

INTERDEPARTMENTAL

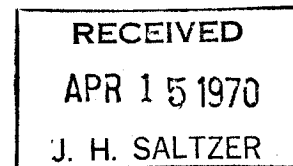
MASSACHUSETTS INSTITUTE OF TECHNOLOGY CAMBRIDGE, MASS. 02139

from the office of

Information Processing Center

April 14, 1970

Prof. F. J. Corbato
Prof. J. H. Saltzer



Re: 645 Electrical Problems

Although my file is not as complete as it could be, I am attaching copies as per your request.

As of this date we have:

1. Moved all DSU 270 hardware to PLT 9-8
2. Eliminated grounding imbalances (wire size and loops)
3. Removed old ground wires

We have not:

1. Run a new building ground to the basement
2. Completed the load leveling by phase on panels 9-6 and 9-7

I hope you can get some value from the attached.


Wes Burner

WJB/prm
Attachment

From
MURAN BOSTON

Memo to

① DFE's
19-5 → 3-9-8

② Run ground
to basement

③ Perform swap
on 9-7.

38

Room
to balance load
Room

④ #10-9-6 → # 9-7

⑤ Find 2 Amp
on 9-6 float.

Ext.

19

PLT 9-4 (Left Panel)

CKT	UNIT	BLACK A	RED B	BLUE C	BREAKER	NOTES
1		0				
2		2				2A on Neutral
3			0			
4			0			
5				0		
6				0		
7		0				
8		0				
9			0			
10			0			1A on Neutral
11				0		
12				0		
13		0				
14		0				7A on Common
15			0			Neutral on
16			0			circuits 7
17				7.5		and 14
18				0		
29		0				
30		1.5				1.5A on Neutral
31			0			
32			0			1.5A on Neutral
33				0		
35		<u>0</u>	<u>—</u>	<u>—</u>		
		3.5	0	7.5		
TONG Readings on MAINS		3.2	2.0	15.0		
Neutrals = 10.5		Bonds = 0				

PLT-9-4 (Right Panel)

CKT	UNIT	BLACK A	RED B	BLUE C	BREAKER	NOTES
1		2.4			1P	1A on Neutral
2		2.0			1P	2.8A on Neutral
3			3.0		1P	1A on Neutral
4			2.3		1P	2.8A on Neutral
5				3.5	1P	1A on Neutral
6				2.3	1P	2.5A on Neutral
7		2.5			1P	2.5A on Neutral
8		3.0				3.5A on Neutral
9			2.0		1P	2.5A on Neutral
10			3.4		1P	3.5A on Neutral
11				4.0	1P	4.0A on Neutral
12					1P	
13		4.5			1P	4.7 on Neutral
14					1P	
15			0		1P	4.7 on Neutral
16						
17						
18						
19						
20						
21						
22						
23						
24						
		14.4	10.7	9.8		
	Tong Reading on MAINS	16.5	10	9.5		
	Neutrals = 6.5		Bonds = 0			

111

PLT 9-5

Power from PDP 150A Breaker CKT #4

CKT #	UNIT	BLACK A	RED B	BLUE C	BREAKER	NOTES
1	DSE 270 (First Group)	-	38.0	38.0	3P	
2	FHD-B Chiller	19.0	24.0	19.0	3P	
3	Handler A	7.0	9.0	7.0	3P	
4	Handler B	1.5	3.5	1.8	3P	
5	Handler C	1.5	3.0	1.0	3P	
6	Handler D	1.4	4.0	1.7	3P	
7	Handler E	1.0	3.0	1.5	3P	
8	Handler F	6.2	9.5	7.0	3P	
9	Handler J	1.0	3.0	1.5	3P	
10	Handler K	1.0	3.4	1.5	3P	
11	Handler L	1.0	3.0	1.0	3P	
12	Handler M	1.5	3.3	1.6	3P	
13	Tape Controller	11.6	10.5	6.4	3P	
14	DSC-270	1.5	2.3	2.0	3P	
		<u>55.2</u>	<u>119.5</u>	<u>91.0</u>		

Tong Readings at MAINS

70

122

86

Neut. 19.5

Bond 0

All Neutrals 1

All Bonds 0

READINGS TAKEN AT 10:30 TO 12:00 AND 12:30 TO 2:00

on 3/16/70

PLT 9-6

Own Main 225 AMP BREAKER

CKT	UNIT	BLACK A	RED B	BLUE C	BREAKER	NOTES
1	DS-10B	0	0	0	3P	
2	DS-10C	15.0	10.0	10.0	3P	
3	FHD-A Electronics	1.0	0	0	3P	
4	DS-10A	11.5	10.8	15.0	3P	
4.5	DS-10 Electronics	3.5	-	-	1P	
5	Card Reader B	0	0	0	3P	
7	Printer B	10.0	5.4	6.5	3P	
8	Punch B	0	0	7.5	3P	
9	Punch A	0	0	0	3P	
✓ 10	FHD Controller B	3.2	3.2	3.5	3P	
11	Card Reader A	0	0	0	3P	
12	FHD B Electronics	4.5	5.5	4.6	3P	
13	Printer A	8.7	5.4	6.5	3P	
14	Peripheral Switch	0	0	-	2P	
15	FHD-B	27.5	32.0	27.5	3P	Blk wire loose
16	FHD-A	<u>22.5</u>	<u>25.0</u>	<u>23.0</u>	3P	
		107.4	97.3	104.1		

