

# **Multiplex Royal Evo 7 Review**

## **Originally for QEFI**

### **Mike Shellim 11/5/05**

## **Introduction**

With the R/C market dominated by the Big Three of Futaba, JR and Hitec, it's easy to forget that it was another manufacturer, Multiplex, which pioneered many of the features which we now take for granted. PCM, digital servos, and integrated scanners are all technologies which Multiplex were the first to market. Multiplex are of course also well known for their Profi 4000, widely regarded as the most flexible set currently available.

In 2002, Multiplex launched the Royal Evo, a mid-to-high end system aimed at a much wider audience than the Profi. The set was more conventionally styled, and incorporated several novel features, most notably an optional synthesiser module allowing crystal-free operation. The Evo has since introduced many new pilots to the Multiplex programming philosophy.

The Evo is available in three versions, all based on the same case and electronics, but with subtle variations in the software. The 9 and 12 channel versions are aimed at advanced sport and competition flyers. The most recent version - and the subject of this review - is the 7 channel unit.

## **Specifications and Software**

The review system was supplied as a 'Vario' package, which includes Evo 7 Tx, Micro 7 IPD receiver, and a choice of crystal controlled (HFM-4) or PLL synthesiser (HFM-S) RF modules. Other packages are available with different equipment levels so it's worth doing some research before purchasing.

Let's take a look at the transmitter first. This is a fully programmable unit with 7 channels and 15 model memories. PPM encoding is employed, so virtually any standard PPM receiver will work fine, with either RF module installed. PCM is not supported.

Both Uni (1.5 mS) and Multiplex (1.6 mS) servo centres may be programmed, and both standards may be mixed in the same model.

The Evo 7's software is based on that in the 9 and 12 channel versions, but it has fewer mixers, and doesn't have the freely assignable channels and switches of its siblings. Looked at positively, less flexibility means less chance of errors creeping in when programming!

Model memories are created from *templates* which provide the framework for programming different types of model. Six are provided for fixed wing models: BASIC1 and BASIC2 (conventional aircraft), ACRO (aerobatic and fun-fly), DELTA (delta and flying wings), GLIDER (simple gliders), and 4FLAPS (advanced gliders). There are two helicopter templates, HELImech (mechanical swashplate) and HELIccpm (CCPM). There is no 'blank-sheet' template - one of the standard templates must be used when creating a new model.

A single timer is provided, which works as a stopwatch or countdown alarm. It can be linked to a control, e.g. throttle for timing motor runs.

The transmitter performs some useful safety checks at switch-on. First, a 'throttle check' function holds the throttle at idle, until the throttle stick is moved to the idle position. Other safety features include 'RF Check' and 'Channel Check' which we'll look at later.

## Receiver

The Micro 7 IPD receiver is a well proven single-conversion design. Dimensions are a compact 53 x 28 x 16 mm. It incorporates a microprocessor with glitch suppression, and a programmable fail-safe. The failsafe kicks in following prolonged signal loss (> 0.5 secs). To program the failsafe, the Tx controls are set to the failsafe positions, and a jumper plug is inserted into one of the receiver outputs.

Ground range was found to be approximately 200 meters with the transmitter aerial fully collapsed. Range in the air will of course be much more than this.

As it happens I've used several of these receivers in various gliders, and they have proved 100% reliable.

## Case and Ergonomics

There's certainly no mistaking the Evo 7 in the transmitter pound. Key features include the smooth grey and black case, large keyboard, and generously sized LCD. The latter can be tilted up to 40 degrees in two steps for optimum viewing.

Pick up an Evo and you immediately notice how light it is at just 900g. Sculpted recesses in the rear make the transmitter nice to hold, even over extended periods, and balance with a neck strap is good. A transmitter tray is also available.

The front face contains a fair sprinkling of controls, all symmetrically arranged. In the middle are two sliders marked E and F for spoilers, flaps and other functions. At the top corners are two 'digi-adjuster' knobs used for programming. Next to these are two 3-position switches, the left one for Dual Rates and AUX1, the one on the right is for PMix and AUX2. Underneath are two 2-position switches, the left one for Combi and Direct Throttle Control, and the right one for Snap-flap and Autorotation. On the left side of the case are the Retract switch, and the Teacher button. On the right side are the 3-position Flight Phase switch, and Throttle Cut button.

