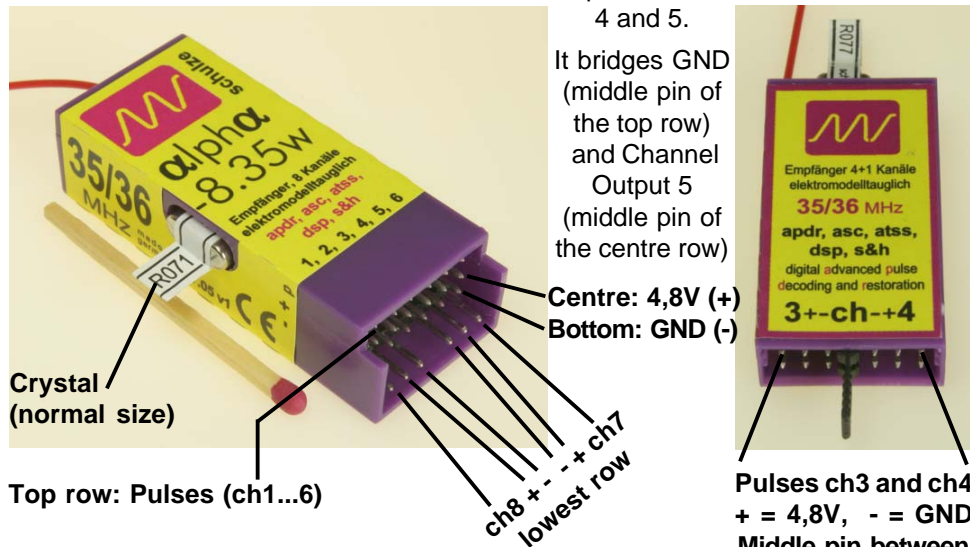


Manufact.	Pulse(ch1..6)	4,8V(+)	Gnd(-)
Graupner/JR	orange	red	brown
Futaba	white	red	black
Multiplex	yellow	red	black

The jumper is used as a guide rail for the servo connector and for the configuration of output channels 4 and 5.



It bridges GND (middle pin of the top row) and Channel Output 5 (middle pin of the centre row)

Top row: Pulses (ch1...6)

Crystal (normal size)

Centre: 4,8V (+)  
Bottom: GND (-)

ch8 +- --+ ch7  
lowest row

## Dear customer,

The purpose of these instructions is to help you become familiar with the new facilities of our Schulze **alpha** series "with point". They concentrate on the most important differences only.

The outstanding characteristics familiar from the earlier range of **alphas** have been retained (if not improved) - and for this reason the operating instructions for the earlier series also apply to the new receivers.

The method of configuring the units via a PC is only described briefly in these operating instructions. Full details of operating the PC program **alphasoft** can be found in the software's Help menu.

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## 1 Outstanding characteristics in brief

### 1.1 dsp - digital signal processing

In contrast to receivers with conventional circuits, **alpha** receivers exploit digital signal processing once the transmitter signal has been picked up, i.e. this process is carried out by a micro-processor.

If the programming is carried out effectively, these receivers are capable of the same outstanding characteristics that are well-known to our existing customers who use the alpha "without point".

### 1.2 tss - transmitter signal supervision (alpha series "without point")

Detects, analyses and monitors the transmitter signature.

The receiver **counts the channel signals** every time it is switched on; this ensures, for example, that receiver signals with the incorrect number of channels are not passed through to the servos. If the channel count is incorrect (in relation to the channels "learned" by the alpha when switched on), the signals are not passed through to the servo outputs (first the old signal is "held", then the signal is switched off).

If another modeller switches on a transmitter operating with PCM modulation on the same RF channel, this will not affect servos connected to the **alpha** receiver (servo jitter), although this does not mean that it is permissible to operate two transmitters on the same channel.

This is an ingenious, ground-breaking in-house development which we have not previously promoted.

### 1.3 atss - advanced transmitter signal supervision

Detects, analyses and monitors the transmitter signature in an unprecedented way:

- If the received channel count is not correct when the receiver is in use, the "alien" transmitter is ignored.
- Compatibility with Futaba "non-standard languages": switches automatically to Synthesizer transmitter module mode.
- Compatibility with Futaba "non-standard languages": switches automatically to HRS mode (in preparation).
- Automatic detection and processing of "positive / negative shift" transmitter signals (as used by American transmitters).

### 1.4 asc - automatic signal strength control

Ideal for long-range reception, and automatic attenuation of the receiver signal at close range. Prevents aerial input stage overload, with its unwanted side-effects (interference).

