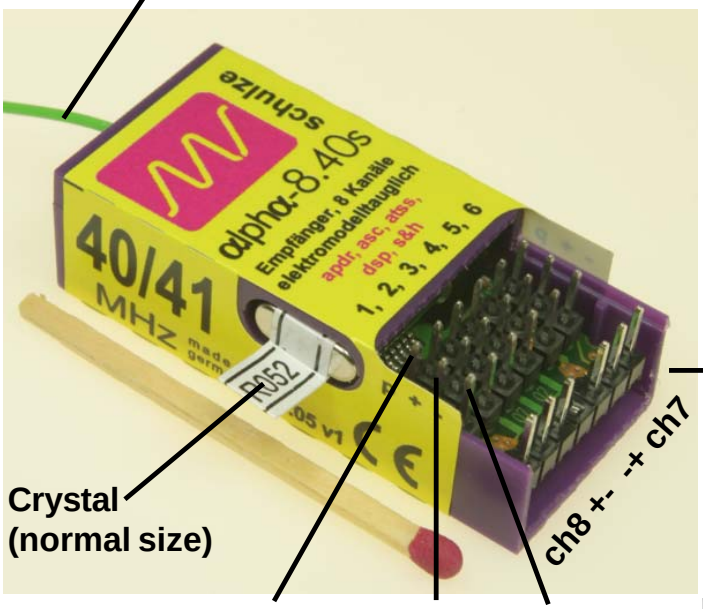
Aerial; red = 35 MHz, green = 40 MHz



Crystal (normal size)

ch8 +- -+ ch7

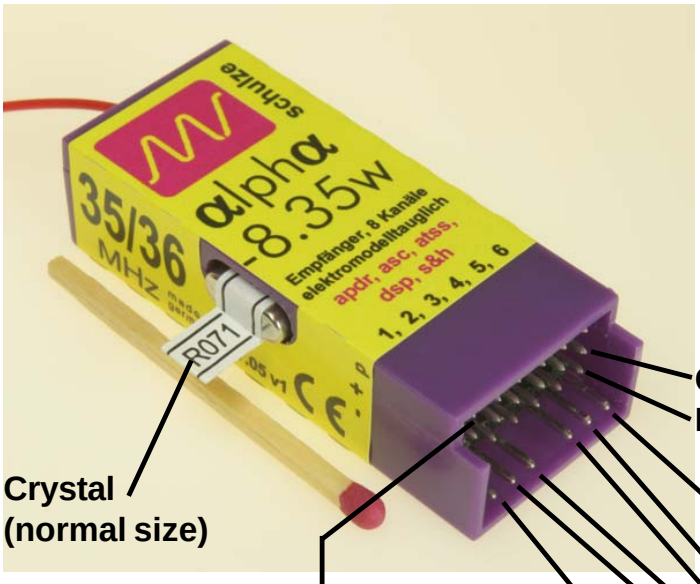
Mini-crystal

Reception quality LED (alpha-8: on the underside)

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

Pulses ch1 and ch2 + = 4,8V, - = GND „ch“ between 1 and 2 = GND

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



Crystal (normal size)

Top row: Pulses (ch1...6)

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

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

ch8 + - - + ch7 lowest row

Pulses ch3 and ch4 + = 4,8V, - = GND Middle pin between 3 and 4 = ch5

Dear customer,

the alpha series are ultra-compact, lightweight FM-PPM-radio control receivers designed specifically to satisfy the increasingly stringent demands of modellers concentrating on electric-powered models.

The **schulze** name on a receiver means not only that it is manufactured to **schulze quality standards** in our own production facility, but also that its performance satisfies the **schulze requirements** we have laid down for electric flight applications.

The special signal analysis process carried out by the alpha-8 also makes this receiver an interesting option for RC cars.

Its narrow-band RF section provides unrestricted use at 10 kHz channel spacing, even when adjacent channels are operating.

Its micro-processor controlled signal analysis stage suppresses interference and noise on the selected channel to a unique extent, in a similar way to a PCM receiver.

A successful fusion of high-end design with small dimensions, light weight and low cost.

The purpose of these instructions is to help you become familiar with the new facilities of our Schulze ***alpha*** series “with point” which are in particular different to the common 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.

Hint:

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

We offer no guarantee that crystals of other makes will work properly. Our receivers usually 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.**

Contents

1 Ensuring safe, trouble-free operation

The CE symbol is your guarantee that the unit meets all the relevant interference emission and rejection regulations when it is in use. If you encounter problems operating the future controller, please note that many problems are due to an unsuitable combination of receiving system compo-nents, or an inadequate installation in the model.

