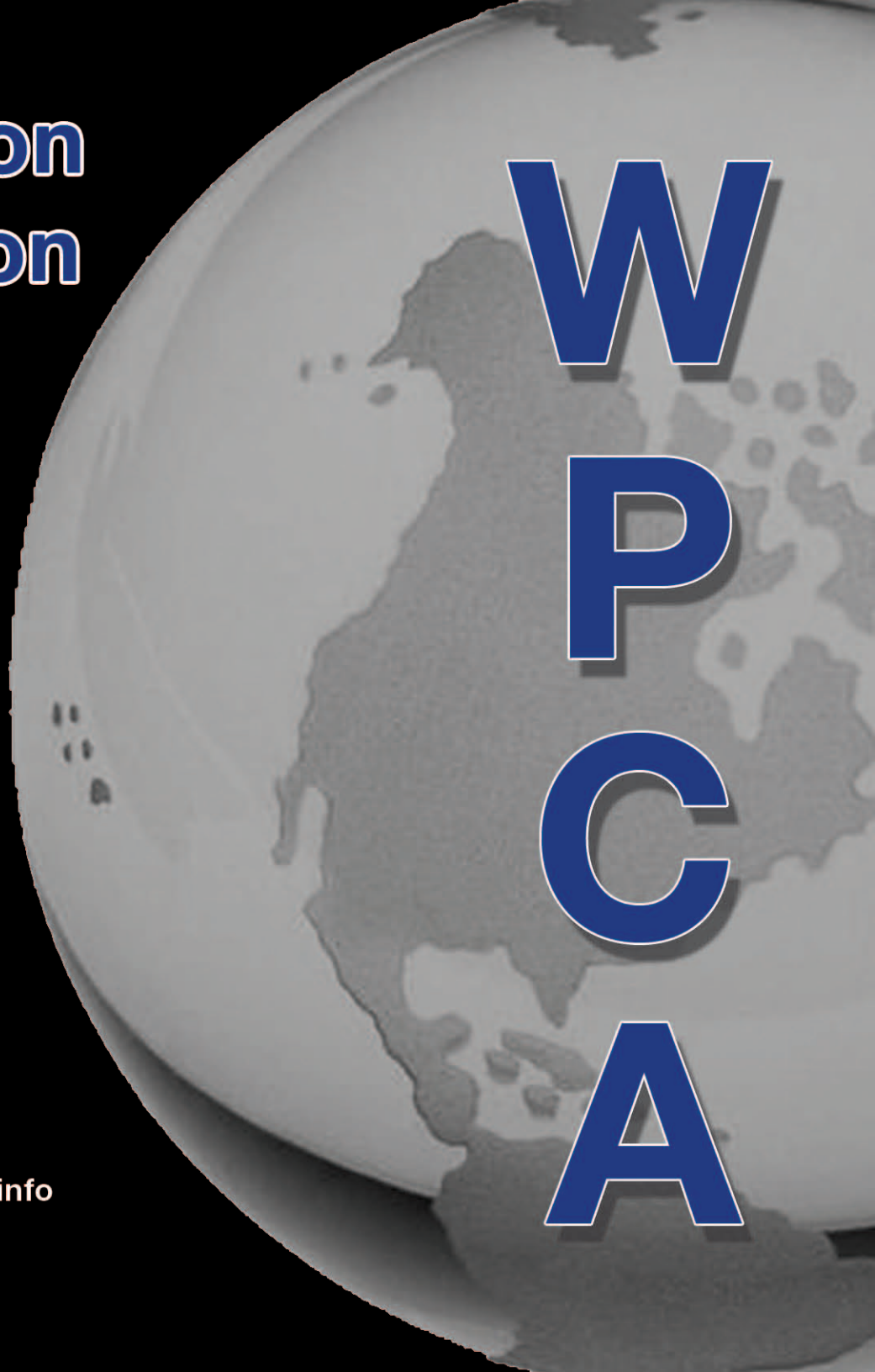
Worldwide Pollution Control Association



Ameren Seminar

August 19–20, 2008

Effingham, IL

Vist our website at www.wpca.info

Advanced On-line ESP Diagnostics

By John Jannone

Topics

- Electrical Readings and What They Mean
- Things to Look for While Walking Around
- What Historical Data Can Tell Us

REDKOH INDUSTRIES

Electrical Readings and What They Mean

“Normal Meter Readings”