### 1.5 apdr - advanced pulse decoding and restoration

Advanced signal processing (plausibility checking) and intelligent restoration of incorrect or absent signals.

Interference effects occur all too readily when the receiver is close to the range limits:

**E.g.** the servos start to jitter, and in unfavourable conditions may strike their mechanical stops; this places a great strain on the receiver power supply. Another possible effect is that an electric power system might burst into life unexpectedly (almost all modellers have experienced this at some time at the moment of launch, or on the landing approach, when the aerial in the model has been poorly positioned. The result is then even more serious receiver interference.

### In this situation a crash is virtually inevitable.

For this reason we place great importance on **digital post-processing** of the received transmitter signal.

**apdr analyses the interference**, and can either generate the actual transmitter signal from the received signal (suppression of a glitch caused by, for example, an electric motor starting up), or generate a signal which is close to the original (**r = restoration**).

In simple teams this means that the receiver **suppresses** interference, and replaces the invalid signals by previously received valid values (similar to PCM transmission technology).

The net result is that the signal passed on to the servos remains within the usual limits, i.e. the servos can usually process them without any difficulty.

Servo jitter resulting from weak signals is significantly reduced.

### 1.6 s&h - sample and hold

Detecting (sampling) and remembering (holding) "clean" signals. If interference occurs, the old, clean signal continues to be fed to the servo (i.e. repeated).

If the interference persists, the receiver switches off the servo signals completely. Under certain circumstances the servo may then be reset by the pressure on the control surface.

### 1.7 10 kHz narrow-band operation - and not only on paper

We consider reliable operation even when adjacent channels are in use as a basic requirement, and that is why we employ **narrow-band filters**, which ensure consistent operation at the usual 10 kHz channel spacing.

### CAUTION: all these outstanding characteristics are still no guarantee for crash-free flying,

because in many cases the receiver's attempts to compensate for an incipient problem will now tend to mask the first signs of interference (close to the range limit, or at close range where the aerial position is unfavourable). That is why we have fitted the reception quality LED, which - in the "point" series receivers - also supplies important status information.

## 2 Hardware improvements and their limits

### Improved power supply buffering

The use of a high-capacitance Low-ESR tantalum capacitor across the receiver and servo power supply makes it possible for the receiver to operate without problem even if the airborne power supply is not really up to the task. Operating voltage collapses of extremely brief duration are now buffered better than previously.

However, this does not mean that it is safe to employ a BEC system of inadequate capacity, or a receiver battery with a low load capacity. The special capacitor does not obviate the necessity of a double power supply from battery to receiver (see last page of the old operating instructions). Neither is it capable of providing longer-term compensation if a high-resistance receiver power supply cannot deliver the current levels required.



A particular warning at this point regarding the use of Ni-MH cells of the AA or AAA size as a receiver battery. These cell types are optimised for capacity, at the expense of the low internal resistance which we need for our applications. Moreover: the chemical make-up of Ni-MH cells means that they are only capable of delivering "useful" currents when they are warmer than about 20°C. For this reason it is not safe to use Ni-MH cells in Winter!

## 3 Configuring the receiver without connection to a PC

### alpha-8.xx:

The configuration cannot be altered without connection to the PC.

### alpha-5.xx:

With this unit the channel assignment can be changed with the help of the jumper (bridging plug) on the central pair of pins in the servo socket row.

As standard the channels 1, 2, 3 and 4 are present at the three-pin sockets.

If you remove the jumper (that is the black bridging plug which is connected vertically on the central two pins of the socket row), then channel 5 is also available. Note: only the signal output and ground (earth) are present - not the positive pin.

Configuring the receiver to 1, 2, 3, 5, 4:

- Disconnect the receiver from the power supply.
- Fit the jumper between the signal outputs "2" and "3".
- Re-connect the receiver to the power supply.
- Watch the integral LED: it should flash five times at one-second intervals.
- Disconnect the receiver from the power supply.
- If channel 4 is not required, fit the jumper between the central pins again. This concludes the configuration process.

Configuring the receiver to 1, 2, 3, 4, 5:

- Disconnect the receiver from the power supply.
- Fit the jumper between the signal outputs "1" and "4".
- Re-connect the receiver to the power supply.
- Watch the integral LED: it should flash four times at one-second intervals.
- Disconnect the receiver from the power supply.
- If channel 5 is not required, fit the jumper between the central pins again. This concludes the configuration process.

