

## DUPLEX Rx



The DUPLEX Rx receiver line is assigned to operate with the transmitter modules DUPLEX Tx in the 2.4GHz band. The fully digital bidirectional communication between transmitter and receiver contributes to the development of new chances in the model remote control branche.

DUPLEX receivers are not only following up with the JBC receiver line by keeping up their univerzality and broad functional extent, but they additionally extend these functions due to the feasibility of the new DUPLEX system. One of the most important advantages is the operation without crystals – watching frequencies is a thing of the past, high interference resistance, far out of visibility range and continual control of model conditions in the air as well as many other functions are new and formerly unknown features.

### DUPLEX Rx Receivers:

Basic Data	DUPLEX R4	DUPLEX R5 (R5 indoor)	DUPLEX R6	DUPLEX R8
Dimensions	38 x 20 x 8 mm	44 x 20 x 5 mm	45 x 24 x 12,5mm	50 x 30 x 12,5 mm
Weight	5 g	5 g (4 g)	11 g	15 g
Antenna Length	2x 100 mm	2x 100 mm (2x 45 mm)	2x 100 mm	2x 200 mm
Active Part of Antenna	30 mm	30 mm	30 mm	30 mm
# of Channel Outputs	4	5	6	8
Temperature Range	- 10 to + 85°C	- 10 to + 85°C	- 10 to + 85°C	- 10 to + 85°C
Supply Voltage	3,2 – 8,4V	3,2 – 8,4V	3,2 – 8,4V	3,2 – 8,4V
Average Current	39 mA	39 mA	40 mA	48 mA
Real Time Transmission of Telemetric Data	●	●	●	●
Programming	JETI BOX	JETI BOX	JETI BOX	JETI BOX
Power Output	6 dBm	6 dBm	20 dBm	20 dBm
Receiver Sensitivity	-98 dBm	-98 dBm	-100 dBm	-106 dBm

### Supply:

The receiver power supply may be carried out by NiCd cells, by a stabilized voltage from the controller (in electric models) or by Li-xx cells combined with a voltage stabilizer like the MAX BEC. Always keep in mind the recommended voltage range of the receiver and the used servos. If all receiver outputs are engaged you may use an Y-cable for power supply. Supply batteries, BEC or Y-cables may be plugged into any channel output. Do not use the output marked Ext. for RX-power supply.

### Operation:

The DUPLEX system may be operated in the same way as any FM system. We recommend to switch on the transmitter first and then the receiver. The transmitter confirms switching on of the receiver by a short beep.

### Installation:

Wrap the receiver in soft foam and place it as far as possible away from sources of interference (servos, power electric motors). The antennas should be routed in such a manner that their active ends make up an angle of 90° and are as far away as possible from each other. See to it that minimum bending radii of the antenna cables are at least 1cm. The active part of the transmitting antenna should be straight and far away from metal parts. If the model comprises a carbon fuselage it is advisable to place the active parts of the antennas outside of the fuselage.

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### **Pairing:**

When using a new receiver or transmitter it is obligatory to perform the so called pairing procedure. This is executed by inserting the shorting plug marked (BIND PLUG) into the socket at the receiver back side (assigned to external equipment and marked Ext.) and by switching on the receiver. Subsequently switch on the transmitter which will report pairing with the receiver by two beeps. Now remove the pairing plug from the receiver. The transmitter is acoustically signalling presence of the pairing plug in the receiver for the time of one minute.

Pairing can also be performed without the pairing plug (BIND PLUG) with the help of the JETIBOX. In that case the JETIBOX must be connected directly to the receiver. Select the item (pairing) in the JETIBOX display and push U (upward arrow). Now the receiver is waiting for switching on of the transmitter with which it has to be paired. The transmitter again reports pairing by two beeps and everything is ready for operation. If pairing did not succeed, switch off the transmitter and receiver and repeat the above mentioned procedure.

