

Lemon RX

Stabilizer PLUS 7-Channel Receiver

Essential Instructions

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Further Information

For more detailed information see the *Complete Guide to the Lemon RX Stabilizer PLUS*, available at:

<https://www.rcgroups.com/forums/showpost.php?p=29478801&postcount=4>

A number of short instructional videos for the Stabilizer PLUS are available on the same RCGroups post.

To offer comments or raise questions about the Stabilizer PLUS or the instructions, please go to *The Official Lemon STABILIZER PLUS thread* on RC Groups:

<https://www.rcgroups.com/forums/showthread.php?2800238-The-official-Lemon-STABILIZER-PLUS-thread-New-Users-read-first-6-posts-%29>

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Introduction

Building on the success of its basic 7-channel Stabilized Receiver, Lemon RX has developed the Stabilizer PLUS with additional features and capabilities:

- Autolevel mode for docile flying (or emergency recovery)
- Gyro mode for normal rate stabilization
- Seven fully usable channels (using Always-ON feature)
- Flexible installation, including inverted and on-edge mounting
- Level Reset feature to compensate for any out of level effects
- Trim Reset feature to correct for trim and subtrim offsets
- Hardware Reset capability
- Dual aileron, elevon and V-tail capability
- Usable with simple DSMX/DSM2 transmitters such as DX5e, as well as fully programmable ones
- DSMX/DSM2-compatible
- Available with either single antenna or dual diversity antennas
- Diversity antenna receiver available in top-pin or end-pin versions

These *Essential Instructions* cover the information that most people will need to get the Lemon Stabilizer PLUS up and flying in a conventional plane with either normal wing configuration (single servo or two servos on a Y-cable) or dual aileron servos on separate channels.

The separately available *Complete Guide* not only provides more information on the functioning of the Stabilizer PLUS, but also covers such advanced topics as programming a transmitter and using Delta Wing (elevons), Flaperons and V-tail mixes.

These instructions are prepared by jj604 (John) and Daedalus66 (Nigel). We have worked closely with the people at Lemon RX but are not paid by, or associated with, the manufacturer.

What does the Stabilizer PLUS do?

When activated, this stabilizer has **three modes**, controlled by channel 5 (Gear):

1. **OFF**: The unit functions as a six channel DSMX-compatible receiver (channel 5 is not usable).
2. **Gyro**: The unit provides rate stabilization to counteract turbulence for smoother flight.
3. **Autolevel**: The unit limits pitch and bank and returns the model to level if the sticks are released.

Requirements of the Stabilizer PLUS

Transmitter

The Lemon Stabilizer PLUS requires a Spektrum® or other DSM2® or DSMX® transmitter using Spektrum technology. Examples include DXe, DX4e, DX5e, DX6, DX6i, DX7s, DX8, DX9, and JR 9303.¹

A three-position switch controlling channel 5 (Gear) is required if all three stabilization modes (OFF, Gyro, Autolevel) are to be available in flight. The more recent DX4e and DX5e transmitters provide such a switch, while more advanced transmitters can generally be programmed to output the necessary 100%/0%/-100%

¹ The Lemon Stabilizer PLUS may not work properly with the Spektrum® DM8 and DM9 modules or with certain non-Spektrum DSMX/DSM2-compatible equipment, including some OrangeRX® transmitter modules.

on channel 5. Such transmitters can also usually be programmed to invoke Autolevel mode for momentary emergency recovery. See the *Complete Guide* for information on programming.

