PRIAS®

Power Rail Intelligent Analysis System
• **Anticipate** critical power rail failures before they occur.

• **Locate** power rail conditions that adversely affect collector shoe gear.

• **Prioritize** limited power rail maintenance resources more effectively.

• **Utilize** maintenance windows by creating an effective power rail PM program.

• **Verify** the condition of new power rail systems with pinpoint accuracy at commissioning while establishing a baseline for system condition over time.

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**200 KHz Possible Sampling Provides a Detailed Analysis of These Critical Factors**

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**Collector/Shoe Gear Impacts**

Collector/shoe gear is the critical link between the trains and the power rail. PRIAS monitors collector impact, bounce, and arcing to provide an accurate assessment of the power rail contact surface.

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**System Voltage at All Points on the Line and at Feed Points**

Voltage loss can have a detrimental effect on available power to your trains. PRIAS can measure system voltage variations due to high resistance at splices or cable connections or current leakage at failing insulators. With simultaneous voltage measurement at substations/feedpoints, PRIAS provides a complete system assessment.

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**Individual & Total Collector Current at All Points on the Line**

In an ideal world, collector currents are steady and balanced. In the real world, current imbalances can affect train performance and power rail condition. PRIAS identifies locations of excessive current demand and potential power rail damage.

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**System Trend Analysis to Guide Preventive Maintenance Programs**

All power rail systems suffer from wear and tear. Periodic PRIAS evaluations can identify trends of wear and system decay. This enables you to focus your maintenance resources on specific, critical areas of concern and make the most of limited maintenance time windows.
PRIAS can capture rapid, short duration collector bounce, impact, and arc flash. Collector impacts increase wear and tear on shoe gear. Collector bounce interrupts current flow (power loss) while producing electrical arcs damaging to power rail and collector shoes.

The table and graph below show actual collector impact data. When merged with precise positioning information, critical collector impacts can be mapped (shown below), directing maintenance teams to problem areas.

### PRIAS Generated System Data

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### Positive Collector Impact

![Positive Collector Impacts](image)

### Collector Impact Map

![Collector Impact Map](image)
Voltage variation due to location and vehicle demand is common along power rail systems. PRIAS helps identify out-of-specification voltage variations. Comparison of raw voltage data with moving average data discriminates between noise and spurious signals from prolonged voltage events. Customer specified thresholds ensure accurate voltage assessment.

Mapping system voltage to predicted voltage can identify areas of excessive resistance due to loose power rail splices or excessive current leakage at insulators. Directing maintenance teams to specific problem areas before critical failures occur maximizes the effectiveness of your limited maintenance resources and time windows.

PRIAS Generated System Data
PRIAS provides individual collector and complete vehicle current. This indicates current balance between collectors, as well as individual collector current load, and total vehicle current demand. Mapping excessive current demand to position may direct maintenance personnel to areas of excessive electrical erosion of the 3rd rail. Current histograms provide insight to current demand on a system loop or specific area of track.
Step 1: Conductix coordinates with the customer to ensure vehicle availability for set-up, data collection and return to service.

Step 2: Conductix technicians temporarily configure the vehicle with sensors and the data acquisition and processing module.

Step 3: The vehicle is operated in the revenue service profile for 2 to 4 runs along the system. This ensures data integrity and verification of significant events.

Step 4: Equipment is removed and the vehicle is returned to revenue service.

Step 5: Conductix engineers analyze, and review the data to identify locations of high collector impact, significant voltage events and trends of excessive current demand or imbalance.

Step 6: A complete report with raw data, filtered data, and mapping of significant events is provided to the customer.

Step 7: Data is reviewed with the client and may include a system walk-through to assist with correlation of events to specific power rail conditions on the system.

The complete PRIAS evaluation typically takes two to four days, depending on system length.
Case Study #1

Problem: Power rail had become severely and prematurely damaged in several locations due to electrical erosion.

A PRIAS evaluation revealed:

- Too few collectors for current demand.
  Solution: The customer added the necessary collectors.

- Severe electrical erosion on the downtrack side of a power rail isolating gap due to vehicle acceleration.
  Solution: The power isolating gap was repositioned to a location of vehicle deceleration.

- Overall peak current demand of the vehicle exceeded the power rail specification.
  Solution: The vehicle speed/acceleration profile was modified to bring peak current within specifications without affecting revenue timing/headways.

Case Study #2

Problem: Collectors were severely damaged during system operation.

A PRIAS evaluation revealed:

- Switch elements had worn causing misalignment of the power rail across the switch gaps. Collectors were unable to negotiate the misalignment and were becoming damaged.

  Solution: Switch elements were realigned and switch inspection and alignment were included in the system Preventive Maintenance schedule.

  Solution: Quarterly PRIAS evaluations assist the customer with their Preventive Maintenance Program.