

# \* Power Measurement Solutions by . . .

---



Specializing in turn-key Mission Critical Infrastructure Solutions & Customized  
Power Distribution Manufacturing

Overview Prepared for:



PowerLogic™

2009 ION / PowerLogic Users Conference

**Presented by Mark Neff, P.Eng.**  
Engineering Services Manager

# \* *The E.A. Group . . . overview*

- *Divisions*
  - Contracting & Maintenance Services
  - Manufacturing
  - Engineering Services
  
- *Strengths*
  - 40 years of Data Centre know-how, resulting in;
    - Common Sense philosophy
    - Un-matched customer service
  - Over 20 Years of installing ION metering
  - Staff factory-trained on ION Enterprise Administrator and Programmer



# \* *Topics*

- *What are the needs of Critical Sites?*
  - Reliability
  - Real-Time Monitoring
  - Event Logging
  - Event Disassembly / Sequence of Events
  
- *How Does ION Satisfy Those Needs?*
  - ION Meters
  - Diverse Connectivity over Modbus
  - Meter Clock Control
  - ION Enterprise Vista Users Interface
  - SQL Server Database for Logging
  
- *Examples from Installed Sites*



## \* ***Needs of Critical Sites...***

---

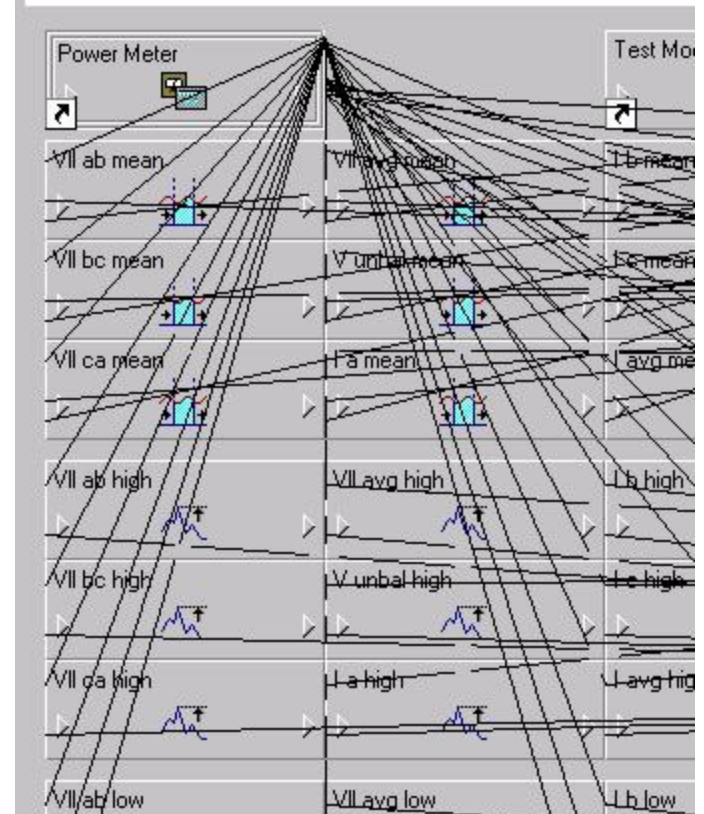
- *In an ideal world, the most reliable components and equipment are selected, they work together seamlessly and provide an identifiable warning of imminent failure*
- *Equipment is fallible, People are fallible and Murphy's Law makes sure that statistics and conditions will conspire to find new ways for things to go wrong*
- *Centralized Real-Time view of the site to identify what's OK, what is approaching a problem and what is in alarm including notification and logging*
- *"What does it mean" when an alarm occurs*
- *Analysis of the alarm and prevention of future alarms*
- *Consideration for the Environment*

# \* *What is ION?*

- *Communications Protocol*
  - Proprietary (similarity to Modbus)
- *Method of Programming*
  - Object Oriented
  - Visual Interconnection
  - Can do it through ION Setup, but ION Enterprise Designer is preferred
  - Patented
  - Program is called a 'Framework'
- *ION Meters*
- *ION Enterprise Software*
- *EEM Software (Enterprise Everything Management)*

## Historic Data Logging

Right-click a module to access its setup registers.