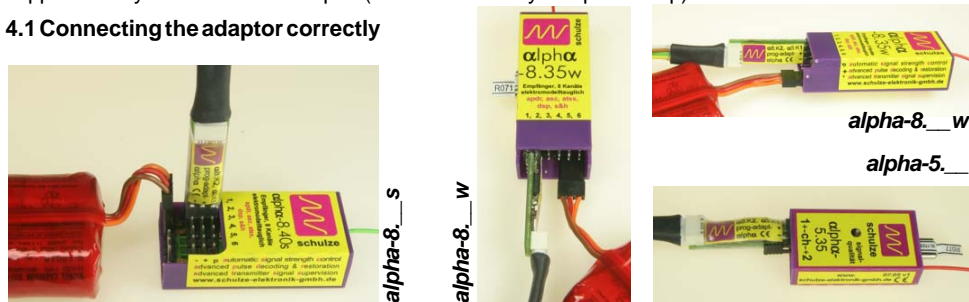
### Note:

If channels 4 and 5 are not located on the pins of the socket row marked "ch4" and the auxiliary channel (ch5), the channels are not interchanged. See also Chapter 6.2: Flashing codes. In this case it is only possible to alter the configuration via a PC connection.

## 4 Configuring the receiver with connection to a PC

The receiver is connected to the RS 232 interface of your PC using the **prog-adapt-alpha** plus the **prog-adapt-uni** adaptor. If the computer has a USB port but no RS232 port, then you will need to fit a supplementary RS232 to USB adaptor (available from any computer shop).

### 4.1 Connecting the adaptor correctly



The correct method of connecting the adaptor to the **alpha 8** and **alpha 4** is also printed on the label and the circuit board of the **prog-adapt-alpha**.

- 1) Disconnect the receiver from the power supply.
- 2) Connect the **prog-adapt-uni** to the PC.
- 3) Connect the **prog-adapt-alpha** to the four-pin socket of the **prog-adapt-uni**.
- 4) Run the **alphasoft** program, and connect the receiver to the **prog-adapt-alpha**.
- 5) Request the program to set up the connection to the **alpha** (see also the "Help" function of **alphasoft**).
- 6) Connect the power to the receiver when prompted by **alphasoft**.

When **alphasoft** announces "connection successful", you are ready to carry out the configuration process. For more details please refer to the "Help" function of **alphasoft**.

### 4.2 Hold times, fail-safe configuration

All servo outputs can be assigned different hold times and fail-safe positions.

**Example:** servo output 1 can be set to 1.1 ms (motor stopped) if the receiver battery voltage falls below the safe limit.

### 4.3 Limiter function

All servo outputs can be assigned different servo end-point limits.

**Example:** servo output 1 (glow motor throttle barrel) can be limited to 1.3 ... 1.65 ms, to avoid the pushrod striking its mechanical stops.

### 4.4 Channel assignment function

All servo outputs can be assigned to different transmitter channels.

**Example:** servo outputs 1 - 4 of the **alpha-5** can be set to supply transmitter channels 9 - 12. By this means you can effectively create a 12-channel receiver in conjunction with an **alpha-8**.

### 4.5 Mixer functions

All servo outputs can be mixed with different transmitter channels.

**Example:** two aileron servo outputs can be generated, with the correct direction of servo rotation and appropriate differential, using only one aileron channel at the transmitter.

### 4.6 The Aux channel

If a PC connection is available, you can make use of a special feature of the **alpha** receivers: voltage measurement input at the Aux channel. This is the auxiliary channel pin (ch5) on the **alpha-5.xx**, and channel 8 on the **alpha-8.xx** (these channels are otherwise normal servo outputs).

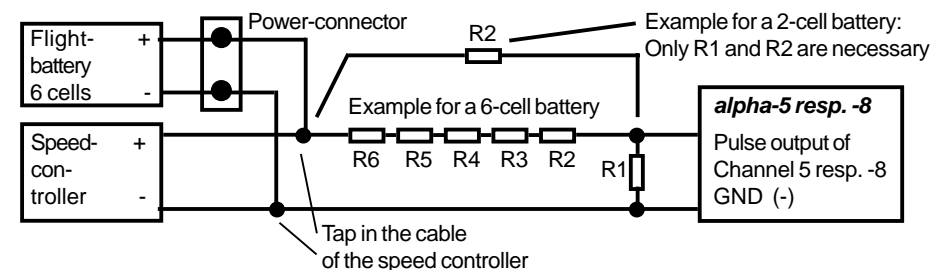
The Aux channel can measure voltages within the range 0 Volts to 3.3 Volts, referred to the receiving system's earth (ground). A broader range of measurement can be obtained by fitting a resistance divider in front of the AUX input.