Watch for oversizes pulses from MPX-transmitters. The ***alpha***-receivers detect them as interferences and react accordingly. More on: www.multiplex-rc.de/PDF/IPD200005D.pdf

Please also remember that ...

... your (brushed!) motor is suppressed by at least two, better: three, ceramic capacitors of 10 to 100nF / 63 to 100V.

... your receiver and the aerial must be **at least 3 cm (>1") away** from motor, speed controller and high-current cables. For example, the magnetic fields around the high-current cables can cause interference to the receiver.

... all high-current cables must be as short as possible. Maximum length between speed controller and motor should not exceed 12 cm (5"), between flight pack and speed controller is not allowed more than 20 cm (8").

... all high-current cables longer than 5 cm (2") must be twisted together. This applies in particular to the motor power cables, which are very powerful sources of radiated interference.

... in model cars or boats: (if you do not use a short aerial) half of the receiver aerial's length should be deployed near the receiver, the other half should be threaded into a small tube mounted upright.
The aerial must never be fitted in a tube which is <u>pushed into a metal holder</u> (a very popular solution in RC cars!).

... in model aircraft: half of the receiver aerial's length should be routed along the fuselage, the other half should be allowed to trail freely (take care not to tread on it). Do not attach the end of the aerial to the fin!

... in helicopters where the receiver is located in the nose, run the receiver aerial forward for about half its length, then out of the cabin, and slip it in a sleeve which terminates at the rear skid bar. If the receiver is located in the rear part of the chassis: slip the aerial into the sleeve (mentioned above) from the rear.
TIP: mount the gyro **on the tail boom**, close to the rotor axis, as this helps to prevent the tail oscillating.

Every time you intend to use the power system - before you turn on the receiver - **make sure that ...**

... no one else is using the same frequency (identical channel number).

... your transmitter is switched on and the throttle stick is (as a rule) in the STOP position (exceptions see operating instructions of your speed controller)).

As a general rule: receiver interference is more likely to occur when using a controller with BEC system, as these units do not feature an opto-coupler with its optical link.

--> Range check - the right way <--

Carry out a range check before each flight. Ask an assistand to hold the model aircraft and set the throttle stick to the half throttle position. Collapse the transmitter aerial. Let the assistand walk away with the model to a distance of about 50-60 m (200'). Make sure that you still have full control of the system at this range.

Be sure that other pilots do not stand less than 5 meters (16') to each other and that your transmitter with the <u>collapsed</u> antenna has the <u>closest</u> distance to the model. Otherwise it could be possible that the transmitters(!) produce a frequency mix on exactly your channel, which seems to reduce the range of your receiver.

Example 1: Pilots are airborne with channel 63 and 64. If they are too close to each other the transmitters produces additional frequencies on the channels 62 and 65

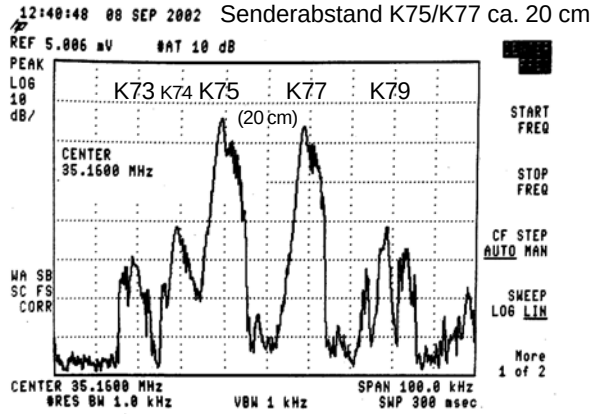
with the same intensity as your transmitter with the collapsed antenna. Your range check is negative, because your transmitter signal is too weak in relation to the mixed frequency.

The mixed frequencies can only be reduced by distance (more space) between the pilots. Your channel will become clear again for the range check.