One transmitter may be paired with an arbitrary amount of receivers. One receiver can be paired with one transmitter only, i. e. the receiver is paired with the transmitter which has been paired last.

### **Real Time Transmission of Telemetric Data:**

Every receiver is already in its basic configuration able to transmit the actual voltage of the on-board system, i. e. the receiver voltage without telemetric sensors.

One telemetric sensor can be connected directly to the socket marked (Ext.) on the receiver back side. If connection of several sensors is necessary the expander DUPLEX Ex may be connected to the receiver socket (Ext.).

### **Signalling of Bidirectional Communication Loss:**

In case of bidirectional communication loss between transmitter and receiver the DUPLEX module in the transmitter starts to indicate this situation by means of acoustic signals. This condition means that there are no actual data available from telemetric sensors or from equipment connected to the Ext. receiver socket input. However, the model can be further controlled even in this situation.

For receivers we grant a warranty of 24 months from the day of purchase under the assumption that they have been operated in conformity with these instructions at recommended voltages and that they were not damaged mechanically. Warranty and post warranty service is provided by the manufacturer.

We wish you successful flying with the products of : JETI model s.r.o. Pribor, [www.jetimodel.com](http://www.jetimodel.com)

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### Communication with the DUPLEX Receiver via the JETIBOX:

It is possible to connect the JETIBOX in two ways:

#### 1. Direct connection JETIBOX <-> Receiver

Plug the connector of the interconnection cable (accessory of JETIBOX) into the socket marked **Impuls + -** (you will find it on the right side of the **JETIBOX**) and into the receiver socket marked **Ext.** on the RX back side. Connect the receiver supply to the receiver directly (see Supply) or to the socket of the JETIBOX.

#### 2. Wireless connection JETIBOX <-> Transmitter <-> Receiver

In this case connect the JETIBOX to the transmitter.

There will appear the text **Tx** as well as a right and down arrow in the display. By pushing button **R** (right arrow) you will enter the receiver and the display will show the text **Rx**, by subsequent pushing of **D** (down arrow) the receiver menu will be entered, which is conform to the display shown for direct connection (see point 1).

Wireless connection is only possible with a receiver in Normal mode. If you change mode from Normal to Clone during the prevailing wireless connection the receiver will change to monitoring mode and the JETIBOX will stop working. In order to restore communication with the receiver you will have to connect the JETIBOX directly to the receiver (see point 1). If you want to use a receiver which was in the monitoring (Clone) mode in an other model, do not forget to reset the original mode (Normal).

Disconnection of the JETIBOX is possible only after disconnection of the receiver from its power supply. **Tracking of the receiver condition or parameter setup is anytime possible, even if the receiver is working in the model. In such a case increased caution is necessary. We do not recommend adjustments of receiver parameters during model operation. Carry out adjustments only if you are sure that there is no danger for the model or health of persons.** For safety reasons prevent the possibility of motor activation, it is advisable to remove the propeller from the model!

### Communication with the Expander DUPLEX E8 with Aid of the JETIBOX (JB):

Plug in one plug of the connecting cable (accessory of the Expander) to the (Rx) socket on the back side of the Expander and the other plug into the receiver socket marked (Ext.) on the receiver back side. Connect the JETIBOX to the transmitter module. Switch on the transmitter and connect the receiver power supply (see Supply). The JETIBOX display shows the text **Tx** and by pushing button **R** twice (arrow right) select item **Mx**. By pushing the button **D** (down arrow) you will enter the Expander menu. The basic menu (selection of the connected equipment **Tx**, **Rx**, **Mx**) you will arrive at by holding down the push button **U** (upward arrow) for a longer time.

#### Revue of Receiver Items

The introductory display shows informations of the receiver type. By pushing button **R** (right arrow) you may obtain more detailed informations about the receiver and transmitter.

**Pairing:** by pushing button **U** (upward arrow) the receiver becomes paired with the transmitter. Carry out receiver pairing only with the JETIBOX connected directly to the receiver.