**Note:** if you are using a BEC speed controller, the earth connection between flight battery and **alpha** receiver is not required. If you are using a speed controller with opto-couplers (i.e. no BEC system), the earth connection must be present. However, please note that the earth connection also disables the effectiveness of the opto-coupler in combating receiver interference.

**Example:** the Aux channel can be used to monitor the voltage of the flight battery in a multi-motor electric model, and to throttle back or stop the throttle channel (for all motors) if the flight battery voltage falls below the safe limit. Note that the under-voltage threshold must be set to a value above the speed controller's own cut-off limit, to prevent the controller's own low voltage detection system taking effect.

**Connections:** the voltage divider must consist of the same number of identical resistors (each **10 KiloOhm**) as there are cells in the pack, i.e. two resistors (R1, R2) with a two-cell pack, four resistors (R1, R2, R3, R4) with a four-cell pack. The cut-off voltage is stated in the **alphasoft** configuration program in **Volts per cell**, i.e. with Lithium batteries this is set to around 2.5 V / cell, with Nickel-Metal-Hydrate batteries around 1 V / cell.

Exception: if only one cell is to be monitored, then only R2 must be installed; R1 must not be fitted.



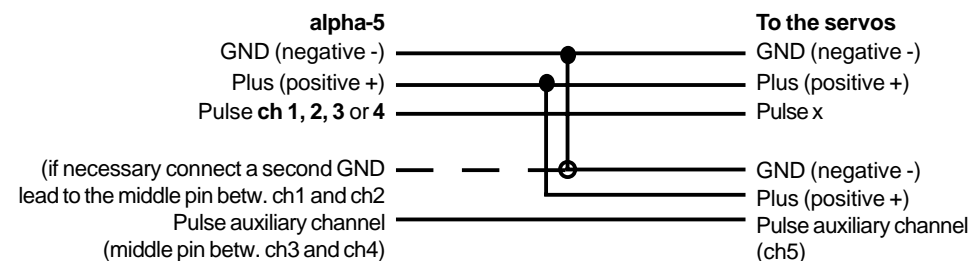
## 5 Connecting a fifth servo to the **alpha-5**

As a general rule the auxiliary channel requires neither its own earth connection nor a positive connection.

**Example:** Graupner transmitters broadcast signals for the two aileron servos on channels 2 and 5.

Since all three wires (signal, positive, negative) of channel 2 are fed into the wing, all that is needed for channel 5 is the signal. Naturally this means that the positive and earth wires of both servos must be soldered together in the wing, and connected correctly at the wing joiner connector.

If you wish to connect five servos individually, you must make up your own X-distributor lead as shown in the sketch below. Of course, in this case the jumper between the centre pins of the socket row is not required.



## 6 Status messages and error messages

The receiver signal quality LED is also pressed into service to display functional problems and other error messages. The following section explains the new flashing codes:

**6.1** Before the receiver is armed, it checks whether the core frequency including frequency deviation of the radio control transmitter lies within about +/- 1.5 kHz relative to the nominal frequency. If the **alpha** detects a larger discrepancy (up to around +/- 3 kHz), it considers this to be unacceptable, and indicates the problem with a flashing error code.

The LED flashes around twice per second, and the **alpha** remains unarmed.

If the frequency discrepancy is any greater than this, the narrow-band design of the **alpha** makes it unable to detect the problem, as it already represents an "invisible" signal on the adjacent channel. In this case the transmitter may already be causing interference on the adjacent channel.

The LED stays on constantly, and the **alpha** remains unarmed.

**6.2** As already mentioned, it is possible to swap over outputs **ch4** and **ch5** with the **alpha-5.xx**. If you carry out the re-configuration using the jumper, the LED will flash to confirm the process:

**6.2.1** The LED flashes four times followed by a one-second pause. This means: transmitter channel 4 is present at the **ch4** output, and transmitter channel 5 at the **ch5** output.

**6.2.2** The LED flashes five times followed by a one-second pause. This means: transmitter channel 5 is present at the **ch4** output, and transmitter channel 4 at the **ch5** output.

**6.2.3** The LED flashes continuously at about once per second. This means that the channels have not been swapped, since transmitter channels 4 and 5 were **not** assigned to one of the outputs 4 and 5. The change can only be reversed using the PC configuration process.