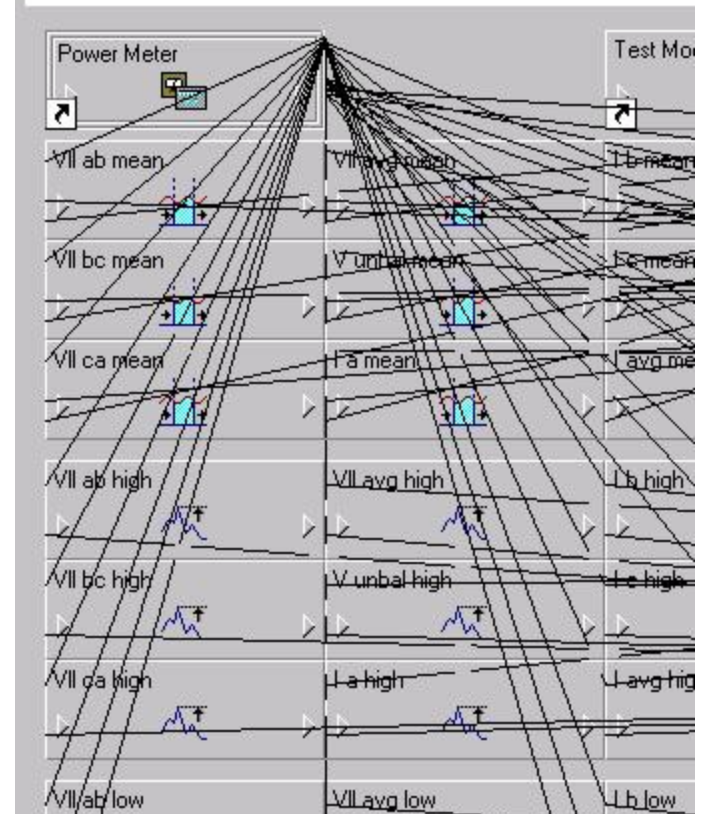


# \* *What is ION?*

- *Communications Protocol*
  - Proprietary (similarity to Modbus)
- *Method of Programming*
  - Object Oriented
  - Visual Interconnection
  - Can do it through ION Setup, but ION Enterprise Designer is preferred
  - Patented
  - Program is called a 'Framework'
- *ION Meters*
- *ION Enterprise Software*
- *EEM Software (Enterprise Energy Management)*

## Historic Data Logging

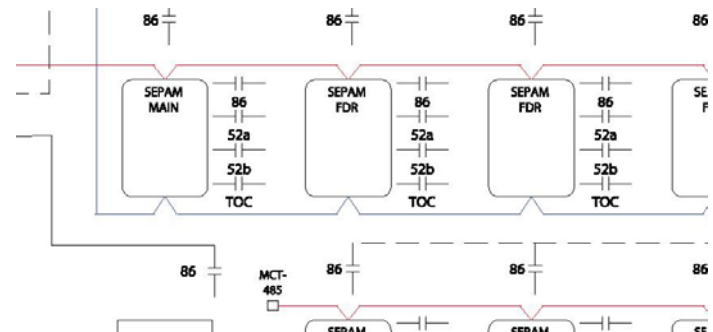
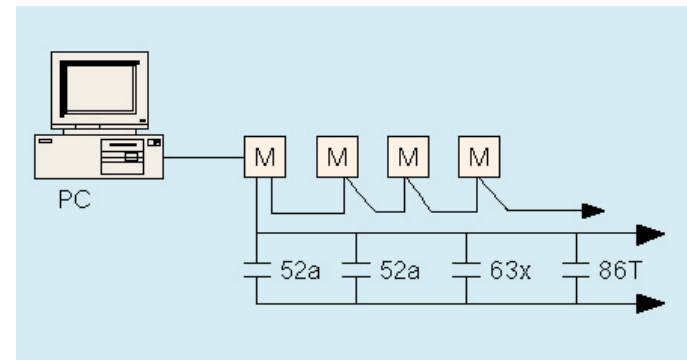
Right-click a module to access its setup registers.





