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Motion RC User Guide for the
Detrum SR86A Receiver

Version 1.0

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This guide provides you with information about the Detrum SR86A receiver. This information includes an overview of the receiver along with step-by-step instructions for binding, installing, and configuring it.

Review the Receiver's Features



- Built-in gyro with multiple modes (Off, Normal, Auto-recovery, and Aerobatic) that is programmable with some transmitters (such as the GAVIN-8C) or the 3-in-1 Programming Card
- LED that indicates which mode the gyro is operating in (see Appendix A)
- 2.4 GHz Direct Sequence Spread Spectrum (DSSS) and Frequency-Hopping Spread Spectrum (FHSS) technology to maximize performance and minimize interference
- Diversity antennas combined with advanced processing maximizes the strength and reliability of the signal between the transmitter and receiver
- Fail-safe places all controls in their fail-safe positions if the receiver loses signal
- Eight input ports so you can control up to eight channels (seven channels for control of airplane surfaces or functions and one channel to control the gyro mode)

Review the Receiver's Ports and Connection Orientation



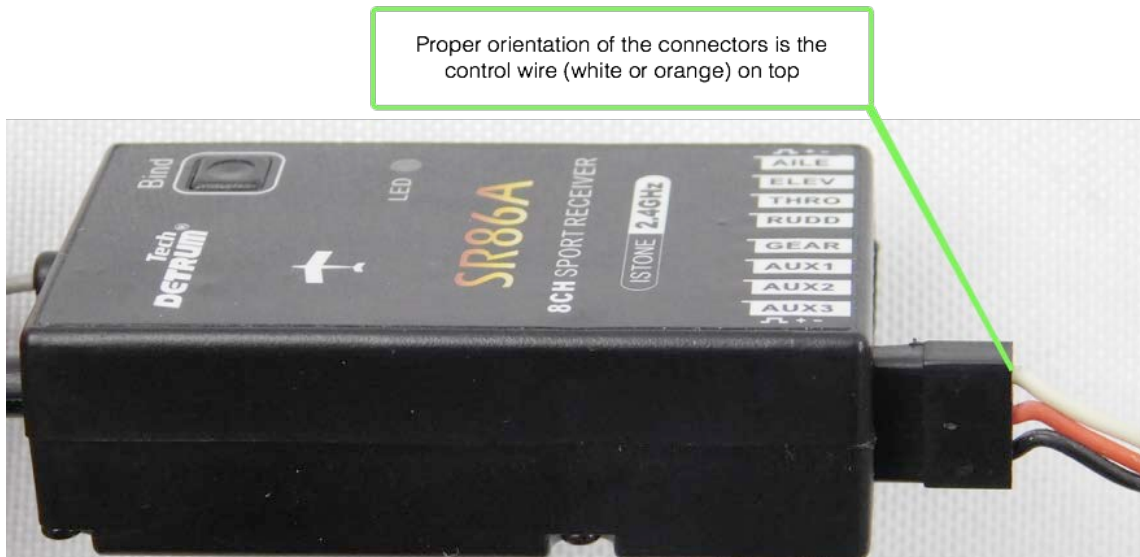
The SR86A has the following ports:

- AILE—ailerons
- ELEV—elevator
- THRO—throttle/ESC
- RUDD—rudder (and steering in many models)
- GEAR—retracts
- AUX1—auxiliary, controls gyro mode
- AUX2—auxiliary, use for flaps or other control surface
- AUX3— auxiliary, use for additional control, such as separate steering channel

With some of the Detrum transmitters, such as the GAVIN-6C or GAVIN-8C, you can program some of these ports, such as the GEAR and AUX2 ports, to be controlled by specific switches on the transmitter. For example, you might want to use the AUX2 port for flaps and program a three-position switch on the transmitter (such as the FMOD switch on the GAVIN-6C transmitter) to control this port.

The gyro mode is controlled by the AUX1 channel. You should not use AUX1 for other aircraft controls so that you can change the gyro's mode without impacting other functions. However,

you can use that channel to provide power to lights or to connect an external BEC; in other words, you can use it for something that doesn't use a control signal, but just needs to receive power from or send power to the receiver.