## 7 Note removing the case

Some customers are bound to want to remove the receiver from its case in order to save weight.

From **our** point of view we wish to point out that we don't think this is a good idea at all - the SMT components, protected by just a heat-shrink sleeve (or even without!), are vulnerable to damage. In any case our receiver cases really are lightweights!

However, we are aware that some of you won't take any notice of this, so we will restrict ourselves to telling you how to do it properly.

Please note that removing, or attempting to remove, the case invalidates the guarantee.

**alpha-4:** slip a screwdriver blade, 4 - 5 mm wide, through the crystal slot and position it in the centre of the crystal socket; you can now push the circuit board out of the case.

**alpha-8:** carefully lift the self-adhesive label at "[www.schulze-elektronik-gmbh.de](http://www.schulze-elektronik-gmbh.de)" using a knife blade, and peel it from the whole of the side surface. The case can then be folded apart.

Now take a heat gun and gently warm the circuit board from above (be very careful if using anything other than a modelling heat gun), in order to soften the contact cement used to glue the circuit board in the case. You will then be able to raise the circuit board from the socket end with virtually no force; this will avoid leaving hair-line cracks in the components.

## 8 Firmware updates

The firmware is the software contained in the **alpha's** micro-processor. If necessary, you can update the firmware of the new **alphas** "with point" to the latest state.

The receiver has to be connected to the RS 232 interface of a PC as described in Chapter 4, using the **prog-adapt-alpha** plus the **prog-adapt-uni**.

The firmware and the transfer program can be downloaded from our web site, e.g. when the free update to cater for HRS mode becomes available.

## 9 Safety note for the **alpha 8.xx**



In the **alpha-8xx** the new, large blocking capacitor for the operating voltage is quite close to the crystal. Please check from time to time that the insulating frequency label on our crystal is not damaged; this will avoid the risk of „noise“ interference when the receiver is in use.

## 10 Specifications

Receiver type:	single conversion
Operating mode:	FM / PPM
Channel separation:	10 kHz (narrow band)
Sensitivity about:	1 m aerial: 10 µV
Intermediate frequency:	455 kHz
Current draw LED:	about additional 1 mA
Noise suppression:	digital-squelch
Case <b>alpha-8</b>	leightweight plastic 3,6 g (included in the table below)
Case <b>alpha-4</b>	heat shrinking tubes. crystal + 5 mm.
Aerial length	1 m, can be shorted by „too much range“ down to 40 cm.
Operating voltage range	4-5 cells = 4.8 ... 6 V nominal voltage = 3.6 ... 9 V min / max.
Operating pulse range	Pulse width 850...2350 µs, pulse interval: 11...32 ms

For optimum results we recommend that you only use genuine **schulze** crystals.

The 35-36 MHz receivers work obviously in the A- and the B band.

We offer no guarantee that crystals of other makes will work properly. Our receivers may work correctly with other crystals, but you may encounter range loss and interference when an adjacent channel is in use.

A **range check** is generally advisable in any case, but is **absolutely essential if you use non-Schulze crystals**.

Order-term	Freq. [MHz]	Channel count	Size [mm]	Current [mA]	Weight w/o crystal [g]	Application	Servo-connectors
<b>α-8.35w</b>	35-36 (red)	8	53*21,5*13,5	10,5	14	Aircraft	horizontal
<b>α-8.35s</b>	35-36 (red)	8	46*21,5*13,5	10,5	13	Aircraft	vertical
<b>α-8.35wW</b>	as listed above, PCB splash water protected					for seaplanes	
<b>α-8.35sW</b>	as listed above, PCB splash water protected					for seaplanes	
<b>α-8.40w</b>	40-41 (green)	8	53*21,5*13,5	10,5	14	Air,Boat,Car	horizontal
<b>α-8.40s</b>	40-41 (green)	8	46*21,5*13,5	10,5	13	Air,Boat,Car	vertical
<b>α-8.40wW</b>	as listed above, PCB splash water protected					for boats	
<b>α-8.40sW</b>	as listed above, PCB splash water protected					for boats	
<b>α-5.35</b>	35-36 (red)	5	37*20,5*9	9	9,5	small & leight-weight models	horizontal
<b>α-5.40</b>	40-41 (green)	5	37*20,5*9	9	9,5		horizontal
<b>α-5.35W</b>	35-36 (red)	5	37*20,5*9	9	11	seaplanes	horizontal
<b>α-5.40W</b>	40-41 (green)	5	37*20,5*9	9	11	boats	horizontal