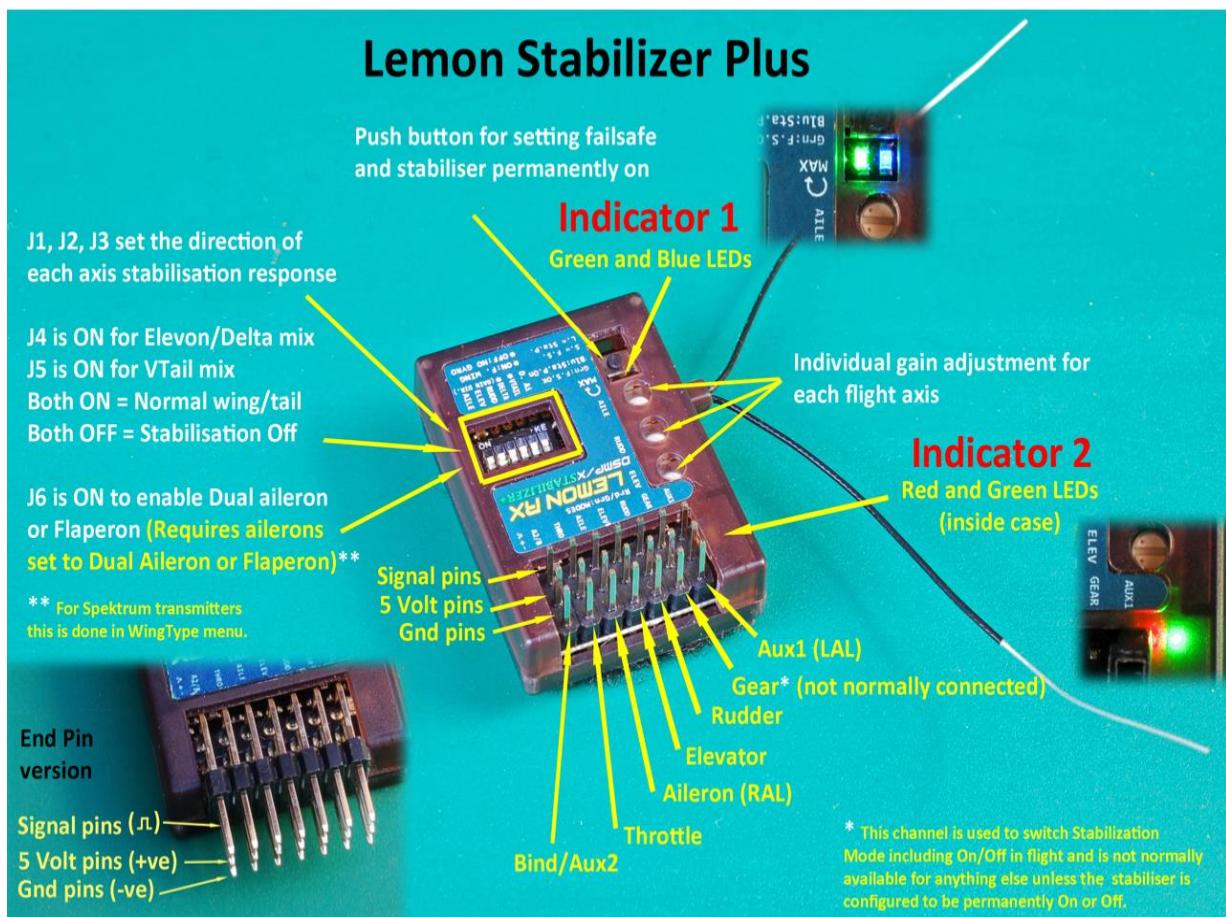
Transmitters with only a two-position switch on channel 5, such as the older examples of DX4e and DX5e, as well as programmable ones that lack the ability to assign a suitable three-position switch, can be set to access either Gyro or Autolevel, but not both, as explained in the note under Changing Mode Order (see page 9). Alternatively, many such transmitters, including specifically the DX6i, can be programmed to control the three modes by means of two two-position switches (see page 11 and the *Complete Guide*).

Servos and Power Sources

The Stabilizer PLUS works well with a wide range of servos, both analog and digital. For optimum stabilization, servos with relatively fast response times are preferred. Metal-gear servos may be used for their shock resistance but they too are optional.

Be sure to use an ESC (speed control) or BEC (battery eliminator) with ample current capacity. Stabilization makes the servos work harder than unstabilized flight and thus generates significantly higher current drain. A good rule to follow is to choose a BEC, whether internal to the ESC or separate, that has at least 50% more capacity than you would use for a similar but unstabilized model. An adequate power supply is vital because although the Stabilizer PLUS is highly resistant to short power interruptions (<1s), several seconds are needed for a reset after a longer power loss.

If possible, use a switching BEC (SBEC), either in the ESC or as stand-alone unit, for its ability to deliver power without overheating and to cope with higher battery voltages. Linear BECs can also be satisfactory as long as you stay within their voltage and servo limits.



