zeno

2) Booster Extraction Bumps – alarm if fault

Alarm when the power supply has gone into a locally obvious fault condition. (Pulsed Power Group and Controls). *Arleen Zhang is aware of the need. Bob Lockey is point engineer.*

16aug04 "soon" (Warburton via Keith)

Champ: Zeno

3) Booster Hall Probe measurements logged and available

Distinguish between the digital information sent to the Booster Gauss Clock to give the clock a starting value and logged values (which might be taken at other times). Add the "secondary" Hall probe into the logging. Can this be done using "standard" MADC, GPM, and timing infrastructure?

(Ring P.S. Group, Bonati), (Controls)

Champ: Gardner

4) Booster rf stability at capture and extraction

rf feedback on Band II cavities may help this.

Champ: Zeno

5) Booster turn-by-turn (t-b-t) gains: computer controlled

RF resources (Siegfried?) Ops Support (DiFranco) maybe ready. Controls resources.

Champ: Gardner

6) B6 instead of B4 as Booster horizontal t-b-t PUE

Ops Support (DiFranco)

Champ: Gardner

7) Betatron Tune Measurement by non-expert

Can non-expert Operators measure the Booster betatron tunes? First step - to have tune measurement capability by Operations expert.

9Aug04: Brian Oerter(working with Kevin) has suggested a simplification to the timings for this system, which will remove one of the difficulties associated with the setup. He takes advantage of V202 features. This change is being implemented.

18aug04 Oerter allows that we add (generically) into the supercycle, unique events to indicate each Booster cycle - so a BC1, BC2, ... BCn event. These would carry User information only due to there position in the supercycle - i.e. the User Reset even

preceding a cycle event (in time) would (as usual) indicate the User involved. At least for timing using V202s (which know Users) this should be sufficient to allow triggering in a particular Booster Cycle - which is useful for the tune meter timing.

Champ: Kevin Brown.

Agitator: Ahrens

8) ? PPMR qualified magnet cycle for Booster merge

I leave this somewhat out of ignorance. We won't be doing gold merge, but the tools required may be relevant. Some clarification: the problem is that we cannot presently (as of the 04 Gold run) implement an aggressive eight transfer gold setup without tripping the PPMR relay alarm. The supercycle we used was watered down to be acceptable.

Agitator: Brennan

9) alarm on Booster re cavity trips

(rf group, Controls)

Champ: Marr

10) remove D6 septum as a routine critical device for the r line.

Not clear this is possible - Need to get Adam into loop.

Champ: Marr

D. BtA:

1) BtA power supplies reproducibility

Zeno wants this, and adds the need for new instrumentation to adequately measure the stability of certain magnets - F6, DH2-3, DH4, L20, perhaps Hall probes?

Brian van Kuik is one resource working on this now for some time. New ideas?

Some discussion 12Jul meeting. Roger Bonati is looking into Hall Probes.

Glenn meeting 4Aug04 (written up by Woody - email). Tying information from the June 04 BtA study, and Operational observations (Zeno, vanKuik). Bonati has list of items, and priority (which he needs - too much to get done). Hall probe for DH4 if physical problem is not discovered. Better current measurements DCCTs for power supplies presently using shunts and requiring better precision than a shunt can deliver.

16Aug04 (Keith) Warburton gives some history which suggests we have in the past had more in the way of readbacks than we have now.

Champ: Zeno

2) BtA foil optimization

Under the rules, the immediate question concerns the light ion for '05. Thieberger is a resource. *No changes are planned for this summer. We could get near 100% stripping with a foil 10% of our thinnest one, but the gains, reductions, in emittance would be a challenge to measure.*

Champ: Gardner

3) AGS inj kicker timing jitter

What is the problem?

16aug04 (Keith) timing drifts over hours and days of 50ns. Warburton suggests probably thyatron trigger "issue", he will look when the system is pulsing.

Champ: Zeno

4) BtA BPMs

Gullotta. van Kuik is Operations this space.

E. AGS:

1) AGS Hall Probe measurements logged and available

(Ring P.S. Group, Bonati), (Controls)

Champ: Gardner

2) Betatron tune measurement by non-experts

Can non-expert Operators measure the AGS betatron tunes? First step - to have tune measurement capability by Operations expert.

resources: Bai, Operations.

