LifeRacing

Professional Electronics for Automotive and Motorsport

Product Catalogue
2023-2024

Contents

Life Racing was formed in 2002 to provide specialist electronics for the professional motor racing industry, OEM automotive suppliers and military applications. Life Racing has extensive experience in the design, manufacture, development and support of a broad range of products including engine control units (ECUs), power distribution units (PDUs), display units, integrated paddle shift systems and high reliability wiring harnesses to all levels and variations of motorsport and automotive applications.

This includes unique strategies for direct injection, drive-by-wire, gear shifting, boost control and traction control.

We have extensive experience in particular of knock-limited, intake-restricted turbocharger control gained over years of support where we have multiple class and series wins in conjunction with race engine development companies.

F88

The F88 ECU is an extremely high-level precision engine management controller. The twin processor unit uses a high-speed RISC processor for code execution and an additional large FPGA for high-speed engine position tracking, allowing the scheduling of code to be independent of signal patterns, increasing flexibility, efficiency and accuracy under transient conditions. This powerful combination also allows advanced control algorithms but yet remains easy to calibrate for the end user.

F88RX/RS/R/RXL/RSL/RL

The F88 R and L ranges have been specifically designed for applications where cost is paramount. These ECUs incorporate the same control strategies and processing power as the F88 however unnecessary hardware components have been removed so that the overall cost can be reduced for users who do not require the full complement of I/O the F88 utilises. The broad range of specifications means the perfect ECU can be selected for each application.

Product	Part Number
F88	ECU-A01
F88RX	ECU-A02
F88RS	ECU-A03
F88R	ECU-A04
F88RXL	ECU-A05
F88RSL	ECU-A06
F88RL	ECU-A07
88Way Connector Kit	CON-B01

F90RX

The F90RX ECU has been introduced to allow easy and cost-effective control for complex and challenging applications. This twin processor unit is available with 3 full bridges and can sequentially control up to 12 cylinders.

F90A

The F90A ECU is the entry level unit that utilises Autosport connectors, it is based on the F90RX design and is intended for when the installation demands an Autosport solution for harsh environment applications. This ECU is available with 3 full bridges and can sequentially control up to 12 cylinders.

F90F

For advanced and challenging applications our F90F ECU is now available with control of 2 Bosch HDP-5 fuel pumps and multi bank, independent drive by wire functions with 4 full bridges.

Product	Part Number
F90RX	ECU-B01
F90A	ECU-B02
F90F	ECU-B03
F90T	ECU-B04
121Way Connector Kit	CON-B02
F90A Connector Kit	CON-A01
F90F Connector Kit	CON-A02

F88GDi4

The F88GDi4 has been specifically designed for gasoline or diesel* direct injection engines with up to 4 cylinders and can generate the complex waveforms required to activate the injectors. Capable of direct injection, port injection or a combination of both, this ECU eliminates the need for an external injector driver unit. The direct injection control and direct motor control features are included as standard.

V8 GDi Package

The V8 DI package consists of an F90RX with 2 external DI drivers with the direct injection control and direct motor control features included as standard. This package caters for gasoline or diesel* direct injection engines with up to 8 cylinders.

V12 GDi Package

The V8 DI package consists of an F90RX with 3 external DI drivers with the direct injection control and direct motor control features included as standard. This package caters for gasoline or diesel* direct injection engines with up to 12 cylinders.

Diesel control requires the Diesel feature. Solenoid injectors only.

Product	Part Number
F88GDi4	ECU-C01
F90 V8 DI Package	ECU-C04
F90 V12 DI Package	ECU-C05
88Way Connector Kit	CON-B01
121Way Connector Kit	CON-B02
GDi Driver Connector Kit	CON-A07
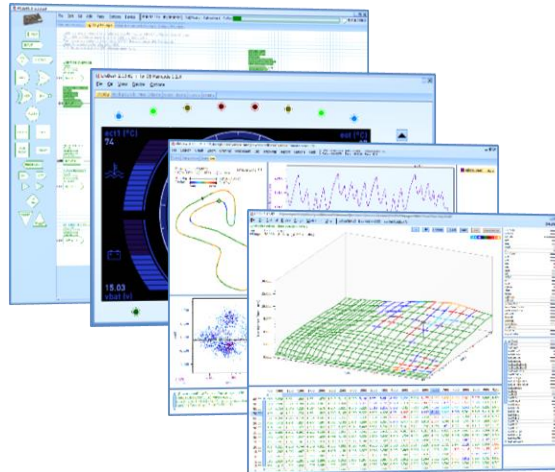
As standard all our ECUs include control of: Twin Injection, Closed Loop Lambda, Boost, Gear Cut, Gear Blip, Idle, Limp Mode, Cruise Control, Anti Lag, Nitrous, Launch, Variable Valve Timing, Variable Intake, Differential, Data Logging, Custom CAN and Water Injection. An example calibration showing all options is obtainable from the Life Racing website.

