

TRACKCIRCUITLIFE CHECK

A KEY TO PREVENTIVE MAINTENANCE

The TrackCircuitLifeCheck is a versatile measurement instrument that can be used on both diagnostic and commercial trains. Implementation of the TrackCircuitLifeCheck allows extensive assessment of AC Audio frequency track systems, such as the UM71 used in the French TVM.

Similar to the BaliseLifeCheck, it is in many ways a lab on wheels that can be embedded in test vehicles allowing the maintenance of AC Circuits trackside systems to become both automated and predictive.

The TrackCircuitLifeCheck, designed and manufactured entirely at ERTMS Solutions, guarantees complete independence from track circuit manufacturers by providing a free-standing tool to test and measure TVM track circuits. In addition, this tool enables exponential growth as the modular approach allows for future expansions without hindrance.



- Compatibility with all TVM Track Circuits equipments (430, and 300)
- Measure shunted track circuits currents $|I_{cc}|$
- Measure transversal impedances
- Measure EPI loops (TVM-300)
- BSP loops measurement (TVM-430)
- Odometry module (Wheel Sensor/Doppler Radar, GPS-IMU)
- Control and data analysis (Software)
- Alarms for corrective maintenance



ERTMS Solutions consistently creates innovative products that alter the railway signaling world. This is what has made us an industry leader. We not only operate as the only company of our kind to offer testing, maintenance, and software protocol services that are compatible with the European railway signalization standards ERTMS/ETCS but also, maintain the agility to tailor our products to existing national standards.

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UNIQUE STRENGTHS OF THE TRACKCIRCUITLIFECHECK

ELECTRICAL SPECIFICATIONS	
POWER SUPPLY	230 V AC, protected by 1500 VA online UPS. Total average power consumption 500 W. Option: +72 V DC available according to EN50155 Class S2.
ANTENNAS/SENSORS	<ul style="list-style-type: none"> TVM sensors based on CSEE/ANSALDO TVM/2G standard track circuits sensors for standard audio frequency track circuits (1700, 2300, 2000 and 2600 Hz) EPI sensors (TVM-300) based on CSEE/ANSALDO TVM IP-1/P standard EPI loop sensors BSP sensors (TVM-430) based on CSEE/ANSALDO TVM BSP standard BSP loop sensors Custom designed 25 kHz TX loop antenna for transmission of signal for transversal impedances measurement Custom designed 25 kHz RX eight-like loop antenna for reception of 25 kHz signal for transversal impedances measurements
COEXISTENCE WITH ON-BOARD SYSTEMS	<ul style="list-style-type: none"> Completely independent from already existing onboard TVM systems Installation compatible with EPSF SAM 706 v2 TVM Installation Specifications
RF EMISSION	Only 25 kHz signal is transmitted and it is compliant with ETSI EN 300 330 Standard for inductive loop systems in the frequency range 9 kHz to 30 MHz.
RADIO COMMUNICATIONS	Full UMTS/3G data link available for remote monitoring and maintenance through RF MODEM.
SIGNAL DETECTION AND ANALYSIS	<ul style="list-style-type: none"> Track short circuit current measurement from 100 to 5000 mA rms with +-1% precision Track circuits FM modulation detection for track-to-train transmitted bits detection (option) EPI (TVM-300) signal detection and measurement with +- 1Hz frequency measurement precision. EPI signal envelope detection BSP (TVM-430) left and right signal detection and PSK demodulation. Full signal envelope detection and measurement with more than 20 dB of dynamic range available Transmission line compensation capacitors detection and quality evaluation. The system is capable of identifying and distinguishing JES transversal LC elements from compensation capacitors
ENVIRONMENTAL AND PHYSICAL SPECIFICATIONS	
TEMPERATURE RANGE	<ul style="list-style-type: none"> Indoor sub-rack Units: 0 to +70°C cubicle internal temperature Outdoor antennas: -40 to +85°C external temperature
SHOCK & VIBRATION	According to EN 61373 with EN50155 specific requirements for electrical equipment installed in rolling stock (certification pending).
HUMIDITY/DUST	Outdoor Antennas and sensors: IP66 with proper protective conduit for cable and connector protection.
PHYSICAL DIMENSIONS	<ul style="list-style-type: none"> External TVM, EPI and BSP Sensors: CSEE/ANSALDO, according to EPSF SAM S 706 V2, Annex 13 Transversal Impedances Antennas: TX antenna is 1.2m x 1.2m x 80 mm, 40kg. RX antenna is 2.2m x 1.2m x 80mm, 80 kg Onboard Measurement instruments: 19" standard rack mount, 510mm depth, 15U vertical height All cables from sensors/antennas to instruments : 4x1.5 mm² and 4x2x0.5mm², Ø 8.5mm EN 45545-2 compliant
TVM SIGNAL MEASUREMENTS	
SIGNAL ENVELOPES	<ul style="list-style-type: none"> Envelopes of all received signals (Track Circuit short circuit currents, EPI, BSP and 25 kHz) are measured using high speed ADC to fully assess signal levels Track circuits currents measurement are fully calibrated to offer precise measurements according to onboard operational TVM systems
SIGNAL FREQUENCIES	<ul style="list-style-type: none"> Track Circuits currents audio frequencies (1700, 2300, 2000 and 2600 Hz) are measured with a +- 1 Hz precision for proper track circuit functional assessment EPI loops frequency measurement and detection to check EPI loop functional states BSP loops frequency and level assessment to detect proper functional states of transmitting BSP loops
DATA EXTRACTION	<ul style="list-style-type: none"> EPI Loops (TVM-300): Single frequency measurement at +- 1Hz precision for EPI message detection BSP Loops (TVM-430): Carrier frequency detection and PSK demodulation with telegram detection and extraction for both left and right BSP loops. Full message decoding and checksum verification OPTION: possibility of FM modulation detection and full demodulation on track circuits currents for track-to-train continuous data detection and extraction
DATABASES	<ul style="list-style-type: none"> Real-time balises analysis during train movement RAW data of all track elements analyzed are stored in database if further analysis is required
TRACK ELEMENT POSITIONING	<p>All track elements with precise location are recorded, using either:</p> <ul style="list-style-type: none"> GPS data coupled to Inertial Measurement Unit (IMU) for sub-meter precise positioning, or Using longitudinal track (KP) positioning based on odometry units (Wheel sensor, Doppler radar)
PREVENTIVE & PREDICTIVE MAINTENANCE	Possibility of predictive maintenance based on multi-data of the same track element in time and deviation analysis. Realtime alarms pver GSM/GPRS network possible on-demand.

