



PERFORMANCE enhancing

WHEN BEING THE BEST IS
SIMPLY NOT GOOD ENOUGH...

Imagine for a moment, if you will, the plight of Mercedes AMG High Performance Powertrains – the team behind the engine fitted to Lewis Hamilton’s chassis and of course the Williams and Force India cars. Put yourself in their shoes. You have just designed the most accomplished F1 engine of its generation. Reversed by all, the (almost) perfect combination of power, torque, hybrid design and power-to-weight ratio. You’d be feeling pretty smug about it all, polishing both the 2014 and the 2015 FIA Constructors-winning trophies whilst basking in your glory, almost drowning in the plaudits being showered upon your creation by drivers, engineers and industry insiders alike.

And then the news filters down from the very top. Delivered by someone from management, presumably with a furrowed brow or a bit of a Teutonic frown and quite matter-of-factly tells you that it’s good, but it’s not quite good enough. He wants more – more power, more speed, more reliability and he wants it to be smaller and be more thermally efficient. Oh yes – and it has to be delivered within budget and on time.

For a brief moment, you’d be forgiven for a subtle rolling of your eyes or a despairing look at the heavens for some it would seem, are never going to be satisfied.

Now picture the Sanwa-Denshi corporation’s design offices. Deep within the technical bowels of the Japanese giant’s organisation, the engineering department responsible for the design and development of the world championship-winning M12 2.4GHz RC system could also be forgiven for taking a moment to reflect upon just how dominant their 2.4GHz RC systems have been in recent years. Responsible for guiding and controlling nearly every single world championship-winning RC car across all race disciplines in recent times, there’s absolutely

no doubting the pedigree or class-leading performance of Sanwa’s high-end RC transmitters. And yet, behind locked doors and along the hushed corridors of Sanwa’s design department, it would seem that total world (championship) domination is not enough.

Thus it would appear that no matter where you go or whatever you do, whatever accolades you achieve or what plaudits you receive, for some it will never be quite enough and they’ll always push you to deliver more. Give them an inch and they’ll take the proverbial one-point-six kilometres.

BEING THANKFUL

As consumers though, we should be thankful for this never-ending pursuit of excellence as

NEW FEATURES

Here’s a brief run down of the new features that make their debut with the M12S along with some of the more established ones:

- Earphone jack (for audible alerts)
- Telemetry and telemetry mixing
- Adjustable left- or right-handed operation
- Steerwheel drop down and offset plates included
- Vibration alerts
- Programmable low voltage alerts and limit alarms
- Programmable push-button switches, trim switches, lever and dial
- Customisable user display menu
- User selectable pre-set racing modes (on-the-fly setting adjustment)
- Servo reversing
- Steering, throttle and brake dual rates
- End Point adjustment
- Exponential, ARC and curve adjustments
- Servo speed adjustment
- Anti-lock braking
- Throttle offset and hold
- Lap timer and interval timers
- Programmable aux channel mixing
- Ten selectable model type templates with pre-set mixing (4WS, crawler modes, etc)

“Sanwa radio equipment can be found in the hands of many European and World Champions”

In Sync

Sanwa's Synchronised Link, or SSL for short, provides the ability for the transmitter to alter the settings of the speed control whilst on the fly - so long as the speed control and receiver are both SSL compatible (like Sanwa's Super Vortex Zero). It's a big caveat, but it's a neat trick and gives us a glimpse into what is technically feasible if the correct communication protocols are designed into products. Take a step back for a moment and it's rather surprising that this type of technology hasn't been exploited more until now. After all, we've been using the computing power of transmitters to modify their signals to a receiver to give us the exponential curves, trim offsets and travel adjustments on each channel for years - so why not use the transmitter to transmit the speed control settings rather than resort to a separate hard-wired, or Bluetooth programming module? Logical isn't it? The only limitation is that it does limit the speed control choice to those that are SSL compatible, but as we've already mentioned it serves to give us a glimpse of what the technology is capable of and what the Sanwa software engineers are capable of.



It provides us with better quality products year-on-year. Whilst we can presumably empathise with the plight of these hard-working development engineers, we also crave the performance gains they miraculously eke out of their products with each and every new release or upgrade. In the pursuit of world championship-winning performance, be it in Formula 1 powertrain development or radio control system development, if you snooze, you lose and no one likes to lose - least of all champions who have tasted the spoils of victory.