Listed below are feature upgrades available whereby we charge an additional fee. Once a feature is added, it is permanently active on the upgraded ECU.

Adaptive Knock Control:

The adaptive knock control feature allows an engine to be pushed to the edge ensuring maximum performance without compromising safety.

Direct Injection:

This function enables the ECU to directly control DI high pressure fuel pumps and perform the fuel quantity calculations required for injection.

Diesel Control:

The diesel feature allows any DI series ECU to control a diesel engine, such as direct control of the high pressure pump and multi-stage injection including smoke limitation.

Direct Motor Control:

Allows the ECU to directly control high current motors e.g., dbw using the fast internal H-Bridge circuitry in full bridge mode (F88 & F90 ECU's H-Bridges can be used as low side PWMs without this feature, F88L/R/RS/RX ECUs require this feature to use the H-Bridges as low side PWMs and/or full bridge configuration).

Gearbox Control:

This allows the use of paddle shift gearbox control, including electric solenoid, electric motor (Megaline E-shift, Marelli GCC), hydraulic and pneumatic shifting. Extensive strategies have been developed at a high level of motorsport to include gear ratio learning, gear cut, gear blip, over rev protection, and clutch control.

Traction Control:

Allows the use of up to 4 conditioned wheel speeds for traction control. Strategies include steering angle, lateral G or Yaw based for torque reduction.

Upgrade Features

Wastegate Position Control:

Integrates closed loop wastegate position control into the wastegate strategy.

Second Lambda Input:

Allows the use of a second lambda sensor for F88 R or L series ECUs.

Thermocouple 1 Input

Allows the use of a single K-Type thermocouple on F88R or L series ECUs .

8 Frequency Inputs:

Allows the use of an additional four frequency sensor inputs for the F88 R series ECUs, ideal for low cost VVT and traction control applications.

6 Ignition Outputs:

Allows the use of an additional two ignition outputs for F88 R or L series ECUs, ideal for low-cost coil on plug (COP) 5 or 6 cylinder engines.

12 Ignition Outputs:

This modification is an optional upgrade for the F88 ECU only and allows the use of 12 ignition drivers in exchange for 4 fuel drivers in order to control a COP V10 or V12 engine. This feature must be requested at the time of ordering and TTL spark configurations are not support with this function.

Custom Security:

As standard all ECUs can be passworded however we provide many security layers to protect the intellectual rights of the manufacture, engine builder, teams and end user. The security levels are tailored to the application required ensuring extreme flexibility for all parties involved. We can provide dongles and software locks or a combination of both depending on requirements.

Product	Part Number
Adaptive Knock Control	ECU-FEAT-K
Direct Injection Pump Control	ECU-FEAT-I
Diesel Control	ECU-FEAT-D
Direct Motor Control	ECU-FEAT-E
Gearbox Control	ECU-FEAT-G
Traction Control	ECU-FEAT-T
Wastegate Control	ECU-FEAT-W
Second Lambda Input	ECU-BTC-2L
Thermocouple Input	ECU-BTC-KT1
8 Frequency Inputs	ECU-BTC-8F
6 Ignition Outputs	ECU-BTC-6I
12 Ignition Outputs	ECU-BTC-12I
Custom Security	ECU-ID-XXX

