

**PAN-AM POOL
WINNIPEG, MANITOBA**

**ELECTRICAL SYSTEM
SHORT CIRCUIT AND CO-ORDINATION STUDY**

PREPARED BY
MANENGCO ENGINEERING
218-530 Century Street
Winnipeg, Manitoba
R3H 0Y4

October 28, 1999

Re-issued October 28, 1999
Supersedes Final Report issued on June 30, 1999



MANENGCO ENGINEERING

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**SHORT CIRCUIT AND CO-ORDINATION STUDY
PAN-AM POOL
WINNIPEG, MANITOBA**

SECTION A

SUMMARY REPORT

1.0 INTRODUCTION:

This short circuit and co-ordination study was prepared for the electrical distribution system at Pan-Am Pool, Winnipeg, Manitoba.

The purpose of the study was to:

- .1 Determine the maximum available short circuit current magnitudes at all distribution points.
- .2 Establish the capability and suitability of equipment and protective devices to withstand the maximum available short circuit currents.
- .3 Examine the degree of protective device co-ordination and establish settings for selective tripping for all main and feeder breakers in the event of fault.

2.0 OBSERVATIONS:

.1 Short Circuit Study Results:

Short circuit study calculations show that based on nameplate and published rating information, the electrical system protective device, except as noted in section 4 components can safely withstand and, when required, interrupt the maximum fault currents which can occur.

Section 4.0 summary table shows some breakers at node 60 to be unacceptable.

*Deemed unacceptable because the maximum calculated symmetrical fault current at the breaker terminals is slightly higher than the breaker capability. In the case of a fault occurring close to the breaker load terminals, the breaker may not satisfactorily interrupt the available fault current. As the distance from the fault to the breaker increases the fault current decreases and at some point will be less than breaker capability..

.2 Co-ordination Study:

Setting of protective devices in accordance with drawing tabulations will result in selective co-ordination, except as follows:

Drawing 98242-2

Breaker B-MD-TRY Y co-ordination curve does not co-ordinate with TR-YY transformer 12X inrush current (see section 3.3.4(a)).

The same condition applies to breaker B-MD-TRXX and transformer TR-XX.

Drawing 98242-3

There is slight overlapping between breaker B-A-TRN and breaker B-TRN-B in the instantaneous region.

Transformer TR-N 12X inrush current may trip the breaker B-A-TRN (see section 3.3.4(a)).

3.0 BASIS OF STUDY

.1 Input Data

- .1 Utility information provided by utility has been used.
- .2 The actual impedance value for all transformers as provided by equipment supplier has been used
- .3 Motor contribution to the fault level has been assumed to be **25% of transformer capacity** in accordance with standard practise for commercial and institutional type systems.

.2 References

Single Line Diagram - Scouten Mitchell Sigurdson.
Shop Drawings - Schneider.

3. Co-ordination Curves

The-co-ordination curves and related single line diagrams are shown on Manengco Engineering drawings 99042-S1, 99042-S2 and 99042-1 to 99042-4.

The curves show the following:

- .1 Time-current characteristics at the optimum setting for protective devices associated with 600V and 208V feeders and subfeeders.
- .2 On the drawings, the curves plotted for the protective devices, terminate at the co-ordinates which represent the maximum available fault levels at the device locations on the system.
- .3 Full load transformer currents.
- .4 Transformer damage and inrush current curve values:
 - a) Inrush factors were taken as 12X rated values in accordance with CSA22-1-98 Rule 26-256 Appendix B.
 - b) Transformer damage curves are shown on the curve drawings for the line to ground, line to line and the three phase fault conditions.

4.0 EQUIPMENT SHORT CIRCUIT SUITABILITY

NODE NO.	IDENTITY	EQUIPMENT TYPE	NAMEPLATE CAPABILITY	MAXIMUM AVAILABLE CALCULATED FAULT CURRENT	REMARKS
11	Main distribution	F.P.E.Switchboard	25000 A	15856 A	Acceptable
11	B-Main	F.P.50H-2 Breaker	50000 A	15856 A	Acceptable
11	All CJL-E Bre.on MD	F.P.CJL-E Breakers	25000 A	15856 A	Acceptable
11	All CE-N Bre.on MD	F.P.CE-N Breakers	25000 A	15856 A	Acceptable
11	ALL CJM-E Breakers	F.P. CJM-E Breakers	25000 A	15856 A	Acceptable
11	ALL NJL Breakers	F.P.E. NJL Breakers	25000 A	15856 A	Acceptable
13	Panel A	F.P.E. NBLP panel	22000 A	04616 A	Acceptable
14	PRL4 panel A	W.H. PRL4 panel	22000 A	10020 A	Acceptable
121	CDP panel XX	F.P.E. CDP panel	42000 A	16402 A	Acceptable
122	panel K	F.P.E. NBLP panel	22000 A	10572 A	Acceptable
123	panel L	F.P.E. NBLP panel	22000 A	10353 A	Acceptable
124	panel M	F.P.E. NBLP panel	22000 A	10142 A	Acceptable
125	panel N	F.P.E. NBLP panel	22000 A	09938 A	Acceptable
126	panel B	F.P.E. NBLP panel	22000 A	05808 A	Acceptable
127	panel K2	F.P.E. NBLP panel	22000 A	02250 A	Acceptable
128	panel R	F.P.E. NBLP panel	22000 A	10684 A	Acceptable
129	panel P	F.P.E. NBLP panel	22000 A	11788 A	Acceptable
130	panel OL	F.P.E. NBLP panel	22000 A	10126 A	Acceptable
211	CDP panel YY	F.P.E. CDP panel	42000 A	16655 A	Acceptable
212	panel F	F.P.E. NBLP panel	22000 A	03674 A	Acceptable
213	panel G	F.P.E. NBLP panel	22000 A	03720 A	Acceptable
214	panel D	F.P.E. NBLP panel	22000 A	05711 A	Acceptable
215	panel E	F.P.E. NBLP panel	22000 A	06970 A	Acceptable
216	panel C	F.P.E. NBLP panel	22000 A	12784 A	Acceptable
217	panel H	F.P.E. NBLP panel	22000 A	01897 A	Acceptable
218	panel J	F.P.E. NBLP panel	22000 A	01872 A	Acceptable
219	SS panel	F.P.E. NBLP panel	22000 A	04817 A	Acceptable
171	PRL4 panel A	W.H. PRL1 panel	22000 A	04588 A	Acceptable
173	panel BA	W.H. PRL1 panel	22000 A	03952 A	Acceptable
174	panel BB	W.H. PRL1 panel	22000 A	03998 A	Acceptable
175	panel BC	W.H. PRL1 panel	22000 A	04171 A	Acceptable
176	panel BD	W.H. PRL1 panel	22000 A	03907 A	Acceptable
177	panel BE	W.H. PRL1 panel	22000 A	03817 A	Acceptable
60	All CE-B breakers	F.P. CE-B breakers	14000 A	14790 A*	Unacceptable
60	All MP breakers	F.P. MP breakers	**	14790 A	-----
60	All FDP breakers	W.H. FDB breakers	14000 A	14790 A*	Unacceptable
60	All FB breakers	W.H. FB breakers	14000 A	14790 A*	Unacceptable
60	All JA breakers	W.H JA breakers	22000 A	14790 A	Acceptable
60	All FA breakers	S.D. FA breakers	14000 A	14790 A*	Unacceptable
60	All HMCP breakers	W.H. HMCP breakers	25000 A	14790 A	Acceptable
60	All HP breakers	W.H. HP breakers	**	14790 A	-----
121	All NJL breakers	F.P.E. NJL Breakers	25000 A	16402 A	Acceptable
121	All FKDL breakers	F.P. FKDL Breakers	25000 A	16402 A	Acceptable
121	All FKGL breaker	F.P. FKGL Breakers	25000 A	16402 A	Acceptable
50	All KAL Breakers	S.D. KAL breakers	25000 A	14311 A	Acceptable
14	All FDB Breakers	W.H. FDB breakers	14000 A	10020 A	Acceptable
14	All FB Breakers	W.H. FB breakers	14000 A	10020 A	Acceptable
14	All JD Breakers	W.H JD breakers	25000 A	10020 A	Acceptable
16	AllHMCP/HP Breakers	W.H. HMCP/HP breakers	25000 A	09820 A	Acceptable

