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Margin Check for BTA Magnet Currents

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AGS Complex Machine Studies (AGS Studies Report No. 333) Title: Margin Check for BTA Magnet Currents
Study Period: 7Jun95 - Midnight Shift
Participants: K. Zeno, JW Glenn
Reported by: JW Glenn
Machine: Booster/AGS
Beam: 60 TP protons
Tools: Booster/AGS CBM's
Aim: Develop a List of the Relative Precisians Required for BTA Power Supplies. (Data taken in HEP [AGS] Book IV pp 38.)

Introduction

The variation in AGS intensity caused by the F6 Booster ejector has been observed. The effect of changes in the remainder of the BTA group magnets needed documentation. The "BTA Magnets" include Booster extraction and AGS injection supplies.

Procedure/Results

The various power supplies in the BTA were varied up and down one at a time. The change in setting resulting in a 10% reduction in AGS intensity, with constant Booster beam, was noted. This data is shown in the first four columns of Table 1. There is no data on the shape of the setpoint vs AGS intensity curve save these three points.

For the required "tolerance", 10% of the range that keeps the AGS above 90% of the normal intensities is chosen. This is consistent with our experience with F6 where a 20 Amp variation may cause an intensity change and a 10 Amp variation generally will not cause a noticeable change (10% of the range for F6 is 12 Amps). The power supply maximum setting from the Data Base is given in Column five, and the required precision "tolerance" is given in column six. This tolerance is the 10% of the full range of settings dividend by the PS maximum setting. Those tolerances smaller than 1% are flagged by >, and those less than 0.1% by >>.

Some of these precisians may be hard to achieve. As the setpoints for the magnets tend not to vary more than ~10% during a specific run, the dynamic range of the supply could be reduced to improve stability. The tolerance, re-normalized to the operating setpoint, is provided for those magnets whose tolerance is less than 0.3%.

Conclusion

The required precision for the bend magnets is better than a few parts in ten thousand, quads a few parts in a thousand, and steering magnets a few percent. DH2-3, F6, L20 and DH5 are the critical supplies.

Table I
Setpoint Range for 10% less beam

Magnet	Setpnt	"-"Rng	"+"Rng	PS Max	Tol = 10% of Range tol/max	tol/setpoint
DH2-3	3622	9.7	-9.8	5000	>> 0.039%	>> 0.054%
L20 sept	15296	88	-40	30000	>> 0.043%	>> 0.084%
F6 sept	10556	-51	66	30000	>> 0.039%	> 0.111%
DH5	443	-3.9	2	1000	>> 0.059%	> 0.133%
DH4	118	1.39	-1	300	>> 0.080%	> 0.203%
DH1	236	-3.6	6.11	700	> 0.139%	> 0.412%
QH6	531	-13	26	1500	> 0.260%	> 0.734%
QV7	262	-28.6	16	1500	> 0.297%	1.705%
QV13	476	-18	14	1000	> 0.320%	
QV5	501	26.5	-30	1500	> 0.377%	
QH4	579	-9	30	1000	> 0.390%	
QV15	0	0	21	500	> 0.420%	
F3 kick	37	-3	0	50	> 0.600%	
QH8	272	-10	22	500	> 0.640%	
QH2	454	-26	40	1000	> 0.660%	
QH14	297	-30	40	1000	> 0.700%	
QV1	359	37	-45	1000	> 0.820%	
QV9	439	-37	23	700	> 0.857%	
A5 kick	30	-4.5	0	50	> 0.900%	
A1 bmp	860	-100	100	2000	1.000%	
F2 bmp	500	-100	100	2000	1.000%	
QH10	141	-22	49	700	1.014%	
F4 bmp	402	-120	100	2000	1.100%	
QH12	288	-27	54	700	1.157%	
QV3	461	-50.6	78	1000	1.286%	
F7 bmp	665	-200	80	2000	1.400%	
DV168	2	1.49	-1	15	1.660%	
L20pos	15	-5	5	40	2.500%	
DV181	5	-1.5	2.5	15	2.667%	
DV007	-7	3.6	-2	15	3.733%	
DV141	1	3.98	-3	15	4.653%	
QV11	214	-84	56	300	4.667%	
L20ang	-4	-7	12	40	4.750%	
DH127	-3	3.04	-5.5	15	5.693%	
DH158	-3	4.02	-10.4	15	9.613%	