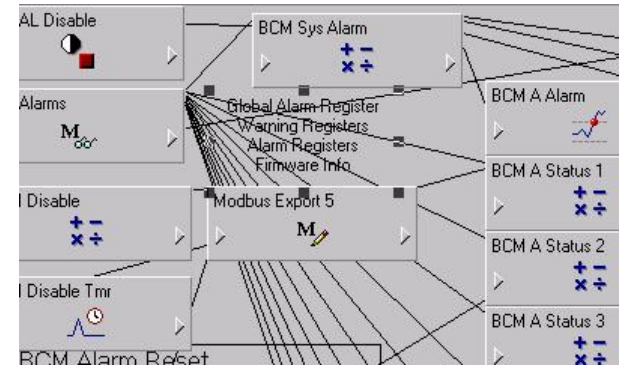
# \* Meter I/O and Alarm Notification

- *I/O Function is Programmable in the Framework*
  - Analog Inputs
  - Analog Outputs
  - Digital Inputs
  - Form C (Relay) Outputs
  - Form A (Transistor) Outputs
- *Digital Inputs can be configured to log an event upon change of state*
- *Analog Inputs can be compared to setpoints and a variety of actions can be taken*
- *Meters can send out notifications on its own – Modem, Modbus, Email, SNMP*
- *Meters are time-coordinated by ION Enterprise*



# \* *Meter-Connected Devices*

- *Serial Port*
  - RS-232 (EIA-232)
  - RS-485 (EIA-485)
- *Accessed Directly By Meter*
  - Meter acting as Master
    - Modbus Master Options Module
    - Modbus Master Map
    - Modbus Import
  - Meter acting as Slave
- *Accessed by ION Enterprise VIP using Ethergate*
  - VIP acting as Master
- *Meter Display Annunciation*



ALARMS		11/07/2005 3:22:04	
Freq Tolera	NORMAL (1)	Phase Rev	NORMAL (7)
Over Cure	NORMAL (2)	High Temp	NORMAL (8)
Neutral Cur	NORMAL (3)	Over Temp	NORMAL (9)
Over Volt	NORMAL (4)	Gnd Fault	NORMAL (10)
Under Volt	NORMAL (5)	THD Alarm	NORMAL (11)
Phase Loss	NORMAL (6)		
Inputs	Synchronized (12)		

ALARMS | Volt/Arms | PowerSum | Energy | Demand



# \* *Server-Connected Devices*

- *VIP – Virtual Processor*
- *Modbus*
  - Serial Port
  - Ethernet Gateway Device
  - Modbus/TCP (Ethernet)
- *Modbus Device Importer*
  - IONize your device
- *XML*



Modbus Device Importer - C:\Program Files\Power Measurement\ION Enterprise\config\templates\SixNet\_D18\_A18-T1\_v0\_0\_1.ion

File Edit View Tools Settings Help

ION Map Information

SixNet\_D18\_A18-T1\_v0\_0\_1

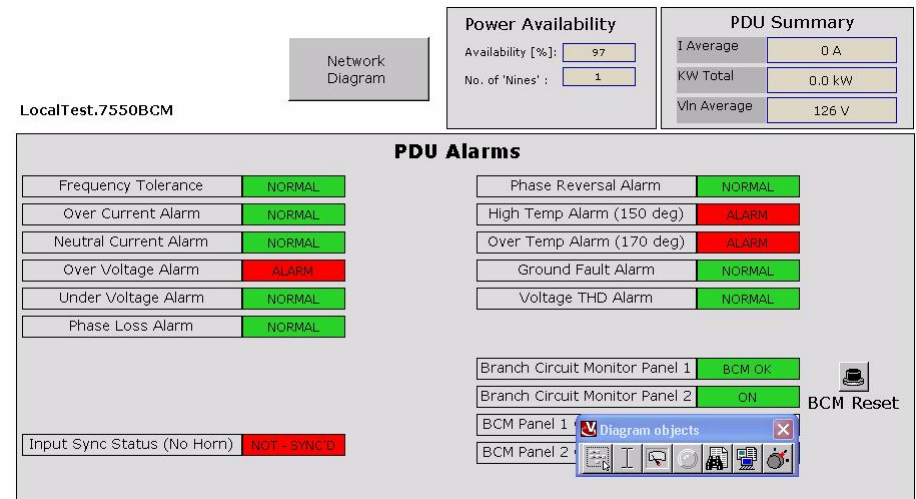
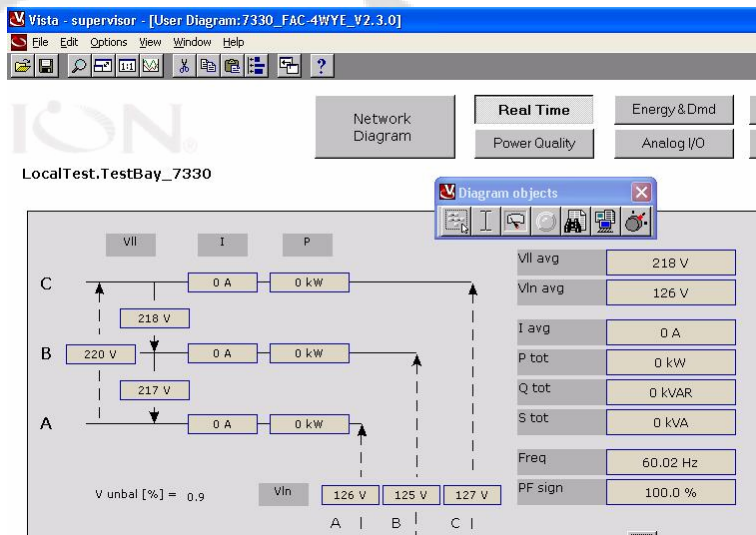
- [-] Analog I/O
- [-] Digital I/O