When connecting servos to the receiver, ensure the control wire (orange or white) is toward the top side of the receiver (the side the Bind button is on). Make sure the servo connectors are firmly installed in the receiver to ensure they don't come loose during flight.

Bind the Receiver to a Transmitter and Model

To use the receiver, you must bind it to a transmitter. During this process, the transmitter and receiver establish a unique code so that the transmitter recognizes the receiver as being used for a specific model. This connection also prevents interference from other transmitters.

You only need to bind the receiver once for each model with which you use it. If you move the receiver to a new model, you must bind it to that model (it won't be bound to the previous model any more).

It's easier to bind the receiver to a model before installing it, but the same process works whether the receiver is installed or not. Use the following steps to bind the SR86A to a Detrum transmitter, such as the GAVIN-8C (these steps may be different with other types of Detrum transmitters; refer to the *Motion RC Supplemental Guide* for your transmitter for the specific steps for your transmitter):

1. Turn the transmitter on.
2. When the home screen is displayed, press **ENT**.

3. Select *Model Set* and press **ENT**.
4. Select *Model* and press **ENT**.
5. Highlight the model you want to bind to the SR86A and press **ENT**. The model you selected becomes active.
6. Press **EXT** twice to move back to the home screen.
7. Turn the transmitter off.
8. Use the *Motion RC Supplemental Guide* for your transmitter to determine which switch is used to bind the transmitter to a receiver. For example, the GAVIN-8C uses the SC switch while the GAVIN-6C uses the TRAINER switch. Some transmitters, such as the GAVIN-6A, don't have a specific switch for binding; instead you just turn on the transmitter.
9. Connect the SR86A receiver to at least one servo and to the ESC; if the receiver is already installed in a model, skip this step.



10. Power the receiver by connecting a battery to the ESC. The Bind light on the receiver flashes red rapidly.
11. Press and hold the Bind button on the receiver until the Bind light flashes red more slowly; when the light slows down, release the Bind button. The receiver is in Bind mode.
12. Hold the switch you identified in step 8 in the bind position (such as the SC switch on GAVIN-8C, which you hold toward the front of the transmitter) and turn the transmitter on (if the transmitter doesn't use a switch for Bind mode, just turn it on). You hear the

bind tone on the transmitter and the Bind light on the receiver becomes solid, indicating the bind process is complete. The color of the light depends on the current gyro mode (green—Off, blue—Normal, purple—Aerobatic, or Blue-green—Auto-recovery).

13. Move the control associated with the servo you connected to ensure it moves. If so, the model is bound. If not, repeat this process until it is successful.
14. Power off the receiver.
15. Power off the transmitter. You are ready to install and program the receiver.

Mount the Receiver in a Model and Secure its Antennas

If you are going to use the built-in gyro, how you mount it in the model is very important. The receiver should be mounted as close to the model's center of gravity as possible. The three centerlines (front-to-back, side-to-side, and top-to-bottom) of the receiver should align with the corresponding centerlines of the model as much as possible. For example, the axis of the receiver that runs from its front side to its backside should be parallel with the plane's centerline from the nose to the tail.

1. Connect the servo and ESC leads to the corresponding ports on the receiver.
2. Position the receiver in the model as close to the aircraft's center of gravity as possible.
3. Ensure the front of the receiver (the direction toward which the airplane icon on the receiver points) is oriented toward the front of the plane.
4. Determine the orientation of the receiver with respect to the plane; you can place the receiver face up, face down, left-side up, or right-side up. You'll need to program the receiver with this orientation when you configure the gyro as described in a later section.
5. Align the three axis centerlines of the receiver with the model's three centerlines as much as possible.
6. Try to avoid the antennas being blocked by the battery, ESC, or other components. As you decide where to place the receiver in the model, you should also ensure the antennas can point 90 degrees to each other so they have the most reliable reception possible.
7. Use a single piece of double-sided tape to mount the receiver in the model. You don't want the tape to be very thick nor do you want it to be very soft as this can impact the gyro's performance.
8. Use tape to position and secure the antennas so they are 90 degrees from each other. For example, position one of the antennas so it is parallel to the model's centerline axis and the other so it points up, down, left, or right. Placing the antennas at 90 degrees to each other maximizes signal strength and minimizes the chances of interference.

