

CORRELATOR ELECTRIC LOAD BALANCING BETWEEN 50KVA(UPS1) & 20KVA(UPS2)

I. Analysis of proposed load on 50KVA :

IMH 21/06/2018

Load Type	Load Details	Load without corr. in use	Load with corr. in use	% of load Variation
Fixed	Clk/pps units, eth./Infini switches, fans, Temperature m/c's, casper/online m/c's, & POCO racks	22.2 Amps	22.2 Amps	0
Marginally variable	ROACH units, Host m/c's,	18.0 Amps (0.5*16)+(1.0*10)	20.6 Amps (0.6*16)+(1.1*10)	14.4
Highly variable	gwbcorr m/c's with 2 GPUs – 16 nos, NCRA nodes – 8 nos & CITA nodes – 7 nos.	42.2 Amps (1.7*16)+(1.0*15)	59.5 Amps (2.5*16)+(1.3*15)	41.0
	Total	82.4 Amps	102.3 Amps	24.2

Important Note :

1. Existing load per phase of 50KVA 3 phase UPS = $102.3 / 3 = 34.1$ Amps
2. NAS Load per phase = $12.0 / 3 = 4.0$ Amps (This needs to be balanced between 3 phases, which is not now).
3. Future load per phase (ie GPB with 16 gwbcorr m/c's with 2 GPUs in each & 10 Host m/s's + s/w's,fans etc..) = $72 / 3 = 24$ Amps (assumed 72amps will be maximum load of GPB based on GWB)
4. So total load per phase = $34.1 + 4.0 + 24.0 = 62.1$ Amps.
5. So Maximum load per phase will be $62.1 \text{amps} * 100 / 72.4 \text{ Amps} = 85.8\%$
6. Hence NAS load of 4 amps per phase (total 12 amps) needs to be moved away from this 50KVA UPS.

II. Phase wise connection of Extension Boards (EB) & % of Load Distribution in the Racks :

Rack Deatils	Phase of 50KVA	Extension Boards	% of Load	Remarks
GWB RACK 1	Phase 1	Top & Bottom	100	
GWB RACK 2	Phase 2	Top & Bottom	100	
GWB RACK 5	Phase 3	Top & Bottom	100	
GWB RACK 6	Phase 1	Top	33	Fixed, Marginally and Highly variable load must be shared almost equally.
	Phase 2	Middle	33	
	Phase3	Bottom	33	
GWB RACK 3	Phase 1	Bottom	66	Fixed and Marginal variable load must be shared in 1:1* proportion.
	Phase 2	Top	33	
GWB RACK 4	Phase 2	Top	33	Fixed and Marginal variable load must be shared in 1:1* proportion.
	Phase 3	Bottom	66	
GSB RACK 4	Phase 1	Middle	4N+4cita nodes	Moderately variable load, but gets used rarely!
	Phase 3	Bottom	4N+3cita nodes	
GSB RACK 6	Phase 2	Bottom	All server+ m/c's	Only fixed load like casper m/c's
POCO+ racks	Phase 2	Top-2nos.	POCO racks-2	

* More variable load on Phase 2 to compensate the marginally variable load of GSB rack4 put only on phase 1 & 3, while only fixed load of GSB rack 6 & POCO+ racks on Phase 2.

MCB Number : *First Digit* ---> *UPS Number*
Second Digit ---> *Row Number in the Distribution box inside the correlator room.*
Third Digit ---> *MCB Number in the distribution box.*

III. UPS 1 (New 50KVA)

Table 1 : Phase 1 (R + N)

Present MCB No.	Future MCB No.	Load Details	Cons'n in Amps	Remarks
111	111	GWB RACK 1	11.6	
123 (Top EB)	112	GWB RACK 6 (EB-112 Top)	3.9	
225 (Bottom EB)	113	GWB RACK 3 (EB-113 Bottom)	3.7	
317	114	<u>GSB</u> RACK 4 (EB-114Middle)	8.0	
	115			
	116			
	117			
	118			
	119			
	11a			
	11b			
	11c			
		NAS machines..	4.0	
		Sub Total of Phase 1 (R+N)	31.2	

Variable Load

GWB rack 1, 2, 5 & 6 – 5.9 to 11.6amps each

N111 to N118 nodes -6.6 to 10.2 amps

CITA nodes (7 nos) – 5.8 to 9.0 amps

GPB Racks (4 racks) – 3650 amps each rack with 8 GPUs.

Fixed Load

GWB racks 3 & 4 - 5.6 & 6.6 amps fixed respectively.