All controls fall easily to hand, with the exception of the Combi and Snapflap switches which are a little awkward to locate by feel.

The sticks have a smooth action, and spring tension is adjustable. On unpacking, one stick will need to be converted for throttle use – easily done by adjusting two screws, one to disengage the return spring, and the other to engage either a friction wheel or ratchet. Unusually, the entire stick assemblies can be rotated within their housings – this might seem a bit of a gimmick, but a few degrees of 'toe-in' actually feels quite comfortable. Three sets of stick ends cater for all flying styles, the shortest pair having serrated non-slip tops – the first time I've seen this on an Evo and a welcome change.

The digital trims are in the form of four buttons arranged in a quadrant beneath each stick. Each button press is accompanied by a beep, and the buttons auto-repeat if

pressed continuously. I have to admit I've never been a big fan of digital trims - that said, the Evo's work well enough.

The aerial is conveniently short at just one meter, and a spring-loaded knuckle joint provides a choice of two positions, either pointing straight out, or angled upwards and to the left (I found the latter ideal for soaring). When not in use the aerial retracts almost into the case, and replacing a damaged aerial is very easy. All in all a very neat design.

The back of the case houses a DIN socket for the charger and buddy box leads (unfortunately this means the Tx cannot be rested on its back while charging). A smart chrome handle tops it off.

Build quality is somewhat improved compared with the Evo 9 which I tested two years ago. However the Evo 7 still does not have the perceived quality of the best Far Eastern sets. Nothing major, just various small niggles, for example the switch action is a little rougher than the competition, and the toggles possess some lateral play. Also the slider controls were a little stiff on my unit, and that sprayed-on finish can get tatty if not protected.

## **Look no Crystals!**

Unless you live on a desert island, sooner or later you'll want to change channels, and for the lazy pilot, nothing beats the synthesiser module. Instead of fiddling with crystals, the desired channel is simply selected from a menu!

The synthesiser supports all UK channels 55 - 90, plus the German channels (UK channel numbers are prefixed by '0' or '2'). Changing channels takes approximately 20 seconds from start to finish, including a built-in 10 second delay. With the synth installed, an 'RF Check' is performed each time you switch on, whereby the system requests confirmation of the active channel before it will start transmitting.

One caveat, very occasionally PLL synths have been known to go out of lock in the presence of a mobile phone in very close proximity. The instructions therefore recommend a minimum separation of 2 meters, in practice it's mainly a case of switching off your mobile if you carry it on your person while flying. This is in line with the BMFA's recommendation for *all* transmitters.

The crystal module (HMF-4) is a cheaper alternative. However it has to be said the design has a rather unfinished feel about it - before you can get at the crystal, you have to first open the case, then unplug the module from the main board. It doesn't help that the module is just an uncased board with pins exposed.

## **Optional Scanner**

Multiplex also offer an optional scanner module. This piggy backs on to the synth board and adds two very useful functions.

First, as its name suggests, it turns the transmitter into a powerful 35 MHz frequency scanner. To activate this feature, you simply press a special key while switching on the transmitter, whereupon a bar graph is displayed showing the channels in use. The height of each bar represents the signal strength, and a memory feature shows channel usage over a period of time.

Secondly, it performs an automatic 'Channel Check' at startup. When you switch on, the scanner silently searches for another device on your frequency. If one is found, a warning is displayed and your transmitter is blocked, thus saving the embarrassment - or worse - of shooting somebody down. Note however that it won't stop others shooting *you* down - there's still no substitute for the good old pegboard when it comes to frequency control!

## Battery Management

The Evo 7 is powered by a 6-cell 1500 mAH NiMH pack with a built-in fuse. It lasts approximately 8 hours with the crystal module, or 7 hours with the synth - enough for a full day's flying. However, being NiMH chemistry the cells can expire literally within seconds of the voltage alarm being triggered - relying on the alarm is not a good idea on NiMH equipped systems.