**RX/TX:** item **RX** shows the unique (production number) of the receiver. Item **TX** on the other hand shows the unique (production number) of the transmitter, which the receiver has been paired with lastly.

**Rx Diag:** item **A1** or **A2** indicates, which receiver antenna is at the moment operating. Item **Kx** indicates the number of transmitted channels (this number depends of the transmitter contingencies).

With the aid of push button **D** (down arrow) we arrive at the line of basic mode selection. Here you may either select reading out of measured data (**Measure**) or receiver settings (**Main setting, Channel set, Out Pin Set, Auto Set**).

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**Measure:** renders possible reading out of measured data of the maximum, minimum and actual receiver voltage.

- **Volt Min / Act / Max** : the receiver examines the supply voltage and indicates marginal values and extremes which occurred during operation, at the same time it shows the actual receiver voltage. Without switching on of the paired transmitter the MAX and MIN values are not changing at all, only the value of the actual ACT voltage is becoming refreshed. In order to delete the values MAX and MIN it is necessary to depress simultaneously push buttons L (left arrow) and R (right arrow).

**Main setting:** basic adjustment, here the general receiver behaviour common to all channels can be adjusted.

- **Signal Fault:** receiver behaviour adjustment in case of signal loss, *repeat*- repetition of the last valid deflections, *out off* – output switch off, *FailSafe* – transition to to preadjusted deflections of particular outputs which are adjustable in the menu **Out Pin Set – FailSafe**.
- **FailSafe Delay:** indicates the time after which receiver outputs will pass in case of signal loss or switched off outputs to preadjusted positions at particular outputs (in accordance with **Signal Fault**).
- **Volt act/alarm:** the first item indicates the actual receiver supply voltage, the second value serves for adjustment of the alert decision level. As soon as during operation the actual voltage decreases below the adjusted level, the transmitter will announce this situation by an acoustical warning.
- **Output Frame Rate:** adjustment of the output signal frame rate (standard adjustment 20ms), with lower values analog servos will show faster reactions (response) and will draw a higher current. Some servos may tend to oscillate if this value becomes too low. The output frame rate may also be set to a synchronized mode with the transmitter by adjustment to - **Output Period - By Transmitter**.
- **RX mode:** this adjustment switches the receiver to the monitoring mode (Clone). Apply this mode only if you intend to use two or more receivers in the model in parallel at the same time. Use one of the receivers as main receiver (Normal) and the rest in monitoring mode (Clone). Receiver mode change (Normal / Clone) must be performed only with the JETIBOX connected directly to the receiver.

**Channel set:** parameters of individual input (received) signals *CH*

- **Set Input Channel:** selection of input channel, which is to be set; value A shows actual input value of selected input channel.
- **Set Center:** sets neutral value of the channel; this parameter is important for other processing when using mixes, reverses, gains etc.
- **Mix CHa and CHb:** allows to create mix of selected channel with another channel.
- **Mix Relation:** sets the proportion of mix; mixed channel is always 50% (Mix CHa and CHb, relation 100% = 50% CHa and 50% CHb / relation 50% = 50%CHa and 25% CHb / relation 200% = 50% CHa and 100% CHb).
- **Mix Sign:** sets the + or – sign of mixed channel (will be increased or decreased)

**Out Pin Set:** function allocation to individual receiver output channels (pins) *Y*.

- **Set Output Pin:** selection of output channel, which is to be displayed or set.
- **Set Input Channel:** function allocation to selected output, any input channel or its mix (defined in menu **Channel Set**) may be chosen.
- **Reverse A:** allows to reverse the sense of output in half-plane A; (half-planes are splitted by neutral value as set in menu **Channel set - Set Center**).
- **Reverse B:** allows to reverse the sense of output in half-plane B.
- **Gain A:** sets gain coefficient for output in half-plane A (100% = no changes).
- **Gain B:** sets gain coefficient for output in half-plane B (100% = no changes).
- **Fail Save:** sets value for selected output channel for the case that signal is lost.
- **Delay:** slowdown of servo move (output) reaction on input change; given time is equal for output change in range from 1ms to 2ms. This function is useful for landing gear control etc.
- **Curve:** sets output curve of selected channel.
- **ATV High Limit:** adjusts (reduces) maximum deflection of selected output (half-plane B).
- **ATV Low Limit:** adjusts (reduces) maximum deflection of selected output (half-plane A).