Installation and Setup

These instructions are intended to explain the basic steps in setting up the Lemon Stabilizer PLUS to fly a conventional plane using the following channel assignments:

1. Throttle
2. Ailerons (or Right Aileron if dual servos on separate channels are used)
3. Elevator
4. Rudder
5. (Gear) normally dedicated to selection of Stabilizer Mode
6. (Aux1) Left Aileron (only if dual servos on separate channels are used), or other function
7. (Aux2) Available for other function

For information on other configurations, see the *Complete Guide*. A brief note on mixing is included on page 11. **Note that Elevon (Delta) or V-tail mixing in the transmitter must NOT be used.**

For a “normal” aileron setup (either single aileron servo or two aileron servos on a Y-cable), set receiver switches **J4 and J5 to ON**. Make sure the switches snap over completely.

If your model has **dual aileron servos using separate channels (or flaperons)**, set **J4 and J5 to ON** and also set switch **J6 ON** to activate aileron stabilization on channel 6 (Aux1).

When using a programmable transmitter, **create a new ACRO model** using Spektrum defaults. If your model has a single aileron servo or dual servos on a Y-cable, choose **Normal Wing Type**. For two aileron servos on separate channels, select **Dual Aileron Wing Type**.

For Stabilization Mode, Channel 5 (Gear) should be on a three-position switch if possible.² On recent Spektrum programmable transmitters, go to Channel Assign and select a suitable switch (such as B or D).

If your transmitter has eight or more channels, set up a knob or slider to control channel 8 (AUX3) for Master Gain control. On recent Spektrum transmitters, this is done in Channel Assign by setting AUX3 to be controlled by the knob (RKnob).

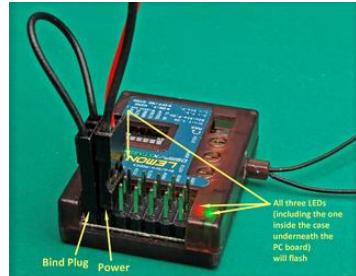
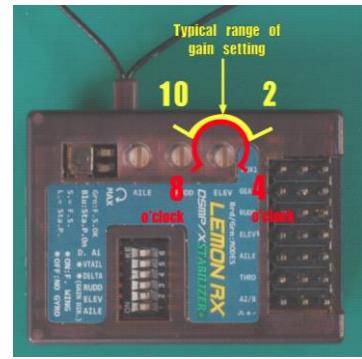
Install the Stabilizer PLUS upright in the aircraft (i.e., flat on a surface that is horizontal when the model is in normal level flight attitude). The long axis of the unit must be aligned with the flight direction and the servo connectors must be to the rear of the aircraft. Other possible orientations are explained in the *Complete Guide*.

Because the Stabilizer PLUS uses both gyros and accelerometers (sometimes called a “6-axis” stabilizer), for best performance it should be located as close as possible to the center of gravity of the model.

Check that the three **gain pots are set to the mid-point – 12 o’clock** (straight up – see picture).

Binding (Bind Plug in channel 7)

1. Insert a bind plug into the Bind/channel 7 slot (labeled “A2/B”).
2. With the transmitter turned OFF, apply power to the receiver. The Red and Green lights of Indicator 2 (and the Red internal light) should flash rapidly to indicate that receiver is in **Bind Mode**.³



² See discussion of using a two position switch on page 11.

3. With the **throttle at LOW position**, turn **ON** the transmitter in **Bind Mode** (check instructions for your transmitter). The transmitter will usually bind at fairly close range but may sometimes need to be separated from the receiver by 1-2m (3-6 feet) or more.
4. Wait until the transmitter indicates “bind complete” or the rapid Red/Green flashing stops. If your bind process involves holding a button or switch, hold for a couple of seconds more, then release.
5. Wait 20 seconds or so for the initialization process to complete. Check that the transmitter has control of the servos.
6. Power down the receiver and transmitter. **Don’t forget to remove the bind plug.**

To test the bind, turn on the transmitter and then the receiver. Wait for the receiver to initialize, as indicated by: Indicator 1 (Green/Blue) lights no longer flashing, Indicator 2 (Red/Green) lights signaling the stabilizer mode (see below), and the transmitter acquiring control of the servos. Be sure to wait long enough.

Verify control of stabilization by placing the channel 5 (Gear) switch in each of its positions. A three-position switch should display the following:

- Position 0: **OFF** – Red/Green solid (or flickering very slightly); no servo movement when model is rotated.
- Position 1: **Gyro** – Green ON solid, Red OFF; servos move briefly when model is rotated.
- Position 2: **Autolevel** – Red and Green lights flashing alternately; aileron and elevator servos stay deflected when model is not level, rudder servo moves briefly when model is rotated.