Configure the Gyro

A gyro provides automatic control over a plane to make it easier and more fun to fly. For example, a gyro can counteract the effects of turbulence on a plane by automatically applying controls to keep the plane flying smoothly. Or, you can activate the Auto-recovery mode to put a plane in a straight and level orientation to help you recover when you get into a tough situation.

The Detrum SR86A includes a built-in gyro that you can configure in several ways:

- **Off.** In this mode, the gyro is turned off and doesn't do anything.
- **Normal.** When in the Normal mode, the gyro counteracts external forces on the plane. For example, if the plane encounters a gust of wind that would cause the plane to bank, the gyro activates control surfaces to keep the plane level. This mode is useful for general flying as it limits the impact of wind and other external conditions on the plane.
- **Auto-recovery.** When this mode is active, the gyro returns the plane to a straight and level attitude. It is most useful for recovering the plane when you lose orientation or get into a position from which you can't recover. Activating this mode returns the plane to level flight, potentially preventing a crash.
- **Aerobatic.** In this mode, the gyro attempts to hold the plane in its current orientation. This is especially useful when you are performing aerobatics, because once you put the plane in the desired orientation, the gyro attempts to hold it in that position. For example, if you perform a knife edge, the gyro attempts to keep the plane in that orientation.
- **Gain.** The gain is the strength of the input the gyro provides to the channels it is controlling; the angle gain controls the amount of the gyro's input while the rate gain controls how fast the gyro provides input. The larger the gains, the more control the gyro applies. If the gains are set too high, a control surface can oscillate, which can cause the plane to fly erratically and potentially crash. If the gains aren't set large enough, the gyro won't have enough control. The only way to know the correct gain settings is to fly the plane and adjust the gains based on how it flies. Start with the gains set to their default levels. If you observe oscillation, such as in pitch, you can decrease the associated gains. If the gyro seems to be having little-to-no effect, you can increase the associated gains. Changes to gains should be made in small increments and always be based on flight performance.
- **Mounting.** The gyro needs to be configured to match the receiver's orientation relative to the plane to perform correctly.
- **Wing Type.** This setting enables the gyro to control various configurations, such as standard ailerons, delta wing, or v-tail.

- **Offsets.** Offset is used to account for differences between the receiver's mounting position relative to the plane's roll and pitch axes when the Auto-recovery mode is used (as mentioned in the installation task, the receiver should be aligned with the plane's axes as much as possible). For example, if the gyro isn't exactly at 0 degrees bank when the plane is perfectly level and the Auto-recovery mode is made active, the plane matches the bank angle of the receiver rather than putting the plane at 0 degrees of bank. You can adjust the roll offset so that when the Auto-recovery mode is active, the plane has zero bank and is perfectly level. You can also adjust the offset for the pitch axis. Like the gains, you should leave the offsets in their default settings and adjust them based on flight performance. Changes to the offsets should also be done in small increments.

The Detrum SR86A's AUX1 port is used to control the gyro's modes. You can't use this port to control something else on the plane, such as flaps, and the gyro modes independently. Therefore, you should use the AUX1 channel only to control the gyro's mode. However, you can connect devices that only deal with the receiver's power to the AUX1 port. For example, if you use an external BEC, you can connect it to the AUX1 port because it only uses the positive and negative power connections and changes to the gyro mode won't impact it. Or, you can connect a light system that is always turned on to the port to provide power to it (if the lights use a control to turn them on or off, you should use a different channel).

You can program three of the four modes to be available on the transmitter (because the Detrum transmitters have three-position switches).

For two main reasons, you should initially configure the gyro so you can turn it off from the transmitter. One is that you should fly the plane with the gyro off to make sure it flies properly and is trimmed correctly before activating the gyro. The second, and more important, reason is that being able to turn the gyro off is helpful in case it isn't configured correctly; flying with a gyro not working properly can lead to a crash. If you can turn the gyro off, you can prevent it from crashing the model so you can land it and re-configure the gyro. When the gyro is configured correctly, you can choose to not use the Off mode any more if you want to have the gyro on all the time.

