Diversity in Pitlab FPV System

Introduced in version **2.60**

Diversity feature allows to connect to autopilot two independent RC receivers, and system will automatically select signal from receiver which is not in failsafe state (has active link to transmitter).

This diversity feature increases safety and system durability in case of RC link failure (receiver malfunction, loose wires, etc.) which may occur during flight.

In most cases diversity may utilize long range receiver (LRS) and standard short range receiver. In this case when LSR fails, airplane will fly back to base (starting point), where short range receiver will still work and allows manual control and safe landing.

NOTE: Diversity works only with serial inputs: CPPM or SBUS. It do not work with parallel connection.

There are two diversity modes available:

1. SBUS signal connected to input #1 (SBUS#1), and serial CPPM signal connected to input #6 (CPPM#6).
2. One CPPM signal connected to input #1 (CPPM#1) and another CPPM signal connected to input #6 (CPPM#6)

Diversity modes are selectable in FPV_manager in Autopilot -> Radio RC page.

Diversity selects proper input signal as soon as valid frame from any input is received. Maximum delay is less than frame length. When signal from input is lost (e.g. broken/disconnected wire) this channel is disabled by diversity after 0.5 second. When proper input frame appears again, diversity immediately enables this channel.

NOTE: both input signals (CPPM or SBUS) for diversity must have this same channel order (mapping) to work properly.

In most cases both receivers gets signal from this same transmitter, so both input streams has this same channel order. Some users may want to use two separate sets: transmitters and receivers (even when one transmitter is a backup one normally switched off) – in this case both transmitters must have this same channel order (and of course airplane configuration).

This two-transmitters configuration with CPPM#1/CPPM#2 diversity mode (2) may be also used for ***trainer-pupil*** configuration (when trainer sets RTH mode in his transmitter, control is transferred into pupil transmitter)

Mode 1: Diversity SBUS#1 <->CPPM#6

In this mode SBUS input has priority over CPPM input. Generally SBUS signal has better quality and resolution due to full digital protocol, so until SBUS do not report failsafe condition, diversity selects this input. When SBUS lost RC link (range) and report failsafe condition, diversity selects CPPM input.

Detailed state and system behaviour are shown in following table:

SBUS#1 input	CPPM#6 input	Active channel	Autopilot state	OSD indication
Connected, No RTH, No failsafe	Any state	SBUS#1	Normal control	[A]
Connected, RTH, No failsafe	Any state	SBUS#1	RTH	[A]
Connected, Failsafe	Connected, No RTH	CPPM#6	Normal control	[B]
Connected, Failsafe	Connected, failsafe/RTH	CPPM#6	RTH	[B]
Not connected	Connected, No RTH	CPPM#6	Normal control	[B]
Not connected	Connected, failsafe/RTH	CPPM#6	RTH	[B]
Not connected	Not connected	None	RTH	[X] -RC

Mode 2: Diversity CPPM#1 <-> CPPM#6

CPPM signal has no explicit failsafe indicator, and receivers should have properly failsafe settings forcing AUTO mode and throttle down (RTH condition). In this diversity mode priority has input without RTH state (without failsafe condition).

Detailed state and system behaviour are shown in following table:

CPPM#1 input	CPPM#6 input	Active channel	Autopilot state	OSD
Connected, No RTH	Connected, No RTH	CPPM#1	Normal control	[A]
Connected, failsafe/RTH	Connected, No RTH	CPPM#6	Normal control	[B]
Connected, failsafe/RTH	Connected, failsafe/RTH	CPPM#1	RTH	[A]
Connected, No RTH	Connected, failsafe/RTH	CPPM#1	Normal control	[A]
Not connected	Connected, No RTH	CPPM#6	Normal control	[B]
Not connected	Connected, failsafe/RTH	CPPM#6	RTH	[B]
Not connected	Not connected	None	RTH	[X] -RC

We wish you many safe flights with our system!

Pitlab Team