With a two-position switch, only OFF and Autolevel mode will normally be available. This can be changed to OFF and Gyro, as explained under Changing Mode Order (see page 9).

Setting Failsafe (Bind Plug in channel 7)

If Pre-set Failsafe is not set/enabled as explained below, the receiver will, on loss of signal, stop sending pulses to the servos and ESC. This will cause the ESC to cut power to the motor within a second or two (to be sure, test this with the prop removed), while the servos stay where last commanded. This type of failsafe is adequate for electric models but unsuitable for IC (fuel) powered aircraft.

If Pre-set Failsafe is enabled, the receiver will, on loss of signal, go to the chosen pre-set positions on all channels. The most important safety requirement is that this cause the motor to shut off.

To enable Pre-set Failsafe:

1. With receiver and transmitter powered down, insert a bind plug in the **bind/channel 7 slot (A2/B)**.
2. Power up the receiver. Indicator 2 lights should be flashing rapidly to signal **Bind Mode**.
3. Power up the transmitter in **Bind Mode** (see instructions for your transmitter).
4. Allow bind to complete, until Indicator 1 lights (Green/Blue) have stopped flashing and Indicator 2 lights are signaling the current stabilization mode. This may take up to 20 seconds or more.
5. Move the relevant transmitter sticks and switches to the **desired failsafe positions**.
6. **Press the receiver button briefly (<1s)** and release. **Indicator 1 Green light ON** shows failsafe is set.⁴
7. **Remove the bind plug** and power cycle the unit.

The failsafe settings will be retained even when the receiver is powered off.

To cancel the failsafe setting, repeat the above procedure and again press the button briefly.

³ If this rapid flashing of Indicator 2 does not happen, there is no possibility of binding. Low power supply voltage, reversed plugs or a defective bind plug are among the possibilities to check.

⁴ If the BLUE light comes on, you have held the button too long and selected Always-ON. Press the button again for more than 1 second to cancel this, then to set failsafe, press briefly (<1s) while holding the desired control inputs.

Preparing to Fly

Always remove the propeller when working with the battery plugged in.

1. With the receiver already bound, power up first the transmitter and then the receiver (i.e, transmitter should be FIRST ON, LAST OFF). The Stabilizer PLUS will calibrate its sensors automatically any time the model remains stationary, with no vibration, for 2 or 3 seconds during power-up of the receiver. This calibration is seldom needed, so making sure it happens every month or two will be adequate.
2. With the stabilizer mode set to **OFF** (Indicator 2: Red/Green ON steadily), verify that all control surfaces travel in their **correct directions when the transmitter sticks are moved**. If necessary, change the relevant Reverse settings in the transmitter. At this time check that all control surfaces are centered.

Note: If using a Transmitter with two-position Gear switch, skip step 3 or step 4, as appropriate.

3. Set the stabilizer mode to **Autolevel** (Indicator 2: Red and Green lights alternately flashing slowly). Rotate the model about the pitch and roll axes and watch for the ailerons and elevator to deflect and stay deflected when it is not level. Rotate the model about the yaw axis and watch for a momentary pulse of rudder deflection followed by a return to neutral.

The directions of this stabilizer action on each axis MUST be as follows:

- Model **rolls to the right**, the **right aileron goes DOWN** and the left UP to counter the motion.
- Nose of model **pitches down**, the **elevator goes UP** to restore the model to level flight.
- Model **yaws (rotates) to the right**, the **rudder pulses LEFT momentarily** (as in Gyro mode – see Step 4) to resist the displacement.

If any response is incorrect, change the appropriate switch J1, J2 or J3 to reverse the travel.

4. Set the stabilizer to **Gyro** mode (Indicator 2: Green ON, Red OFF) and test the stabilizer action on each of the control axes. Directions of movement should be as above, except that this time what you are looking for on all three axes is a **pulse of movement of the control surface** which occurs while the model is starting to move from stationary.

For example, when you roll the model sharply to the right, the right aileron should for a moment go DOWN and the left UP (to oppose the displacement), then they should return to neutral. Note that if the direction of stabilization movement for aileron and elevator is correct for Autolevel mode it will also be correct for Gyro mode.