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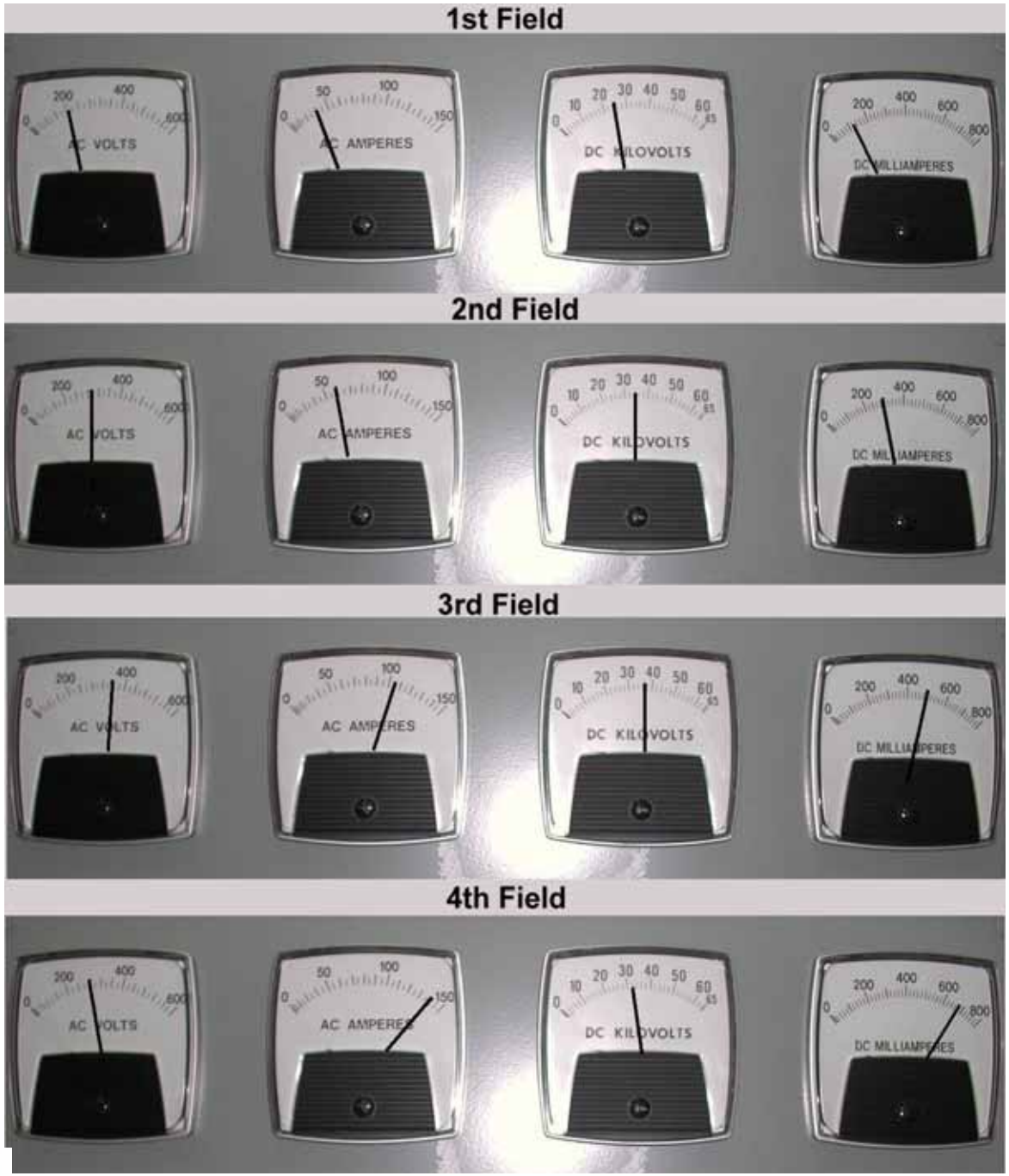

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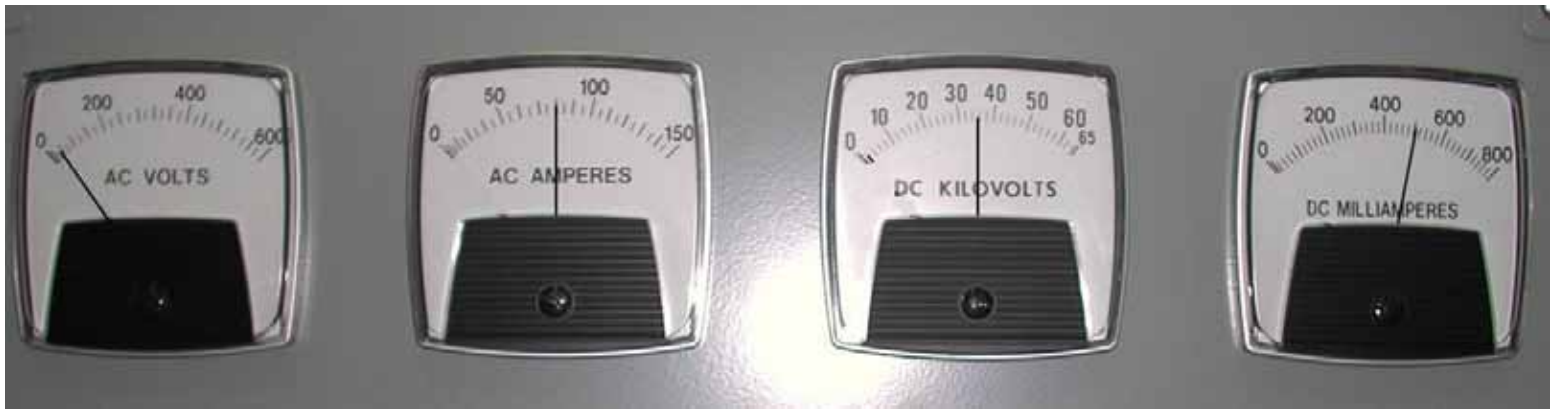
Electrical Readings and What They Mean



Indication	Cause
One “meter” has abnormal reading while others are within normal ranges	Metering problem

