

Programming Manual for the Multiplex Royal Evo

Software version 1.09

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Arriba

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Revision History

- 7 March 2003
 - Added example for F3B glider.
 - Added a list of software bugs.
- 21 February 2003
 - Modified servo reversing method in setup a new model.
 - Added final configuration for example: Zaggi model.
 - Added example for F5J glider.
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- Revision January 2003
 - First edition



Architecture

It follows the architecture of other MPX radios, consisting of three layers (in boldface):

- Tx Control elements**
i.e., sticks, sliders, two and three state switches, buttons, 3D digi-adjustors.
- Model Controls and Mixers**
To name a few: elevator, rudder, aileron, V-Tail mix, Delta mix, etc
- Servos**
Servos curves can be calibrated independently.

And the connection between layers (in boldface):

- Tx Control elements
- Control/Switch Assignments**
Up to five sets of assignments can be defined, being three of them predefined and used in model templates.
Each set establish a correspondence from *Tx Control elements* to *Model Controls and Mixers*
- Model Controls and Mixers
- Servo to Function Assignment**
This is named **Templates** in the manual. They include assignment from *Model Controls and Mixers* to individual servos.
- Servos

This is a step towards user friendly programming. Instead of defining a model totally from scratch, a predefined programming is already done by selecting the appropriate Template and Assignment.

When defining a new model the only parameters to play with are:

- Name
Up to 16 characters.
- Mode
Assignment of the left/right sticks to the primary control functions (aileron, rudder, elevator, throttle/spoiler).
It can be changed later.
- Template
It is fixed at creation time, but it is not a problem, because the programming it does can be changed individually later on, although consuming more time to do so.
- Servo assignment configuration.
The placement of control surfaces to each channel, being able to choose from three configurations
 - Multiplex
 - Futaba
 - JR
- The signal format of the servos.
 - Multiplex
 - Universal

By default, for JR and Futaba configuration, Universal signal is assumed. For Multiplex configuration, either signal format can be chosen. Later on, each servo signal format can be tuned independently

Once the model has been defined, the parameters that can be changed are:

- Name
- Mode
- Control/Switch Assignment

plus the rest of mixers values, servo assignment and more.

Now let's review the concepts introduced above.

Tx Control elements

The user can operate on different Transmitter control elements:

- sticks: implicitly labeled as A, B, C and D (friction stick)
- trims for elevator, aileron, rudder and throttle.
- sliders: E and F
- two state switches: I, K (not factory installed), N, P (not factory installed)
- three state switches: G, J, L, O
- control buttons: H and M
- menu access buttons: Setup, Controls, Mixers, Servos, Timers and Models
- Data entry: 3D digi enabler/lock/unlock, Reverse/Clear, Enter, Up, Down
- 3D-digi adjustor: used as data entry (Up/Down/Enter) and to modify some values during flight. To see which parameters can be modified in flight see the [control reference table](#).

Sticks will be used to control primary functions, i.e., aileron, elevator and rudder.

They can not be configured using the Assignments, but with Mode.

Throttle and spoiler may be controlled by either via the friction stick, via a left slider as assigned in the predefined assignments or with right slider, or with any switch or control button.

To use throttle trim, it doesn't matter whether throttle is assigned to a slider or stick.

Assignments

Up to five sets of assignments can be defined, being three of them predefined and used in model templates. An assignment has the following attributes:

- Name
Up to 8 characters.
- Controls.
A list of model functions assigned to the Tx Control elements
- Switches
A list of transmitter functions that modify the behaviour of the programming, for example, dual rates, flight phases, timers, enabling mixer inputs, etc.

Model Controls and Mixers

Controls

The model controls that are defined for the Royal Evo are listed in [control assignment table](#).

Each of these controls have its own set of parameters that can be adjusted. A list of attributes for each control is listed in [control reference table](#).

Mixers

The classification of mixers is:

- System mixers. They are Aileron Differential and Combi-Switch (Aileron to/from Rudder)
- User mixers. Up to 14 user mixers, being 5 of them [factory predefined](#). Every user mixer can be modified. A recommendation is made to not modify the predefined ones in order to ensure templates will work as defined in the text of the user manual.

In fact, what we found are 14 mixer templates, or to avoid confusion, let's name them mixer definitions. These **user mixer definitions are global**, i.e., shared in all models. However, each model will own its private mixer implementation, independent of other models. Let's see an example. A model named "MyBasic" might use user mixer ELEVATR+ definition, and implement it using only one input. Unused inputs are 0 or OFF, and the used input has the following values:

Elevator	Asymmetrical	Travel Up	100	Travel Down	100
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Other model named "MyGlider" might also use user mixer ELEVATR+ definition, and implement it using two inputs. Unused inputs are 0 or OFF, and the used input has the following values:

Elevator	Asymmetrical	Travel Up	90	Travel Down	95
Spoiler	Single-Sided with Curve	Point 1	5	Point 2	10

See that although "MyBasic" and "MyGlider" both use the same user mixer definition, they implement it in different ways.

The important lesson is that, in practice, we have more than those 14 user mixers, being enough for 20 or 36 models in the transmitter.

User mixers can have up to five Controls inputs. They sum the value of the active inputs and pass the result.

User mixers can not be cascaded, i.e., a mixer can not be used as an input for another mixer. The result of a mixer can only be passed to servos, and the same mixer can be assigned to any number of servos.

User mixers inputs are always activated by default. There are three software enablers, namely Mix1, Mix2 and Mix3, that when in the ON state, the corresponding mixer input is

considered in the final sum. Mix1 to Mix3 can be assigned to a transmitter control element, namely:

- two and three state switches
- momentary buttons
- Control switches: E and F sliders, friction (D) stick.
User can set a position which will act as the toggle point for a logical ON/OFF two state switch.
This logical switch will act independently of the function assigned to the stick or slider, for example, activate timer with throttle stick.

Templates

This is a tool to simplify the initial programming of a new model. All the programming done with the selection of a template can be modified. Also, choosing a template selects the model graphic displayed in the main screen.

Of course, frequently our model will not match 100 % the specifications covered by any template. In that case we could select the template which mostly cover the needs, or choose the simplest one and then, program as desired.

Servos

Servos are identified by the receiver channel number they are assigned to.

Each servo is assigned a single model control or a mixer, but two or more servos can be assigned the same model control or mixer.

Each servo has its own calibration with a 2, 3 or 5 point curve, independently of the assigned model control or mixer.



Programming User Interface

- LCD screen.
With modifiable angle of view and contrast adjustment.
- Menu buttons
 - Transmitter general setup.
Configures transmitter options, such as LCD contrast, sounds, user code protection, etc.
 - Transmitter control.
To access parameters (dual rate, exponential, etc) of model controls (aileron, rudder, etc)
 - Mixer.
To access the implementation values (travel, offset, dead, etc.) of mixer inputs used in the model.
 - Servo.
To access assignment and curve calibration of servos.
 - Timer.
To set/reset time and alarms of timers.
 - Memory.
To manage creation, selection, copying, deletion, flight phases of models.
- Task buttons
 - Digi assignment.
To do in flight tuning of some control/mixer parameters.
 - REV/CLR.
To quickly change sign or set to zero the values parameters.
 - ENTER.
To confirm data entry.
 - Up cursor.
To increase values.
 - Down cursor.
To decrease values.
- 3D rotatory digi adjustors.
User to increase/decrease/select/confirm values during on ground programming and increase/decrease during flight tuning.
- Transmitter controls
 - Sticks, sliders, switches