If the stabilizer motion is hard to interpret, turn the gain pots fully clockwise (or turn up Master Gain, if available). Note that it is often easier to feel the direction of deflection with your finger on the control surface than to see it. Additional information on stabilizer response is provided in the *Complete Guide*.

5. **Carefully recheck the directions of control movement and stabilizer action – a mistake here can have serious consequences!**
6. Check that the **three gain pots on the receiver are set to 12 o'clock**.
7. If available, set **Master Gain to the midpoint** (0% on the transmitter's monitor screen). If your transmitter has less than eight channels, Master Gain is fixed at 1 and you can skip this step.
8. Check that the **flight control trims are set to zero**. If necessary, use Sub-trim to align the servo arms at right angles to the pushrods. Finally, **adjust the mechanical settings** to center the control surfaces.
9. **Test failsafe** by turning off the transmitter with throttle well above zero (make sure your prop is removed or the model is restrained). The motor should stop within a second or two. Turn the transmitter back ON and it should restart.

10. Make sure you know how to find the Stabilizer Mode switch without having to look down at the transmitter and that you know how to turn it OFF quickly if you get in trouble.
11. It is recommended that you set up **Dual Rates** on the transmitter with Low Rate being about 70% and High Rate 100%. Use mechanical adjustments and/or servo travel (called Travel, ATV or End Point Adjust depending on the transmitter) to set control throws to those recommended for the model.
12. You may also wish to add 20% Expo, or somewhat more, to soften control responses around neutral, but keep in mind that stabilization has an expo-like effect.

Your First Flight

1. Power up first the transmitter and then the receiver.
2. Wait 20 seconds or so until initialization is complete, and the transmitter has control of the servos.⁵
3. Once again check the directions of control and of stabilization movement, especially aileron.
4. Set **Stabilizer Mode** switch (channel 5/Gear) to the desired mode.⁶
5. Take off and climb to a safe height.
If you have a two-position switch giving access only to Off and Autolevel, go to step 9 below.
6. Turn ON **Gyro mode** (Position 1 on a three-position switch). Expect Gyro mode to cause the model to fly more smoothly, resist wind gusts, and be somewhat less sensitive to control inputs than with the stabilizer OFF. If there are any unexpected reactions, immediately turn OFF the stabilizer (Position 0) and land to trouble-shoot.
7. If you encounter oscillation on any control surface, slow down and land.⁷ Turn the relevant gain pot(s) down (counter clockwise) 10 or 20 degrees. See the *Complete Guide* for advice on fine tuning the gain.
8. Switch to **Autolevel mode** (Position 2). In Autolevel mode, you should find the model much more docile, with a strong tendency to return to level when you neutralize the sticks. You will still have control, but turns may require significantly more input and maximum bank and pitch will be limited. To increase control authority, you can use High Rate and/or change to Advanced Autolevel mode, which allows steeper bank angles (see page 9). Be ready to switch to OFF or Gyro if you encounter a problem.
9. If the model (with throttle set appropriately) does not maintain level flight, switch to OFF or Gyro mode, land and reset Stabilizer Level and Alignment and Stick Neutrals, as explained below.

If you are a beginning flier looking to use the Lemon Stabilizer PLUS to assist you in developing your piloting skills, we recommend enlisting the help of an experienced pilot for the first flights.

Resetting the Stabilizer

Resetting Level and Alignment (Toggle)

The Stabilizer PLUS normally uses default settings when initialized, based on the assumption that the receiver is mounted upright and level and accurately aligned with the flight direction. To compensate for any variations, the receiver can be reset by performing a “**toggle gesture**” during the initialization process. This is also required, for example, if the stabilizer is mounted upside down or on edge (e.g., on a profile fuselage), or if the unit is mounted not quite level.

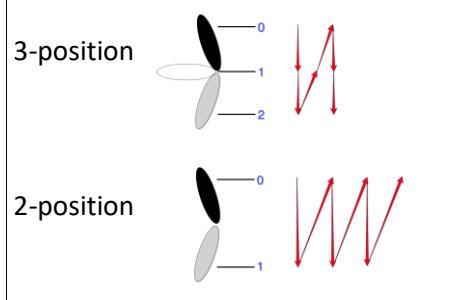
⁵ A flashing orange light in a receiver operating in DSM2 mode indicates that receiver power was connected without first cycling transmitter power. This “Brown-out Detection” feature warns of power interruptions. To stop the flashing, power down both receiver and transmitter and repeat power-up. This feature is not present for DSMX.