ECU Comparison

FEATURE/ECU	F88RL	F88RSL	F88RXL	F88R	F88RS
CONFIGURABLE INPUTS	**12**	**12**	**12**	**24**	**24**
Generic Input (5V/TH/BI/FREQ)	4	4	4	4/8*	4/8*
Analogue Only (5V/TH)	8	8	8	12	12
Voltage Only (5V)	0	0	0	4	4
Thermistor Only (TH)	0	0	0	4	4
DEDICATED INPUTS	**5†***	**5†***	**5†***	**5†***	**5†***
Dedicated Knock	2*	2*	2*	2*	2*
Dedicated Lambda	1/2†*	1/2†*	1/2†*	1/2†*	1/2†*
Dedicated Thermocouple	1†*	1†*	1†*	1†*	1†*
OUTPUTS	**16**	**20**	**24**	**16**	**20**
Injectors (PORT/PWM)	8	12	16	8	12
Injectors (GDI)	0	0	0	0	0
Ignition (IGBT/TTL)	4/6†*	4/6†*	4/6†*	4/6†*	4/6†*
General (PWM)	0	0	0	0	0
Half-Bridges	4*	4*	4*	4*	4*
INTERFACES	**4**	**4**	**4**	**4**	**4**
CAN 2.0B	2	2	2	2	2
RS232	1	1	1	1	1
RJ45	1	1	1	1	1
MEMORY	**16MB**	**16MB**	**16MB**	**32MB**	**32MB**
PHYSICAL					
Pins	88	88	88	88	88
Weight	480g	480g	480g	480g	480g
UPGRADES					
Adaptive Knock	Y†	Y†	Y†	Y†	Y†
Direct Injection	N	N	N	N	N
Diesel Control	Y	Y	Y	Y	Y
Direct Motor Control	Y	Y	Y	Y	Y
Gearbox Control	Y	Y	Y	Y	Y
Traction Control	Y	Y	Y	Y	Y
Wastegate Position Control	Y	Y	Y	Y	Y
Custom Security	Y	Y	Y	Y	Y
BUILD TIME CHOICE					
Second Lambda	Y	Y	Y	Y	Y
Thermocouple 1 Input	Y	Y	Y	Y	Y
8 Frequency Inputs	N	N	N	Y	Y
6 Ignition Drivers	Y	Y	Y	Y	Y
12 Ignition Drivers	N	N	N	N	N
CAN3 rather than Lambda #2	Y	Y	Y	Y	Y

* See relevant 'Upgrade Features' for explanation
^ GDI Driver required to drive GD injectors
† Build Time Choice
~ Up to 8 outputs can be software configured as additional analogue inputs
- Included as standard/irrelevant

F88RX	F88	F90RX	F90A	F90F	F90T	F88GDi4	V8 DI Pac	V12 DI Pac
24	**24**	**36**	**36**	**64**	**92**	**24**	**36**	**36**
4/8*	16	16	16	20	BTC	16	16	16
12	0	0	0	12	BTC	0	0	0
4	4	8+8~	8+8~	16+8~	BTC	4	8+8~	8+8~
4	4	4	4	8	BTC	4	4	4
5†*	**6†***	**8***	**8***	**8***	**8***	**4***	**8***	**8***
2*	2*	4*	4*	4*	4*	2*	4*	4*
1/2†*	2/1†	2	2	2	2	1	2	2
1†*	2	2	2	2	2	1	2	2
24	**28**	**50**	**50**	**52**	**106**	**24**	**50**	**50**
16	16	24	24	24	BTC	12	16	12
0	0	0	0	0	BTC	4	8	12
4/6†*	8/12†*	12	12	12	BTC	4	12	12
0	0	8~	8~	8~	BTC	0	8~	8~
4*	4*	6*	6*	8*	BTC	6	6*	6*
4	**4**	**5**	**5**	**5**	**6**	**5**	**5**	**5**
2	2/3†	3	3	2	1	3	3	3
1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1
64MB	**64MB**	**128MB**	**128MB**	**128MB**	**128MB**	**64MB**	**128MB**	**128MB**
88	88	121	136	191	239	88	121+38	121+57
480g	485g	670g	950g	1250g	1500g	520g	1160g	1405g
Y†	Y	Y	Y	Y	Y	Y	Y	Y
N	Y^	Y^	Y^	Y^	Y^	-	-	-
Y	Y	Y	Y	Y	Y	Y	Y	Y
Y	Y	Y	Y	Y	Y	-	-	-
Y	Y	Y	Y	Y	Y	Y	Y	Y
Y	Y	Y	Y	Y	Y	Y	Y	Y
Y	Y	Y	Y	Y	Y	Y	Y	Y
Y	Y	Y	Y	Y	Y	Y	Y	Y
Y	-	-	-	-	-	N	-	-
Y	-	-	-	-	-	-	-	-
Y	-	-	-	-	-	-	-	-
Y	-	-	-	-	-	N	-	-
N	Y	-	-	-	-	N	-	-
Y	Y	-	-	-	-	-	-	-