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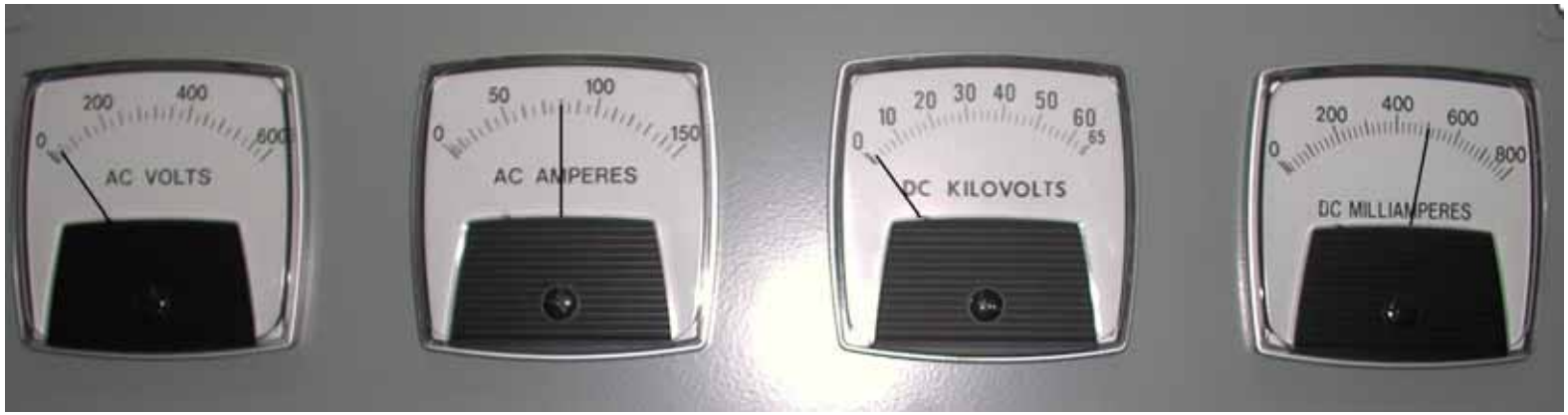
Electrical Readings and What They Mean



Indication	Cause
Under Voltage Trip	Electrical ground within precipitator
Low or no primary and secondary voltage, high or rated primary and secondary current	Electrical ground within TR tank

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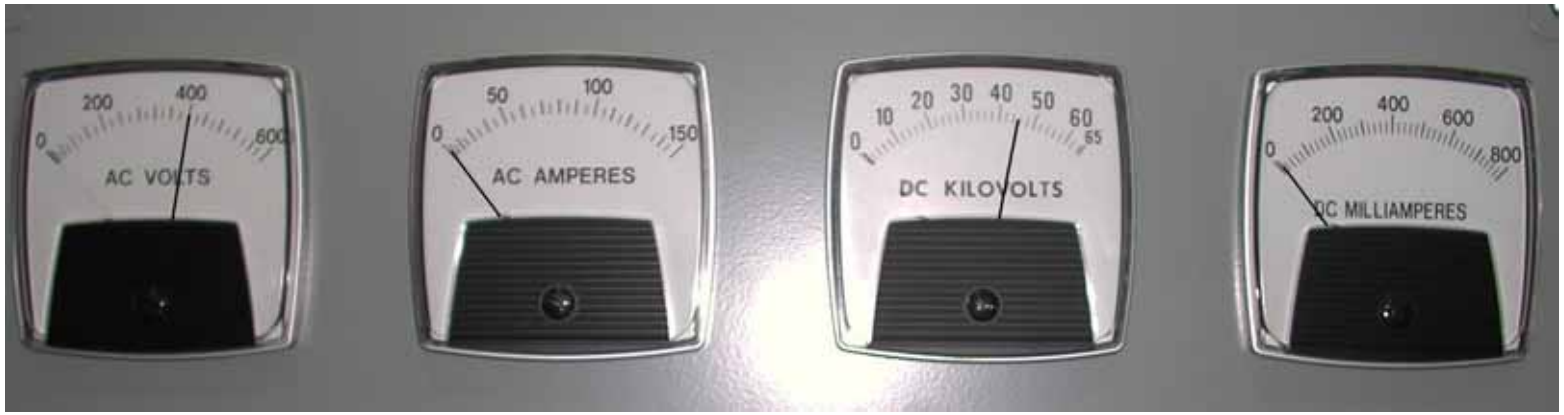
Electrical Readings and What They Mean

Indication	Cause
Over Current Trip	SCR shorted
	Control malfunction

Electrical Readings and What They Mean

Indication	Cause
SCR Imbalance Trip	One or more bad SCRs
	Failure of the SCR firing circuit