**Auto Set:** global setup of the receiver to a predefined function. After having selected the desired option, hold RIGHT and LEFT buttons on JETIBOX simultaneously for 3 seconds.

- **Normal:** basic setup, mixes off, individual input channels are allocated to relevant outputs (i.e. input CH1 to output Y1 etc.)
- **MixCH1&CH2 Elevon:** output channels Y1 & Y2 allocated to mix of inputs CH1 & CH2
- **MixCH2&CH4 V-Tail:** output channels Y2 a Y4 allocated to mix of inputs CH2 a CH4

**Auto Set – Normal** = factory default, all received channels CH are passed to relevant outputs Y without changes, that means the receiver is working like a standard non-programmable receiver.

Channel Set				
SetInputChannel CHx	Set Center	Mix CHx and CHy	Mix Relation	Mix Sign
CH1	1,5ms	CH1 and CH1	100%	+
CH2	1,5ms	CH2 and CH2	100%	+
CH3	1,5ms	CH3 and CH3	100%	+
CH4	1,5ms	CH4 and CH4	100%	+
CH5	1,5ms	CH5 and CH5	100%	+
CH6	1,5ms	CH5 and CH6	100%	+
CH7	1,5ms	CH7 and CH7	100%	+
CH8	1,5ms	CH8 and CH8	100%	+

Out Pin Set											
Set Output Pin	SetInChannel	Reverse A	Reverse B	Gain A	Gain B	Fail Save	Delay	Curve	ATV HighLimit	ATV LowLimit	
Y1	CH1	off	off	100%	100%	1,5ms	0s	linear	2,0ms	1,0ms	
Y2	CH2	off	off	100%	100%	1,5ms	0s	linear	2,0ms	1,0ms	
Y3	CH3	off	off	100%	100%	1,5ms	0s	linear	2,0ms	1,0ms	
Y4	CH4	off	off	100%	100%	1,5ms	0s	linear	2,0ms	1,0ms	
Y5	CH5	off	off	100%	100%	1,5ms	0s	linear	2,0ms	1,0ms	
Y6	CH6	off	off	100%	100%	1,5ms	0s	linear	2,0ms	1,0ms	
Y7	CH7	off	off	100%	100%	1,5ms	0s	linear	2,0ms	1,0ms	
Y8	CH8	off	off	100%	100%	1,5ms	0s	linear	2,0ms	1,0ms	

### Samples of receiver setup:

(changes against default values are marked **bold** in the tables)

**1. V-tail:** models with combined tail planes, each plane is controlled by one servo on channels Y2 and Y4, mix combines movements of rudder CH4 and elevator CH2. Motor on CH3. In case of reverse sense of the mix change the sign in menu **Mix Sign**.

Transmitter channel	Channel Set				
	SetInputChannel CHx	Set Center	Mix CHx and CHy	Mix Relation	Mix Sign
Elevator	CH2	1,5ms	<b>CH2 and CH4</b>	100%	-
Motor	CH3	1,5ms	CH3 and CH3	100%	+
Rudder	CH4	1,5ms	<b>CH4 and CH2</b>	100%	+

Function	Out Pin Set										
	Set Output Pin	SetInChannel	Reverse A	Reverse B	Gain A	Gain B	Fail Save	Delay	Curve	ATV HighLimit	ATV LowLimit
Servo 1	Y2	<b>Mix CH2</b>	off	off	100%	100%	1,5ms	0s	linear	2,0ms	1,0ms
ESC	Y3	CH3	off	off	100%	100%	<b>1,2ms</b>	0s	linear	2,0ms	1,0ms
Servo 2	Y4	<b>Mix CH4</b>	off	off	100%	100%	1,5ms	0s	linear	2,0ms	1,0ms

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**2. Elevon:** both ailerons are controlled by independent servos on channels Y1 and Y2, move like standard ailerons on input CH1 (one up, second down) and at the same time like elevators on input CH2 (up/down simultaneously). In case of reverse sense of the mix change the sign in menu **Mix Sign**.