**Name plate fault capability is not available.

5.0 PROTECTIVE DEVICE ADJUSTABLE SETTINGS

BREAKERS

NODE NO.	IDENTITY	EQUIPMENT TYPE	LTPU	LTD	STPU	STD	INST	CT	PU	DEL.
11	B-THY-MD	F.P. 50H-2 Breaker	1.10	30.0	4.0	0.25	12.0			
11	B-MD-P60	F.P. CJM-E Breaker					5.0			
11	B-MD-TRY	F.P. CJL-E Breaker					5.0			
11	B-M-NEW	F.P. CL-E Breaker					5.0			
14	B-A-TRN	W.H. JD Breaker					5.0			
171	B-TRN-MCC1	W.H. DK Breaker					5.0			
60	B-60-PRP	W.H. JA Breaker					5.0			
14	B-A-MCC2	W.H. JD Breaker					5.0			

**SHORT CIRCUIT AND CO-ORDINATION STUDY
PAN-AM POOL
WINNIPEG, MANITOBA**

SECTION B

**SHORT CIRCUIT STUDY DOCUMENTATION
Short Circuit Output Data**

NODE LABEL	VOLTS @NODE	NO PH	MOT/GEN STATUS	CALC TYPE	PER.UNIT -REACTN-	PER.UNIT -RESIST-	X / R RATIO	-SYMMT-CURRENT	-ASSYM-CURRENT
1 UTILITY	4,160	3	NEITHER MOTOR	3PH 3PH	0.00399 0.00396	0.00033 0.00033	12.000 11.932	34,697 34,886	43,430 43,644
10 THYD	600	3	NEITHER MOTOR	3PH 3PH	0.05546 0.05121	0.00769 0.00723	7.216 7.080	17,185 18,606	20,363 21,995
11 MD	600	3	NEITHER MOTOR	3PH 3PH	0.06530 0.05941	0.01389 0.01239	4.700 4.796	14,413 15,856	16,154 17,819
12 MD-TRXX	600	3	NEITHER MOTOR	3PH 3PH	0.06724 0.06135	0.01512 0.01361	4.448 4.507	13,962 15,312	15,533 17,065
13 PANEL AA	600	3	NEITHER MOTOR	3PH 3PH	0.09953 0.09364	0.18777 0.18626	0.530 0.503	4,528 4,616	4,528 4,616
14 PRL4 PANEL A	600	3	NEITHER MOTOR	3PH 3PH	0.09517 0.08928	0.03689 0.03538	2.580 2.523	9,427 10,020	9,828 10,423
15 UNIT HEATER	600	3	NEITHER MOTOR	3PH 3PH	0.11769 0.11180	0.42980 0.42830	0.274 0.261	2,159 2,174	2,159 2,174
16 MCC2	600	3	NEITHER MOTOR	3PH 3PH	0.09635 0.09046	0.03915 0.03765	2.461 2.403	9,252 9,820	9,602 10,170
17 MCCTRN	600	3	NEITHER MOTOR	3PH 3PH	0.09561 0.08972	0.03774 0.03623	2.534 2.476	9,361 9,944	9,742 10,327
21 MD-TRYX	600	3	NEITHER MOTOR	3PH 3PH	0.06673 0.06083	0.01479 0.01329	4.511 4.579	14,079 15,454	15,694 17,260
50 MD-VPMCC	600	3	NEITHER MOTOR	3PH 3PH	0.07006 0.06417	0.02127 0.01977	3.293 3.246	13,142 14,331	14,070 15,316
60 MCC1	600	3	NEITHER MOTOR	3PH 3PH	0.06912 0.06323	0.01683 0.01533	4.106 4.125	13,526 14,790	14,890 16,292
120 TR-XX	208	3	NEITHER MOTOR	3PH 3PH	0.15510 0.14921	0.03464 0.03314	4.477 4.503	17,466 18,161	19,449 20,238
121 CDP PANEL XX	208	3	NEITHER MOTOR	3PH 3PH	0.16929 0.16339	0.04556 0.04406	3.715 3.709	15,833 16,402	17,205 17,819
122 PANEL K	208	3	NEITHER MOTOR	3PH 3PH	0.21672 0.21082	0.15799 0.15648	1.372 1.347	10,350 10,572	10,403 10,622
123 PANEL L	208	3	NEITHER MOTOR	3PH 3PH	0.21921 0.21332	0.16391 0.16240	1.337 1.314	10,141 10,353	10,187 10,396
124 PANEL M	208	3	NEITHER MOTOR	3PH 3PH	0.22171 0.21582	0.16982 0.16832	1.306 1.282	9,939 10,142	9,979 10,179

NODE LABEL	VOLTS @NODE	NO PH	MOT/GEN STATUS	CALC TYPE	PER.UNIT -REACTN-	PER.UNIT -RESIST-	X / R RATIO	-SYMMT-CURRENT	-ASSYM-CURRENT
125 PANEL N	208	3	NEITHER MOTOR	3PH 3PH	0.22420 0.21831	0.17574 0.17424	1.276 1.253	9,744 9,938	9,779 9,970
126 PANEL B	208	3	NEITHER MOTOR	3PH 3PH	0.35283 0.34693	0.33025 0.32874	1.068 1.055	5,744 5,808	5,752 5,815
127 PANEL K2	208	3	NEITHER MOTOR	3PH 3PH	0.39133 0.38544	1.17334 1.17183	0.334 0.329	2,244 2,250	2,244 2,250
128 PANEL R	208	3	NEITHER MOTOR	3PH 3PH	0.21547 0.20958	0.15503 0.15353	1.390 1.365	10,457 10,684	10,514 10,738
129 PANEL P	208	3	NEITHER MOTOR	3PH 3PH	0.20423 0.19834	0.12840 0.12690	1.591 1.563	11,506 11,788	11,616 11,893
130 OL PANEL	208	3	NEITHER MOTOR	3PH 3PH	0.23646 0.23057	0.14976 0.14826	1.579 1.555	9,917 10,126	10,009 10,214
170 TR-N	208	3	NEITHER MOTOR	3PH 3PH	0.58279 0.57689	0.17693 0.17543	3.294 3.289	4,557 4,603	4,879 4,927
171 PRL4 PANEL B	208	3	NEITHER MOTOR	3PH 3PH	0.58449 0.57860	0.17824 0.17674	3.279 3.274	4,542 4,588	4,860 4,908
173 PANEL BA	208	3	NEITHER MOTOR	3PH 3PH	0.62225 0.61635	0.33819 0.33669	1.840 1.831	3,919 3,952	3,983 4,015
174 PANEL BB	208	3	NEITHER MOTOR	3PH 3PH	0.61945 0.61356	0.32634 0.32484	1.898 1.889	3,964 3,998	4,036 4,069
175 PANEL BC	208	3	NEITHER MOTOR	3PH 3PH	0.62268 0.61679	0.25133 0.24982	2.478 2.469	4,134 4,171	4,293 4,330
176 PANEL BD	208	3	NEITHER MOTOR	3PH 3PH	0.62504 0.61915	0.35004 0.34853	1.786 1.776	3,875 3,907	3,931 3,963
177 PANEL BE	208	3	NEITHER MOTOR	3PH 3PH	0.63064 0.62474	0.37374 0.37223	1.687 1.678	3,786 3,817	3,832 3,862
210 TR-YY	208	3	NEITHER MOTOR	3PH 3PH	0.15458 0.14869	0.03431 0.03281	4.505 4.532	17,530 18,229	19,536 20,332
211 CDP PANEL YY	208	3	NEITHER MOTOR	3PH 3PH	0.16707 0.16117	0.04393 0.04242	3.803 3.799	16,068 16,655	17,513 18,150
212 PANEL F	208	3	NEITHER MOTOR	3PH 3PH	0.41670 0.41080	0.63564 0.63414	0.656 0.648	3,652 3,674	3,652 3,674
213 PANEL G	208	3	NEITHER MOTOR	3PH 3PH	0.41295 0.40706	0.62677 0.62526	0.659 0.651	3,698 3,720	3,698 3,720