POCO+misc racks – 4 amps

Casper+online+temp'r&misc m/c's+ – 4 amps

Table 2 : Phase 2 (Y + N)

Present MCB No.	Future MCB No.	Units / Load	Cons'n in Amps	Remarks
112	121	GWB RACK 2	11.6	
To be added	122	GWB RACK 6 (EB-112 Middle)	3.9	
225 (Top EB)	123	GWB RACK 3 (EB-123 TOP)	1.9	
MDB3 New1	124	GWB RACK 4 (EB-124 TOP)	2.2	
216	125	<u>GSB</u> RACK 6	5.0	
MDB3 New2	126	POCO+ racks	2.0	
	127			
	128			
	129			
	12a	Lamps	1.0	
		NAS machines..	4.0	
Sub Total of Phase 2 (Y+N)			31.6	

Table 3 : Phase 3 (B + N)

Present MCB No.	Future MCB No.	Units / Load	Cons'n in Amps	Remarks
122	131	GWB RACK 5	11.6	
123 (Bottom EB)	132	GWB RACK 6 (EB-132 Bottom)	3.9	
MDB3 New1	133	GWB RACK 4 (EB-133 Bottom)	4.4	
315	134	<u>GSB</u> RACK 4 (EB-134 Botom)	7.0	
	135			
	136			
	137			
	138			
	139			
	13a			
		NAS machines ..	4.0	
Sub Total of Phase 3 (B+N)			30.9	

IV. UPS 2 (Old 20KVA) :

Table 4 : Only essential GSB system units.

Present MCB No.	Future MCB No.	Units / Load	Cons'n in Amps	Remarks
312	211	GSB Rack 1 (Top E.B.)	4.0	ADC node1 to 7 & PPS/CLK
313	212	GSB Rack 1 (Bottom E.B.)	6.4	ADC node 8 to 16 + spare 1.
213	213	GSB Rack 2 (Top E.B.)	5.9	Node 17 to 20, eth s/w – 3 nos
222	214	GSB Rack 2 (Middle E.B.)	7.7	Node 21 to 26 (6nos)
211	215	GSB Rack 2 (Bottom E.B.)	7.7	Node 27 to 32 (6nos)
	216			
	217			
	218			
	219			
	21a			
	21b			
Sub Total of Row 1			31.7	
223	221	GSB Rack 3 (Top E.B.)	4.7	Node 33 to 35 & s/w's – 3nos.
212	222	GSB Rack 3 (Middle E.B.)	5.8	Node 36 to 42 (7nos)
221	223	GSB Rack 3 (Bottom E.B.)	4.9	Node 43 to 48 (6nos)
315	224	GSB Rack 4 (Top E.B.)	2.5	Node 49,50 & s/w's – 2 nos.
215	225	E.B. - 225 (@ GSB Rack 1)	3.0	Fans of Rack1&2, & Mon.1
214	226	E.B. - 226 (@ GSB Rack 3)	2.0	Fans of Rack3&4, TempMon.1 & Power Supply – 1no.
316	227	E.B. - 227 (@ GSB Rack 5)	2.0	gsbm1 to gsbm4 m/c
314	228	E.B. - 228 (@ GSB Rack 5)	1.0	Gsbm5, gsbm6 & HDDs
311	229	E.B. - 229 (@ GSB Rack 6)	2.0	GSB node 51 to 54.
Sub Total of Row 2			27.9	
Grand Total			59.6	

Note : 1. Here, UPS utilization is restricted by the line filters ie 60amps. So UPS is utilized for 69% only. **Warning** : No margin left to add any more units on this UPS.

Actual Measured Current = 31.2+31.6+30.9+59.6 = 153.3 – 12(NAS) = 141.3 = ~145Amps

Old Readings follows

Current Drawn Status as on : 20/06/2018

A. The following changes have been done today (AAD/HVK/IMH) :

1. GWB Rack3 (5.6amps) moved to UPS2 from UPS1 (MCB-225)
2. GWB Rack4 (6.6amps) moved to UPS3 from UPS1 (MCB-311 extra added)
3. POCO+ racks (1.9amps) moved to UPS3 from UPS1 (MCB-312 extra added)
4. Tube lights(7.1amps) moved to raw power(MSEB) from UPS1.

B. After these changes, the current drawn status on UPS 1,2&3 is as follows in Amps;

	<u>UPS1</u>	<u>UPS2</u>	<u>UPS3</u>	<u>Total</u>
without correlator running	26.4	45.2	33.9	105.5
with correlator running\$	50.5*	59.1	39.0	148.6
	DisplayBad	74%	82%	.

- \$ This is the typical current under the mode “400MHz/16Kchannels/Full stokes” and current drawn may increase with other modes on UPS1 , 2 & 3.
- * - machines like raw data, spare GWB machines are in off condition (on UPS1).