Transmitter channel	Channel Set				
	SetInputChannel CHx	Set Center	Mix CHx and CHy	Mix Relation	Mix Sign
Elevator	CH2	1,5ms	CH2 and CH1	100%	+
Ailerons	CH1	1,5ms	CH1 and CH2	100%	-

Function	Out Pin Set										
	Set Output Pin	SetInChannel	Reverse A	Reverse B	Gain A	Gain B	Fail Save	Delay	Curve	ATV HighLimit	ATV LowLimit
Servo 1	Y2	Mix CH2	off	off	100%	100%	1,5ms	0s	linear	2,0ms	1,0ms
Servo 2	Y1	Mix CH1	off	off	100%	100%	1,5ms	0s	linear	2,0ms	1,0ms

**3. Combination of rudder CH4 and front gear direction control** (with deflection reduced to 60% of rudder deflection), rudder on output Y4 and front gear turn (direction) on output Y7. Gear retraction on output Y8 (realistic retraction with set **Delay**, exact servo end stops set - **ATV**).

Function	Out Pin Set										
	Set Output Pin	SetInChannel	Reverse A	Reverse B	Gain A	Gain B	Fail Save	Delay	Curve	ATV HighLimit	ATV LowLimit
Rudder	Y4	CH4	off	Off	100%	100%	1,5ms	0s	linear	2,0ms	1,0ms
Gear direction	Y7	CH4	off	Off	60%	60%	1,5ms	0s	linear	2,0ms	1,0ms
Gear retraction	Y8	CH8	off	Off	100%	100%	1,82ms	5,0s	linear	1,82ms	1,26ms

**4. Mix of ailerons Y1 and rudder Y4 (Combi - mix):** rudder CH4 moves together with ailerons CH1 (mix); rudder can be still controlled in full range. Useful for scale models.

Transmitter channel	Channel Set				
	SetInputChannel CHx	Set Center	Mix CHx and CHy	Mix Relation	Mix Sign
Rudder	CH4	1,5ms	CH4 and CH1	25%	+
Ailerons	CH1	1,5ms	CH1 and CH1	100%	+

Function	Out Pin Set										
	Set Output Pin	SetInChannel	Reverse A	Reverse B	Gain A	Gain B	Fail Save	Delay	Curve	ATV HighLimit	ATV LowLimit
Rudder	Y4	Mix CH4	off	off	200%	200%	1,5ms	0s	linear	2,0ms	1,0ms
Ailerons	Y1	CH1	off	off	100%	100%	1,5ms	0s	linear	2,0ms	1,0ms

**5. Mix of elevator CH2 and flaps CH6:** when flaps Y6 move, also elevator Y2 moves in opposite direction.

Transmitter channel	Channel Set				
	SetInputChannel CHx	Set Center	Mix CHx and CHy	Mix Relation	Mix Sign
Flaps	CH6	1,5ms	CH6 and CH6	100%	+
Elevator	CH2	1,5ms	CH2 and CH6	25%	-

Function	Out Pin Set										
	Set Output Pin	SetInChannel	Reverse A	Reverse B	Gain A	Gain B	Fail Save	Delay	Curve	ATV HighLimit	ATV LowLimit
Elevator	Y2	Mix CH2	off	off	200%	200%	1,5ms	0s	linear	2,0ms	1,0ms
Flaps	Y6	CH6	off	off	100%	100%	1,5ms	0s	linear	2,0ms	1,0ms

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**6. Flaperon:** mixes aileron *CH1* and flaps (or airbrakes) *CH6*. Each aileron is controlled by independent servo *Y1* and *Y2*, ailerons work normally depending on stick position. At the same time, ailerons may move up (airbrakes) or down (flaps) – depending on flap control.