TONG READINGS AT MAIN

100 90 103 Neutral 8.5 Bond

(not tight) 0

All Neutrals = 0

All Bonds = 0 A

PLT 9-8

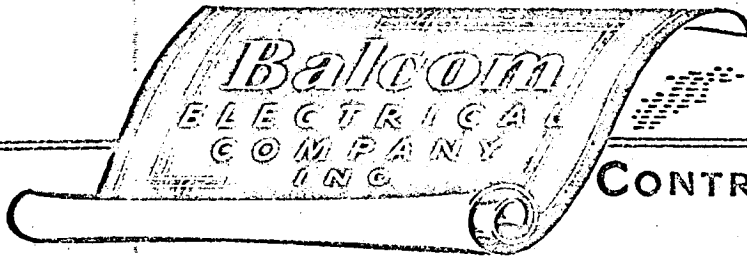
CKT	UNIT	BLACK A	RED B	BLUE D	BREAKER	NOTES
1	DSE 270 (second group)	36.0	36.0			
2	DSE 270 (third group)	36.0		36.0		
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
		72.0	36.0	36.0		

Tong Readings at MAIN 60.0 35.0 35.0

Neutral 0 Bond 0

All Neutrals = 0

All Bonds = 0



CONTRACTORS

3/9

27 IRVING COURT
MALDEN, MASS. 02148

324-5130
324-8780

February 25, 1970

*For 3/10
9:00 AM
Meeting*

Mr. Michael V. Solomita
Information Processing Center
Building 39
M.I.T.
Cambridge, Massachusetts 02139

Dear Mr. Solomita:

As you requested the following work has been performed at Project MAC on the 9th Floor:

- A. A trace of the ground system was done; a schematic is attached showing the distribution of power from the Main Buses to the various panels, transformers, and the Motor Generator. (Please note that the red lines indicate what we suspect as possible problem areas. A summary of these problem areas is given below.)
- B. Readings were taken on February 23, 1970, at 10 a.m. to check the balancing of the Motor Generator Unit. Panel PLT9-7 which is connected directly to the M/G unit was used for recording these readings. The breaker sizes, the unit associated with the breakers, and the readings from each of the 3 phases is attached. It is obvious now why the neutral bus has such a high current, a rebalancing is needed between legs. I would like to point out that we had balanced the load in this panel late last year and were within 5 amps of balance. I now understand that some units were removed since that time which explains the unbalanced condition that now exists.

SUMMARY OF GROUND PROBLEMS

These are recommendations that may help to eliminate the grounding problems that exist now:

1. The ground wire between the main ground bus and the ground point of the MDP should be the same size wire as the main ground bus.
2. The feeder from the MDP to the 100A 3Ø CB and to the 75 KVA transformer should have a ground wire added in the conduit; this would then ground the 75 KVA transformer, the meter, and the 100A 3Ø CB.

The ground wire should be a #2 wire to be consistent with the secondary copper of the transformer.

3. The ground "daisy chain" should be eliminated between PLT9-6 and PLT9-7.
4. The M.G. prime mover should be grounded by bringing a ground conductor, the same size as the generator output from the MDP ground bus to the prime mover of the M.G. unit. The ground for PLT9-7 should be tied onto this ground.
5. The A.C. Motor Control Center feeding the fans, chillers, and pumps should also have a ground.
6. Remove jumper in Main Switch Board located in basement, the jumper now runs from Neutral to ground and frame ground. The tie point should be made closer to the entrance of the ground wire and neutral bus as they come into the building.
7. A separate ground could be run from all the Computer Equipment to the Main Ground in the basement.

We are still conducting readings on the neutral bus and the three phases with a 24 hour Amp Probe recorder; the results of these readings should be available in about a week.

