CDS Rail
a voestalpine company

Track Circuit Monitoring

Intelligent early warning of track circuit degradation…

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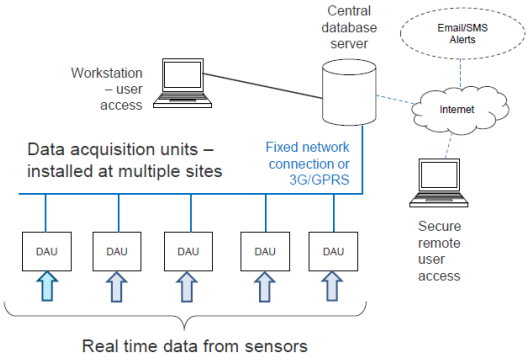
Introduction…

Track circuits are a vital part of most signalling systems and maintaining their performance is fundamental to the safety and efficiency of the rail network. CDSRail was one of the first companies in the world to apply remote monitoring principles to derive information about the operating condition of track circuits and has subsequently developed solutions to reliably identify deterioration in most common types of track circuit equipment, including DC, AC and audio frequency, for early detection of problems like:

- ✓ **Rail head/wheel contamination**
- ✓ **Ballast contamination/flooding**
- ✓ **Failure of insulated joints**
- ✓ **Poor impedance bonds**
- ✓ **Faulty equipment or wiring**

TCM solutions…

CDSRail employ a modular, integrated architecture for all applications, using common hardware and software components and believe in providing customers with the skills & tools to generate targeted information on asset health and performance. All hardware and software can be owned by the customer and operate within secure railway networks.



Modular system architecture – allows new assets or applications to be added at any time

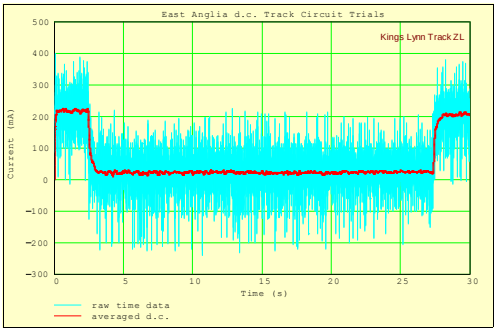
Different measurement technology and data processing is applied dependent on the track circuit type as explained here:

DC Track Circuits

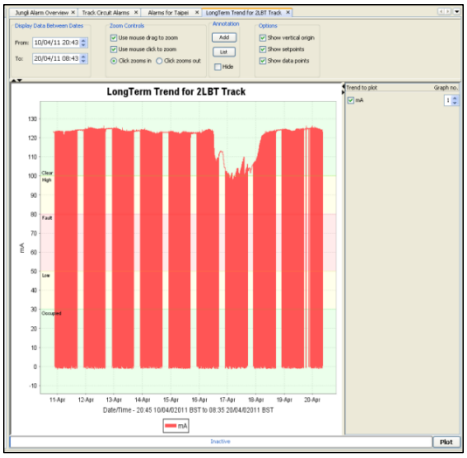
The track circuit receiver current is monitored non-invasively using a Hall Effect sensor installed in a trackside equipment case or signalling room.

Hall Effect transducers measuring track circuit receiver current.

Real time data from the output of the sensors is recorded by a CDSRail data acquisition unit which uses a system of multiband alarming to detect when the operating characteristics of a track circuit start to change.



Signal processing in the CDSRail data logger isolates the DC component from any AC noise

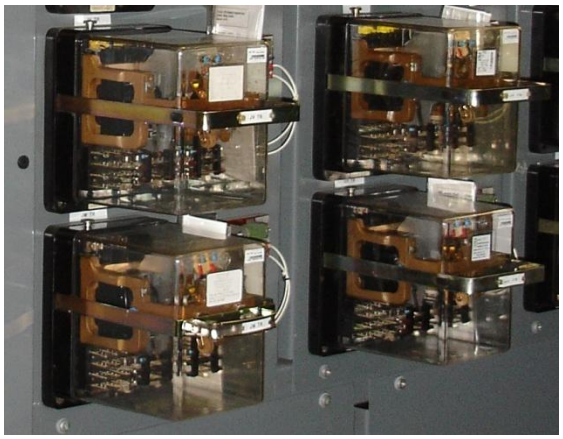


Multiple alarm bands provide progressive condition based alerts

Track circuits can be easily combined with other CDSRail applications for integrated condition monitoring. Data is transferred from the field units using a variety of communications options including GPRS/3G and stored in a central database server which allows users to assess asset performance and condition using a simple browser based interface with clear 'traffic light' status indicators and detailed graphing & reporting tools.