THEORY OF EVOLUTION - IT'S ALL IN THE GENES

It won't take the rocket scientists long to figure out that the new M12S shares more than a passing resemblance to its predecessor. In fact, it looks to share the exact same mouldings - which is no bad thing. We know that the ergonomics of any radio have an important role to play and the M12 lineage share some of the best.

What we're talking about here is the overall weight and balance of the transmitter. It all starts with making the transmitter comfortable to hold. It might look top heavy and, with the reduced weight of the LRP transmitter LiPo in the base, it's certainly not being counterbalanced but the M12S rests nicely in the hand without feeling unwieldy. The latter is important, especially in situations where you might be controlling your model for extended periods of time, like for instance a nitro-class final, or for a day's recreational scaling where high capacity batteries could result in runtimes far exceeding an hour at any time. It's important that any transmitter feels natural to hold and is balanced and not too heavy and the M12 series has always been amongst the very best for user ergonomics.

ADJUSTABILITY

Most high-end transmitters will offer adjustment on the steering wheel tension and many offer

alternative wheel 'drop-down' positions. The M12 series all offer this and more. Not only can the wheel be dropped, but it can also be angled toward or away from the driver and offset in any one of three positions (forward, neutral or rearward) and whilst none of this adjustment is technically infinite, it offers a decent level of customisability to suit all types. As ever, multiple thickness grips are included which is common with most mid- or high-end steering wheel transmitters. What sets the M12S apart from its rivals is the additional adjustment features that the Sanwa designers have considered. There's two sizes of steering wheel included; the marginally larger one offering potentially more discrete control and a finer response feel because of the increased diameter. There's also the option to not only adjust the return spring tension, but also to fit a heavier spring for a greater range of tension adjustment. Furthermore, the actual range of wheel movement can be limited, independently with adjustable left and right end stops.

This level of adjustability is also carried through to the throttle trigger that can be angled, re-positioned, have its spring tension tuned and adjust the shape of the brake lever through the use of different plastic inserts (similar in concept to the hand grip sizes). There's even the option to flip the entire display and steering wheel section from right to left to make the M12S more suited to someone who wants to hold the transmitter in their right-hand and operate the steering with their left, like a certain Mr Ryan Cavalieri. All in all, it adds up to a widely adjustable ergonomic solution which few, if any, of its rivals can match.

The European version comes as a combo, complete with a single RX-472 receiver that features Sanwa's Synchronised Link (SSL), a clever feature that can enable on-board speed control programming or limited telematic functionality when used with compatible Sanwa accessories. The manual and online material make reference to it containing a LiFe battery and charger, but



The large display means a lot of information can easily be read from a distance



The M12S uses a combination of dials and switches to make adjustments



The trigger underneath can be positioned for both 50:50 and 70:30 travel



A flat LiPo falls into place in the base that means the radio is nicely balanced in use



Like other Sanwa models, the M12S can be reversed for left-handed operation



The high spec and performance of the M12S means it has become the "go to" steering wheel on the market

ours came as a dry-cell combo although the European distributor LRP did kindly supply us with a separate LRP-branded transmitter LiPo.

IRONIC

The irony of the S version of the M12 is that the vast majority of its improved feature set, its "raison d'être" if you will, is hidden and almost intangible. The M12 is already a class leading transmitter and the improvements in the S version centre largely around efficiency gains in how it processes the inputs from the driver and delivers them as signal outputs to the receiver. On spec, its now significantly faster (up to 30 per cent) than its predecessor although in reality, we're talking about millisecond improvements - which quite possibly can only be achieved in perfect, noise free environments and can only be measured on the bench under specific test conditions. We're talking about the flow of electromagnetic energy through the circuitry and the processing speed within the transmitter itself - i.e. how far the electricity has to flow and how quickly the computer transfers the electrical input into a radio wave output. It still uses Sanwa's leading 2.4GHz frequency hopping FH3 and FH4T signal protocols (the T presumably standing for the fact that it's telemetry compatible), which would suggest that there is no change to the actual signal protocol in anyway. Delays in this processing ability is what is

often termed as 'system latency' and the previous M12 already claimed a class leading performance level that would equate it to being less than 3mS - so the 30 per cent improvement gain could quite possibly be a real-world gain of about one millisecond maximum. Marginal gains maybe - but they all add up - just ask Sir Dave Brailsford...