PDUXB Range

The PDUXB range of intelligent power controllers bring many new features to power distribution. The optional internal IMU feature offers a six-axis gyro and accelerometer which can be utilised within the programmed logic or transmitted over CAN.

Inputs - Flexible input channels capable of support 0-5v, thermistor, bi-polar and frequency type signals. Optional build-time-choice for two-wire wheel speed sensor interfaces.

Flexible outputs - 10x extremely flexible output drivers configurable to operate as High-side, Low-side, PWM or Half-bridge (can be paired into Full-bridges). These outputs are also capable of soft starting electrical loads with closed loop current limitation.
The PDUX also includes a variable number of additional high-side drivers, a dedicated wiper output and 10 additional PWM signal outputs.

Slave Link - Enables Life Racing ECU units to directly claim access to the PDU's input and output channels in order to receive data from or else control those channels with ultra-low latency.

Powerful Networking - 3x fully flexible CAN 2.0b, 1x LIN (Bosch wiper and custom projects) as well as a two port Ethernet switch, 1x RS232 (custom projects) .

Advanced Power Management - The PDUXB is capable of automatic wake/sleep operation which can be triggered by a dedicated "wake" pin, activity on specific inputs or on CAN. Sleep state helps increase vehicle battery life when the engine is not running.

All PDUXB devices are capable of 12 or 24V operation. Specialist variants of the PDUXB range include the PDUX4B-48V and marine spec versions of all devices.

Power Distribution

PDUX2B

The PDUX2B joins the PDUXB range to cater for less complex installations. It includes all the powerful features and slaving capabilities of the larger devices with a respectable 12 inputs and 16 high-side outputs for a total output capacity of 160A. Its size and versatility make it a great expansion when combined with an LR ECU.

PDUX3B

The PDUX3B includes all features in the PDUXB range to cater for more complex installations with a cost-effective application. It includes slaving capabilities with 16 inputs and 34 outputs for a total output capacity of 200A or 350A. The PDUX3B is available in 12 and 24 operating voltages.

PDUX4B

The PDUX4B includes all features in the PDUXB range to cater for more complex installations with more outputs available. It includes slaving capabilities with 16 inputs and 48 outputs for a total output capacity of 200A or 350A. The PDUX4B is available in 12 and 24 operating voltages.

PDUX6B

The PDUX6B is our top of the range power distribution device. Its additional outputs enable design and application of more advanced projects and prototypes using one device. It includes slaving capabilities with 16 inputs and 64 outputs for a total output capacity of 200A or 350A. The PDUX6B is available in 12 and 24 operating voltages.

PDU34A

The PDU34A includes many of the features of the PDUXB range but in a smaller, lightweight package with Deutch Autosport connectors for harsh environments where weight is paramount. The PDU34 has 16 inputs and 34 outputs. All inputs and 14 outputs can be slaved to an LR ECU. It is also sleep capable and includes 3x CAN 2.0b buses, 1x LIN (custom projects) and two port Ethernet.

FEATURE/PDU	PDUX2B	PDUX3B	PDUX4B	PDUX6B	PDU34A
CONFIGURABLE INPUTS	**12**	**16**	**16**	**16**	**16**
Generic Input (5V/TH/BI/FREQ)	4	4	4	4	4
Analogue or frequency (5V/TH/FREQ)	4	4	4	4	4
Analogue Only (5V/TH)	8	8	8	8	8
OUTPUTS	**18**	**38**	**52**	**68**	**34**
Generic Output (HS, LS, PWM, H-Bridge, Soft start)	4	10	10	10	10
High-Side	12	14	28	44	24
High-Side/PWM	0	10	10	10	0
Low-Side/PWM	2	4	4	4	0
INTERFACES	**7**	**7**	**7**	**7**	**7**
CAN 2.0B	3	3	3	3	3
RS232	1	1	1	1	1
RJ45	2	2	2	2	2
LIN	1	1	1	1	1
PHYSICAL					
Pins	62	113	113	113	87
Weight	750g	850g	850g	1140g	690g