Modbus Register Information

Label	Modbus Reg...	Request...	Format	Mask	Scale	Mutiplier	Off...	Enu...	C
DI1	10001	R	UINT16	None	1	1	0	False	
DI2	10002	R	UINT16	None	1	1	0	False	
DI3	10003	R	UINT16	None	1	1	0	False	
DI4	10004	R	UINT16	None	1	1	0	False	
DI5	10005	R	UINT16	None	1	1	0	False	
DI6	10006	R	UINT16	None	1	1	0	False	
DI7	10007	R	UINT16	None	1	1	0	False	
DI8	10008	R	UINT16	None	1	1	0	False	
AI1	30001	R	UINT16	None	655	1	0	False	
AI2	30002	R	UINT16	None	1	1	0	False	
AI3	30003	R	UINT16	None	1	1	0	False	
AI4	30004	R	UINT16	None	1	1	0	False	
AI5	30005	R	UINT16	None	1	1	0	False	
AI6	30006	R	UINT16	None	1	1	0	False	
AI7	30007	R	UINT16	None	1	1	0	False	
AI8	30008	R	UINT16	None	1	1	0	False	

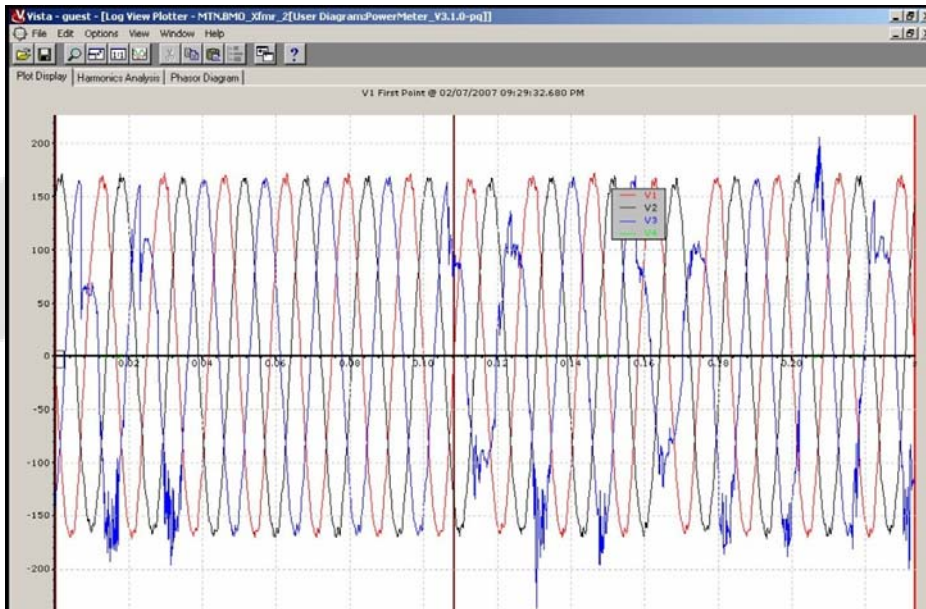
# \* Vista Diagrams

- Meter Diagrams
  - Standard
  - Customizations





# Event and Data Logs



Time	Event	Source	Message	Label
01/24/2007@07:25:05.522 AM	TU Comm 4 - IR	Changed Setup	BU1 Comms	Off-Label written
01/24/2007@07:25:31.653 AM	200 Sag/Swell 1	Disturbance Start	SS1 DistState	Disturbance
01/24/2007@07:25:37.000 AM	128 Vin a	0 Vlna Undervolt	ON	
01/24/2007@07:25:37.000 AM	128 Vin b	0 Vlnb Undervolt	ON	
01/24/2007@07:25:37.000 AM	128 Vin c	0 Vlnb Undervolt	ON	
02/06/2007@08:38:55.609 AM	10 Front Panel	Changed Setup	CM2 Baud Rate	38400
02/06/2007@09:25:48.240 AM	200 Sag/Swell 1	Disturbance Start	SS1 DistState	Disturbance
02/06/2007@09:52:49.178 AM	30	External	ION 7550	Power Down
02/07/2007@02:01:05.562 AM	30	External	ION 7550	Power Up
02/07/2007@02:01:05.676 AM	200 Sag/Swell 1	Disturbance End	SS1 DistState	Normal
02/07/2007@02:01:06.000 AM	128 Trigger CNT	24 Alarm to Relay	ON	
02/07/2007@09:25:48.858 PM	20	External	High Temp alarm	ALARM
02/07/2007@09:26:20.603 PM	20	External	Over Temp alarm	ALARM
02/07/2007@09:26:52.180 PM	20	External	Over Temp alarm	NORMAL
02/07/2007@09:28:32.520 PM	20	External	Over Temp alarm	ALARM
02/07/2007@09:29:05.252 PM	200 Sag/Swell 1	Disturbance Start	SS1 DistState	Disturbance
02/07/2007@09:29:33.364 PM	200 Sag/Swell 1	Disturbance End	SS1 DistState	Normal
02/07/2007@09:30:23.000 PM	128 Ground	5.354 Gnd Fault	ALARM	