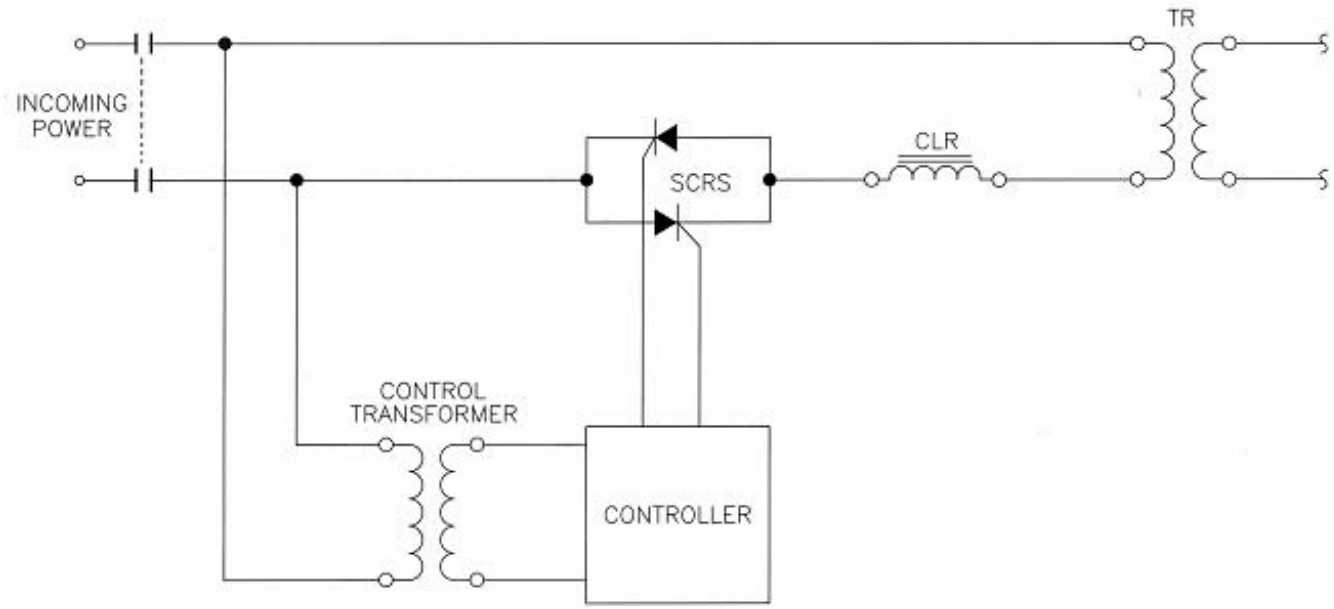
Electrical Readings and What They Mean



Indication	Cause
No primary or secondary current, high or rated voltages	No load on TR

Electrical Readings and What They Mean

Indication	Cause
Breaker trips	Short to ground before SCRs



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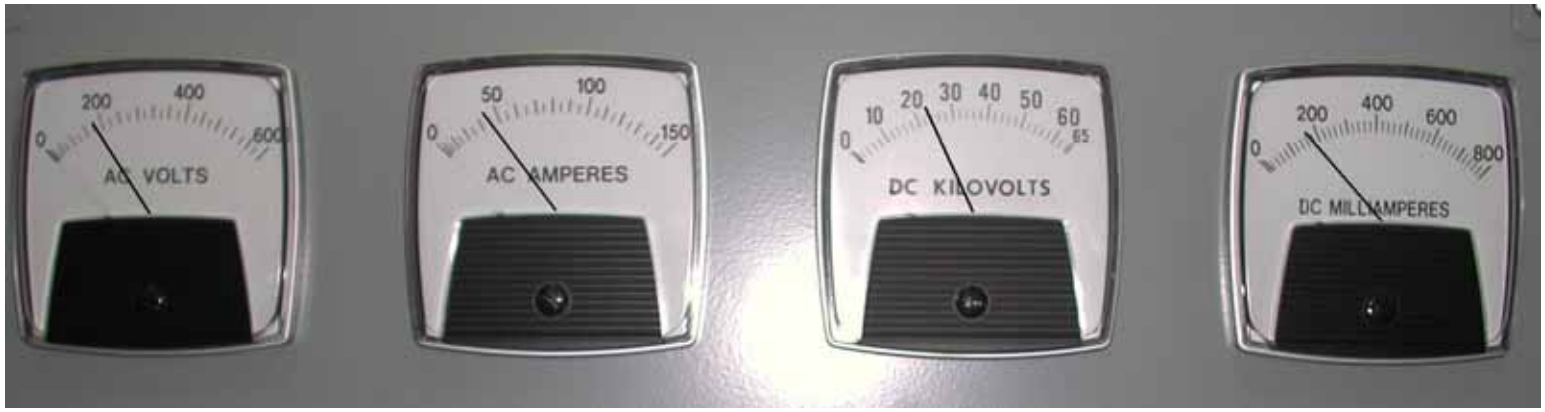
Electrical Readings and What They Mean



Indication	Cause
Low voltages and low currents	Excessive sparking in precipitator
	Electrical noise on return signal (s)

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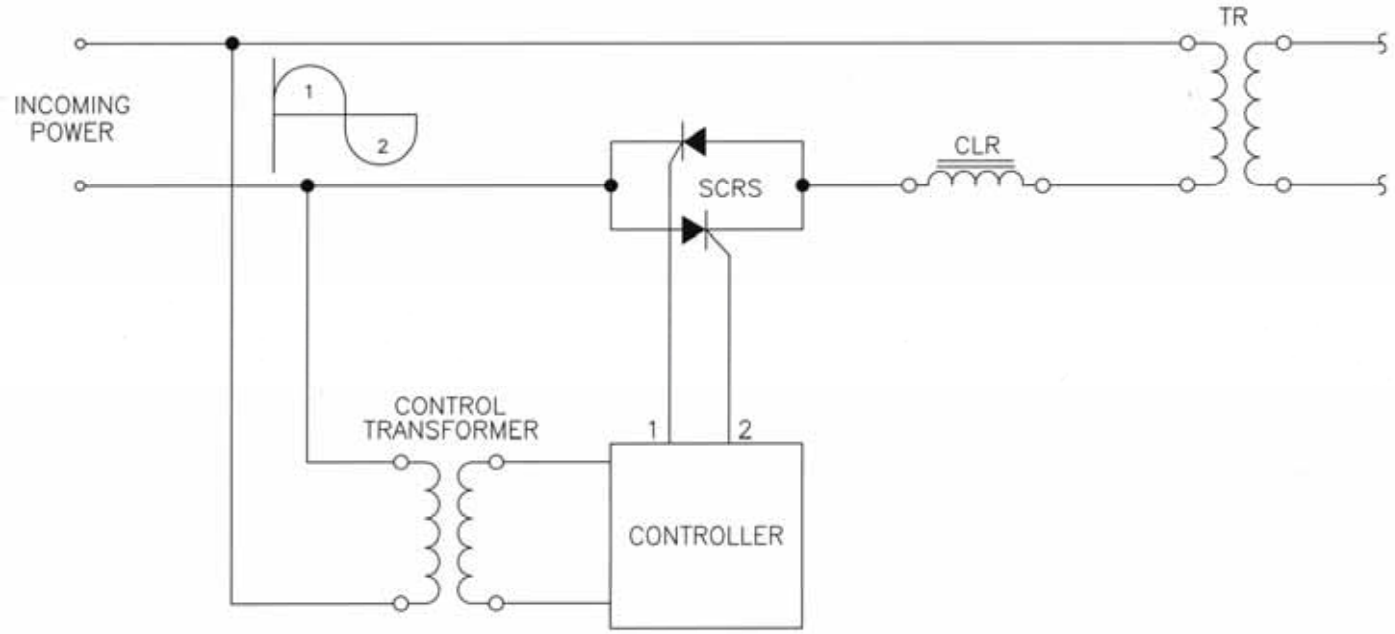
Electrical Readings and What They Mean