Note : Earlier it has been observed, the current drawn from all the 3 UPS together was 167amps.

Current Drawn Status as on : 19/06/2018 (Before the changes done on 20th June 2018)

Note : MCB No. -- First/Second/Third Digits – UPS No./Row No. in MDB/MCB No. respectively.

With load : means the system(s) is being used for tests/observations (correlation programs running).

UPS 1 : 20KVA(86.9Amps) 80%=69.5Amps(max.). But due to AC line filter max. 60Amps only				
MCB No.	Current w/o load	Current with load	Load connected to the MCB	Remarks.
UPS o/p	44.1	71.8		Max. 77amps(88%)
111	8.1	14.0	GWB Rack 1 : 5 m/c's & 4 ROACH	
112	5.9	11.6	GWB Rack 2 : 4 m/c's & 4 ROACH	On 20/06/2018
113	5.3	5.6	GWB Rack 3 : m/c's -5, s/w's, HDDs, Infini s/w, etc..	Move to UPS2
114	0.1	0.2	E.B. @ Opposite GWB racks spare..	
121	6.0	6.6	GWB Rack 4 : 5 m/c's,2Temp m/c's +	Move to UPS3

122	6.7	12.4	GWB Rack 5 : 4 m/c's & 4 ROACH	
123	5.9	11.5	GWB Rack 6 : 4 m/c's & 4 ROACH	
124	1.7	1.9	POCO(R720-1, R210-1, Roach-2, T620-1, Trig+Clk – 1 etc..	Move to UPS3
12a	7.1	7.3	Tube lights	Move to raw power (MSEB)

UPS 2 : 20KVA(86.9Amps) 80%=69.5Amps(max.). But due to AC line filter max. 60Amps only				
MCB No.	Current w/o load	Current with load	Load connected to the MCB	Remarks.
UPS o/p	39.7	46		Max. 55amps(64%)
211	5.0	7.7	GSB rack-2(EB3) : Compute Nodes 27 to 32 (6 nos)	
212	4.9	5.1	GSB rack-3(EB1) : Compute Nodes 36 to 42 (7 nos)	
213	4.2	5.9	GSB rack-2(EB1) : ADC Nodes 17 to 20 & S/W - 3nos	
214	2.0	2.1	GSB EXT 1 : GSB rack fans & HDD's – 2 nos.	
215	0.1	0.2	GSB EXT 2 : GSB rack fans & Tempr monitors	
216	2.5	2.6	EXT 26 : Nodes 52 to 54 and Casper Server m/c's – 3, corr. w/p m/c -1, Online m/c -1 nos, & .5 n/w eth S/W – no.	
217	1.4	1.5	EXT 27 : Spare	
218	0.1	0.2	Lamps : Lamps	
219				
21a	0.1	0.2		
21b	0.1	0.2	EXT 3 : Spare behind GSB racks..	
221	4.8	4.9	GSB rack-3(EB2) : Compute nodes 43 to 48 (6 nos)	
222	5.0	7.7	GSB rack-2(EB2) : Compute nodes 21 to 26 (6 nos)	
223	4.5	4.7	GSB rack-3(EB3) : Compute nodes 33 to 35 (3 nos) & s/w – 2 nos.	
224	0.1	0.2		
228	0.9	1.1	Lamps : ROW2(Bottom), MCB No. 8	

UPS 3 : 12.5KVA(54.3Amps) 80%=43.44Amps(max.)				
MCB No.	Current w/o load	Current with load	Load connected to the MCB	Remarks.
UPS o/p	27.0	27.4		Max. 35Amps(68%)
311	0.1	0.4	GSB EXT 1 : HDD's	
312	3.4	3.7	GSB rack-1(EB1) : ADC Nodes 1 to 7 and PPM/CLK unit – 1 and Distribution units -2 nos.	
313	3.6	3.9	GSB rack-1(EB2) : ADC Nodes 8 to 16 and one spare	

			(10nos)	
314	1.5	1.6	EXT 2 : Node51, R210 PC monitor, gsbm5, gsbm6, HDDs and 5/12 volts P.S. - 1no.	
315	6.4	6.4	GSB rack-4(EB3) : Compute Nodes 49 & 50, s/w -1 and CITA4 to CITA7 and cat5 S/W-1no. N111, N112 and N114.	
316	2.5	2.7	GSB EXT 4 : gsbm1 to gsbm4, HDDs	
317	3.0	3.1	GSB rack-4(EB2) : N113, N115 to N118, CITA1 to CITA3	
318	3.5	3.5	GSB rack-4(EB1) : CITA4 to CITA7 and cat5 S/W-1no.	