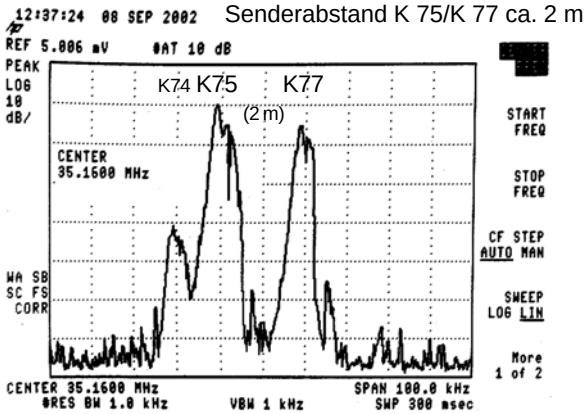
Second example
- calculation and measurement:

2 x (ch 75) 35.150 = 70.300 - 35.170 (ch 77) = 35.130 MHz **(ch 73)** resp.

2 x 35.170 (ch 77) - 35.150 (ch 75) = 35.190 MHz **(ch 79)**



Senderabstand K75/K77 ca. 20 cm



Senderabstand K 75/K 77 ca. 2 m

Note: Signal on channels 73 and 79 only by transmitter caused mixing products. Control signal on channel 74 with collapsed antenna.

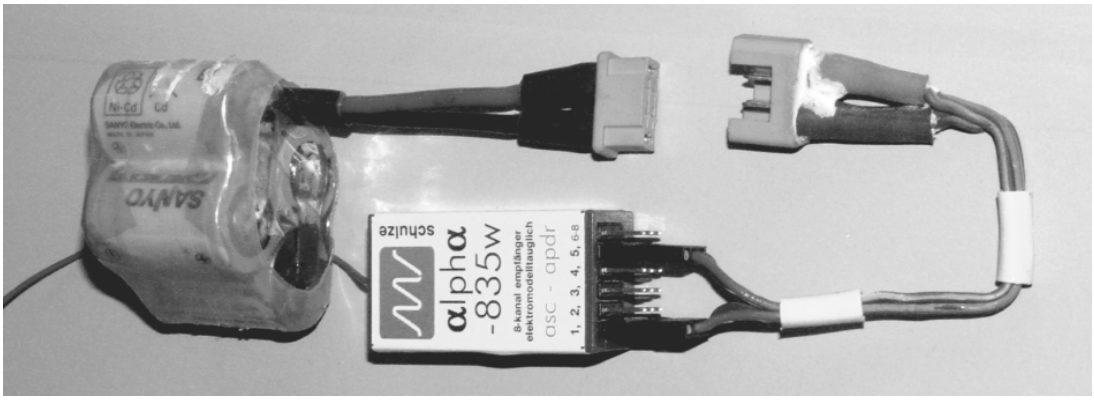
2 Safety note for the *alpha 8.xx*

2.1Click pulses:

In the ***alpha-8xx*** a 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.

2.2 Battery voltage supply:

For safety reasons the receiver battery should be always connected directly to a vacant receiver socket, and not via an intermediate cable. To reduce cable- and contact resistance you should use two cables parallel with no switch in the cables (necessary e.g. in helicopters or aircraft with flaps)



zu 2.2: Ausführung der Stromversorgung mit doppeltem Querschnitt

3 Outstanding characteristics

3.1 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”.

3.2 atss - advanced transmitter signal supervision
Detects, analyses and monitors the transmitter signature in an unprecedented way:

a) 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. If the received channel count is not correct when the receiver is in use, the “alien” transmitter is ignored.

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

b) Compatibility with Futaba “non-standard languages”: switches automatically to Synthesizer transmitter module mode.

c) Compatibility with Futaba “non-standard languages”: switches automatically to HRS mode (in preparation).

d) Automatic detection and processing of “positive / negative shift” transmitter signals (as used by American transmitters).

3.3 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).

3.4 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.

3.5 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.

3.6 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.

4 Hardware characteristics and their limits

4.1 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 20ºC. For this reason it is not safe to use Ni-MH cells in Winter!

4.2 Conductor track width

We have made the tracks between the servo connector power supply pins relatively wide so that „any number“ of digital servos can be connected. If a twin power supply is used as described in Chapter 2.2 - this should be connected either centrally or left and right at the receiver - you do not need to worry about any conductor track becoming hot or burning through.

5 Intended applications

5.1 alpha-5:

A small receiver with „full range“ for all-purpose applications.

The compact dimensions, low weight, automatic gain control and good separation characteristics of the receiving section make this receiver also an excellent choice for **slow-fly models**, which are flown in a very confined space very close to several other transmitters.

It is also highly suitable for use in **park-fly models**, as they usually only require four or five receiver channels, and a short aerial can safely be used.

5.2 alpha 8:

A highly sensitive receiver with all-purpose characteristics suitable for every type of modelling application.