AC Track Circuits

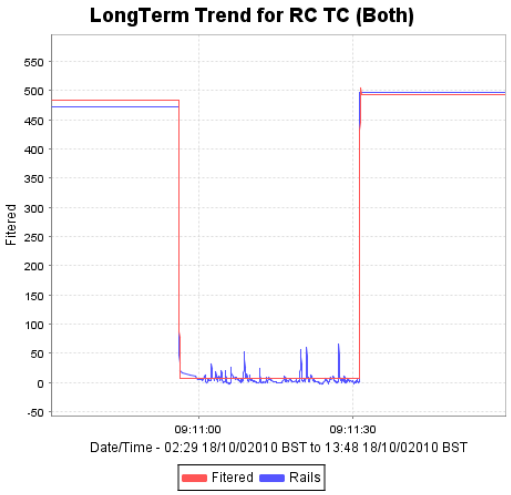
For AC track circuits which use a phase sensitive 'vane relay' CDSRail have developed a patented synchronous detection technique which accurately represents the 'torque' current driving the relay with the option of continuous measurement of the phase angle between the 'local' and 'control' currents.



CDSRail's synchronous detection technique accurately measures the 'torque' current for vane relays like VT1.

Measurement is made using non-invasive transducers and the data acquisition unit processes this information to calculate the current energising the track relay. Interference sources such as DC traction current which do not affect the operation of the relay are rejected to create a realistic picture of track circuit performance.

The synchronous detection hardware is integrated into a special version of the CDSRail MiniLogger which also incorporates 2 analogue and four digital inputs for additional monitoring.



Interference which does not affect the operation of the vane relay is rejected for reliable diagnosis

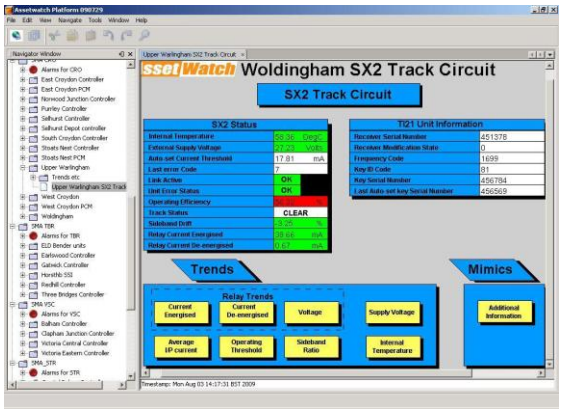
Once acquired, AC track circuit current is analysed using the same intuitive multiband alarming regime as DC track circuits and transferred to the database server. Where phase angle measurement is also used, this can provide additional information to indicate the root cause of the fault such as issues with impedance bonds or ballast contamination.

Audio Frequency – TI21

For modern microprocessor controlled track circuit equipment, local diagnostic outputs are often available carrying information about the condition and status of the system. In these situations, CDSRail data acquisition hardware can be safely interfaced to the manufacturer's equipment to make this data available remotely via a central asset monitoring database.

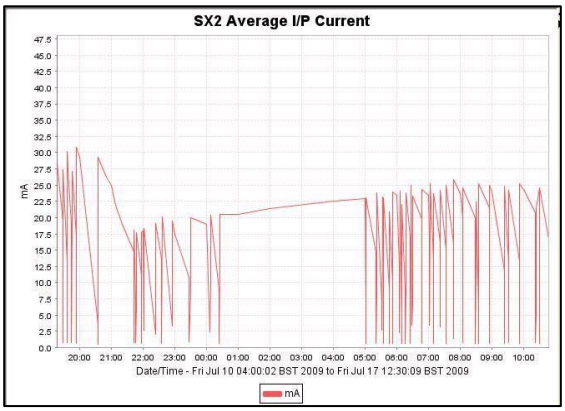
CDSRail MiniLogger with Bombardier *EBI*Track 200 digital TI21 receiver

The latest generation of TI21 receiver from Bombardier (EBI Track 200) is one of many systems that incorporate on board diagnostics and CDSRail have developed specific application software for this system which allows the MiniLogger to communicate with the receiver using the Bombardier protocol.



Typical Overview/Mimic screen for TI21 track circuit.

One MiniLogger can communicate with several Bombardier receivers via an RS485 connection and records status information for each such as relay drive current, voltage, upper & lower sideband current and average input current. The Logger calculates further parameters based on these status inputs and makes all information available for remote analysis and trending.



Long term trend of TI21 Relay current – showing drop experienced during very wet weather

CDSRail Asset monitoring checklist

Supplier

The ability to deliver...
CDSRail have an excellent record for delivering condition monitoring projects on time and budget, with references from leading railways

Ongoing development...
CDSRail have the skills and resource to support expansion and development and offer clients effective training & support tools

Putting customers in Control...
CDSRail can deploy the central server into the client organisation and provide tools and training to enable the client to extend and configure their system independently.

Technical Support...
CDSRail operate a dedicated helpdesk and offer a full spares/warranty service

System

Modular...
CDSRail offer equipment that is both modular and scalable to accommodate anything from a single point end or track circuit to hundreds in a single location.

Configurable...
Using intuitive configuration tools customers can rapidly add new assets or monitoring modules with no loss of data.

Flexible...
CDSRail systems cover multiple applications, and include rack based and MiniLogger hardware options.

Proven...
CDSRail solutions are in operational use with leading rail organisations around the world.