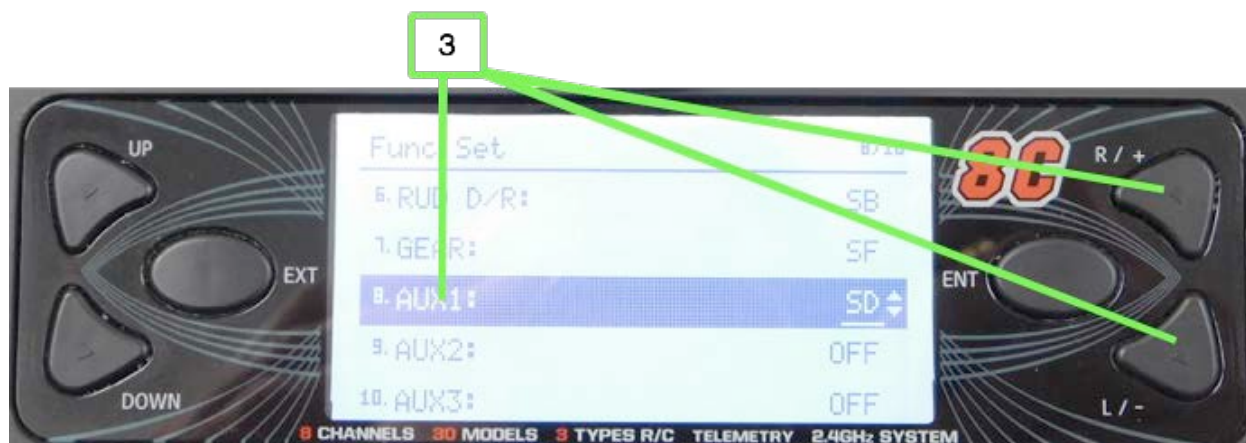
You can configure the Detrum SR86A's gyro directly with some transmitters, such as the GAVIN-8C. If you don't have a transmitter that supports configuration of a gyro, you need to use the Detrum 3-in-1 Programming Card for iStone Stabilizers and Tomcat ESCs. You can purchase one from Motion RC [here](#):

[3-in-1 Programming Card at Motion RC](#)

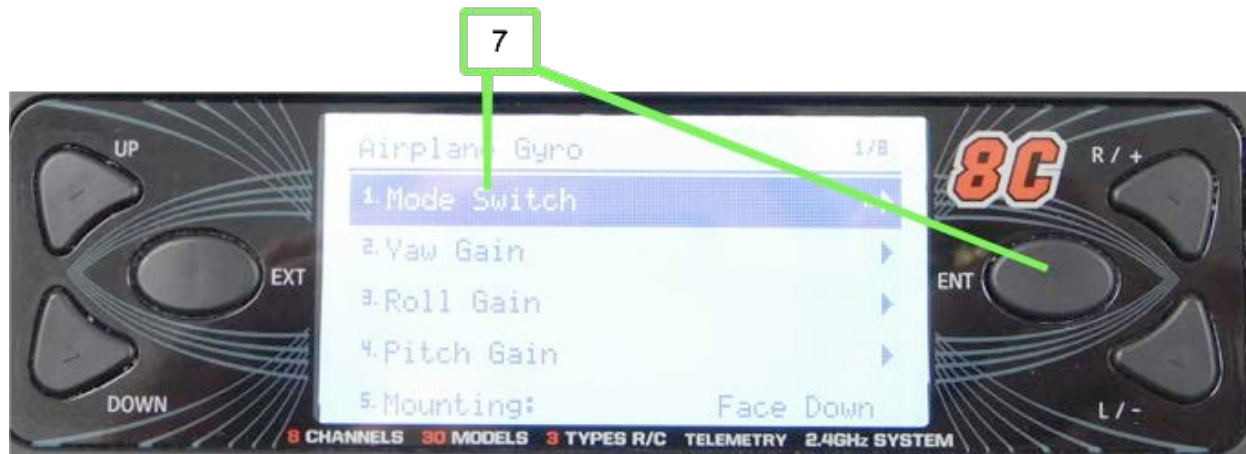
The steps to program the gyro with a GAVIN-8C follow (other transmitters may use slightly different steps; if you use the programming card, refer to its instructions to program the gyro):