All types available with splash water protected PCB (types with “W”-ending).

6 Interference detection and monitor displays

The digital signal processing eliminates the usual warning of interference, which takes the form of unexpected movements in the model, and to compensate for this we have fitted a **reception quality indicator** (glitch counter) **LED**.

The receiver counts the invalid transmitter signals it picks up, and informs you of the number of errors by a pattern of flashing:

1* flash = 1 glitch (2 to the power of 0)
2* flashes = 2 ... 3 glitches (2 to power of 1)
3* flashes = 4 ... 7 glitches (2 to power of 2)
4* flashes = 8...15 glitches (2 to power of 3)
5* flashes = 16...31 glitches (2 to power of 4)
6* flashes = 32...63 glitches (2 to power of 5)
7* flashes = 64...127glitches(2 to power of 6)

The LED glows continuously if interference occurs more than 128 times.

We suggest that you experiment with various arrangements of your receiving system and power supplies in the model (receiver position, aerial position, receiver battery position, flight or drive battery position) and read off the glitch count after each test flight or test run. In this way you can establish the optimum installation of the components in your model by adopting the configuration which reduces the **glitch count to a minimum.**

The glitch counter is reset by switching off the receiver

7 Installing and connecting the receiver

7.1 Installing in the fuselage

We recommend hook-and-loop (Velcro) tape for fixing the receiver in the fuselage; packing it in foam rubber also works well.

Ensure that the reception quality indicator LED is visible.

alpha-4: we recommend that you apply a piece of tape over the crystal to ensure that it cannot slip out.

7.2 Aerial

Run the receiver aerial out of conductive fuselages (carbon) by the shortest possible route. The aerial must not be deployed close to cables, or parallel to steel wire or carbon fibre pushrods or linkages, or any other metallic components (e.g. helicopter chassis, or metal aerial supports).

If you have ”excess range” (e.g. in slowflyers and car models) it is permissible to shorten the aerial in increments to a minimum of 40 cm (the above stated LED should remain off after test flights).

The ideal way to deploy a short aerial is to let it trail freely underneath the model aircraft. Never run it horizontally, either along the fuselage or in the wing.

See chapter 2 for more details about receiver positioning and aerial deployment.

7.3 Connecting the servos e.t.c.

7.3.1 alpha-8:

Preparation: the exposed pins of the ***alpha-8*** are vulnerable, and there is a risk of short-circuit and bent contacts. For this reason you should isolate all superfluous contacts using old, redundant servo cables. Cut off the wires immediately behind the connector, and plug them into the vacant sockets.

The receiver’s operating voltage can be fed to it via any available channel cable socket (check correct polarity!).

The first 6 channels (Ch1...Ch6) should be connected with the signal wires in the servo cables facing the centre resp. to the top of the receiver.

In order to keep the ***alpha 8*** as small as possible, the signal for the **remaining two channels** (Ch7...Ch8) are mounted in an angle of 90° to the other channels, signal leads facing outwards.

7.3.2 alpha-5:

The four channels are connected in such a way that the signal wires in the servo cables face out.

Please remove servocables separately (one after another) otherwise the printed circuit board could slide out of the case.

Four channel sockets are available, and can be used, for example, for elevator, rudder, ailerons and BEC speed controller or receiver battery.

The receiver can be fed its operating voltage via any channel socket (hoever preverably on a channel with very low current draw as e.g. the throttle servo); just make sure that polarity is correct.

If you wish to use two separate aileron servos, they can be connected to the aileron channel using our Y-lead (***alpha-vkab***). An alternative arrangement is possible if the model has no rudder: you can program a mixer function in the transmitter (if your transmitter includes mixer facilities) so that the second aileron servo can be connected to the rudder channel; in this case no Y-lead is required.
Another alternative is to use the channel 5 connector (see below).

