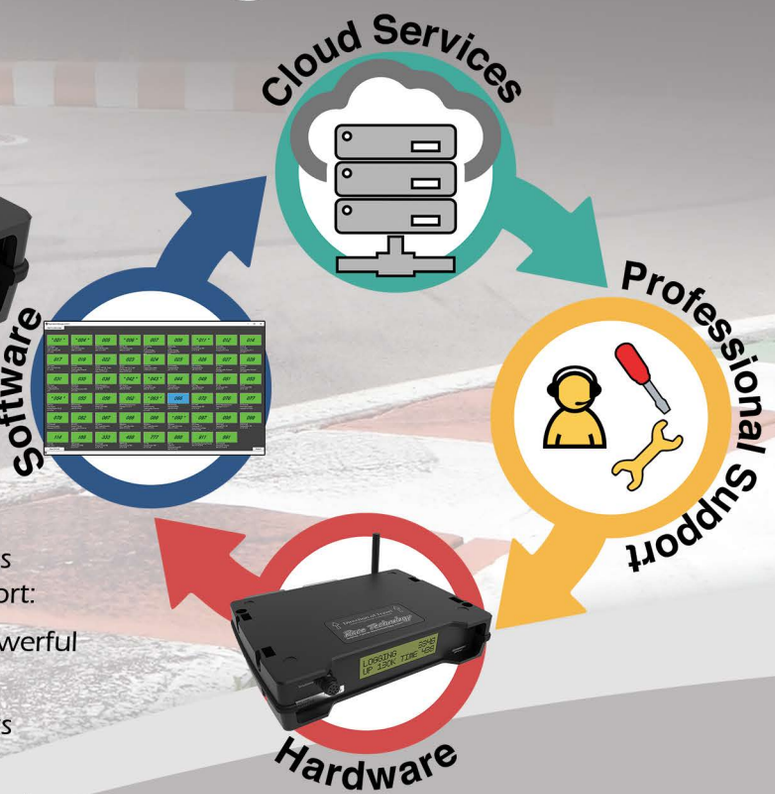
Professional Race Series Management



Race Technology offer a complete solution for series management with specialist and professional support:

Hardware - The RTSS products are race proven, powerful and highly configurable

Software - Our specialist race series manager allows administration of an entire race series grid

Cloud services - All data is securely held on the cloud: simpler, faster and more secure that traditional logging systems

Professional support - We are the experts in series management and technical scrutineering, and can offer a complete package of professional support, including Balance of Performance.

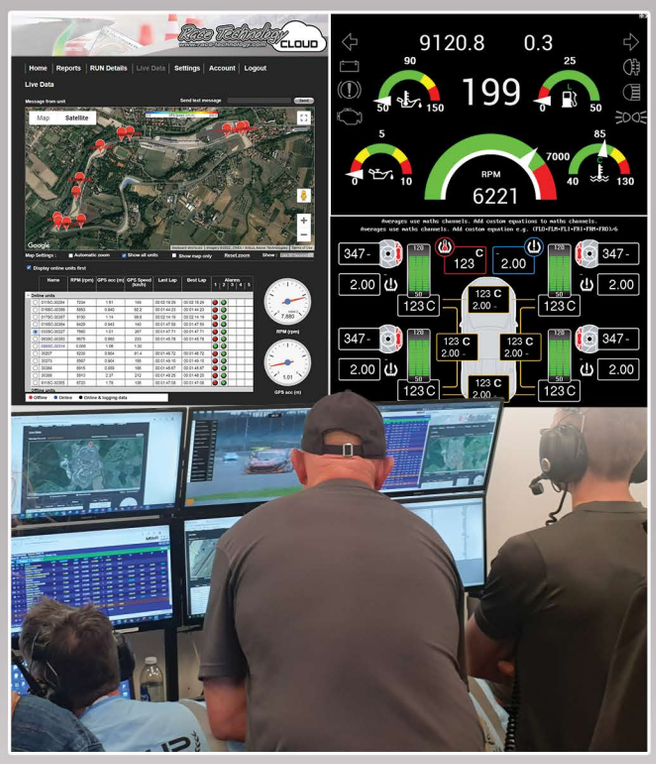
Key features include:

- Automatic data collection
- Automated data processing & report generation
- Live Telemetry
- Team Access
- Remote Unit Management
- Secure data