Indication	Cause
No power after electrical repairs in control cabinet	Power phasing has been switched



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Electrical Readings and What They Mean

Indication	Cause
Primary volts are normal, while the secondary and primary currents are much lower than normal	Heavy particulate buildup on discharge electrodes causing corona quenching and reduced free electron formation

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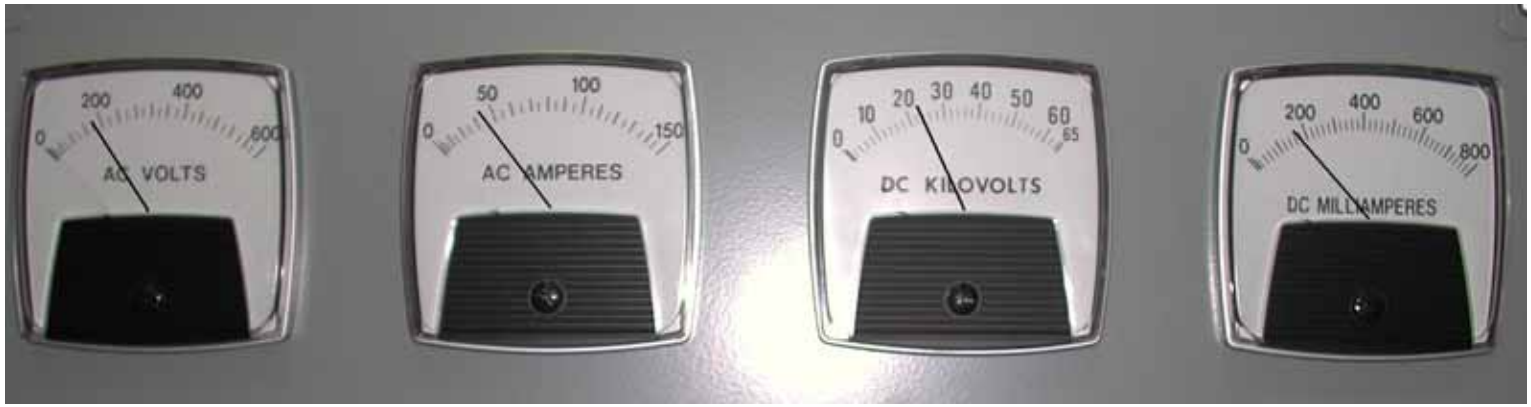
Electrical Readings and What They Mean



Indication

No sparking is occurring and no electrical limit is being reached

Cause

Defective control components

Defective or improperly sized CLR

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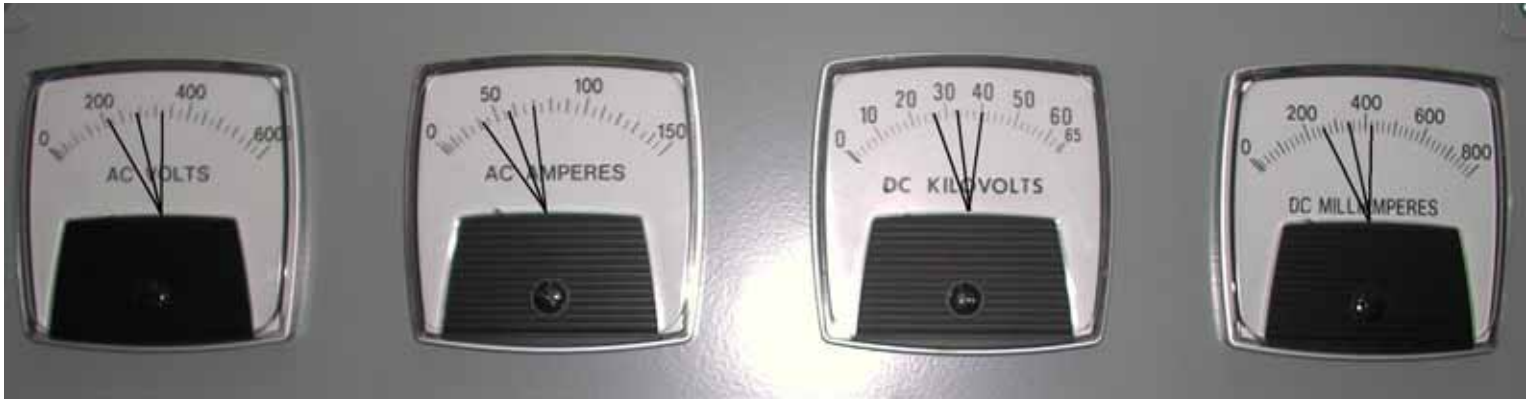
Electrical Readings and What They Mean