COMPUTER FUNCTIONS AND FEATURES

Like all of today's modern computer radios, the M12S features an overwhelming number of inbuilt features and programming options. It's a fully featured true four-channel radio, meaning that its 'auxiliary' third and fourth channels can be programmed to offer true linear response as opposed to being two, or three position switch channels only.

The only problem with reviewing modern computer radios is that the plethora of feature sets and possible programming combinations make it impossible to tailor the review to suit all likely owners as the broad range of differing potential uses makes the appeal of the M12S so universal that you can't do it justice in a single review. Want a fully featured, high-end two-channel radio for racing? You've got it - the M12S will have you covered. Want it for large-scale applications with twin steering servos and a separate auxiliary servo to operate a hydraulic brake system? Yup,

it'll tick those boxes too. Maybe crawling is your thing and you want a four-wheel steer MOA twin motor set up, or a set up with front and rear dig? Again, the M12S can be programmed to meet your needs. In truth, there's little that it can't do with up to four-channel applications and various pre-set or custom mixing. There are ten different pre-set profiles that cover the majority of different surface class types that you can imagine - not that the reference a physical class though. To only downside is that to unleash all this potential, you have to first delve deep into the bowels of the manual and decipher the different preset mixing in order to understand what possible practical applications they might be used for. We're not great fans of the way that the user manual is constructed. It's a minor point and it might actually betray more about our tester's age and generation than it does about the user-ergonomics of the manual creators, but we struggle to comprehend the vastness of the options without having real-world examples to try it all out on as we go.

One really neat trick that did stand out to us was the ability to use the telemetry feedback as part of the mix settings. One example would be that you could monitor engine temperatures and potentially limit full throttle travel once a pre-set head temperature reading is reached in order to avoid damaging the engine by overheating it.



We were supplied with a 3000mAh capacity 2S 7.4V LiPo to install into the M12S transmitter



The LiPo is of a flat design and falls into place in the base of the steering wheel



Ergonomic design means you can easily reach all of the controls without having to move your hands around

TEST SESSION - SANWA M12S

SPECIFICATION

Model:	Sanwa M12S 2.4GHz transmitter and receiver
Receiver:	Sanwa RX-472 included
Frequency:	2.4GHz FH3/FH4 selectable via transmitter
Number of Channels:	Four
Telemetry Capable:	Yes (with selected receivers)
Failsafe Support:	Yes (all four channels)
Model Memory:	50 models
Input Voltage:	4.8-7.4V
Weight:	590g (no battery)
RRP:	£470.99

VERDICT



Proven performance
Build quality
Ergonomic feel



Complex manual and sub menu system
Non-intuitive graphical user interface

CONTACT

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Unit 12 Gisbourne Close, Staveley
Chesterfield, S43 3JT.

Tel: 01246 470900
Website: www.smdirect.co.uk
www.sanwa-denshi.com



The telemetry capable RX-472 that comes with the M12S

Depending on your hand size Sanwa include different grips in the box

Optional wheel included

These parts enable you to angle the wheel if you so wish

at full RPM. That's pretty clever although in many race classes, telemetry itself is banned, so possible practical applications may have to be mindful of any such restrictions in order to avoid falling foul of them, but for a day's extensive testing where you wouldn't want to damage your engine, it could be configured to give you an extra layer of prevention security.

A LA CARTE MENU

Another thing that is a new 'feature' over other M12 variants is the inclusion of a 'basic' menu

setting feature and this is again something that we can easily relate and warm to. Maybe it's our testers age or his RC exposure being predominantly electric based two-channel racing, but one thing's for certain; complex menu systems are not his forte. Fortunately, this time round, the M12 software engineers have recognised that for many, the allure of a high-end transmitter like the M12 lies not only in its ability to perform a myriad of different, complex and disparate functions, but more that it can perform a more limited sub-set of those

functions easily and for those functions to be almost instantly accessible for fine-tuning whilst out on the track or trail. The new aptly named 'basic' menu setting does exactly that and by activating it from within the system menu, what was once a very complex and daunting menu sub-structure, suddenly becomes a much simpler and less intimidating structure where access to the most common functions like dual rate, EPA and Curve (for exponential travel adjustments) is much more straightforward and easier to access. Enabling this mode does doable telemetry, but since that function is illegal for most competition classes, the basic menu structure will make on-track adjustments during practice or warm up laps much easier and much faster to perform which is just what most racers really need on race days.