Automatic data collection

Race data is automatically uploaded from all cars (RTSS SL & RTSS L) in real time to a cloud server. This gives two major benefits:

- There is no requirement to manually download data from all cars after the race, so less on-site support is needed
- Rule infringements can be identified during the race, so judgements can be in place before podium presentations



Live team telemetry to web interface and configurable virtual dashboards in Live Monitor software

Automated data processing & report generation

Race data stored on the cloud server can be accessed from anywhere in the world. Automated reports can process and report on measured parameters, these results can be automatically emailed, or downloaded from the web interface. Alternatively, if the data needs to be checked manually, this can be done by an office based engineer without the need to travel to the track. This increases the data quality and reduces the costs.

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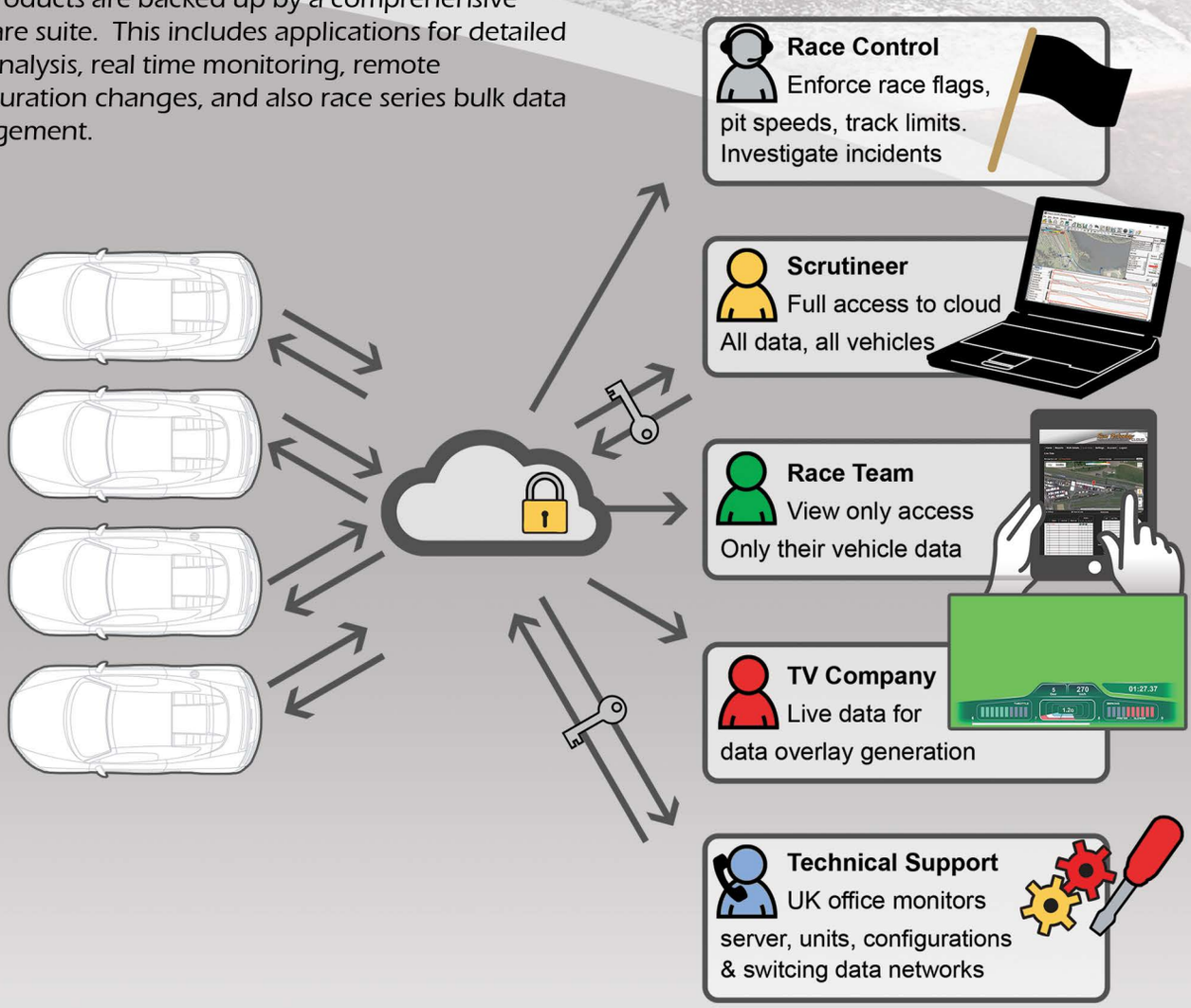
Live Telemetry
View data live from every vehicle in the race series on internet enabled devices. The live data includes lap times, vehicle CAN messages, additional sensor channels and high accuracy GPS data.