Indication

Readings oscillate on a 2 to 3 second cycle

Cause

Broken and swinging discharge electrode

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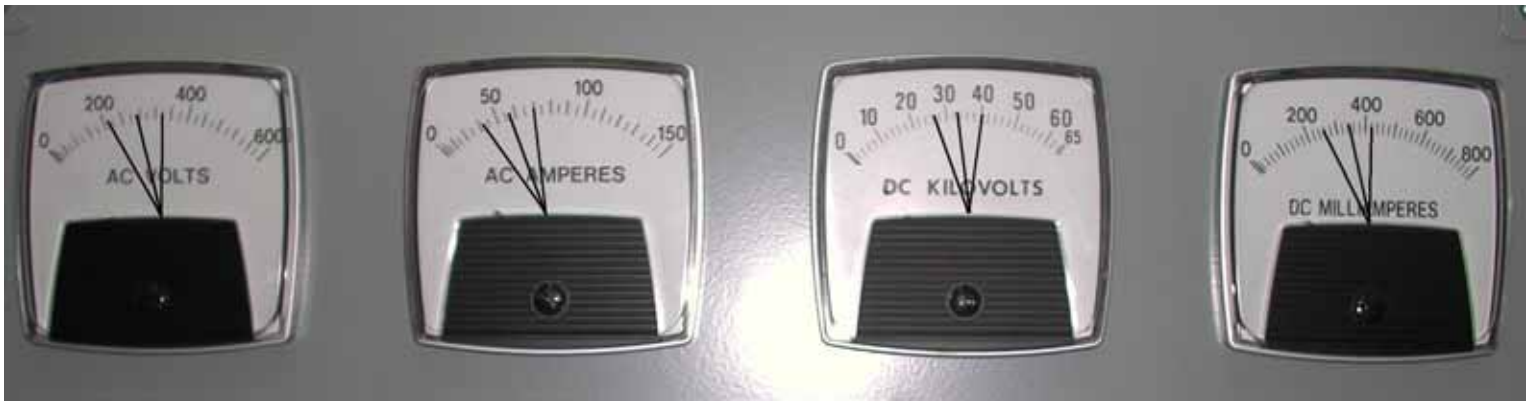
Electrical Readings and What They Mean



Indication

Readings oscillate on a 10 to 15 second cycle

Cause

Swinging discharge electrode lower steadying frame

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Things to Look for While Walking Around

- Roof Level
- Mid Level
- Hopper Level

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Things to Look for While Walking Around

Roof Level (keep your eyes and ears open)

- Pressurizing Fan
- Purge Air Heaters
- Overall Rapper Condition
- Rapper Rod Elevations (especially on HT)
- Leaking TRs
- Corroded Bus Duct / Sparking in Bus Duct
- Air Switch Integrity
- Noisy TR / CLR
- Access Doors

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Things to Look for While Walking Around

- Mid Level
  - Access Doors
  - Loose Insulation
  - Corroded Shell Steel

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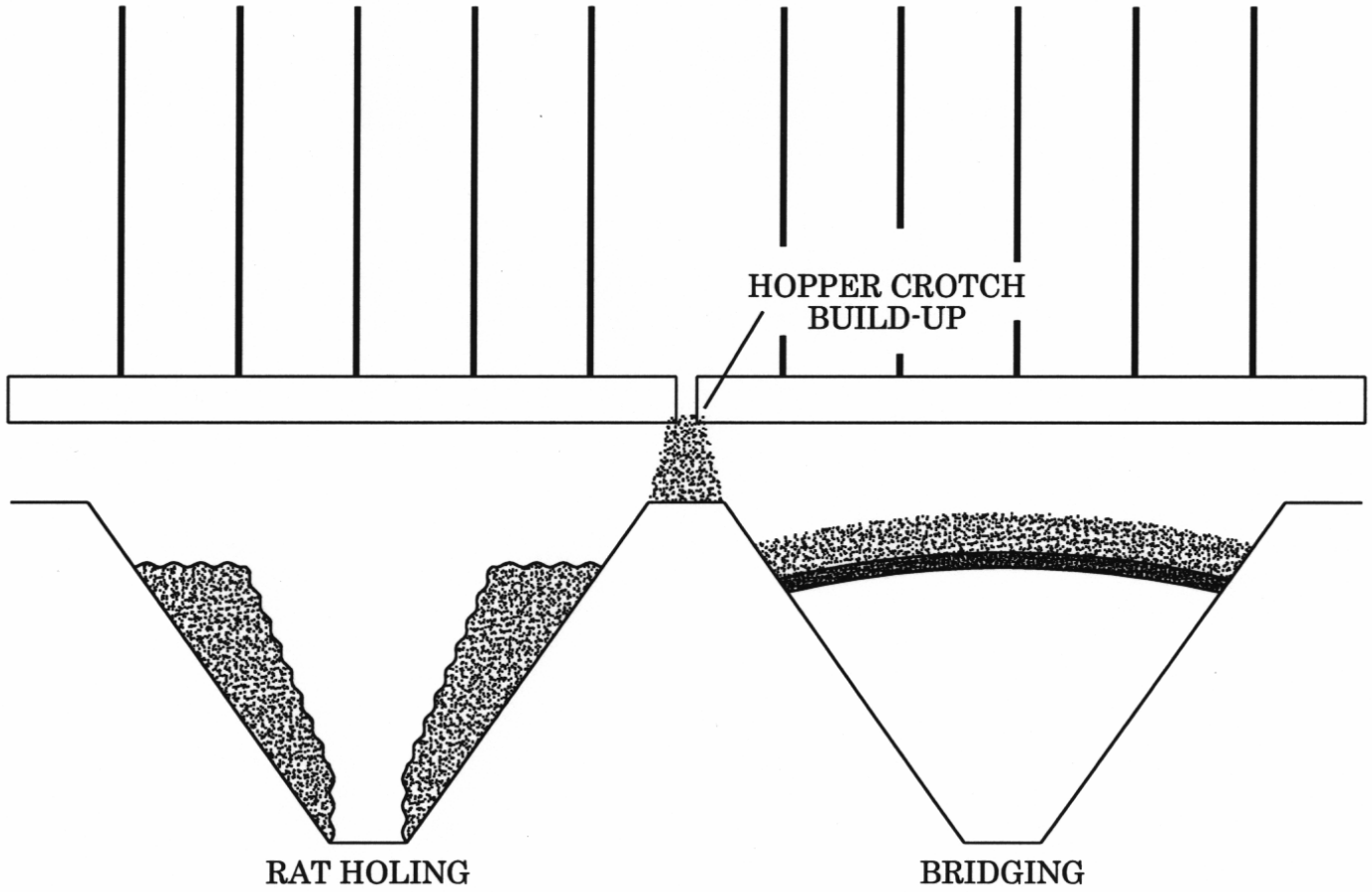
Things to Look for While Walking Around