Product	Part Number
PDUX2B	PDU-C06
PDU34A	PDU-A03
PDUX3B 350A	PDU-C01
PDUX3B 200A	PDU-C04
PDUX4B 350A	PDU-C02
PDUX4B 200A	PDU-C05
PDUX6B	PDU-C03
PDUX4B 48V 350A	PDU-C02-48
PDUX4B 48V 200A	PDU-C05-48
PDUX2B Connector Kit	CON-B12
PDU34A Connector Kit	CON-A10
PDUXB Connector Kit 350A	CON-B10
PDUXB Connector Kit 200A	CON-B11

D5 Dash

The D5 is a 5" fully configurable WVGA display with x2 CAN2.0B ports, RS232 and twin Ethernet ports. It also has x8 high brightness 'shift' LEDs, x4 configurable LEDs as well as x6 general purpose analogue inputs for sensors and x4 switch inputs. The D5 can independently log data or record the streamed data from LR ECUs over Ethernet (F88, F90, etc) to a USB or internal flash memory.

D4 Dash

The D4 is a 4" fully configurable WVGA display with x2 CAN2.0B ports, RS232 and twin Ethernet ports. It is intended to be mounted into a custom dash panel or steering wheel. The D4 has x6 general purpose analogue inputs for sensors and x4 switch inputs. The D4 can independently log data or record the streamed data from LR ECUs over Ethernet (F88, F90, etc) to a USB or internal flash memory.

D7 Dash

The D7 is our upcoming, next-generation dash display unit. Innovative new features include onboard IMU and GPS functionality. The D7 will retain all of the previous functionality and customising options from our previous display range allowing for advanced custom CAN configurations, complex and flexible maths operations and user definable data logging.

Dash features included as standard

	Complex Maths	CANtx	USB Logging
Basic	No	No	No
Club	Yes	Yes	No
PRO	Yes	Yes	Yes

SD4 Racing Wheel

The SD4 is an FIA compliant racing wheel with an integrated 4.3" configurable display and customisable switches. Up to 10 buttons (including isolated radio button) and 5 rotary switches are available as well as 2 digital paddle levers and 2 analogue progressive levers. 2 CAN2.0B buses, RS232 and twin Ethernet connections mean the SD4 has the capability and flexibility to act as a central hub and logger. Available with various customisation options.

Product	Part Number
D4 Basic	DIS-A10
D4 Club	DIS-A02
D4 Pro	DIS-A11
D5 Basic	DIS-A08
D5 Club	DIS-A01
D5 Pro	DIS-A03
Complex Maths	DIS-FEAT-M
CANtx	DIS-FEAT-T
USB Logging	DIS-FEAT-P
SD4 Pro	DIS-B02
50way Connector Kit	CON-B04
SD4 Curly Lead	CON-B09

Ancillaries

CAN Keypad

The CAN Keypad is an intelligent and slim membrane panel designed to replace traditional switch panels in a vehicle's cockpit simplifying wiring and packaging. The CAN Keypad features 20 snap action trans-illuminated buttons in conjunction with 24 programmable LEDs with adjustable brightness control. The input and output states of the keypad are transmitted and received via CAN 2.0B allowing the system full flexibility with many ECUs & controllers. Primarily used in conjunction with a Life Racing PDU the keypad integrates easily with 'PDU Setup' schematic software allowing for quick and easy system integration.

Dash Keypad

The Dash Keypad is designed to work with any Life Racing display unit to navigate and edit pages without having to connect to a PC. Using only one analogue input, the keypad is also able to act as a hub for additional physical switches for the left, right and OK keys or 'drivers controls' that can then be mounted in the steering wheel.

Blink Marine PKP and Grayhill 3K Keypads

The Blink Marine PowerKey PRO series are compact CAN based keypads with interchangeable laser etched inserts and RGB LED status lights. The Grayhill 3K keypads feature a rugged design that boasts high vibration and impact resistance.