02/07/2007@09:30:26.055 PM	200 Sag/Swell 1	Disturbance Start	SS1 DistState	Disturbance
02/07/2007@09:30:26.072 PM	200 Sag/Swell 1	Disturbance End	SS1 DistState	Normal
02/07/2007@09:30:30.333 PM	30	External	ION 7550	Power Down

Timestamp	Vll avg mean	Vll ab mean	Vll bc mean	Vll ca mean	V unbal mean	Vll avg high	Vll ab high
02/06/2007@07:15:00.000 AM	208.087	208.257	207.648	208.357	0.213	208.117	208.294
02/06/2007@07:30:00.000 AM	208.077	208.238	207.642	208.349	0.209	208.119	208.292
02/06/2007@07:45:00.000 AM	208.069	208.226	207.637	208.343	0.207	208.122	208.282
02/06/2007@08:00:00.000 AM	208.064	208.22	207.633	208.341	0.206	208.094	208.253
02/06/2007@08:15:00.000 AM	208.063	208.217	207.633	208.34	0.206	208.091	208.252
02/06/2007@08:30:00.000 AM	208.062	208.216	207.631	208.338	0.205	208.082	208.236
02/06/2007@08:45:00.000 AM	208.061	208.215	207.63	208.336	0.205	208.117	208.272
02/06/2007@09:00:00.000 AM	208.061	208.213	207.632	208.336	0.205	208.089	208.242
02/06/2007@09:15:00.000 AM	208.06	208.213	207.631	208.336	0.205	208.103	208.256
02/06/2007@09:30:00.000 AM	208.062	208.214	207.633	208.339	0.205	208.099	208.25
02/06/2007@09:45:00.000 AM	208.062	208.213	207.633	208.339	0.204	208.098	208.254
02/07/2007@02:15:00.000 AM	208.088	208.251	207.654	208.358	0.21	208.342	208.452
02/07/2007@02:30:00.000 AM	208.081	208.241	207.649	208.355	0.208	208.111	208.27
02/07/2007@02:45:00.000 AM	208.076	208.234	207.645	208.351	0.207	208.114	208.274
02/07/2007@03:00:00.000 AM	208.072	208.228	207.641	208.348	0.206	208.094	208.252
02/07/2007@03:15:00.000 AM	208.071	208.227	207.64	208.346	0.206	208.113	208.282
02/07/2007@03:30:00.000 AM	208.069	208.222	207.639	208.347	0.205	208.091	208.253
02/07/2007@03:45:00.000 AM	208.069	208.221	207.64	208.346	0.205	208.094	208.246
02/07/2007@04:00:00.000 AM	208.068	208.221	207.64	208.344	0.204	208.091	208.247
02/07/2007@04:15:00.000 AM	208.069	208.22	207.642	208.343	0.204	208.115	208.277
02/07/2007@04:30:00.000 AM	208.067	208.217	207.639	208.346	0.204	208.083	208.235
02/07/2007@04:45:00.000 AM	208.067	208.217	207.64	208.344	0.204	208.095	208.248
02/07/2007@05:00:00.000 AM	208.068	208.221	207.639	208.343	0.205	208.081	208.25