18aug04 Mei recommends that she pursue the evolution of the "turn-by-turn" facility in the F18 house, used for ac dipole measurements, primarily during polarized proton operation, into a new AGS Tune Meter. She has a synchronized rf pulse train in F18, and so can make a much more powerful (signal to noise) measurement of the beam transverse coherence than we can using the old tune meter in MCR. Furthermore, her system has shown its strength during the polarized running to measure tunes with high precision.

The existing system in MCR will be maintained for the next year for sure. The Rev Tick facility (item 6 below) is still required. The required improvements in the synchronization of the triggering of the kicker for the tune meter remains a separate piece of the puzzle, which will finally get integrated into the new system as well as the old.

Champ: Ahrens

3) Inhibit low intensity RHIC shots before the RHIC bunch phase is advanced.

(Beam Comp Group - instrumentation, Controls, rf) *Briefly discussed 12Jul meeting. There needs to be a spec produced for general consumption.*

Champ: Michnoff

4) AGS Tune/Chrome controls reliability and associated (skew sext) problems

(in addition to other things, can the Skew Quads move to be more ppm? - can their function be loaded when the active user changes - ..)

(Controls)

Champ: Zeno
Agitators: Ahrens,

5) AGS rf - new functions (just waiting for some hardware to be built)
rf group, who probably provide champion

6) AGS Rev tick universally available - for tune meter, for polarimeter
A robust clock synchronized to the revolution frequency in AGS is needed by the AGS polarimeter and tune meter (in addition to the phase locked version presently available in the F18bldg for Mei's bunch tracker).
(rf group)
2Sep04 Joe DeLong has agreed to help out here. A spec has been sent to the rf group. We have not really done anything yet however.
Champ: Ahrens

7)) Further exploit the F18 t-b-t equipment. PIP analysis
Mei's plans, using the F18 tbt as the next generation tune meter will satisfy this for now.
Champ: Ahrens

8) Automatic Logging snapshots of functions and readbacks
Champ: MacKay

9) Automatic Logging of stuff we presently write into the Krisch Sheet
2Sep04: Waldo is into this, specifically looking at the items we have logged into the Krisch Sheet in the past, to try and automate.
Champ MacKay

10) AGS MAD model: simply available in MCR, Online version, snake version, integrate (tune chromaticity, bumps) with model.

This one generates some enthusiastic discussion and has lots of requestors. Players are Blaskowicz, Kevin Brown, Glenn, Gardner, Mackay, and surely others. One strawman goal - which may be unacceptable to some but which I can at least understand: at MCR console enter into MAD the AGS (main magnet current, quad string currents, sext string currents, radial offset) and learn (momentum, tune, chromaticity, momentum deviation). Can the snakes be included? Can the AGS Orbit Control program use phase advances calculated by MAD? *Discussed 12Jul meeting. Woody has started pushing an organization of resources to be responsible for the MAD input files for the various sections.*

Request that machine L.P.'s be responsible for "models". MCR (Vincent Schoefer) for keeping track.

Kevin Brown: 19July info on LtB (he and Deepak). 22July list of presently available "lists".

Kevin and Johannes working on an adaptation of the RHIC online scheme for the injection complex.

30Aug04: This last plan is shaken a bit by Johannes' leaving plans, but Kevin thinks it is still possible. One missing piece is a combined function magnet module - rather critical for AGS modeling.

Champ: Glenn

11) ? Intensity-dependent losses on the AGS flattop

Champ: Brennan

12) AGS IPM: 40kV

Beam Comp Group has plan to get this done.

Champ: Huang

13) AGS IPM: Add Turbo at E15 or ion pump on/off control

Dick Hseuh has plan for next round. Turning off another ion pump. Need to check pump-down time.

We note in passing that an upgrade / revisit of the ags IPM is underway. The electronics presently in the ring will be moved outside - probably during the next running period. The required cables are going in this summer. Christoph (yes the new scheduling physicist) is physicist for this piece of diagnostic equipment. Joe Skelly is controls expert, Beam Components / Inst Group (Russo) will do the hard work.

Champ Huang

14) ? CNI Pol upgrade – hori target, motor control module

depends on "internal" polarized priorities now.

Champ Huang

15) AGS proton Bunch Merge – new hardware?

Does this have a future?