⁶ Only use stabilization for the initial takeoff if you are confident that you have set the response directions correctly.

⁷ Or turn down Master Gain slightly if channel 8 is available.

Toggle Gesture

Move the Stabilizer Mode switch on your transmitter back and forth as quickly as possible through its full range for at least 2 seconds. This procedure applies to both 2- and 3-position switches. At a minimum the stabilizer needs to see **six changes of switch position** (see diagram) **within 2 seconds**, but a few more changes are desirable to guarantee a successful reset.



To reset level as seen by the stabilizer:

1. Set the model up in level flight position on the bench.⁸
2. Turn on the transmitter and apply power to the receiver (bind plug not required).
3. When Indicator 1 (Green/Blue) starts flashing, immediately (within 8 seconds) perform the **toggle gesture** explained above, flipping the switch back and forth continuously for 2-3 seconds.
DO NOT MOVE OR DISTURB THE MODEL during this step.
4. After 2-3 seconds, the **Red LED of Indicator 2 should come on for a few seconds**. After a further wait, the **Green LED of Indicator 2 should flash four times** to confirm initialization.
If you do not see this confirmation, repeat the process until you do. This is necessary to ensure correct initialization. A possible reason for failure is movement of the model during initialization.
5. Power down the receiver.

If you observe any unexpected responses from the model, on the ground or in the air, perform a reset as described above.

If you perform this procedure, it's REALLY important to verify that the "toggle gesture" is successful, as it resets the Stabilizer's orientation and Autolevel values. Be sure you see **four Green flashes** on the Indicator 2 LED (near the pins). **No flashes = no fly!**

The Stabilizer retains the values generated, so the procedure does not normally need to be repeated unless you want to adjust the Autolevel attitude or you change the stabilizer's position in the plane.

Also, don't forget to also reset the stick neutrals, as described in the next section, as they can have an important impact on the model's behavior.

Resetting Stick Neutrals (Toggle)

To ensure optimum stabilizer performance, after any major adjustment of the trims or subtrims it's a good idea to use the toggle gesture (as defined above) to reset the stabilizer's values for the stick neutral positions. This is an entirely separate process from resetting level and can be done at any time after the stabilizer has completed its initialization, even in flight. During the reset, the aileron, elevator and rudder sticks and the corresponding trims must **not** be moved.

With the transmitter and receiver ON, and leaving the sticks and trims untouched, move the Stabilizer Mode (Gear) switch as quickly as possible back and forth for at least 2 seconds.

The Stabilizer PLUS performs best, especially in Autolevel mode, when trim and subtrim settings are kept to a minimum. Where possible, use mechanical adjustments to eliminate the need for large trim offsets.

⁸ The model may need to be a few degrees nose-up to maintain level flight at a normal throttle setting.

Special Options

Stabilizer Always-ON (Rebind)

By default, channel 5 (Gear) is dedicated to controlling Stabilizer mode (OFF, Gyro, Autolevel), so its pins are basically not usable for other functions. Stabilizer Always-ON, however, allows channel 5 to be used to control retractable landing gear or for other functions. Stabilizer Always-ON can be set to either Gyro mode or Autolevel mode, but cannot be changed in flight. Hence, to verify a proper setup, it is recommended that prior to setting Always-ON, your model be flown at least once with an off switch available.

To enable Stabilizer **Always-ON**:

1. With receiver and transmitter powered down, insert a bind plug in bind/channel 7 (B/A2).
2. Power up the receiver. Indicator 2 lights (Red/Green) should be flashing rapidly to signal Bind Mode.
3. Turn on the transmitter in Bind Mode (see instructions for your transmitter).
4. Wait for Indicator 1 (Green/Blue) to stop flashing and Indicator 2 (Red/Green) to show stabilizer mode. This may take 20 seconds or more. Be patient.
5. Set the channel 5 (Gear) switch to either Autolevel mode (Red/Green alternately flashing slowly) or Gyro mode (Green ON, Red OFF), according to your preference.
6. Press and hold the button (>1s) until the **Indicator 1 Blue LED is ON**, showing that **Always-ON** has been selected. In this condition, channel 5 (Gear) no longer controls stabilizer mode and can be reassigned for another purpose.
7. Power off and remove bind plug.