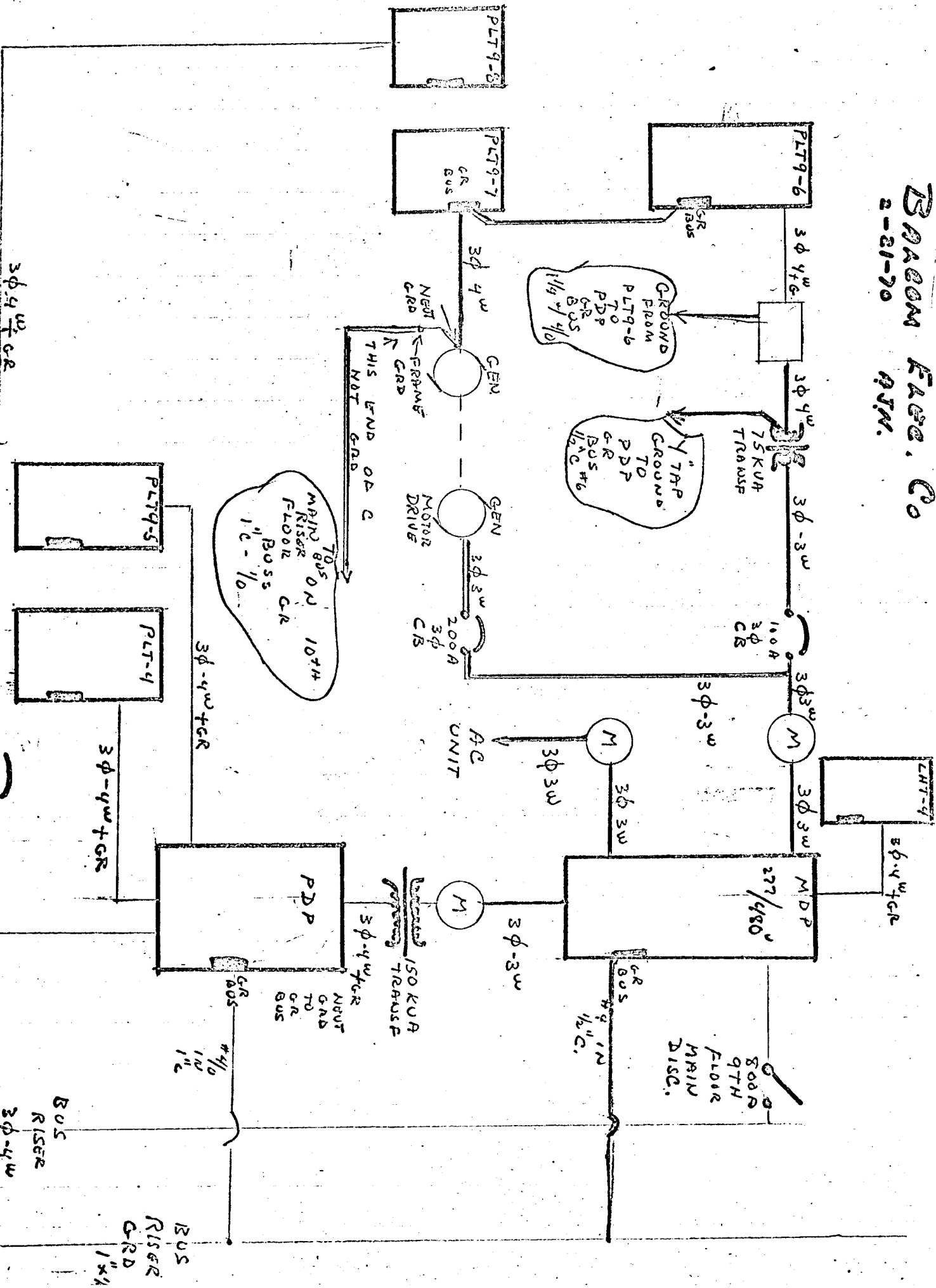
If I can be of any further assistance, please feel free to call me.

Sincerely,

Al Nadeau

AN/dlh

cc: Roger Balcom



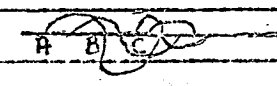
RED LINES INDICATE PROBLEM AREAS.

ONE LINE BUS OF POWER DIST

BY THE LINE BUS MAN

READINGS TAKEN ON FEBRUARY 23, 1970 at 10 A.M.

PLT9-7

1	Sequence	A	B	C	BREAKER	
		0			IP	
2	Console B		3		IP	Since all ϕ are 120° out of phase with each other than it's difference is the additive between phases which appear on the neutral
3	Console C			3	IP	
4	Memory G	6	5	6	3P	
5					3P	
6	GIOC A	21	23	26	3P	
7	GIOC B	25	22	30	3P	
8	CPU A	15	15	15	3P	
9	Memory F (Ext)	6	5	7	3P	
10					3P	Difference A to B - 1.5
11	Memory F (Int)	7.5	12	7.5	3P	A to C - 9.0
12					3P	B to C - 7.5
13	CPU B	16	16	16	3P	18.0
14	Memory G (Int)	9.5	5.5	7	3P	
15	FHD Controller A	3.5	4	3.5	3P	
16	Memory H (Int)	11	7.5	7	3P	
17	Memory H (Ext)	2.5	6.5	4	3P	
18					3P	
		123	124.5	132		

TONG READING AT MAINS

130 120 130

Neut 18

10A difference x 1.72 or 17.3A