Timestamp	Duration	Magnitude	Magnitude	Magnitude	Cause
02/07/2007@09:29:05.269 PM	0.016	98	98	76	Sag/Swell
02/07/2007@09:29:31.388 PM	0.041	97	97	68	Sag/Swell
02/07/2007@09:29:32.813 PM	0.024	97	97	70	Sag/Swell
02/07/2007@09:29:32.863 PM	0.024	97	97	63	Sag/Swell
02/07/2007@09:29:32.922 PM	0.016	99	97	82	Sag/Swell
02/07/2007@09:29:33.005 PM	0.008	99	98	86	Sag/Swell
02/07/2007@09:29:33.047 PM	0.016	98	98	80	Sag/Swell
02/07/2007@09:29:33.364 PM	0.008	99	98	86	Sag/Swell
02/07/2007@09:30:26.072 PM	0.016	98	98	84	Sag/Swell





# \* Custom ION Vista Displays

Vista - supervisor - [User Diagram:Main Floor Layout-Presentation]

File Edit Options View Window Help

Computing Centre Floor Layout

Demand Summary			
Feeder A1 KW	570.2 Kw	Feeder A2 KW	157.5 Kw
Feeder B1 KW	565.8 Kw	Feeder B2 KW	148.2 Kw

UB1-2.1 UB1-2.2

UB1-2.3 UA1-2.3 UA1-2.2 UA1-2.1 UB1-2.4 UA1-2.4

1433x911 Grouping Object@ 2:45 AM

Vista - supervisor - [User Diagram:panel3-presentation]