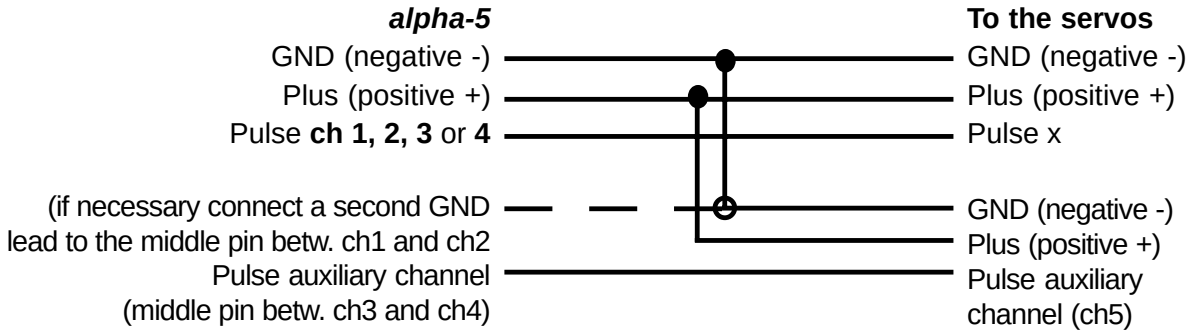
If you need to use a particular function which your transmitter sends on, say, channel 6, you must re-program your transmitter in such a way that all the functions you need are transmitted on the first four channels - or you use the possibility to cnfigure the channels of the ***alpha-5*** listed in the chapters 10 and 11.

7.3.5 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.



8 Accessories (cables and crystals)

8.1 alpha-vkab

Application: e.g. supply of 2 elevator servos or one servo and a board voltage display.

The receiver battery should - if all other channels are used - be connected preferably on the throttle channel (For safety reasons because of the additional contact resistance).

8.2 crystals

Normal crystal	**Mini crystal**
for alpha-8	**for alpha-5**
Order Term:	
RX-###-n	**RX-###-m**

= Channel number*

[*] Hinweis:
European channels could be listed on the Schulze price list with differnt channel numbers you usually know from your country.
For this reason please check/determine the correct order term (based on the frequency) on the Schulze homepage!

9 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.

10 Configuring the receiver <u>without</u> connection to a PC

10.1 alpha-8.xx:

The configuration cannot be altered without connection to the PC.

10.2 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, <u>5, 4</u>:

a) Disconnect the receiver from the power supply.
b) Fit the jumper between the signal outputs "2" and "3".
c) Re-connect the receiver to the power supply.
d) Watch the integral LED: it should flash <u>five</u> times at one-second intervals.
e) Disconnect the receiver from the power supply.
f) 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, <u>4, 5</u>:

a) Disconnect the receiver from the power supply.
b) Fit the jumper between the signal outputs "1" and "4".
c) Re-connect the receiver to the power supply.
d) Watch the integral LED: it should flash <u>four</u> times at one-second intervals.
e) Disconnect the receiver from the power supply.
f) 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 <u>not</u> 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.

11 Configuring the receiver <u>with</u> 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).

11.1 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***.

11.2 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.

alpha-8.__w

alpha-8.__s

alpha-8.__w

alpha-5.__

11.3 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.

11.4 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***.

11.5 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.

11.6 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).

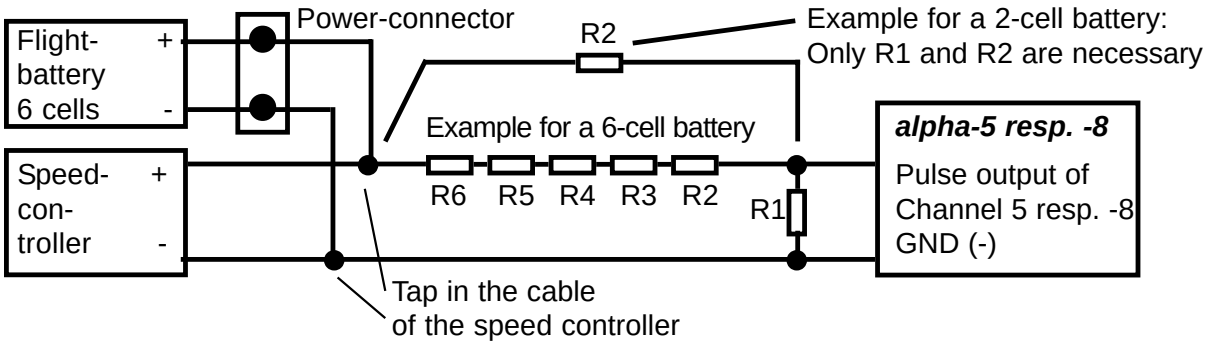
The Aux channel can measure voltages within the range 0 Volts to 3.3 Volts, referred to the receiving system's earth (ground). A broader range of measurement can be obtained by fitting a resistance divider in front of the AUX input.

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-Hydride 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.



12 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:

12.1 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.

12.2 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:

12.2.1 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.

12.2.2 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.

12.2.3 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.