Transmitter channel	Channel Set				
	SetInputChannel CHx	Set Center	Mix CHx and CHy	Mix Relation	Mix Sign
Flaps	CH6	1,5ms	<b>CH6 and CH1</b>	100%	+
Ailerons	CH1	1,5ms	<b>CH1 and CH6</b>	100%	-

Function	Out Pin Set										
	Set Output Pin	SetInChannel	Reverse A	Reverse B	Gain A	Gain B	Fail Save	Delay	Curve	ATV HighLimit	ATV LowLimit
Servo 1	Y2	<b>Mix CH6</b>	off	off	100%	100%	1,5ms	0s	linear	2,0ms	1,0ms
Servo 2	Y1	<b>Mix CH1</b>	off	off	100%	100%	1,5ms	0s	linear	2,0ms	1,0ms

**7. Mix flaps-elevator:** elevator *CH2* automatically balances diving moment caused by move of flaps *CH6*. At the same time, there is a mix flaps-ailerons (ailerons act as flaps).

Transmitter channel	Channel Set				
	SetInputChannel CHx	Set Center	Mix CHx and CHy	Mix Relation	Mix Sign
Ailerons	CH1	1,5ms	<b>CH1 and CH6</b>	100%	-
Elevator	CH2	1,5ms	<b>CH2 and CH6</b>	25%	+
Flaps	CH6	1,5ms	<b>CH6 and CH1</b>	100%	+

Function	Out Pin Set										
	Set Output Pin	SetInChannel	Reverse A	Reverse B	Gain A	Gain B	Fail Save	Delay	Curve	ATV HighLimit	ATV LowLimit
Aileron 1	Y1	<b>Mix CH1</b>	off	off	100%	100%	1,5ms	0s	linear	2,0ms	1,0ms
Elevator	Y2	<b>Mix CH2</b>	off	off	<b>200%</b>	<b>200%</b>	1,5ms	0s	linear	2,0ms	1,0ms
Aileron 2	Y6	<b>Mix CH6</b>	off	off	100%	100%	1,5ms	0s	linear	2,0ms	1,0ms

**8. Mix ailerons-flaps:** both flaps and ailerons are on the wings. *CH1* controls ailerons (*Y1* and *Y5*), *CH6* controls flaps (*Y6* and *Y7*). Mixes ailerons so that they work also like flaps..