RACE ON

If the basic mode doesn't quite cut it though and you need access to more functionality but would like to select different presets during a race then the 'racing' mode from earlier M12 transmitters is still available. This is another feature that could potentially have some very useful real-world advantages - especially during events or races that are extended in duration. Say for instance, an hour long final where track conditions can change, or perhaps if the weather is changeable, which could affect grip and would otherwise result in different curve or mix settings. Racing mode enables up to five different preset modes to be instantly accessed at the flick of a single switch. So say for instance that you're a nitro racer and you start the day on a track where grip is limited and where you know, from experience that the grip can come up as the track evolved and 'rubbers' in. Using the racing mode, its conceivable that you could have up to five slightly different throttle and steering 'set-ups' for the same car, ranging from a super aggressive set up for high grip and perfect conditions, to one with plenty of throttle or steering curve to help modulate the initial response around neutral for when grip is at a premium - and all at the flick of an easily accessible switch which can even be done without even taking your hand off the steering wheel. ■

Summary

The M12S is an insanely capable, range-topping radio system that is as close to perfection as anything that's currently available today. It has more capability than any single user will ever want, class leading ergonomics and adjustability and a rock-solid race winning pedigree to die for. It's hard to fault, but being picky if it has one then it's the complexity of the programming sub menus and sheer vastness of the user interface that lets it down. The problem is inherent with the fact that it is almost completely capable of anything. We've always liked the M12 ergonomics and there's no doubt that the M12S is an evolution of the gene pool, but we have to comment that the next big evolutionary step should come from providing a fully customisable user interface, using technology that we all take for granted in other walks of life from our mobile phones to our tablets and laptops. The M12S goes some way towards making the interface a bit more user friendly but it's still constrained by traditional menu structure thinking. Unlocking all of the potential within the M12S needs an intuitive and customisable menu structure that is as flexible as the capability of the transmitter is. At the moment, that's not the case and so whilst it is supremely capable, you still end up battling with the menu structure before you can access all of that capability.

DATE-A-BASE

E-MAIL: WEB@RCRACER.COM WEBSITE: WWW.RCRACER.COM

MARCH 2016

DATE	CLASS	LOCATION
6	L10 Off-Road Winter Series	Eden Park Raceway
6	Rug Racers	Ware
13	L10 Off-Road Winter Series	Faversham
13	Schumacher Indoor Off-Road Masters	Worksop
19-20	BRCA L12 National Championship	Leeds
19-20	Astro Masters	Navan
19	Super Cup	Maritime
20	BRCA L9 Off-Road Truggy/E-Buggy National	Deerdale
20	L9 off-road	Kent
25-28	NeoIG	Telford
27	L10 Off-Road Winter Series	TORCH

APRIL 2016

DATE	CLASS	LOCATION
3	L9 off-road	Kent
9-10	BRCA L9 Off-Road National	Deerdale
10	Iconic Meet	Broxtowe
16-17	BRCA L10 Off-Road National	Kidderminster
16-17	EFRA European B Championship warm-up	Portugal
17	Summer Series	Brookland
17	Schumacher BTCC	Cotswold
24	BRCA L9 Off-Road Truggy/E-Buggy National	Kent

MAY 2016

DATE	CLASS	LOCATION
13-15	TLR Cup	Novez-Les-Mines, France
7-13	Primrose Model Week	Foley, Scarborough
8	Iconic Cup	West London
8	Summer Series	Brookland
8	L9 off-road	Kent
13-15	EFRA European Championship warm-up	Spain
14-15	BRCA L10 Off-Road National	RHR (Astro)
21-22	BRCA L9 Off-Road National	Kent
27-28	EFRA L10 Off-Road European Championships warm-up	Valdavid, Spain
29	Schumacher BTCC	Adur
29	Summer Series	Brookland

JUNE 2016

DATE	CLASS	LOCATION
5	BRCA L9 Off-Road Truggy/E-Buggy National	Herts
5	L9 off-road	Kent
10-12	EFRA European B Championship	Portugal
11-12	BRCA L10 Off-Road National	Eden Park Raceway
11-12	Xray X-Race UK	Cotswold
12	Iconic Cup	Broxtowe
12	Schumacher BTCC	Bedworth
17-19	Euro Contest	Italy
18-19	Buggython	Robin Hood Raceway
19	Summer Series	Brookland
19	L9 off-road	Kent
25-26	BRCA L9 Off-Road National	Herts

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