NODE LABEL	VOLTS @NODE	NO PH	MOT/GEN STATUS	CALC TYPE	PER.UNIT -REACTN-	PER.UNIT -RESIST-	X / R RATIO	-SYMMT-CURRENT	-ASSYM-CURRENT
214 PANEL D	208	3	NEITHER MOTOR	3PH 3PH	0.30936 0.30346	0.38120 0.37970	0.812 0.799	5,654 5,711	5,655 5,712
215 PANEL E	208	3	NEITHER MOTOR	3PH 3PH	0.30742 0.30153	0.26162 0.26012	1.175 1.159	6,876 6,970	6,892 6,986
216 PANEL C	208	3	NEITHER MOTOR	3PH 3PH	0.19453 0.18863	0.10901 0.10751	1.784 1.755	12,448 12,784	12,630 12,960
217 PANEL H	208	3	NEITHER MOTOR	3PH 3PH	0.54838 0.54248	1.36059 1.35908	0.403 0.399	1,892 1,897	1,892 1,897
218 PANEL J	208	3	NEITHER MOTOR	3PH 3PH	0.55378 0.54789	1.37926 1.37776	0.402 0.398	1,868 1,872	1,868 1,872
219 SS PANEL	208	3	NEITHER MOTOR	3PH 3PH	0.34555 0.33966	0.46700 0.46550	0.740 0.730	4,778 4,817	4,778 4,817
220 TEMP. MTS	208	3	NEITHER MOTOR	3PH 3PH	0.49429 0.48840	1.17383 1.17232	0.421 0.417	2,179 2,186	2,179 2,186
221 TV2	208	3	NEITHER MOTOR	3PH 3PH	0.36043 0.35453	0.71159 0.71009	0.507 0.499	3,480 3,497	3,480 3,497