Multiplex have partly addressed this by integrating a smart battery monitor. This monitors the current flowing into and out of the battery, and makes allowance for self discharge when switched off (approximately 1.5% per day). An estimate of remaining capacity and flight time can be displayed.

The instructions warn that chargers which support more than 8 cells should not be connected through the normal charger socket, due to potentially damaging voltages. Instead, they may be connected directly to the battery pack. Unfortunately this means the valuable battery monitor feature cannot be used.

## Documentation

While I've been critical about Multiplex manuals in the past, I am glad to say they have done a pretty good job on this one. It comes as a perfect-bound A4 booklet in English, German and French. The English section is 75 pages.

The manual is comprehensive, and the structure follows that of the software menus, so finding the right page is easy. It does however lack a Quick Start guide; "Setting up a New Model" is actually on page 53.

A PDF of the manual is available from the Multiplex web site.

## Programming Interface

Multiplex have a reputation for clean and logical programming and the Evo is no exception.

Entry to the programming screens is via the top row of keys. These take you to the main menus entitled 'Setup', 'Control', 'Mixer', 'Servo', 'Timer' and 'Memory'. Each menu contains a list of sub-menus to perform specific tasks.

All adjustments can be accomplished simply by twisting and clicking a 'digi-adjuster' knob. It all works beautifully once you get the hang of it.

The programming screens are nicely thought out too, and put the helter skelter arrangements of most Far Eastern sets to shame. In particular the Servo Calibration screen is a delight, the three key parameters - centre, curves, and end-points - being adjusted in one place, with a single graphical response curve showing the combined effect of all three settings.

## In Flight Adjustment

Many pilots could, I'm sure, dine out on some of the stories resulting from attempting to alter the programming while flying! Well the Evo designers have addressed this one too; you can designate parameters (e.g. Diff, Expo etc.) for totally safe adjustment from the normal menu, i.e. *without* using the programming menus.

Adjustment is via the usual digi-adjuster knobs. Each knob can be assigned to a different parameter, so you can adjust Diff with one knob and Expo with the other. The % value is displayed in large characters, viewable whilst flying. The system even prevents you from doing something silly like reversing the direction of a control.

You can even adjust parameters which affect more than one servo, for example the elevator to flap mixing on an aerobatic soarer. This means you no longer need to land in order to adjust each servo separately - a great time saver.

## Flight Phases

The Evo 7 allows you to swap between three different sets of adjustments during flight, using *flight phases*. Each flight phase stores settings for trim position, control travel, aileron differential, and flap and spoiler presets. For example on a glider you can recall different trim settings for launch, cruise, and landing phases. Flight phases are selected via a three-position switch.

Setting up couldn't be simpler: whenever you make an adjustment, the value is automatically stored in which ever flight mode you happen to be in.

All in all flight phases are very well implemented. The only niggle is the omission of Expo which cannot be adjusted per flight phase, something which helicopter pilots in particular may miss.

## Mixers

Multiplex have traditionally provided excellent mixer capability on their systems, and the Evo is no exception. For fixed wing, there are mixers for Vtail, Delta, Elevator compensation, Camber, Snapflap, Crow Brake, Diff and Combi. Helicopters are provided with Gyro, Tail and Rotor Head. Unlike the Evo 9 you cannot change the mixer inputs or switches, however they should be powerful enough to satisfy most needs.

The tricky bit – the selection of a suitable mixer - is automatically done when you choose a template. All that remains is to 'adjust the mix'. Now this is where pilots used to Far Eastern sets may still feel a little lost, because there's no concept of primary and slave mixer inputs – all inputs have equal status, and it's up to the user to set the 'strength' of each input. However once the penny drops, it rapidly becomes clear that far from being odd, it's actually a very elegant way of programming mixers, especially for complex ones like Crow.

In addition, two free mixers are provided called MixerA, and MixerB. These have two user-definable inputs, rather like PMix on other systems. Unfortunately the mixers work slightly differently, so only one is applicable for a particular task which rather restricts their usefulness.