Available in multiple button configurations, these IP67 rated units allow easy customisation of the cockpit environment. Predefined templates are available for LR devices to directly communicate with these in CANopen or J1939 standards.

Ancillaries

GDI Driver

Life Racing's direct injector driver is a compact unit capable of driving four fuel injectors at a high voltage, thus catering for the requirements of high-pressure solenoid injectors. The unit generates the complex waveforms required to activate the injectors. The injectors are switched on via pulses from the host ECU.

Mini Comms Hub

The MCH is a central hub purposed with translating between CAN devices, applying real-time maths operations and logging data to internal flash memory or USB for quick data grabs either independently or by streaming an LR ECU log. It also includes an Ethernet hub and 10 physical inputs.

NTK Wideband UEGO

NTK Oxygen Sensors combine expertise with innovation and delivers Oxygen Sensors with superior fit, form and function. When you require the best, count on NTK Oxygen Sensors to deliver. Lab grade option also available; these sensors are rigorously tested and robust. They are long lasting in the harshest of applications, providing precise and consistent readings.

Ancillaries

GPS-A10b

The GPSA10b is a compact low mass CAN 2.0B unit capable of tracking vehicle speed by GPS position at 10Hz. The unit features a built-in 3-axis acceleration sensor for measuring Lateral, Longitudinal and Vertical g forces. The module connects to any ECU or logger via the CAN network. Using LifeView PC software, track maps can be created and sessions analysed quickly and easily. This unit utilises an external aerial to increase mounting options and provide a strong GPS signal, accurate to within 2.5m.

GPS-AG50

The GPS-AG50 is a compact low mass CAN 2.0B unit capable of tracking vehicle speed by GPS position at 50Hz. The unit features a built-in 6-axis motion pack for measuring lateral, longitudinal and vertical acceleration as well as pitch, roll and yaw. The module connects to any ECU or logger via the CAN network. Using LifeView PC software, track maps can be created and sessions analysed quickly and easily. This unit utilises an external aerial to increase mounting options and provide a strong GPS signal, accurate to within 2.5m.

Product	Part Number
PDU Keypad	ANC-C01
Dash Keypad	ANC-C02
GDI Driver	ANC-A02
Mini Comms Hub	ANC-A03
4GB Datakey	UFX4GB
Datakey USB adapter	UR4410IM
Wideband NTK UEGO (Lab Grade)	LA0-0001-1B
Wideband NTK UEGO (Automotive Grade)	LA0-0006-1A
GPS-A10b	ANC-B01
GPS-AG50	ANC-B02
GPS Aerial	ANC-B03
9Way Connector Kit	CON-B08
35Way Connector Kit (Black)	CON-B07
GDI Driver Connector Kit	CON-A07
MCH Connector Kit	CON-A11
GPS-AG50 Connector Kit	CON-A08
Blink Marine PKP Series	See Blink Marine documentation
Grayhill 3K Series	See Grayhill documentation

Club Spec

Life Racing's club spec pneumatic gearshift system allows fast and reliable gear changes without the need for lifting off the throttle or using the clutch whilst racing. Available as a complete set or as individual parts. All Life Racing ECUs are able to control both the engine and gearbox in most applications or can operate as a standalone gearshift controller (GCU), with appropriate interfaces to an existing engine ECU.

Le Mans Spec

The Le Mans Spec pneumatic gearshift system has been specifically designed in house to cater for the needs of different model gearboxes with the high speed, precision and reliability required for high performance endurance racing. Available as a complete set or as individual parts. All Life Racing ECUs are able to control both the engine and gearbox in most applications or can operate as a standalone gearshift controller (GCU), with appropriate interfaces to an existing engine ECU.

Product	Part Number
Club spec Gearbox Actuator 30mm	TP0128a
Club spec Gearbox Actuator 50mm	TP0128b
Club spec Paddle shift Compressor Assembly	TP0100
Club spec Valve Block	TP0138
Club spec Throttle Blipper	FA0038
Paddle Switch Assembly	LFR-295-01
Le Mans spec Actuator Assembly	LFR-162-01A
Le Mans spec Compressor	GRA-1021-1A
Le Mans spec Accumulator	GRA-1023-3C
Le Mans spec Blipper	LFR-209-01A
F88 GCU	ANC-A05

Services

Wiring

Life Racing's sister company, GTEC Electronics, design and manufacture complete wiring harness solutions for race and prototype car applications, using industry standard Raychem Type 55 wire and Deutsch connectors. Our looms are built to last in extremely harsh and noisy environments; therefore, we hand build and test each loom before sealing to IP67.