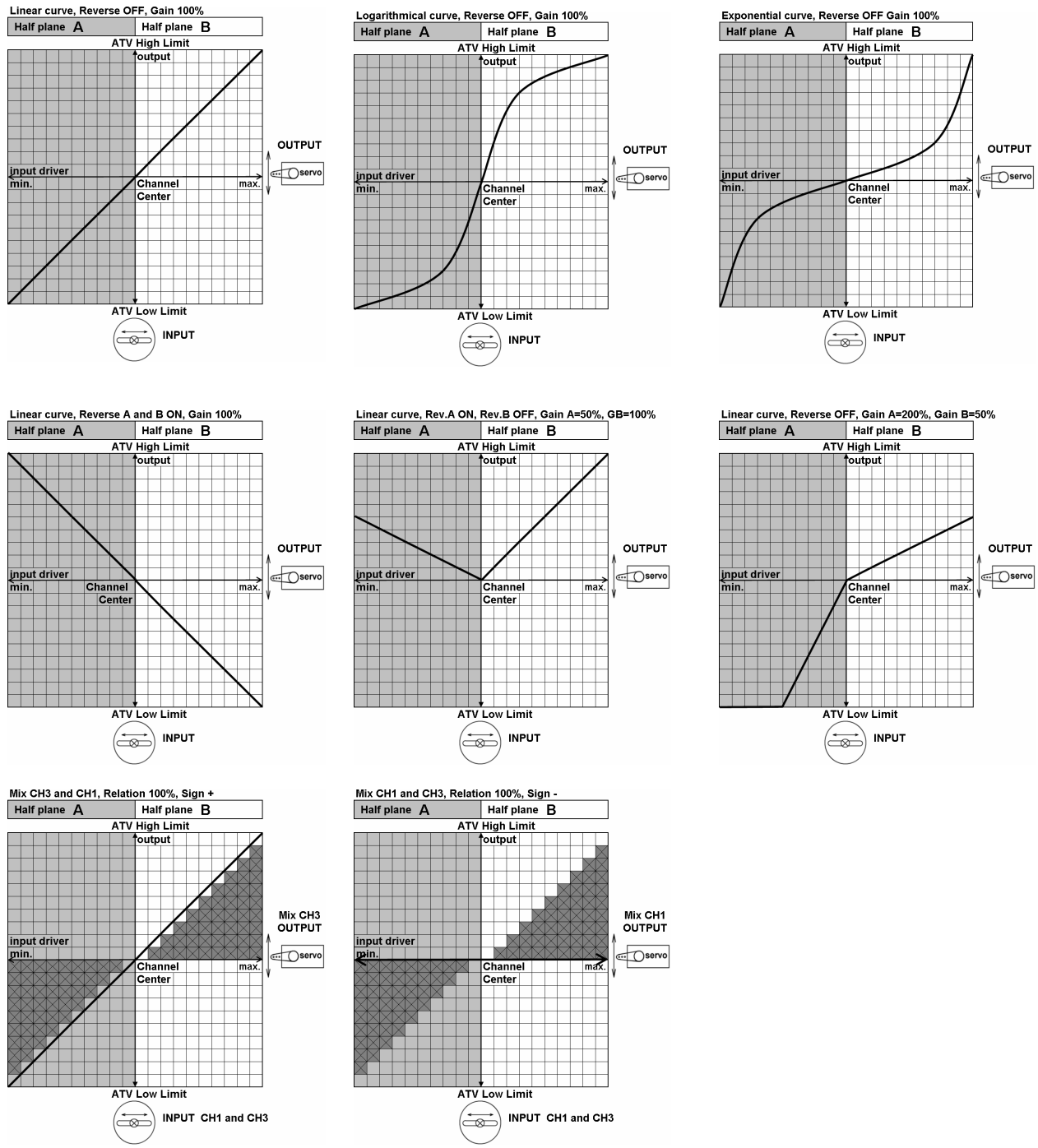
Transmitter channel	Channel Set				
	SetInputChannel CHx	Set Center	Mix CHx and CHy	Mix Relation	Mix Sign
Ailerons	CH1	1,5ms	<b>CH1 and CH6</b>	100%	+
Flaps	CH6	1,5ms	<b>CH6 and CH1</b>	100%	-

Function	Out Pin Set										
	Set Output Pin	SetInChannel	Reverse A	Reverse B	Gain A	Gain B	Fail Save	Delay	Curve	ATV HighLimit	ATV LowLimit
Aileron 1	Y1	<b>Mix CH1</b>	off	off	100%	100%	1,5ms	0s	linear	2,0ms	1,0ms
Aileron 2	Y5	<b>Mix CH6</b>	off	off	100%	100%	1,5ms	0s	linear	2,0ms	1,0ms
Flap 1	Y6	<b>CH6</b>	off	off	100%	100%	1,5ms	0s	linear	2,0ms	1,0ms
Flap 2	Y7	<b>CH6</b>	<b>on</b>	<b>on</b>	100%	100%	1,5ms	0s	linear	2,0ms	1,0ms

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Samples of output channels depending on inputs and receiver setup:





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