1. From the home screen, press **ENT**.

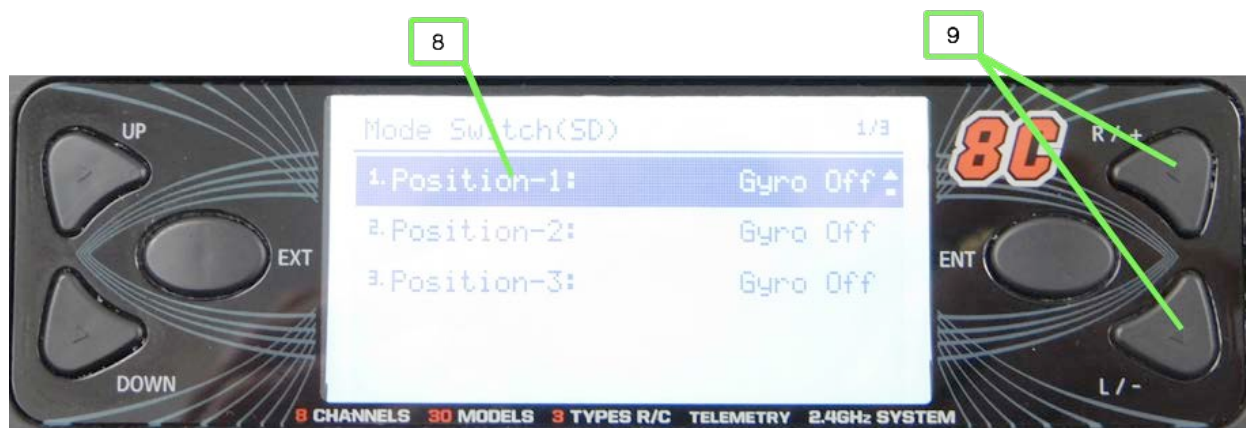
2. Select *Func Set* and press **ENT**.



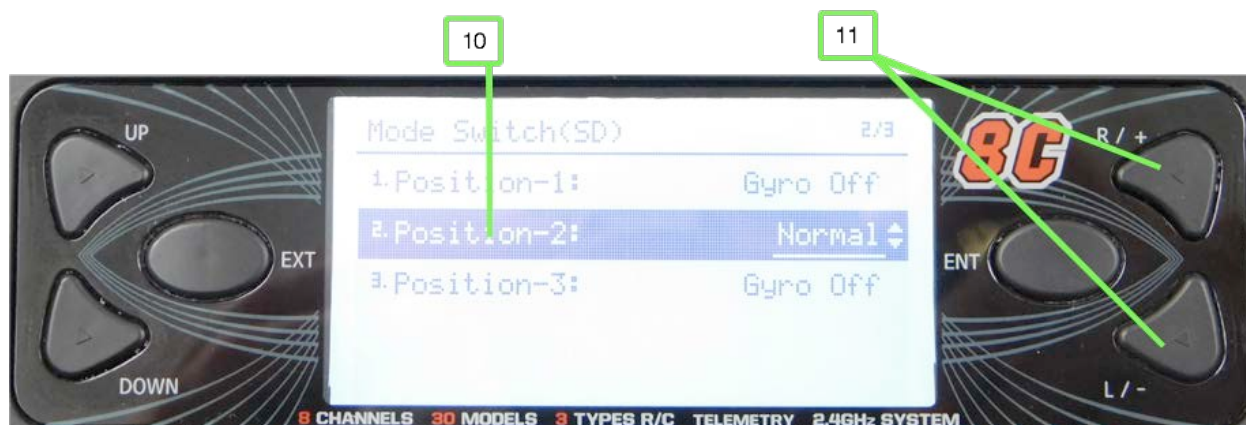
3. Select the channel AUX1 and use the **R/+** or **L/-** buttons to associate the AUX1 channel with a switch, such as SD.
4. Press **EXT**.
5. Select *Model Parameter* and press **ENT**.
6. Select *Airplane Gyro* and press **ENT**.



7. Select *Mode Switch* and press **ENT**.



8. Move the switch associated with the gyro (which is shown at the top of the screen) to position 1, which is then highlighted on the screen.
9. Use the **R/+** or **L/-** buttons to select the gyro mode when the associated switch is in the first position. For example, to disable the gyro when the switch is in this position, choose Gyro Off.