Technical Support

Life Racing can provide a team of highly skilled technical support personnel to assist and support customers for a range of activities including electronic installation and systems checks. The technical support team has factory back up when required, which ensures smooth installation and commissioning of the electronic package. High quality support ensures that customers and partners get the best out of their products. Engineers are on hand to commission the engine electronics in order to obtain optimum performance for the prevailing boundary conditions.

Electronics Design

Life Racing offer complete electrical system design, from embedded software to PCB board layout and production. We are able to cater for the needs of any product not just motorsport based. Call us for further information.
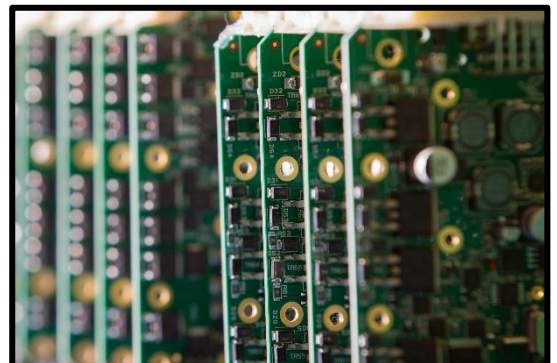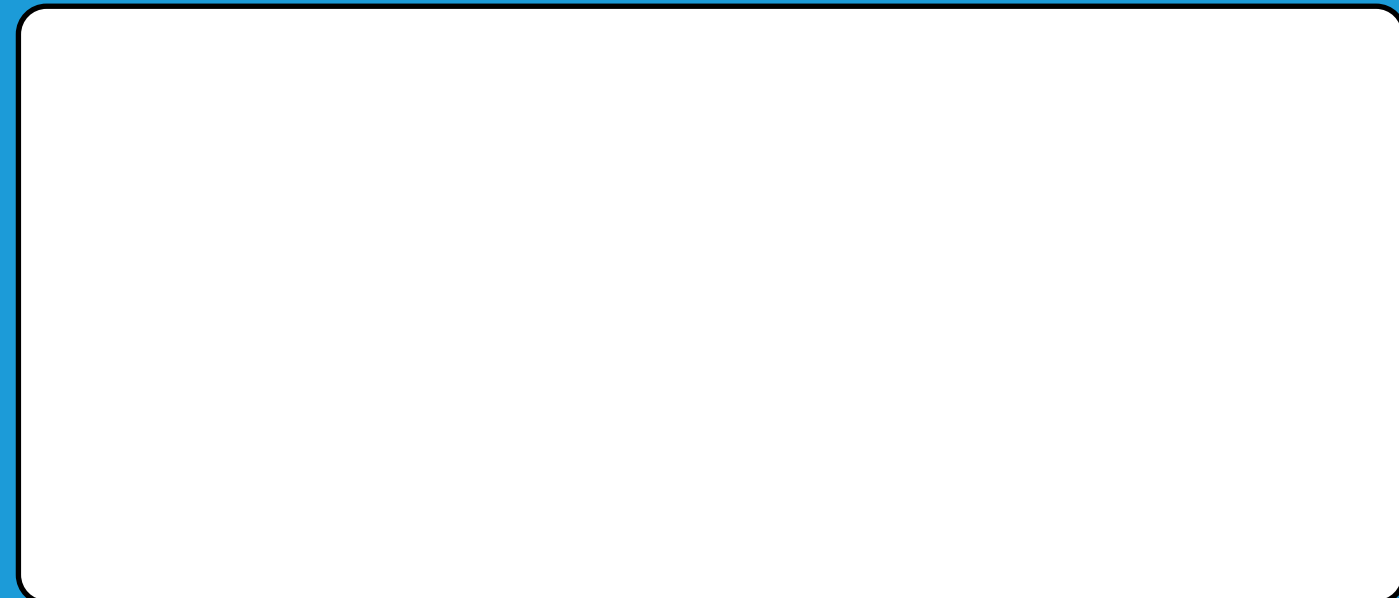
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