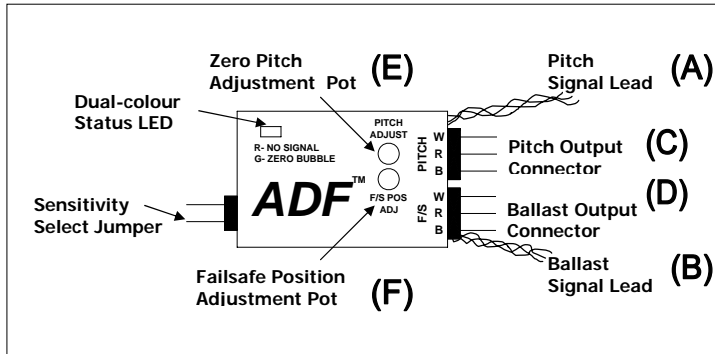


# ADF™

## Angle Driver with integrated Failsafe

### General layout



### Quick Setup Guide

1. Plug the **Pitch Signal Lead (A)** into the pitch channel of your receiver
2. Plug the **Ballast Signal Lead (B)** into the ballast channel of your receiver
3. Plug the pitch servo into the **Pitch Output Connector (C)** connector on the ADF taking note of the correct polarity
4. Plug the ballast servo into the **Ballast Output Connector (D)** connector on the ADF taking note of the correct polarity
5. With equipment tray level and your radio equipment turned on, turn **Zero Pitch Adjustment Pot (E)** until the green LED turns on
6. Turn off your transmitter and wait for the red LED to stop blinking. Turn the **Failsafe Position Adjustment Pot (F)** until the desired failsafe position for the ballast servo is found.

### Features

- **Dual-colour Status LED:** When power is initially switched on both red and green lights will turn as part of a power on self test. Signals coming from the receiver are then evaluated and the LEDs will flash out a code that indicates which signals have been detected:

None	No signal detected
1 blink RED	Ballast (Failsafe) signal detected
1 blink GREEN	Pitch signal detected
3 blinks (GREEN - RED - GREEN) or (GREEN - GREEN - RED)	Both pitch and ballast signals detected

During operation the function of the Dual-colour Status LED changes to indicate:

GREEN	Zero-bubble indicator
RED (fast blink)	Ballast signal lost – servo commanded to neutral position
RED (solid)	Ballast signal lost – servo commanded to failsafe (user defined) position

- **Sensitivity Jumper:** When the jumper is installed the pitch stabilization function is configured for HIGH sensitivity. When the jumper is removed the pitch stabilization function is configured for LOW sensitivity.
- **Zero Pitch Adjustment Pot:** This pot is used to fine tune the "zero bubble" angle of the ADF.
- **Failsafe Position Adjustment Pot:** This pot is used to set the position of the ballast servo when the failsafe function is activated.
- **Pitch and Ballast output connectors:** Pitch and ballast servos should be plugged in to these connectors so that the servo's signal lead is on the pin marked "W", positive power on the pin marked "R" and negative lead on the pin marked "B". (This naming convention is consistent with the lead colours found on Futaba and similar brand servos.)

### ADF Installation

Select a location on your equipment tray for the ADF where the adjustment pots can still be manipulated. The ADF is sensitive to pitch changes along the long edge of the circuit board so this must be installed parallel to an imaginary line drawn from the bow to the stern of your submarine. (The ADF can be mounted in any orientation that has the long edge of the circuit board parallel with this imaginary line.) Attach the ADF to your equipment tray using double-sided foam tape.

### Pitch Control Setup

Connect the **Pitch Signal Lead** to your receiver. Next, connect the pitch servo to the **Pitch Output Connector** taking care to orient the servo connector so that the servo wire colours line up with the **W** (white/signal), **R** (red/positive) and **B** (black/negative) on the ADF's label. Prop up your equipment tray on a level surface in a way that reflects how it will sit in the hull when the waterline is at zero-bubble. Turn on your transmitter, then your receiver. Using a small flat head screwdriver turn the **Zero Pitch Adjustment Pot** until the green LED turns on. Take your time - this adjustment is quite sensitive! Next check for proper stabilization command on the pitch planes. When you lift the bow of your submarine, the trailing edge of your pitch planes should move down. If the planes move in the wrong direction, reorient the ADF so that the signal leads point in the opposite direction or move the pitch plane servo arm to the opposite side of the servo.

### Failsafe Setup

Connect the **Ballast Signal Lead** to your receiver and the ballast servo to the **Ballast Output Connector**. Once again, ensure that the servos leads line up with the **W**, **R** and **B** on the ADF's label. Turn on your transmitter, then receiver. After the ADF has finished its initialization (both LEDs on, then config code blink) turn your transmitter off again- the red LED will flash at a high rate for about two seconds and drive the ballast servo to a neutral position. After two seconds, the red LED will turn solid and command the ballast servo to the failsafe position. You can now adjust the commanded failsafe position by using a flat head screwdriver to turn the **Failsafe Position Adjustment Pot**.

### General Notes

- For proper detection of input signals, your transmitter must always be turned on **before** you turn on your receiver.
- The pitch trim lever on your transmitter will not affect the zero bubble angle of the ADF. This will allow you to use the trim lever to fine tune the stern plane angle required to hold constant depth while underway.
- The ADF always generates a signal for the pitch servo even if the **Pitch Signal Lead** is not connected to your receiver. (The ADF can draw its power through either the **Pitch Signal Lead** or the **Ballast Signal Lead** or can be powered directly from a 4.8V battery pack.) Consequently it can be used to stabilize the rear planes on a model while the pitch channel is used to drive the bow planes on "channel restricted" radios.
- If you can't quite get the zero bubble indicator to stay illuminated when your submarine is fully assembled and level *that's okay!* As long as you're within a few degrees of zero ADF will still function properly.
- The ADF implements a two-stage failsafe- when the signal from the receiver is lost the ADF first enters "stage one" and immediately commands the ballast servo to a neutral position. The ADF will hold the servo in this position for up to two seconds- if the signal returns within that time the ballast servo will immediately go back to the commanded position. If after two seconds the receiver signal has not returned the ADF enters "stage two" and will command the ballast servo to the user-defined Failsafe position. It is advisable that the user ensure that neither "blow" nor "vent" is inadvertently commanded when the ADF is in "stage one" failsafe. (The "stage one" servo position and delay time are factory set and cannot be adjusted by the user.)
- For best depth-keeping performance leave the Sensitivity Select Jumper installed (high sensitivity). If your submarine oscillates up and down at high speed, remove the jumper to reduce the ADF's sensitivity.