**SHORT CIRCUIT AND CO-ORDINATION STUDY
PAN-AM POOL
WINNIPEG, MANITOBA**

SECTION C

CO-ORDINATION STUDY DOCUMENTATION

Single Line Diagram - 99042-S1

Single Line Diagram - 99042-S2

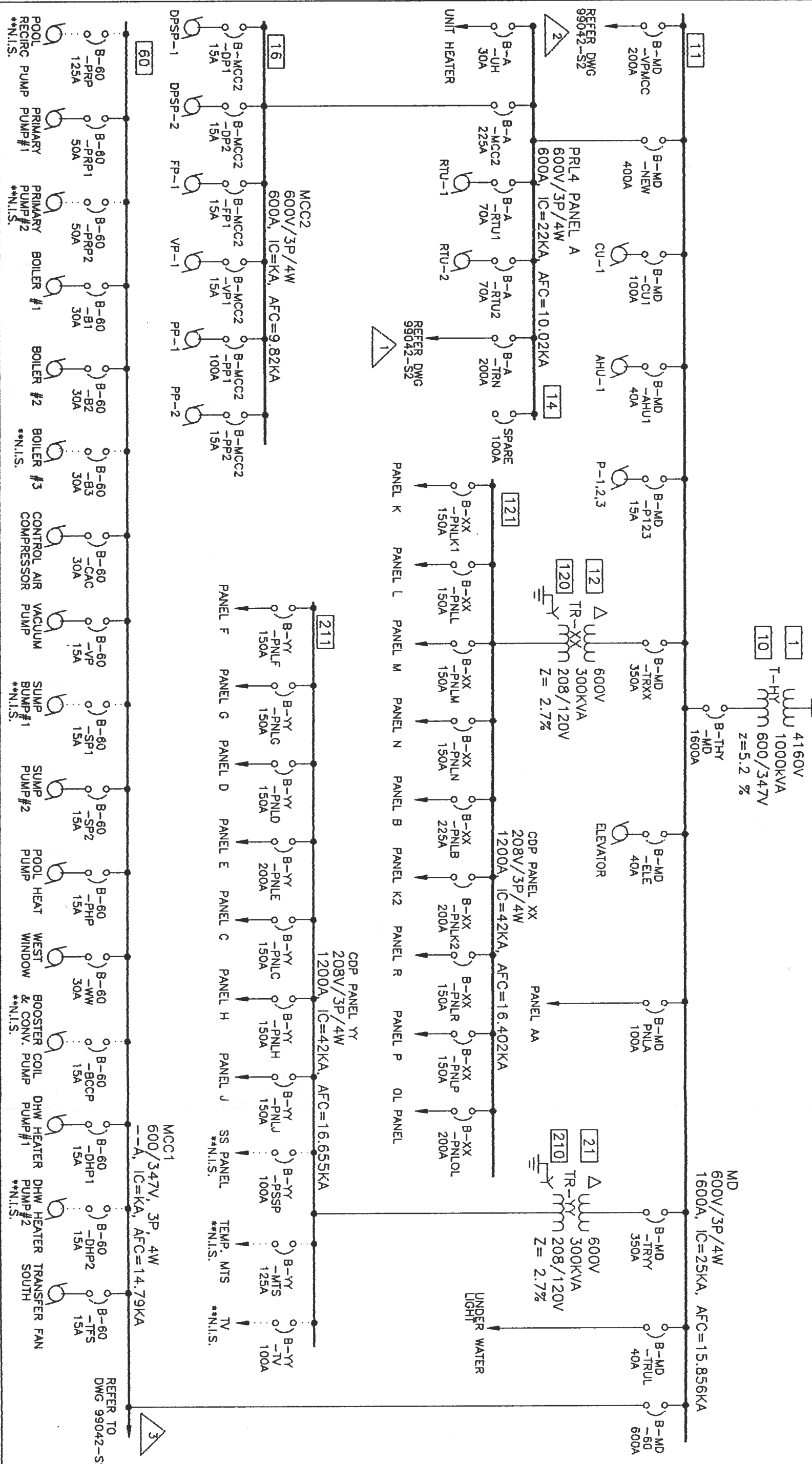
Time Current Curve - 99042-1

Time Current Curve - 99042-2

Time Current Curve - 99042-3

Time Current Curve - 99042-4

**N.I.S. = NOT IN SERVICE



DEVICE IDENTIFICATION: X - Y - Z

B - BREAKER
F - FUSE
R - RELAY

TR - TRANSFORMER
BD - BUS DUCT



CLIENT: WINNIPEG
PROJECT: PAN-AM POOL WINNIPEG, MANITOBA

MAN DISTRIBUTION SINGLE LINE DIAGRAM

OCTOBER 26, 1999

218 - 530 CENTURY WINNIPEG, MANITOBA
R3H 0Y4
Tel. (204) 783-0757
Fax (204) 774-3778

DRN	S.N.	APP	EPD	DWG No
CHKD	DATE			
EPD	MAY 10, 1999			

DWG No 99042-S1

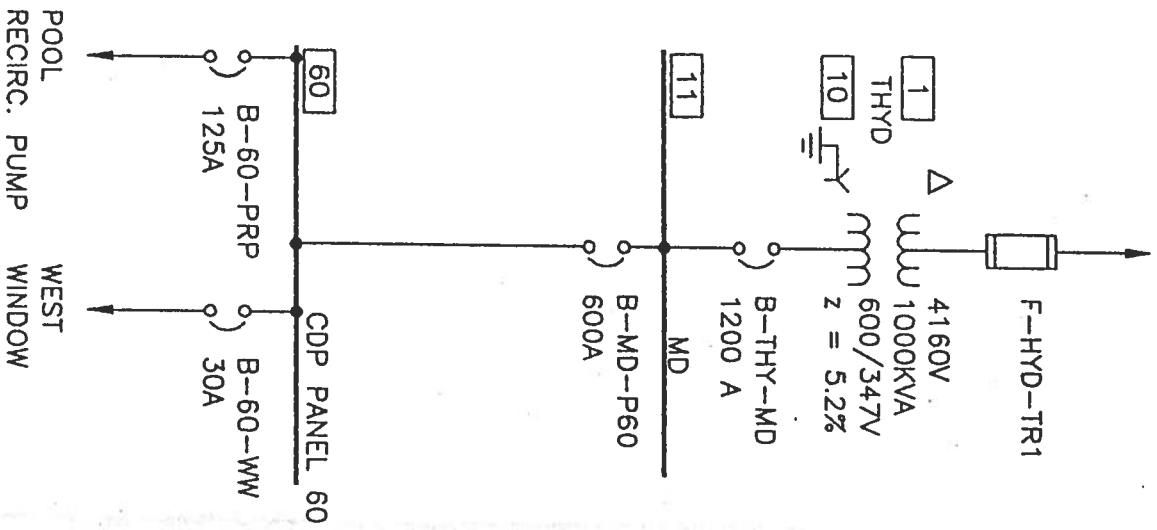
REV 1

FUSE SETTINGS

NoNo.	TYPE	APMS
S&C	K	200A

BREAKER SETTINGS

No.	BRKR TYPE	FRAME	TAP/IR	LTPU	LTD	STPU	STD	INST	NON-ADJUSTABLE	
									W.HOUSE	FB*
B-60-PRP	F.P. 50H-2	1600A							225A	125A
B-60-WW	USR-C	1200A							30A	
B-MD-P60	F.P. CUM-E	600A						5.0		
B-THY-MD	50H-2	1200A		1.10	30.0	4.0	0.25	12.0		



TRANSFORMER DAMAGE CURVES INDICATE: LINE TO GROUND, LINE TO LINE AND THREE PHASE FAULT CONDITIONS WHICH MAY BE ENCOUNTERED.

IC - CONTINUOUS CURRENT (AMPS), IR - PLUG RATING (AMPS), TAP - TAP RATING (AMPS), PS - PLUG SETTING (MULTIPLIER)

DEVICE IDENTIFICATION: X - Y - Z

B = BREAKER
F = FUSE
R = RELAY
S = SOURCE SIDE
L = LOAD SIDE
X = BUS No.
TR = TRANSFORMER
BD = BUS DUCT



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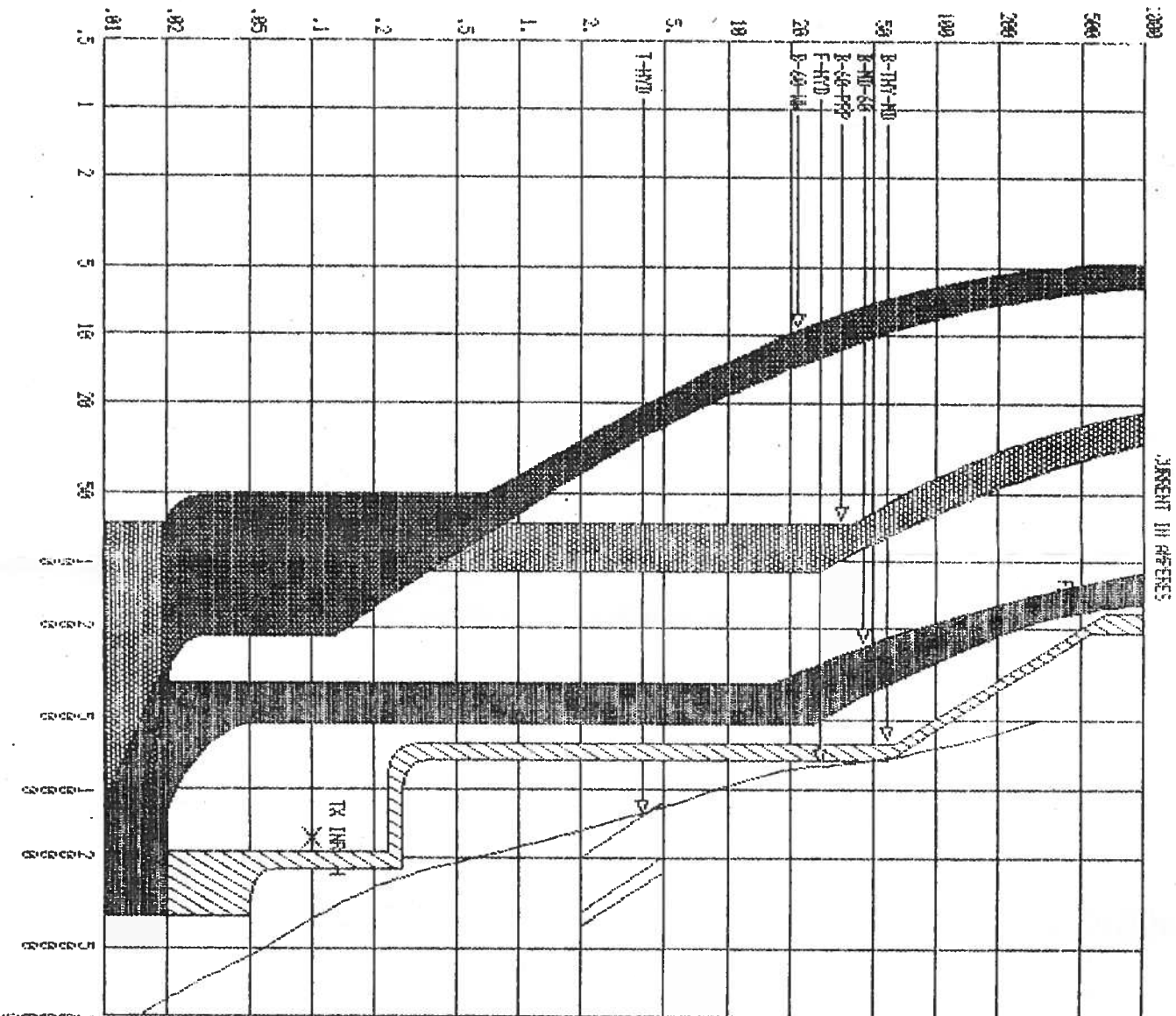
CLIENT:

WINNIPEG

PROJECT:

PAN-AM POOL
WINNIPEG, MANITOBA

SINGLE LINE DIAGRAM AND CO-ORDINATION CURVES



ISSUING 99042-1 PLOT BL: 4188 SCALE: 18"8

DRN	S/N	APP	EPD
CHKD	DATE	MAY 18, 1999	
EPD			

DWG No
99042-1

REV
0

FUSE SETTINGS

NoNo.	TYPE	APMS
S&C	K	200A

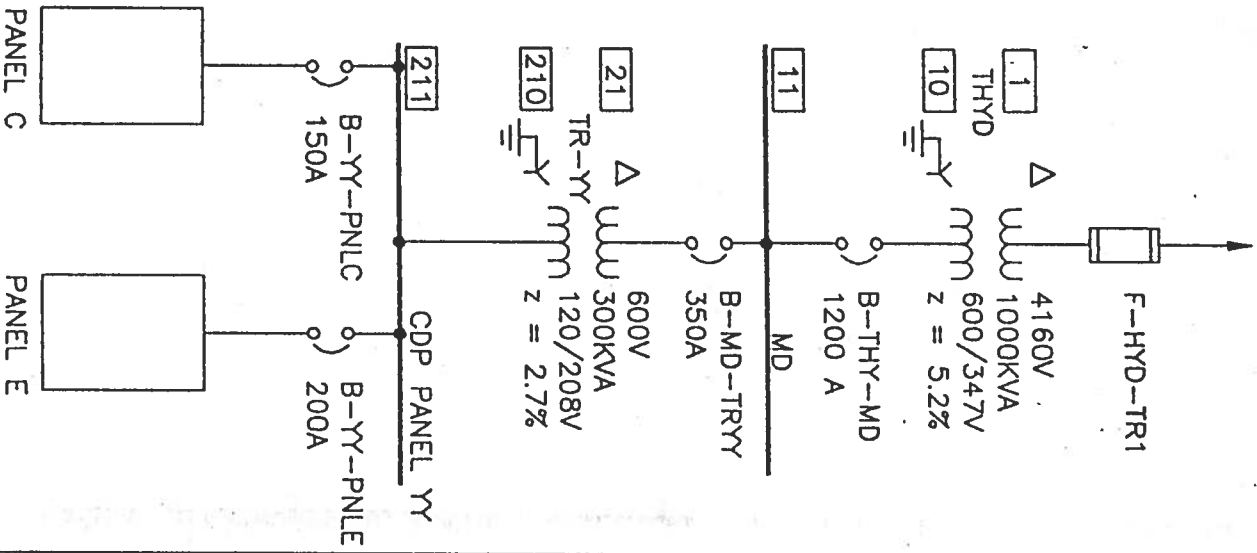
BREAKER SETTINGS

No.	BRKR TYPE	FRAME	TAP/IR	LTPU	LTD	STPU	STD	INST	
									TRIP TYPE
B-THY-MD	F.P. 50H-2	1600A			1.10	30.0	4.0	0.25	12.0
B-MD-TRYY	F.P. CUL-E	400A							5.0
B-YY-PNLC	W.HOUSE FKG*	250A							
B-YY-PNLE	TM	200A							
B-YY-PNLC	F.P.E NUL*	225A							
	TM	150A							