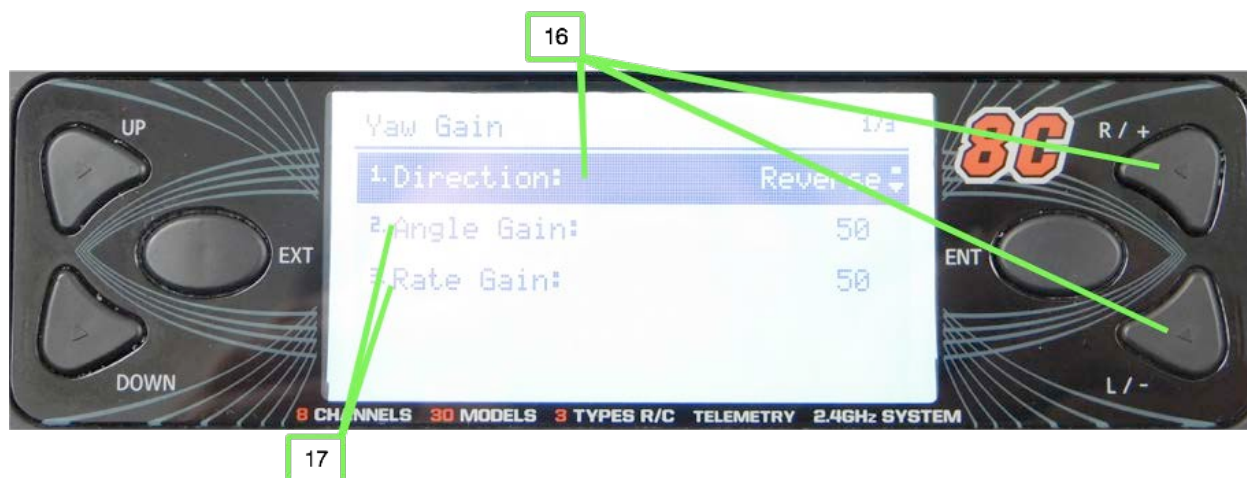


10. Move the switch associated with the gyro to position 2, which is then highlighted on the screen.
11. Use the **R/+** or **L/-** buttons to select the gyro mode when the associated switch is in the second position. For example, to put the gyro in Normal mode, choose Normal.
12. Move the switch associated with the gyro to position 3, which is then highlighted on the screen.
13. Use the **R/+** or **L/-** buttons to select the gyro mode when the associated switch is in the third position. For example, to return the plane to level flight when you move the switch to position 3, choose Auto-recovery.

*While you are making changes to the gyro settings, the transmitter may start beeping. This indicates you need to save the changes by pressing **ENT**. You should do this after you've configured all the gyro settings.*