- Hopper Level
  - Air Inleakage
  - Inoperative “vibrators”
  - Access Doors Safety Chains
  - Hopper Heaters

Hopper Problems



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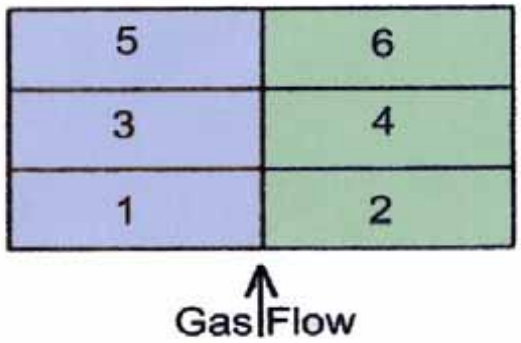
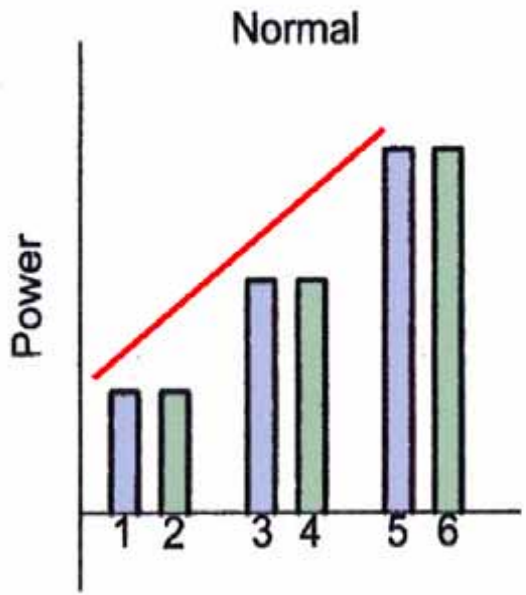
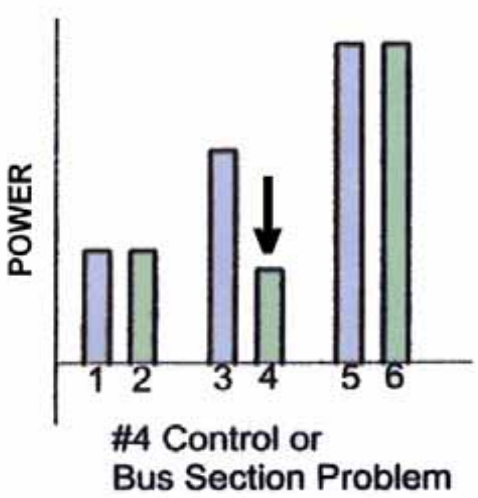
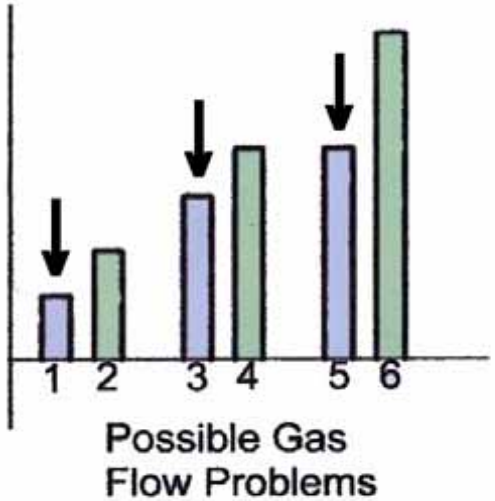
What Historical Data Can Tell Us