*NON-ADJUSTABLE

TRANSFORMER DAMAGE CURVES INDICATE: LINE TO GROUND, LINE TO LINE AND THREE PHASE FAULT CONDITIONS WHICH MAY BE ENCOUNTERED.

IC - CONTINUOUS CURRENT (AMPS), IR - PLUG RATING (AMPS), TAP - TAP RATING (AMPS), PS - PLUG SETTING (MULTIPLIER)



DEVICE IDENTIFICATION:

'B' - BREAKER
 'F' - FUSE
 'R' - RELAY
 DENOTES SOURCE SIDE
 DENOTES LOAD SIDE
 BUS IDENTIFICATION - 'X' BUS No.
 TRANSFORMER
 'BD' - BUS DUCT



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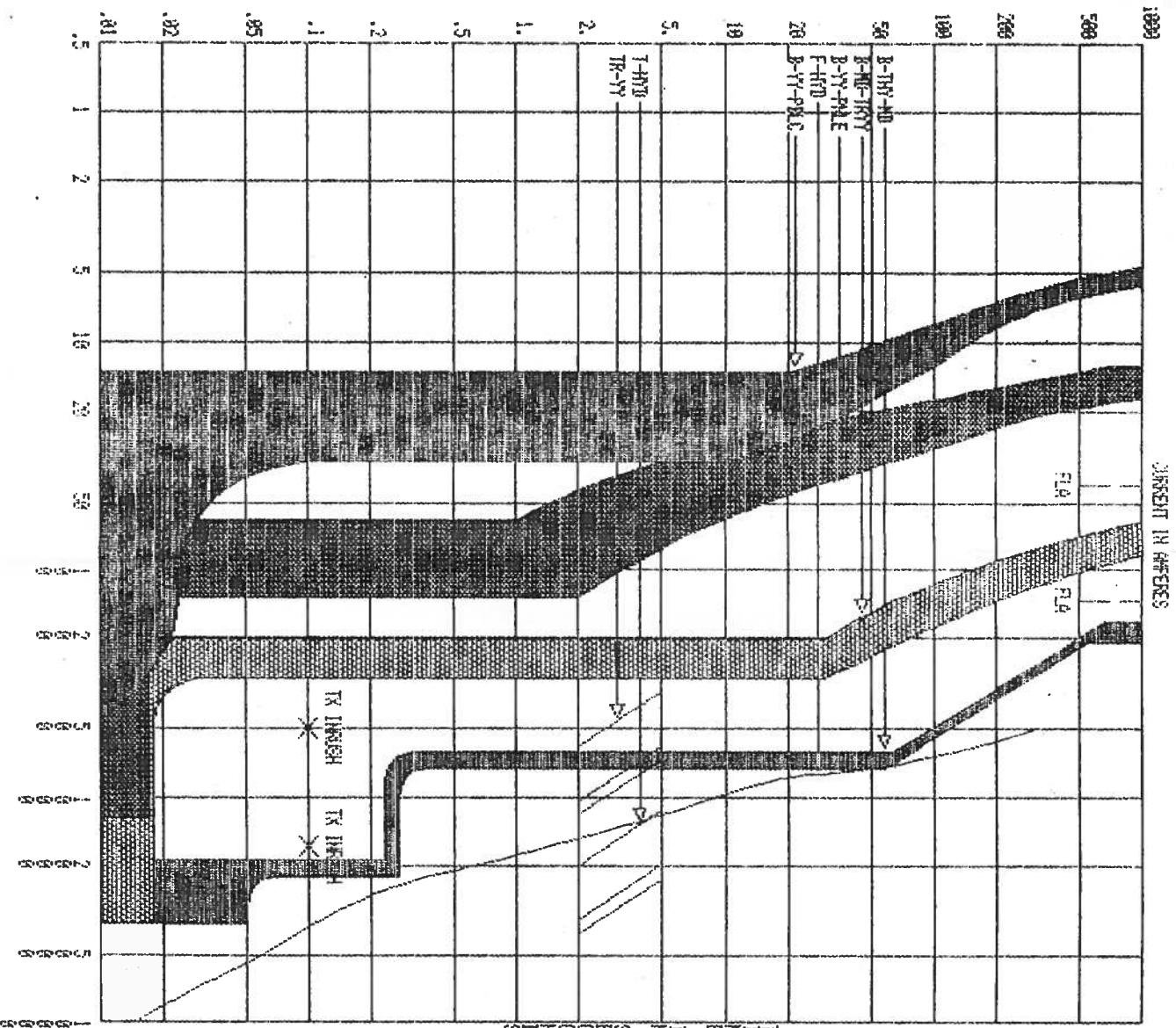
CLIENT:

GROUPE SCHNEIDER CANADA
WINNIPEG
MANITOBA

PROJECT:

PAN-AM POOL
WINNIPEG, MANITOBA

SINGLE LINE DIAGRAM AND CO-ORDINATION CURVES



DRN	APP	DWG No	REV
S.N	EPD	99042-2	0
CHKD	DATE		
EPD	MAY 18, 1999		

FUSE SETTINGS

NoNo.	TYPE	APMS
S&C	K	200A

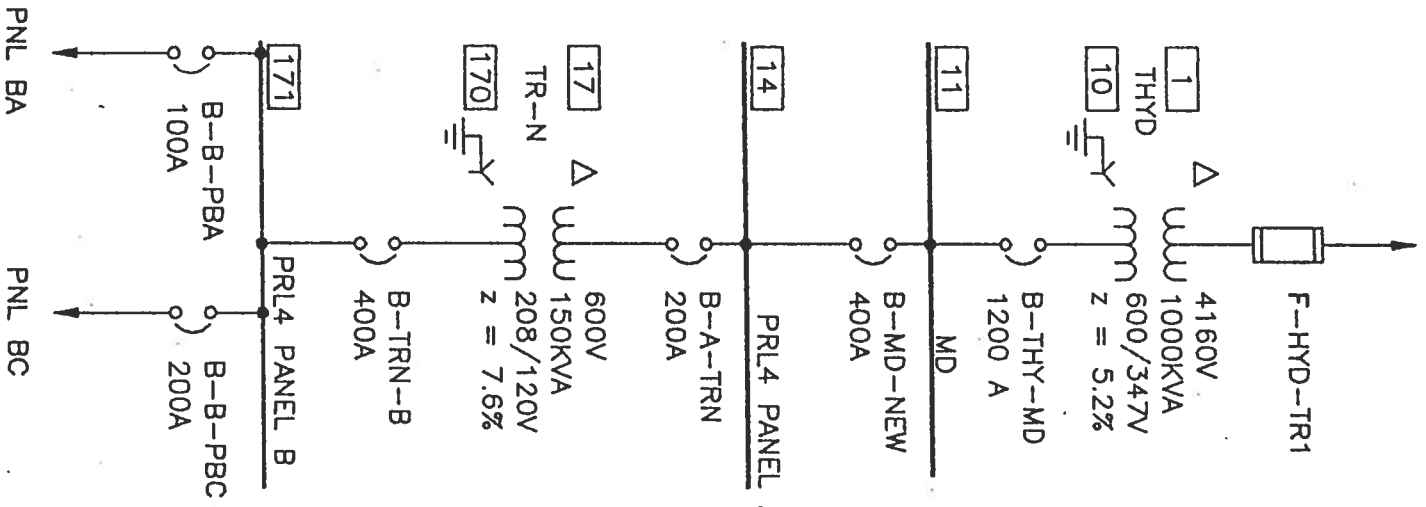
BREAKER SETTINGS

No.	BRKR TYPE	FRAME	TAP/IR	LTPU	LTD	STPU	STD	INST
B-THY-MD	F.P. 50H-2	1600A		1.10	30.0	4.0	0.25	12.0
B-MD-NEW	USR-C	1200A						
B-A-TRN	F.P. CUL-E	400A						5.0
B-TRN-B	W.HOUSE DK	400A						5.0
B-B-PBA	W.HOUSE FD*	225A						
B-B-PBC	W.HOUSE CAH*	100A						
	TM	200A						