File Edit Options View Window Help

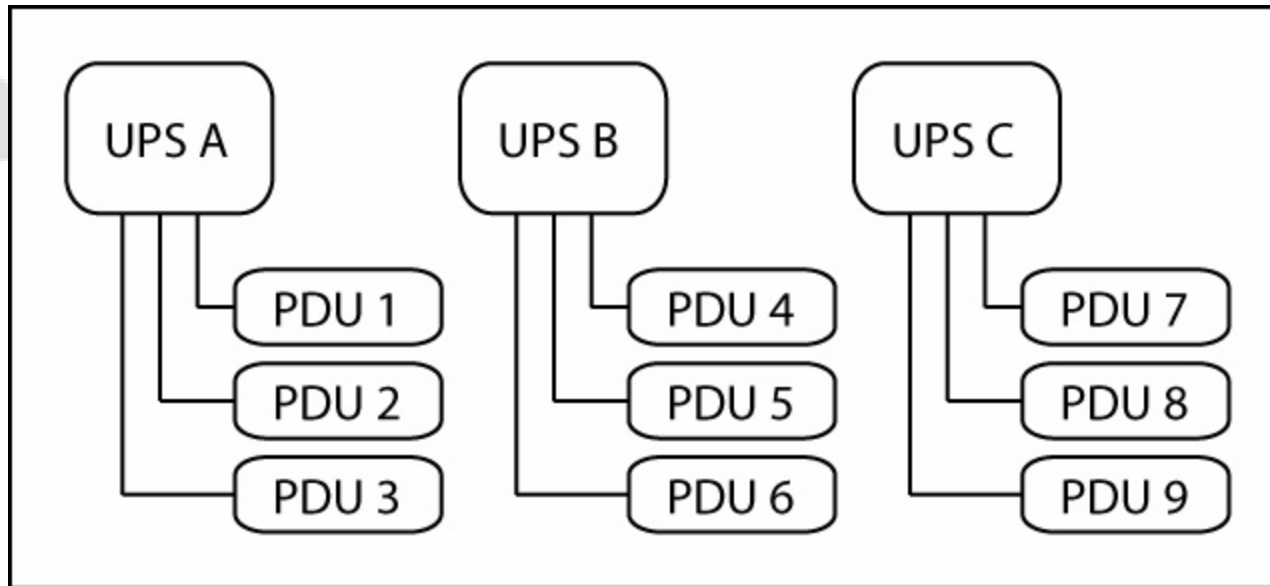
BCM Panel 2

	LOAD	BREAKER		LOAD	BREAKER
Circuit P2-1	0.0 A	30 A		Circuit P2-2	0.0 A 15 A
Circuit P2-3	0.0 A	30 A		Circuit P2-4	0.0 A 15 A
Circuit P2-5	0.0 A	30 A		Circuit P2-6	0.0 A 20 A
Circuit P2-7	0.0 A	60 A		Circuit P2-8	0.0 A 20 A
Circuit P2-9	0.0 A	60 A		Circuit P2-10	0.0 A 20 A
Circuit P2-11	0.0 A	60 A		Circuit P2-12	0.0 A 20 A
Circuit P2-13	0.0 A	15 A		Circuit P2-14	0.0 A 20 A
Circuit P2-15	0.0 A	15 A		Circuit P2-16	0.0 A 20 A
Circuit P2-17	0.0 A	30 A		Circuit P2-18	0.0 A 20 A
Circuit P2-19	0.0 A	30 A		Circuit P2-20	0.0 A 15 A
Circuit P2-21	0.0 A	30 A		Circuit P2-22	0.0 A 15 A
Circuit P2-23	0.0 A	30 A		Circuit P2-24	0.0 A 20 A