The Always-ON setting will be retained even when the receiver is powered off.

Changing Mode Order and Autolevel Setting (Bind Plug in channels 4, 5, 6)

A bind plug inserted across the signal pins of channels 4,5,6 will cause the Stabilizer PLUS to use the blue/green **Indicator 1** lights to display the current **Stabilization Mode Order**:

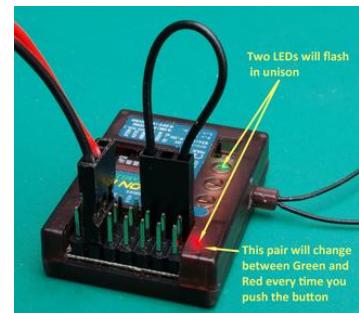
- **Default order:** OFF/Gyro/Autolevel – **Indicator 1 Green** flashing
- **Alternate order:** OFF/Autolevel/Gyro – **Indicator 1 Blue** flashing

The Stabilizer uses the **Indicator 2 Red/Green** lights to signal the **Autolevel mode**:

- **Beginner** mode (default) limits the model's bank and pitch angles – **Indicator 2 Green** flashing
- **Advanced** mode gives the pilot a greater degree of control – **Indicator 2 Red** flashing.

The Mode Order and Autolevel settings can be changed as follows:

1. **With the Stab PLUS powered OFF, insert a bind plug across the signal pins for channels 4, 5 and 6.** The ESC or battery is connected to channel 1 as usual (or to other available channel pins). See picture.
2. Power up the receiver (the transmitter is not required for this operation).
3. **Press the receiver button:**
 - for more than 1 second to change the **Stabilization Mode Order**.
 - for less than 1 second to change the **Autolevel mode**.⁹
4. When the desired changes have been made, power OFF the receiver and remove the bind plug.



⁹ To change both settings, simply press the button twice, once for more than 1 second and once for less than 1 second.

To check the settings, simply power up the receiver with the bind plug across channels 4, 5 and 6 and observe the configuration of Indicator 1 and Indicator 2 lights. See above for the meaning of the lights.

The settings will be retained even when the receiver is powered off. To reverse a change, repeat the procedure described above.

Hardware Reset (Bind Plug in channels 2, 3, 4)

To reset the Stabilizer PLUS to factory default settings, insert a bind plug on the signal pins of channels 2, 3, and 4, as shown in the picture. Note that channel 2 (Aileron) is the third set of pins from the left.

The ESC, BEC or battery is connected to channel 1 (Throttle) as usual (or to other available channel pins). The transmitter is not required.

When power is applied briefly, the lights on the receiver will blink in sequence, indicating that all internal settings have been returned to default. This includes any stabilizer offsets, orientation settings, failsafe presets, mode order changes, etc.



To complete the reset, you may wish to set the stabilizer pots back to the 12 o'clock position and return all DIP switches to OFF, but this is not required.

Other Issues

Using a Two-Position Switch to Control Stabilization

The ability to set Mode Order facilitates use of the Stabilizer PLUS with transmitters lacking a three-position switch to control channel 5 (Gear). By choosing the appropriate Mode Order, the Stabilizer PLUS can be set to use a two position Gear switch to provide access to either Gyro mode or Autolevel mode, but not both. Transmitters with only a two-position switch include older examples of the DX4e and DX5e.

A two-position switch normally provides 100%/-100% output with no middle position. Thus in the default Mode Order (OFF/Gyro/Autolevel), the switch will select **OFF or Autolevel**, while Gyro mode will not be available. Changing the Mode Order to OFF/Autolevel/Gyro will allow the switch to select **OFF or Gyro**.

Another way to use a two-position switch is to set the travel (end point) on the 100% side down to 0%. The switch will then deliver 0% (Gyro mode) or -100% (Autolevel mode). It is important to recognize that this provides no way to turn stabilization OFF unless the transmitter supports Master Gain on channel 8.

Using the Stabilizer PLUS with a DX6i

The Spektrum DX6i is no longer available, but as one of the most popular transmitters of recent years there are still vast numbers of them in use. The DX6i has a two-position switch on channel 5 (Gear/F-Mode), another two-position switch on channel 6 (Flap/Gyro) and two programmable mixes.