Remote management
For large grids it is a challenging task to ensure that all systems are installed, operational, and correctly configured. Common issues with traditional scrutineering systems include damaged GPS antennas and interrupted CAN connection. If there are any issues with the RTSS SL & RTSS L operation, this can be quickly identified from the on-line interface. If a unit needs to have the configuration updated, configurations can be updated remotely, either for the whole grid or on a car-by-car basis.

Software support
Our products are backed up by a comprehensive software suite. This includes applications for detailed data analysis, real time monitoring, remote configuration changes, and also race series bulk data management.

Data security
Whilst the advanced features and automatic data collection are what set the RTSS SL and RTSS L apart, nothing is more important that ensuring that at the end of each event there is a valid data file from every car. To ensure maximum robustness and reliability, the systems also log a local backup of data and we recommend a battery backup to prevent power outages.

Team access and services
Where championship regulations permit, individual teams may also be granted access to their data. Access right are determined by the championship organiser and may for example include read-only access to stored data or even access to live telemetry on any web enabled laptop, tablet or smart phone.



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Three RTSS products are available to tailor a support package to the needs of each race series.

RTSS Scrutineering Systems have:

- Rugged DTF motorsport connectors
- Robust metal enclosure
- CAN input port/s
- RPM input
- 10 x Analogue input
- Dash display connector
- External battery option
- High accuracy GPS/GLONASS receivers
- Local logging either to SD card or internal buffer
- Integration with Race Series Manager software and automatically organised cloud storage
- Advanced real time data handling features including filtering and maths channels

The **RTSS SL** (Real Time Scrutineering System) is purpose designed for race series data collection. With live telemetry, data logged to the internet and SD memory card for complete data security. LED status indicators

- 4G LTE data connection with rollback to 3G/2G where network coverage requires.

The **RTSS L** (Real Time Scrutineering System) is purpose designed for race series data collection. With live telemetry, data logged to the internet and also downloadable via scrutineer port for complete data security. LCD displays status information.

- 4G LTE data connection with rollback to 3G/2G where network coverage requires.

The **RTSS S** stores data to a removable memory card. Data is collected manually and organised using our Race Series Manager software. Rugged connectors, sensor inputs and CAN channels ensure a wealth of important data can be recorded.

- SD card storage requires manual data collection

			Data Logged To...		Inputs		
	Live Telemetry	Status Information	Internet	Memory Card	Analog	Freq	CAN
RTSS SL	✓	LEDs	✓	✓	✓	✓	✓ **
RTSS L	✓	LCD Display	✓	✗	✓	✗	✓ *
RTSS S	✗	LEDs	✗	✓	✓	✓	✓ **

** RTSS SL and RTSS S have 2 CAN ports with up to 105 channels and raw CAN available.

* RTSS L features a single CAN port with up to 60 channels and RAW can available.

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There are ongoing charges for the cloud data services and live telemetry. We can discuss these charges and your championship's requirements as part of a complete technical support package.