## In Use

To see how the Evo 7 fares in practice, I programmed it for my Vector, a no holds barred aerobatic sailplane with four wing servos and a conventional tail. The model is normally flown using my trusty Multiplex 4000 with comprehensive mixing, so this would be a stiff test.

Creating the new model was trivially simple using the 'new model' wizard - in fact it took just 15 seconds! First, the '4-FLAPS' template was selected - this supports crow mixing and elevator compensation making it perfect for the job. Next, I selected a servo numbering scheme from a choice of 'Hitec', 'MPX', 'Futaba' or 'JR'. Finally, I selected the stick mode, in this case 'Mode Two'. Hey presto, all the servos were responding to the controls. A further ten minutes in the Servo Calibration screen got them all moving in the right direction with end points set.

Adjusting the mixers took a little more time – about twenty minutes. The most time consuming aspect was setting up the crow brakes so that as the spoiler stick is pulled back, the ailerons rise and the flaps deflect downwards, creating extra drag for landing. The Evo has good support for this function including automatic aileron differential suppression where aileron diff is reduced as the brakes are deployed, leading to increased roll response.

Other mixes set up included flapperons, ailerons as flaps, elevator to flap (otherwise known as 'snapflap'), and elevator compensation. Finally, I set up a second flight mode with increased control throws, and the model was ready to fly.

The Evo 7 acquitted itself very well indeed – it was hard to believe that it's the base model in the range.

## Nice touches

Now for some nice touches which are not always to be found on other sets. First, the servo end points act as 'never exceed' limits. This feature is a boon when using V-tail mixers, as it allows aggressive movements to be set for both rudder and elevator, without risk of damage to the linkage should maximum inputs be applied, e.g. during a spin.

Then there's the ability to tune the response of any servo using a 2, 3 or 5-point curve. This allows the movement of twin servos to be accurately matched, e.g. for flaps.

Finally, the Evo makes a clear distinction between servo calibration and trim adjustment. You can recalibrate your servos to compensate for bent linkages or temperature drift, without worrying about losing any trim offsets you may have already set. For those who are pernickety about accurate trimming, this feature is very useful.

Any downsides? Well it would be nice to have freely assignable switches and sliders. And assignable channels too: with the 7, it's not possible to use a 4-channel receiver to drive twin aileron servos on DLG's and similar models, since the second aileron must be assigned to channel 5. To be fair, few if any radios in this price range offer that kind of configurability, but I mention it because the Evo 9 addresses both these limitations.

## User Upgradeable Firmware

The Evo 7 can be upgraded with new software features and bug fixes as they become available. The 'Data Manager' program and the latest firmware patch will be required, and they can be downloaded free from the MPX web site. An MPX data cable will also be required.

The Data Manager program also provides a useful backup/restore facility.

## Summary

The Evo 7 has several points in its favour: very good programming flexibility, good ergonomics, convenient synth module, and neat user interface. When also factor in the in-flight adjustment feature, flight phases, and the battery management system, it all adds up to a highly capable system.

Downsides? Pilots who prefer to use crystals will feel somewhat neglected, as the crystal module is rather poorly packaged. The other issue is less tangible and more personal, but somehow the system lacks the quality feel of the better Far Eastern sets – it feels a bit 'plasticky' for a premium brand.

All in all, the Evo 7 makes a thoroughly capable tool for the keen sport flyer. If you're likely to extend your activities to more specialist disciplines like Scale, F3X gliders, DLG, then the Evo 9 with its even greater flexibility may also be worth a look.

## SPECIFICATIONS

System	Multiplex Royal Evo 7
Channels	7
Memories	15
Flight Modes	3
Transmission	PPM6/7 (auto selected)
Current Drain	180 mA (HFM-4), 200 mA (HFM-S)
Weight	900 g incl. Batteries
Price as tested	£269 (Tx with Xtal module + Micro 7 IPD Rx) £310 (Tx with synth module + Micro 7 IPD Rx)
Manufacturer	MULTIPLEX MODELLSPORT GmbH+Co.KG
Availability	