The methods explained above can be used to work around the DX6i's limitations, or the gear switch, a programmable mix and a second switch (such as Mix), can be used to simulate a three-position switch:

MIX 1
GEAR → GEAR ACT
RATE D 0% U -100%
SW MIX TRIM INH

Set GEAR channel to Reverse (change N to R)

This mix will produce -100%/0%/100% output, functioning as follows:

Gear switch in Position 0: Gives Stabilization OFF (100%) for either position of the Mix switch.

Gear switch in Position 1:

Mix switch in Position 0 gives Autolevel mode (-100%).

Mix switch in Position 1 gives Gyro mode (0%).

Mixing

It is mandatory that any elevon (delta wing) or V-tail mixing take place in the stabilizer and NOT in the transmitter. Such mixing is controlled by the settings of switches J4 and J5, as shown in the illustration on page 3. Use of the transmitter for elevon or V-tail mixing is permitted only if stabilization is turned OFF at the receiver (switches J4, J5, J6 OFF).

By contrast, other types of mixing, such as flaperons, aileron differential or aileron-to-rudder, are managed as usual in the transmitter. When this is done, switch J6 should be turned on to activate left aileron stabilization on channel 6 (AUX1).

The *Complete Guide* provides a full discussion of this issue.

Stabilizer Mode Settings

The inputs required by the Stabilizer PLUS on channel 5 (Gear) do not need to be exact. The following ranges will be recognized as defining the three Stabilization modes:

- Any value below -36% (pulse length 1356us) will put the unit into Autolevel mode.
- Any value between -35% (1360us) and +35% (1640us) will invoke Gyro mode.
- Any value above +36% (1644us) will turn the Stabilizer OFF.

Alignment and Location

The Lemon Stabilizer PLUS must be aligned with the flight axis of the model and the servo connectors must be to the rear. It can be mounted upright, inverted or on either edge, but only if it is mounted fully upright can default values be used to determine level. If mounted in any other orientation, or if fine tuning of stabilizer level is needed, the Reset “toggling” process described earlier (page 8) must be used. For best results, the unit should be located as close as possible to the center of gravity of the model. These issues are discussed in more detail in the *Complete Guide*.

Mounting

All stabilizers must be mounted in a way that protects them from vibration and shock. At the same time, they must be attached securely enough that they accurately follow the movements of the model and cannot come loose. A suitable method of mounting is essential to ensure that the unit performs correctly.

The double-sided mounting tape provided with the Lemon Stabilizer PLUS offers the simplest solution. Use it to attach the receiver in the appropriate attitude to a flat surface in the model. Make sure the surface is clean, the attachment is solid and the receiver case is not touching any part of the model. Good quality servo-mounting tape or 3M (Scotch) Permanent Outdoor Mounting Tape is also suitable for this purpose. Do not use the common indoor white foam mounting tapes.

The disadvantage of mounting with tape is that subsequent removal of the unit can be difficult. Accordingly, Velcro®-type tape can be used (avoid thick or extra strong types). Cover the whole bottom of the receiver with the fuzzy (loop) side of the material. Since the unit MUST be attached firmly, use a patch of the hook-side material at least as big as the case. Make sure there is no possibility of the stabilizer's wobbling.

Whichever mounting material you use, be careful when removing the receiver, as the case is only held together by two small screws. To provide reinforcement, you may wish to apply transparent tape to the case sides before mounting.

These methods are suitable for electric-powered models, but may not provide sufficient isolation in the harsher environment of a fuel-powered (IC) model. For further information, see the *Complete Guide*.

Vibration

Autolevel stabilizers are particularly susceptible to vibration. It is therefore very important, even for an electric model with a properly mounted receiver, to eliminate possible sources of vibration.

The main symptom of excessive vibration is that in Autolevel mode the plane flies off-level, particularly if the condition gets worse over time. Even after using a toggle gesture to reset level (see page 8), the off-level attitude returns. In cases of extreme vibration, even Gyro mode may be affected.

What's happening is that the stabilizer circuits that keep track of accumulated errors see vibration as a series of continuous small corrections. There comes a point where the stabilizer "overloads" and can no longer correct for the errors; its "sense of level" then starts to drift and the attitude of the plane with it.

You should do everything possible to minimize vibration. The required steps are simple: balance the propeller and check for any out-of-true running of the motor shaft or bearings. A well-balanced electric model should show no noticeable vibration in any part of its speed range.