	RTSS S	RTSS L	RTSS SL
Data Upload		Mobile data network connection to online cloud storage	Mobile data network connection to online cloud storage
SIM Card		User accessible, any data SIM can be used	User accessible, any data SIM can be used
Telemetry Update Rate		Typical update rate to website browser is 5Hz, live data upload to PC software and cloud up to 100Hz depending on connection.	Typical update rate to website browser is 5Hz, live data upload to PC software and cloud up to 100Hz depending on connection.
Memory card	Removable SD card up to 32GB		Removable SD card up to 32GB
Maximum No Channels	No hard limit, potentially 100s	No hard limit, potentially 100s	No hard limit, potentially 100s
GPS	20Hz update rate. Tracks GPS and GLONASS	20Hz update rate. Tracks GPS and GLONASS	20Hz update rate. Tracks GPS and GLONASS
RTK (2cm position)		Optional, requires suitable RTCM correction source	
GPS Antenna	3.3v multi constellation active antenna with SMA connector.	3.3v multi constellation active antenna with SMA connector.	3.3v multi constellation active antenna with SMA connector.
Analogue Inputs	12 external inputs, 0-25v. All inputs are protected and have a 2nd order filter with corner frequency of 105Hz. Accuracy = 0.4% of measured voltage +- 20mV. Sample rate 100Hz.	12 external inputs, ratiometric, 0-5v or 0-25v. All inputs are protected and have a 2nd order filter with corner frequency of 105Hz. Accuracy = 0.4% of measured voltage +-20mV. Sample rate 100Hz.	12 external inputs, ratiometric, 0-5v or 0-25v. All inputs are protected and have a 2nd order filter with corner frequency of 105Hz. Accuracy = 0.4% of measured voltage +-20mV. Sample rate 100Hz.
Frequency Inputs *	4 external frequency inputs with a maximum input frequency >2kHz. Triggering voltage requires a low input of <1v and a high input of >4v and 15v maximum.		4 external frequency inputs with a maximum input frequency >2kHz. Triggering voltage requires a low input of <1v and a high input of >4v and 15v maximum.
RPM *	12v frequency input for engine speed.	12v frequency input for engine speed.	12v frequency input for engine speed.
Low side driver	4 x low side driver, local firmware controlled, 500mA per channel	4 x low side driver, web interface controlled, 500mA per channel	4 x low side driver, web interface controlled, 500mA per channel
Power Supply Requirements	12v nominal input, minimum of 10v, maximum of 20v. Current consumption TBD	12v nominal input, minimum of 10v, maximum of 20v. Current consumption TBD	12v nominal input, minimum of 10v, maximum of 20v. Current consumptionTBD
Permanent Supply		External feed to finish uploading data, vehicle or battery pack	External feed to finish uploading data, vehicle or battery pack
+5v Output 1	+5v +-1.5% output for powering sensors Maximum current draw 500mA.	+5v +-0.5% output for powering sensors Maximum current draw 200mA. Voltage source for ratiometric analogue inputs	+5v +-0.5% output for powering sensors Maximum current draw 200mA. Voltage source for ratiometric analogue inputs
+5v Output 2	+5v +-1.5% output for powering sensors Maximum current draw 500mA.		+5v +-1.5% output for powering sensors Maximum current draw 500mA.
Case Construction	Die cast aluminium housing	Die cast aluminium housing	Die cast aluminium housing
Connector Type	2x 12 way Deutsch DTF, 1x 5 way binder, 1x SMA	2x 12 way Deutsch DTF, 1x 5 way binder, 1x6 way binder3x SMA	2x 12 way Deutsch DTF, 1x 5 way binder, 1x6 way binder3x SMA
Display connector	Auxiliary output to enable local monitor of all channels	Auxiliary output to enable local monitor of all channels	Auxiliary output to enable local monitor of all channels
USB port	Configuration port for setting up unit	Configuration port, also for downloading locally cached data	Configuration port for setting up unit
CAN Port 1	Maximum of 105 individual messages, at up to 1Mbit/s RAW CAN reception	Maximum of 60 individual messages, at up to 1Mbit/s RAW CAN reception	Maximum of 105 individual messages, at up to 1Mbit/s RAW CAN reception
CAN Port 2	Maximum of 105 individual messages, at up to 1Mbit/s (Optional) RAW CAN reception (Optional)		Maximum of 105 individual messages, at up to 1Mbit/s (Optional) RAW CAN reception (Optional)
Accelerometers	3 axis, precision digital output. Guaranteed 2g minimum full scale on all axes. Resolution of 0.005g. Optional 6g sensor available as a factory option.		3 axis, precision digital output. Guaranteed 2g minimum full scale on all axes. Resolution of 0.005g. Optional 6g sensor available as a factory option.
Vibration	Factory tested at 25g, 50Hz sinusoid for 5 minutes (without memory card inserted).	Factory tested at 25g, 50Hz sinusoid for 5 minutes	Factory tested at 25g, 50Hz sinusoid for 5 minutes (without memory card inserted).
Temperature	Factory tested from -20oC to 70oC	Factory tested from -20oC to 70oC	Factory tested from -20oC to 70oC
Status indication	4 LEDs for Status, GPS, Power, Logging	2 line x 16 character status display	Status LED (Red) and configurable LED (Green)

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