(rf group)

discussed but very open at 30Aug meeting.

Champ Huang

16) AGS AC dipole – understand, eliminate “warm up” time, avoid capacitor failures.

(Pulsed Power group) (Mei Bai)

Warburton has better capacitors and will add cooling to the cap enclosure - which will help if the component warming is the capacitor.

champ Huang

17) Beam intensity loss between AGS and RHIC

(Ahrens, Beam Component Group - Willinski)

One useful addition would be loss monitors to remove areas of blindness. Surely there is one around the W line dump. Under discussion with Beam Components group. Tsoupas in the loop.

23Aug04: the motivating intensity comparison is between RHIC circulating and AGS circulating, and so we should quantify from RHIC loss monitors how much beam is lost on first few turns in RHIC, (as well as applying the same machinery for AtR losses. The instrumentation folks claim they can give us a few spare channels if we can say where the monitors should be deployed. These would not affect the old numbers and so come "for free".

2Sep04 Mei, Peggy, Tony, Paul, Leif walk some of this territory. Tony has a plan to make use of four spares, deploying them at upstream end of the arcs, just after switching magnet. Mei, Paul (Ziminski) will get the book keeping straight so we can see these monitors.

champ: Huang

18) Develop AGS beam "on demand" mode - to avoid quenching cold snake.

(Controls)

discussed 28Jul04 @ pol meeting. Proposal to dedicate two Users in order to accomplish this. Identical except for whatever is necessary to stop the beam before A20. Not clear which machine User. Booster would work well - F3 kicker, but Booster Users are dear, and we could not see the "not injected" beam in BtA, to be sure things were ok before taking a shot. The selling feature of this approach is that we automatically can trigger and log only on the shots with beam .

An alternative solution requires a special trigger when we want beam. This trigger besides allowing the beam to be injected into the AGS, would also somehow be required to trigger MCR scopes and to Log. This approach removes the need to keep 2 Users nearly identical, and does not use up a second User.

23Aug04: the "alternate" is the plan. What does the occurrence of the event do to inhibit beam? Woody notes that the point is to stop the beam before it can spray the cold snake (A20) so killing it in Booster has an appeal. On the other hand, checking the quality of the beam as close to AGS as possible is also useful. No decision, need "offline" discussion.

Champ: Huang

F. AtR:

1) new DG535 finelay timing mod to give G10 Yellow/Blue independence.

Discussed 26jul04 at inj meeting, Brennan assumes this a job for Kicker folks! Skelly suggests we could send setpoints to the DG535 when we switch between injecting into Blue or Yellow (and cope with the "green" situation, which needs to be well defined). Not finalized.

23Aug04 - restatement of this. Morris will check on the situation. Expectation is that a software change can solve this problem...

Champ Brennan

2) automatic correction AGS flattop field (RHIC) (power supply guys and Controls)

23Aug04 Wolfram is quite satisfied that he has good information for correcting - not every injection pulse yet. There needs to be a communication (Wolfram, John (Morris), Ioannis) to see how to go from here. Presumably getting a field "point" for every transfer is as much information as one ever needs.

Champ Fischer

3) recover automatic steering to golden orbit

23Aug04 Todd is resource, nothing yet. Discussion (Woody, Dejan, etc. of how the old tuning system could be made better - including the big bends into the correction machinery; getting these strong bends right for starters.

Champ Marr

G. General

1) Get the AGS Tech Notes (pre year 2000) into the digital documentation

23Aug04: Kip has talked with Anna. She has investigated getting documents scanned into computer by "outside" resources. Some discussion of indexing machinery - Gerry Jackson's company...

Champ Gardner

2) Injector MADC infrastructure - generic setup for generic logging of time functions

23Aug04 discussed. Ahrens needs to spend some time here. We need to list what would be useful (and what indeed he already have. I forgot that we added independent readings of the current transformer during the last polarized run

Champ Morris

3) Dedicate a set of Injector Mux outputs into channels of an MADC

23Aug04 discussed, Ingrassia aware, what is status?

2Sep04 Morris into the loop. Scope of project on the table - quick making use of Virtual Scope and old scope signals from MCR5 (where scopes are mostly forbidden); and/or connecting some MUX signals into dedicated MADC channels. Meeting 9Sep 3pm tentative.

Champ Glenn