2:54 AM

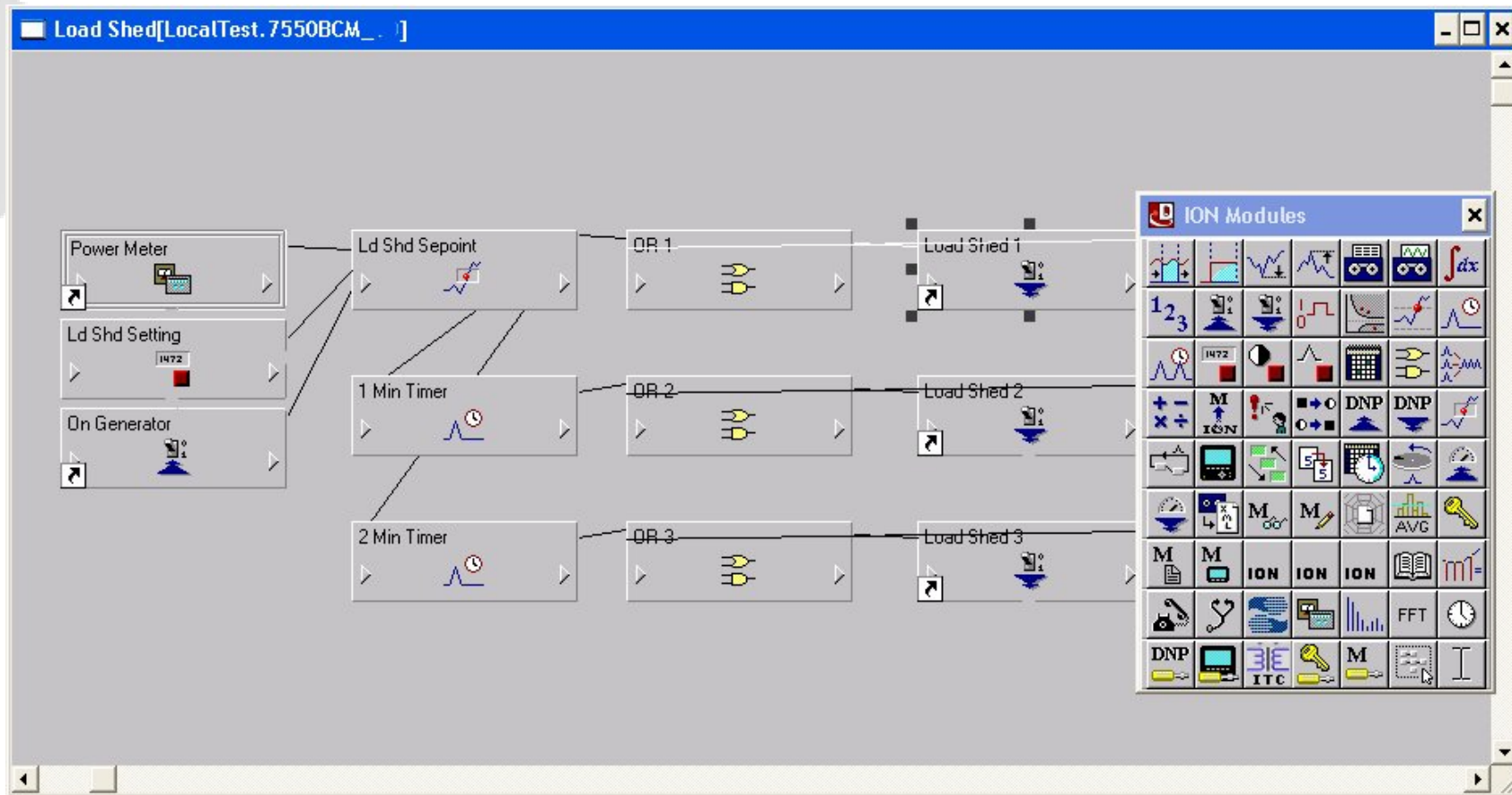
# \* *Calculations & Analysis*

---





# \* *Automated Control*





# Automated Reports

Aggregate Energy & Demand				
From: April 1, 2009 00:00:00				
To: May 1, 2009 00:00:00				
<b>ENERGY</b>				
Tariff	Total kWh	Cost/kWh (\$)	Cost for Tariff (\$)	
Tariff 1	209917.88	0.00	0.00	
<b>Total Cost</b>			0.00	
Tariff	Total kVARh	Cost/kVARh (\$)	Cost for Tariff (\$)	
Tariff 1	0.00	0.00	0.00	
<b>Total Cost</b>			0.00	
<b>DEMAND</b>				
Tariff	Time	Max kW	Cost/kW (\$)	Cost for Tariff (\$)
Tariff 1	17-Apr-09 2:15:00 AM	295.76	0.00	
<b>Total Cost</b>				
Tariff	Time	Max kVAR	Cost/kVAR (\$)	Cost for T
Tariff 1	Not Available	0.00	0.00	
<b>Total Cost</b>				

Load Tracking Data													
Area 1	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	
1	29	29	29	29	29	29	29	29	22	24	24	25	
2	27	27	27	27	27	27	27	27	27	29	29	29	
3	28	28	28	28	28	28	28	29	29	30	30	31	
4	36	35	35	35	35	27	27	27	27	29	29	29	
5	52	52	52	51	50	50	50	49	49	48	47		
6	54	54	54	54	53	53	52	52	51	51	51		
7	43	43	42	42	42	42	41	41	41	41	40	41	
8	40	40	40	40	40	40	39	39	39	39	38	38	
9	10	9	9	9	9	9	9	9	9	10	9	11	
10	9	8	8	8	8	8	8	8	8	9	9	10	
11	16	15	15	15	15	15	15	15	15	15	15	16	
12	25	24	24	24	24	24	24	24	17	18	17	18	
13	369	364	363	362	360	352	349	349	335	345	339	345	
14	27	27	27	27	27	27	27	27	29	29	29	29	
15	29	29	28	29	29	29	28	28	30	30	30	30	
16	34	34	34	34	34	34	33	33	33	33	33	33	
17	16	16	16	16	16	16	16	16	16	16	16	16	
18	25	26	26	26	26	26	24	24	26	26	26	26	
19	23	23	23	23	23	23	22	23	24	24	24	24	
20	22	22	22	22	22	23	22	22	23	22	23	22	
21	23	23	23	23	23	23	23	23	24	23	24	24	
22	19	18	18	19	20	20	20	20	20	20	21	20	
23	12	12	12	13	14	14	14	14	15	14	15	14	
24	231	231	230	232	235	236	229	231	240	238	241	239	
25	600	595	593	594	595	587	579	580	574	583	580	584	
26	97	96	96	95	95	93	92	92	88	91	89	91	
27	77	77	77	77	78	79	76	77	80	79	80	80	
28	Sub Totals (kW)												
29	Totals (kW)												
30	Area 1												
31	Area 2												

## \* *Result . . .*

---

- Critical systems fully monitored
- Real Time Data and Historical Data available when you need it
- Automation
- Reports

## \* *Thank You*

---

- Contact us for systems designed and engineered to meet your requirements with unmatched support by The E.A. Group.

[www.eagroup.on.ca](http://www.eagroup.on.ca)

[416-292-2295](tel:416-292-2295)