*NON-ADJUSTABLE

TRANSFORMER DAMAGE CURVES INDICATE: LINE TO GROUND, LINE TO LINE AND THREE PHASE FAULT CONDITIONS WHICH MAY BE ENCOUNTERED.

IC - CONTINUOUS CURRENT (AMPS), IR - PLUG RATING (AMPS), TAP - TAP RATING (AMPS), PS - PLUG SETTING (MULTIPLIER)



DEVICE IDENTIFICATION: X - Y - Z

'B' - BREAKER
'F' - FUSE
'R' - RELAY
DENOTES SOURCE SIDE
DENOTES LOAD SIDE
BUS IDENTIFICATION - 'X' BUS No.
'TR' - TRANSFORMER
'BD' - BUS DUCT



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R3H 0Y4
Tel. (204) 783-0757
Fax (204) 774-3778

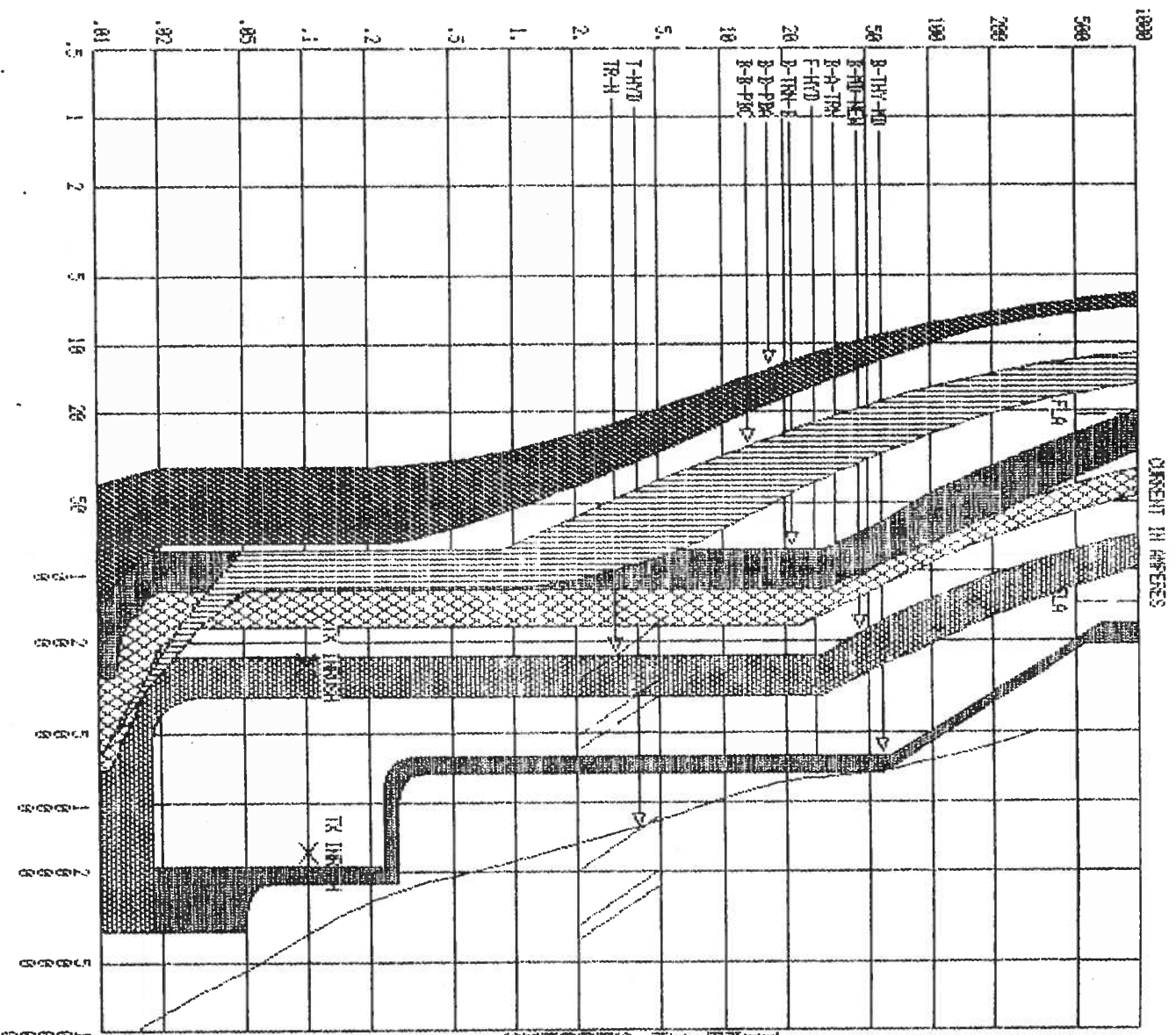
CLIENT:

GROUPE SCHNEIDER CANADA
WINNIPEG
MANITOBA

PROJECT:

PAN-AM POOL
WINNIPEG, MANITOBA

SINGLE LINE DIAGRAM AND CO-ORDINATION CURVES

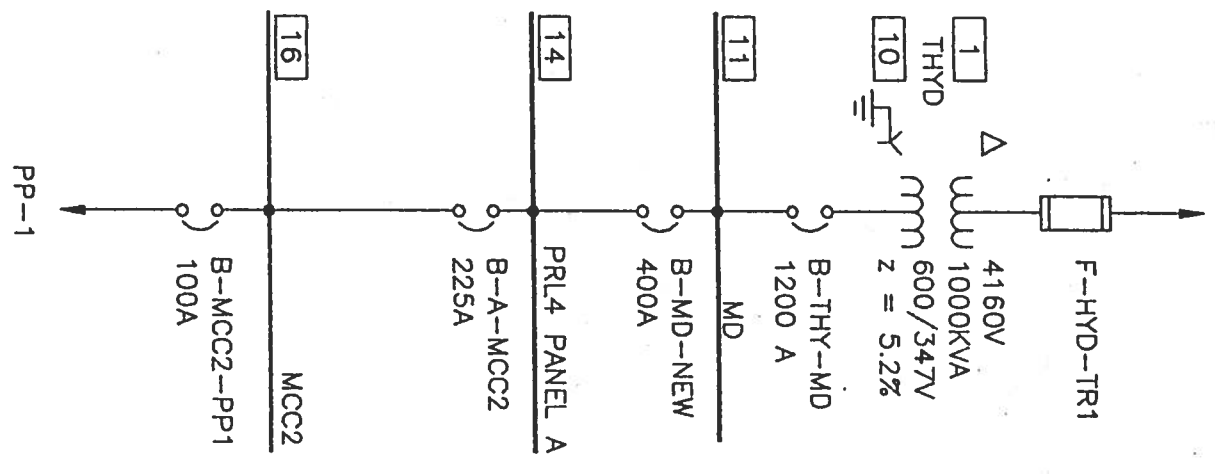


REVISION 99042-3 PLOT BL: 4188 SCALE: 18"8

DRN	S.N	APP	EPD	DWG No	REV
CHKD	EPD	DATE	MAY 18, 1999	99042-3	0

FUSE SETTINGS

No. No.	TYPE	APMS
S&C	K	200A



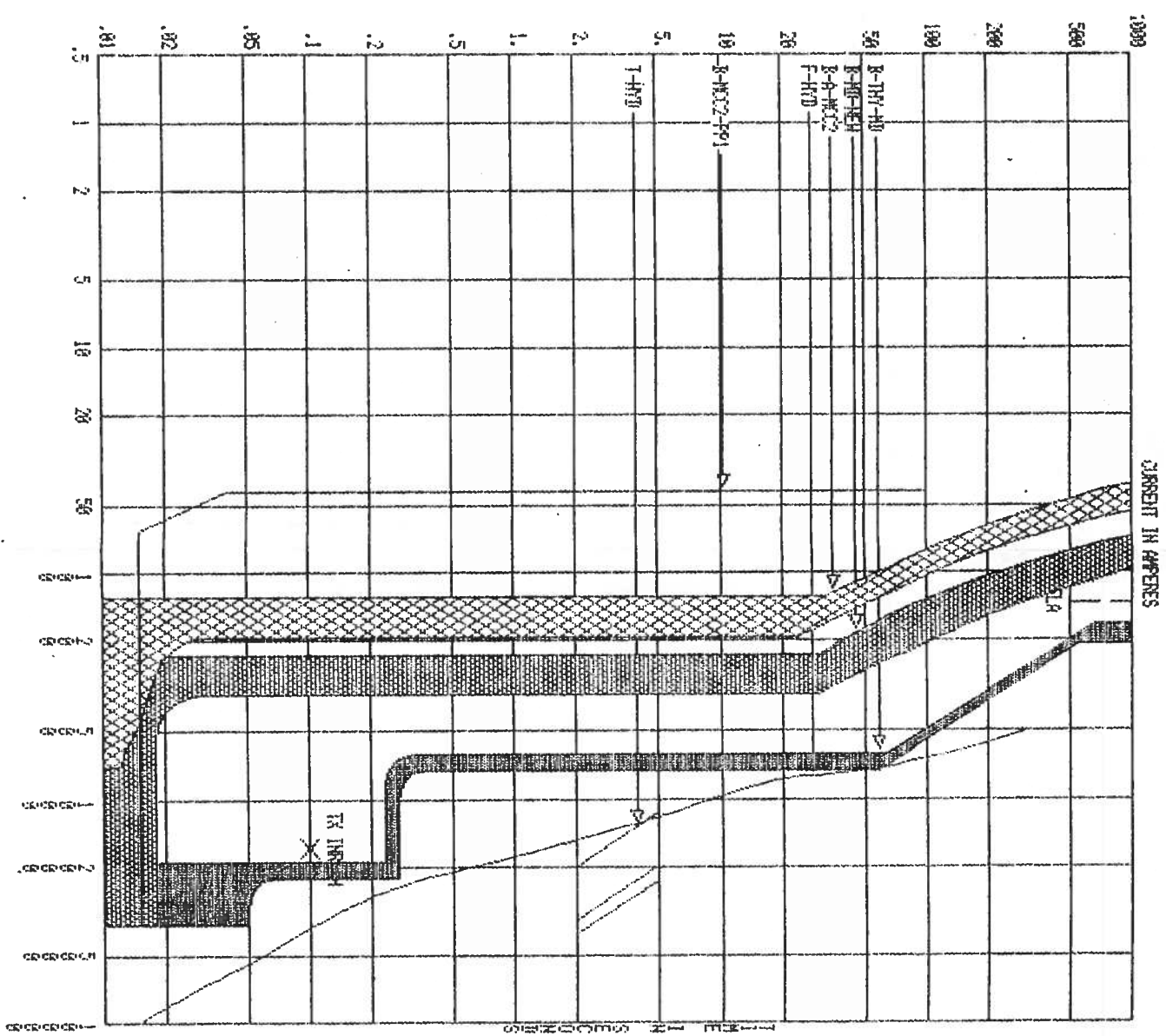
BREAKER SETTINGS

No.	BRKR TYPE	FRAME	TAP/IR	LTPU	LTD	STPU	STD	INST
B-THY-MD	F.P. SOH-2	1600A			1.10	30.0	4.0	0.25 12.0
B-MD-NEW	USR-C	1200A						
B-A-MCC2	F.P. C/L-E	400A						5.0
B-MCC2-PP1	TM	400A						5.0
	W.HOUSE JD	250A						
	TM	225A						
	W.HOUSE HMCP*	100A						
	HMCP	100A						
	100R3	100A						

*NON-ADJUSTABLE

TRANSFORMER DAMAGE CURVES INDICATE: LINE TO GROUND, LINE TO LINE AND THREE PHASE FAULT CONDITIONS WHICH MAY BE ENCOUNTERED.

IC - CONTINUOUS CURRENT (AMPS), IR - PLUG RATING (AMPS), TAP - TAP RATING (AMPS), PS - PLUG SETTING (MULTIPLIER)



DEVICE IDENTIFICATION: X - Y - Z

'B' - BREAKER
'F' - FUSE
'R' - RELAY

DENOTES SOURCE SIDE
DENOTES LOAD SIDE

'X' - BUS IDENTIFICATION - 'X' BUS No.
'TR' - TRANSFORMER
'BD' - BUS DUCT



MANENGCO ENGINEERING
218 - 530 CENTURY
WINNIPEG, MANITOBA
R3H 0Y4
Tel. (204) 783-0757
Fax (204) 774-3778

CLIENT: **MANITOWAG**
PROJECT: **WINNIPEG**

PAN-AM POOL
WINNIPEG, MANITOBA

SINGLE LINE DIAGRAM AND CO-ORDINATION CURVES

DRN	APP	DWG No	REV
S.N	EPD	99042-4	0
CHKD	DATE		
EPD	MAY 18, 1999		

**SHORT CIRCUIT AND CO-ORDINATION STUDY
PAN-AM POOL
WINNIPEG, MANITOBA**

SECTION D

**SHORT CIRCUIT STUDY DOCUMENTATION
Short Circuit Input Data**

Cable Data

Bus Duct Data

Transformer Data

Motor Data

MANENCO ENGINEERING
885 KING EDWARDS STREET
WINNIPEG, MANITOBA

PROJECT: PAN-AM POOL
CLIENT: SCHNEIDER
DATE: MAY 28, 1999

ELITE SOFTWARE SHORT PROGRAM

DESIGNER: MANENCO ENGINEERIN

SYSTEM DATA:

INITIAL SHORT CIRCUIT KVA:	250,000
INITIAL SYSTEM VOLTAGE:	4,160
INITIAL X/R RATIO:	12
INITIAL NUMBER OF PHASES:	3
INITIAL WIRING CONNECTIONS:	DELTA
PROJECT FILENAME:	99042PAN
PROJECT LOCATION:	WINNIPEG
BASE KVA:	1,000
CYCLES IN HERTZ OF SYSTEM:	60
LOCKED ROTOR MOTOR FACTOR:	6.0
TEMPERATURE DEVIATION (DEG C):	0
DEFAULT POWER FACTOR:	0.900

DEFAULT X&R COMPONENT TABLE FILENAMES:

CABLE DATA FILE:	ELITE
BUS DUCT DATA FILE:	ELITE
SWITCH DATA FILE:	ELITE
CURRENT TRANSFORMER DATA FILE:	ELITE
CIRCUIT BREAKER DATA FILE:	ELITE
OVERHEAD CABLE DATA FILE:	ELITE
FUSE DATA FILE:	ELITE
VOLTAGE TRANSFORMER DATA FILE:	ELITE

NETWORK COMPONENT SUMMARY:

	ACTIVE	INACTIVE	TOTAL
TOTAL NUMBER OF CABLES:	37	0	37
TOTAL NUMBER OF OVERHEAD CABLES:	0	0	0
TOTAL NUMBER OF BUS DUCTS:	0	0	0
TOTAL NUMBER OF SWITCHES:	0	0	0
TOTAL NUMBER OF VOLTAGE TRANSFORMERS:	4	0	4
TOTAL NUMBER OF CURRENT TRANSFORMERS:	0	0	0
TOTAL NUMBER OF CIRCUIT BREAKERS:	0	0	0
TOTAL NUMBER OF FUSES:	0	0	0
TOTAL NUMBER OF SPECIAL COMPONENTS:	0	0	0
	-----	-----	-----
TOTAL NUMBER OF NETWORK COMPONENTS:	41	0	41
TOTAL NUMBER OF MOTORS:	1	0	1
TOTAL NUMBER OF GENERATORS:	0	0	0
TOTAL NUMBER OF CAPACITOR BANKS:	0	0	0
TOTAL NUMBER OF GENERAL PURPOSE LOADS:	0	0	0
	-----	-----	-----
TOTAL NUMBER OF MOT/GEN/CAP/LOADS:	1	0	1

CABLE DATA:

COMPONENT.NODE NODE.LABEL	BUS.VOLT CONDUIT	MATERIAL TABLE	SHIELD PHASES	Z0/Z1 CAB/PH	INSUL	USER.SIZE CALC.SIZE	LENGTH C.STATUS
10 - 11 MD	600 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 2	90 C	500 ----	152 ACTIVE
11 - 12 MD-TRXX	600 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 1	90 C	500 ----	15 ACTIVE
11 - 60 MCC1	600 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 2	90 C	350 ----	56 ACTIVE
11 - 13 PANEL AA	600 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 1	90 C	4 ----	195 ACTIVE
11 - 14 PRL4 PANEL A	600 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 2	90 C	350 ----	438 ACTIVE
11 - 21 MD-TRY Y	600 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 1	90 C	500 ----	11 ACTIVE
11 - 50 MD-VPMCC	600 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 1	90 C	3/0 ----	33 ACTIVE
14 - 15 UNIT HEATER	600 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 1	90 C	10 ----	115 ACTIVE
14 - 16 MCC2	600 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 1	90 C	2/0 ----	8 ACTIVE
14 - 17 MCCTRN	600 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 1	90 C	2/0 ----	3 ACTIVE
120 - 121 CDP PANEL XX	208 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 2	90 C	350 ----	25 ACTIVE
121 - 122 PANEL K	208 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 1	90 C	1/0 ----	38 ACTIVE
121 - 123 PANEL L	208 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 1	90 C	1/0 ----	40 ACTIVE
121 - 124 PANEL M	208 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 1	90 C	1/0 ----	42 ACTIVE
121 - 125 PANEL N	208 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 1	90 C	1/0 ----	44 ACTIVE
121 - 126 PANEL B	208 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 1	90 C	3/0 ----	153 ACTIVE

CABLE DATA:

COMPONENT.NODE NODE.LABEL	BUS.VOLT CONDUIT	MATERIAL TABLE	SHIELD PHASES	Z0/Z1 CAB/PH	INSUL	USER.SIZE CALC.SIZE	LENGTH C.STATUS
121 - 127 PANEL K2	208 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 1	90 C	4 ----	152 ACTIVE
121 - 128 PANEL R	208 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 1	90 C	1/0 ----	37 ACTIVE
121 - 129 PANEL P	208 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 1	90 C	1/0 ----	28 ACTIVE
121 - 130 OL PANEL	208 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 1	90 C	3/0 ----	56 ACTIVE
170 - 171 PRL4 PANEL B	208 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 2	90 C	350 ----	3 ACTIVE
171 - 173 PANEL BA	208 MAGNETIC	COPPER ELITE2	NO 3 PHASE	15 1	90 C	3 ----	27 ACTIVE
171 - 174 PANEL BB	208 MAGNETIC	COPPER ELITE2	NO 3 PHASE	15 1	90 C	3 ----	25 ACTIVE
171 - 175 PANEL BC	208 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 1	90 C	2/0 ----	31 ACTIVE
171 - 176 PANEL BD	208 MAGNETIC	COPPER ELITE2	NO 3 PHASE	15 1	90 C	3 ----	29 ACTIVE
171 - 177 PANEL BE	208 MAGNETIC	COPPER ELITE2	NO 3 PHASE	15 1	90 C	3 ----	33 ACTIVE
210 - 211 CDP PANEL YY	208 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 2	90 C	350 ----	22 ACTIVE
211 - 212 PANEL F	208 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 1	90 C	1/0 ----	200 ACTIVE
211 - 213 PANEL G	208 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 1	90 C	1/0 ----	197 ACTIVE
211 - 214 PANEL D	208 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 1	90 C	1/0 ----	114 ACTIVE
211 - 215 PANEL E	208 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 1	90 C	3/0 ----	117 ACTIVE
211 - 216 PANEL C	208 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 1	90 C	1/0 ----	22 ACTIVE

CABLE DATA:

COMPONENT.NODE NODE.LABEL	BUS.VOLT CONDUIT	MATERIAL TABLE	SHIELD PHASES	Z0/Z1 CAB/PH	INSUL	USER.SIZE CALC.SIZE	LENGTH C.STATUS
211 - 217 PANEL H	208 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 1	90 C	2 ----	282 ACTIVE
211 - 218 PANEL J	208 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 1	90 C	2 ----	286 ACTIVE
211 - 219 SS PANEL	208 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 1	90 C	1/0 ----	143 ACTIVE
211 - 220 TEMP. MTS	208 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 1	90 C	2 ----	242 ACTIVE
211 - 221 TV2	208 MAGNETIC	COPPER ELITE	NO 3 PHASE	15 1	90 C	2 ----	143 ACTIVE

VOLTAGE TRANSFORMER DATA:

COMPONENT.NODE NODE.LABEL	PRI.VOLT SEC.VOLT	X/R.RATIO IMPEDANCE	USER.SIZE CALC.SIZE	NEU.RES PHASES	TAP	Z0/Z1 SEC.WIR	TABLE STATUS
1 - 10 THYD	4,160 600	7.00 5.20	1,000 KVA ----- KVA	0.00 3 PHASE	+0.0%	1 WYE	ELITE ACTIVE
12 - 120 TR-XX	600 208	4.50 2.70	300 KVA ----- KVA	0.00 3 PHASE	+0.0%	1 WYE	ELITE ACTIVE
17 - 170 TR-N	600 208	3.50 7.60	150 KVA ----- KVA	0.00 3 PHASE	+0.0%	1 WYE	ELITE ACTIVE
21 - 210 TR-YY	600 208	4.50 2.70	300 KVA ----- KVA	0.00 3 PHASE	+0.0%	1 WYE	ELITE ACTIVE

MOTOR DATA:

NODE	XR.RATIO	MOT.FLA	RUN.PF	MOTOR.TYPE	NEC.CODE	STARTER.TYPE	RPM
MOTOR.LABEL		INRUSH	START.PF	VDROP.DIP	PF.CAPS	LOCK.ROT.FAC	STATUS
11	6.00	240.7	0.800	INDUCTION	-	NEMA 0	0
LUMP MOTOR11		1,444.2	0.200	RUNNING	0.00	6.0	ACTIVE

**SHORT CIRCUIT AND CO-ORDINATION STUDY
PAN-AM POOL
WINNIPEG, MANITOBA**

APPENDIX A

MANITOBA HYDRO DISTRIBUTION INFORMATION



FAX COVER PAGE

TO: E.P. Dbusschere DATE: MAY 31/99
COMPANY: Manengco Eng. FAX NUMBER: 774-3778
SUBJECT/FILE: Pan Am Pool NUMBER OF PAGES: 2 (including cover page)

MESSAGE:

Please find the transformer data you requested

FROM: Ed Nichiparick LOCATION: _____
FAX NUMBER: 772-3852 POSTAL CODE (if needed): _____
PHONE NUMBER (if needed): 986-4604

FORM HY629: 95 07

25 Poseidon, Pan Am Pool

S/N A8616-01 1000 kVA , 4160-600/347V, three phase, four wire padmount transformer.
Impedance: 5.2%

Primary protection: 200A "K" type fusing on Overhead Cutouts by Keamey or A.B.
Chance.

Maximum available fault level to the transformer primary is 250 MVA.