13 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.

13.1 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.

13.2 alpha-8: carefully lift the self-adhesive label at **"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.

14 Legal matters

14.1 Warranty conditions

All **schulze** receivers are 100% tested by using a test circuit especially develloped for this use.

For optimum results we recommend that you only use genuine **schulze** crystals. We offer **no guarantee** that crystals of other makes will work properly. Our receivers usually 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.**

If your unit develops a problem, please return it to **schulze** or to the importer.

Include a description of the problem. Before returning the unit for repair, please test it „one more time“ carefully with different crystals. If we find that the receiveris operating correctly, whether it is under warranty or not, we will make a charge for our lost time.

Warranty claims are processed according to our current General Conditions of Business, which are enclosed in our price list or our web page.

The warranty does not cover consequent damage or damage due to incompetent usage, such as: damage caused by nechanical load, moisture, short circuits or reverse polarity at the channel connectors.

One further note:

If a problem arises with a schulze device, send it straight back to us or our authorized representative (see catalogue); don't attempt to repair it!

This allows us to repair it as quickly as possible, as we can detect warranty defects without any doubt and thus keep costs low. You can also be certain that we will fit genuine replacement parts which are a perfect match to your device. (Very few hobby shops are equipped to analyze and repair surface-mount printed circuit boards.)

We reserve the right to refuse repair to units which have been modified or „improved“ by unauthorized „experts“. You also have the comfort of a properly repaired unit with a renewed warranty. The warranty period of repaired devices is applicable only to the repair. This period is shorter than the warranty period of a new product (See general conditions of business).

14.2 Liability limits / compensation

We at Schulze Elektronik GmbH are unable to monitor methods of installation and operation, and have no control over how you fit, use and maintain the devices we produce. For this reason we accept no liability for loss, damage or costs which arise from the incorrect or incompetent use of our products, or are connected with that use in any way.

In so far as the law allows, our obligation in respect of compensation, regardless of the legal grounds, is limited to the invoice value of that quantity of goods which was immediately involved in the event which caused the damage. This does not apply if legally binding regulations oblige us to accept unlimited liability in a particular case, or if deliberate or gross negligence can be proved on our part.

14.3 CE certification

The products described in this manual are manufactured in accordance with all specific and mandatory European CE guidelines:

EMI 89/336/EEC, 91/263/EEC and 92/31/EEC.

The products have been tested according to the following norms:

EMI-emissions:	**EN 50 081-1:1992**
EMI-resistance:	**EN 50 082-1:1992 or EN 50 082-2:1995**

The design and construction of our products comply with the requirements for safe operation.

EMI emissions were tested under realistic conditions, i.e. using suitable motors close to the maximum allowed currents. The use of resistors instead of motors do not create maximum emission levels.

Further testing is carried out to ensure adequate EMI resistance against emissions from other apparatus. The RF signals used for these tests are similar to those produced by mobile telephones and RC transmitters.

We wish to point out again that our products are tested under realistic conditions for the most dangerous scenario: exposed to the field of a powerful transmitter, the motor must not start while you are working on the model.

Nevertheless: in the interests of safety always keep well clear of the propeller, just in case the motor should burst into life unexpectedly; hold on tight to the model!

15 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 ***alpha-8***	leightweight plastic 3,6 g (included in the table below)
Case ***alpha-4***	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**
α-8.35w	35-36 (red)	8	53*21,5*13,5	10,5	14	Aircraft	horizontal
α-8.35s	35-36 (red)	8	46*21,5*13,5	10,5	13	Aircraft	vertical
α-8.35wW	as listed above, PCB splash water protected for seaplanes						
α-8.35sW	as listed above, PCB splash water protected for seaplanes						
α-8.40w	40-41 (green)	8	53*21,5*13,5	10,5	14	Air,Boat,Car	horizontal
α-8.40s	40-41 (green)	8	46*21,5*13,5	10,5	13	Air,Boat,Car	vertical
α-8.40wW	as listed above, PCB splash water protected for boats						
α-8.40sW	as listed above, PCB splash water protected for boats						
α-5.35	35-36 (red)	5	37*20,5*9	9	9,5	small & leight-	horizontal
α-5.40	40-41 (green)	5	37*20,5*9	9	9,5	weight models	horizontal
α-5.35W	35-36 (red)	5	37*20,5*9	9	11	seaplanes	horizontal
α-5.40W	40-41 (green)	5	37*20,5*9	9	11	boats	horizontal