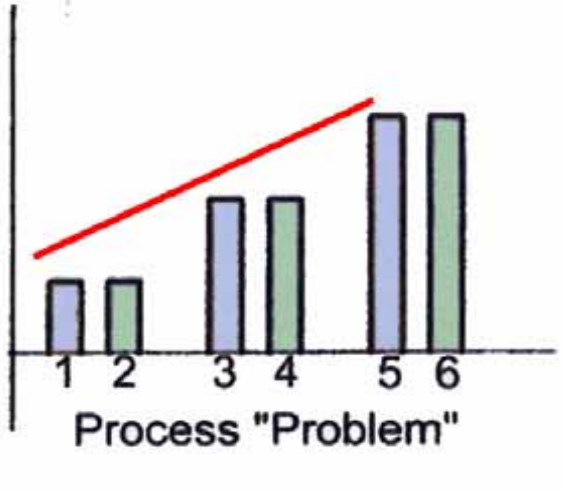
- **Historical Data Forms the Basis of Comparison for Determining Problems**
  - **Electrical Levels of TR Sets**
  - **Rapper Operating Programs**
  - **Inspection Maps**
  - **Process Trends**


5
6
3
4
1
2
Gas Flow


Normal
Power
1 2 3 4 5 6


POWER
1 2 3 4 5 6
#4 Control or
Bus Section Problem


1 2 3 4 5 6
Possible Gas
Flow Problems

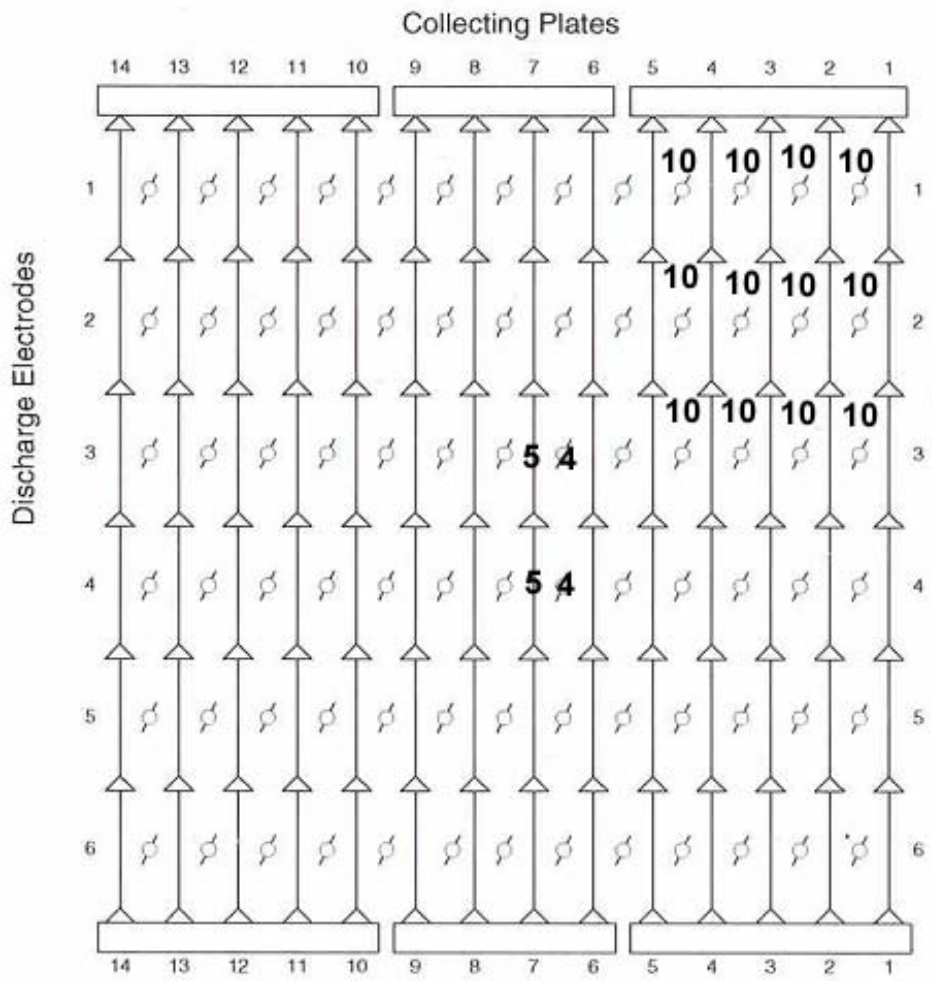

1 2 3 4 5 6
Process "Problem"

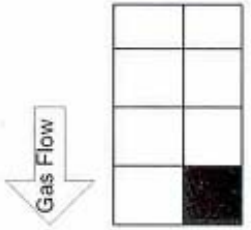
Rapper Operating Program

- Cycle Time by Field
- Energy by Field
- Failed Rappers

Inspection Maps

Inspected By: _____ Date: _____





Legend

1	Kinked Discharge Electrode
2	Warped Discharge Electrode Frame
3	Broken Discharge Electrode Frame
4	Broken Discharge Electrode
5	Bowed Collecting Electrode
6	Heavy dust Build-Up
7	Heavy Corrosion
8	Rapper Alignment Off-Center
9	Improper Collecting Electrode Spacing
10	Improper Discharge Electrode-To-Collecting Electrode Spacing
11	Other

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Process Trends

- Boiler Load - Inlet Loading
- Boiler Load - Gas Velocity
- Coal Grind - Particle Size
- Process Moisture - Ash Stickiness
- Soot Blowing - Particulate Re-entrainment
- Fuel - Resistivity

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Possible Internal Problems

- Collecting Plate to Discharge Electrode Alignment
- Plate Build-up
- Discharge Electrode Build-up
- Corrosion
- Build-up on Internal Surfaces

In a Nutshell

- Evaluate Present Electrical Operation
- Keep Your Eyes and Ears Open
- Compare with Historical Data

Questions?