14. Press **EXT**.

15. Select *Yaw Gain* and press **ENT**.

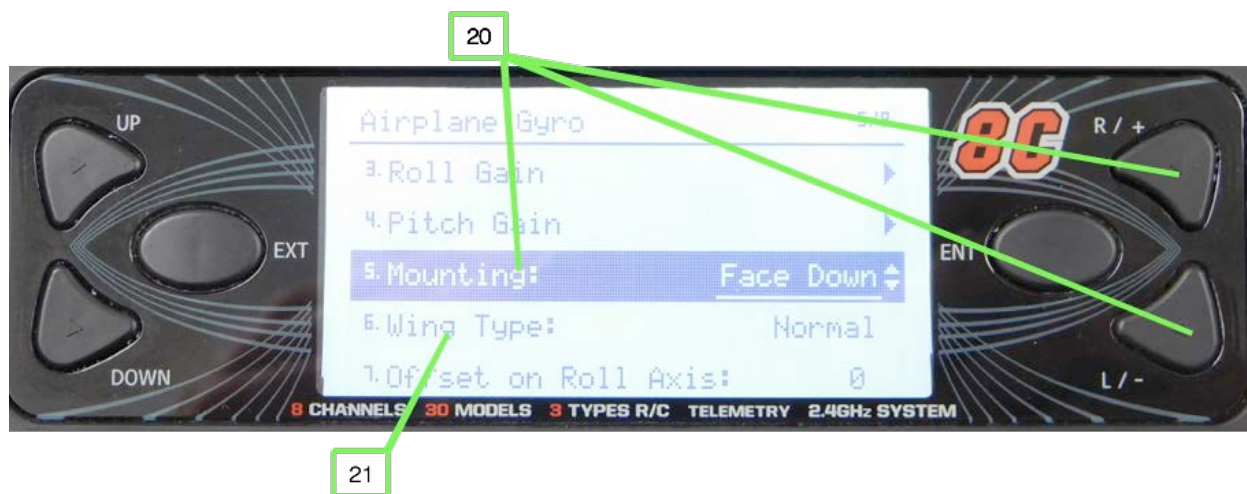


16. If you need to reverse the gyro's movement of the rudder, select *Direction* and press the **R/+** or **L/-** button. You can determine the direction of the gyro's input with the plane fully set up and the gyro in normal mode. Rapidly rotate the plane's nose to the right, the gyro should automatically move the rudder to the left to try to return the plane to neutral yaw. If the rudder moves to the right instead, which would increase the yaw of the plane rather than decrease it, the gyro direction needs to be reversed.

17. If you need to adjust the gains, select the gain you want to adjust (*Angle* or *Rate*) and use the **R/+** or **L/-** buttons to increase or decrease the gain. You should fly the plane with the default values and adjust the gains only if needed.

18. Press **EXT**.

19. Repeat steps 15 through 18 to set the direction and gains for the roll and pitch axes. Make certain that you check the direction of the gyro's action for each axis so the gyro's input opposes the direction in which you move the plane. For example, if you bank the plane to the right, the gyro should apply up left aileron and down right aileron to counteract the plane's movement. When you move the plane's nose up, the elevator should move down to move the plane's nose down again.



20. Select *Mounting* and use the **R/+** or **L/-** buttons to select the orientation of the receiver in the plane, such as Face Up. The mounting option you select must match how you installed the receiver in the previous task. If the Mounting setting doesn't match the physical orientation of the receiver, the gyro won't work properly and could cause a crash.
21. Select *Wing Type* and use the **R/+** or **L/-** buttons to select the plane's configuration, such as Normal if the plane has a standard configuration (ailerons, elevators, and rudder).



22. Use the Offset on Roll Axis and Offset on Pitch Axis selections to change the amount of offset used for the roll and pitch axes. You only need to adjust these if the plane doesn't return to straight and level orientation when the Auto-recovery mode is activated. For example, if you activate Auto-recovery and the plane banks to the right, you need to adjust the roll offset in the opposite direction. The closer aligned to the plane's axes that the receiver is mounted, the less offset you need.
23. When you're done configuring the gyro, press **ENT**. The transmitter saves your changes

and restarts both the transmitter and receiver.

24. If you configured gyro modes for specific switch positions, move the switch through each position and check the LED on the receiver to ensure it is in the mode it should be:
Green—Gyro Off, Blue—Normal, Purple—Aerobatic, and Blue-green—Auto-recovery.

Initialize the Gyro

Because the receiver has a built-gyro, it needs to initialize when it first powers on. During this process, you shouldn't move the plane or the gyro's sensors might not be initialized properly, which could lead to a crash. When you power up the model, perform the following steps:

1. Turn on the transmitter.
2. Connect a battery to the plane's ESC or BEC. The receiver starts to initialize and its LED flashes green.
3. Leave the plane in a stationary position and don't move any controls on the transmitter until the LED on the receiver becomes solid green (Gyro off), blue (Normal mode), purple (Aerobatic mode), or blue-green (Auto-recovery mode). This indicates the gyro has completed the initialization process and you can move the plane. (If you can't see the LED on the receiver, you should wait at least 15 seconds between powering up the model and moving it.)

Appendix A: LED Colors and Status

LED Color	Status
Rapid Red Flash	Not Bound
Slow Red Flash	Ready to Bind
Slow Green Flash	Gyro Initializing
Solid Green	Bound and Gyro Initialized, Gyro Off
Solid Blue	Bound and Gyro Initialized, Normal Mode
Solid Purple	Bound and Gyro Initialized, Aerobatic Mode
Solid Blue-green	Bound and Gyro Initialized, Auto-recovery Mode

Appendix B: SR86A Specifications

Parameters	Detrum SR86A Specifications
Type	2.4 GHz 8-channel
Gyro	6-axis
Output Signal	PWM (71 Hz)
Power supply	3.6~16 V
Weight	15 g
Size	51 mm x 28.3 mm x 14.5 mm