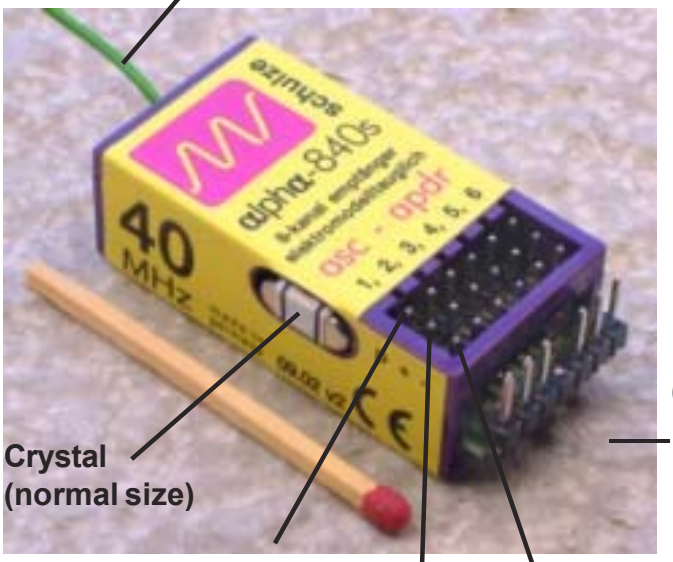
Aerial; red = 35 MHz, green = 40 MHz



Crystal (normal size)

Mini-crystal

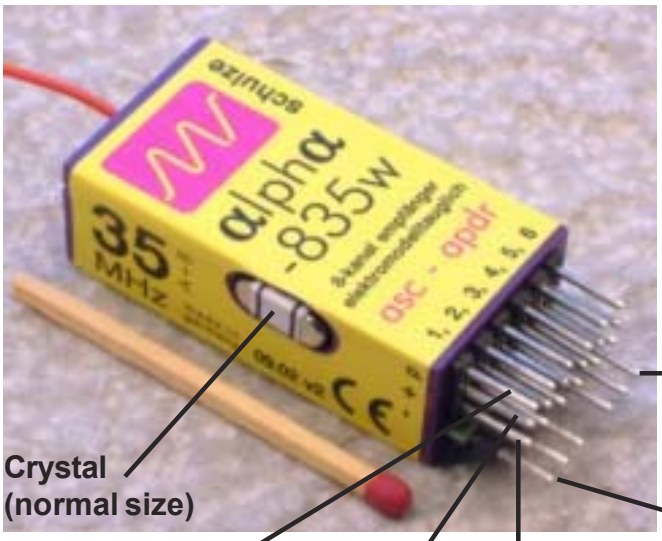
Reception quality LED (alpha 8: on the underside)

Manufact.	Pulse(Ch1..6)	4,8V(+)	Masse(-)
Graupner/JR	orange	red	brown
Futaba	white	red	black
Multiplex	yellow	red	black

Pulse Ch1 and Ch2
+ = 4.8V, - = GND

Pulse Ch4 and Ch3

The red resp. green Jumper is used as a guide rail for the servo connector



Crystal (normal size)

Pulse outputs

Ch 7
+
-
-
+
Ch 8

Pulse(Ch 1..6) 4.8V(+,POS) GND(-,NEG)

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 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.

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.

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.

Note:

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 Special features

The **asc** (automatic signal strength control - automatic regulation of received signal amplification) ensures optimum close-range and long-range reception. **The** receiver automatically reduces the gain of powerful received signals, thereby avoiding the risk of overloading the aerial input stage, which always has unwanted side-effects.

Reliable operation when adjacent channels are in use is a fundamental requirement as far as we are concerned. For this reason we employ **narrow-band filters** which provide safe operation using the standard 10 kHz channel spacing. **When** a receiver is operated close to its range limit it is particularly vulnerable to interference. These are the signs:**The servos start to jitter** under certain circumstances they may run against their mechanical stops and overload the receiver power supply. If the model is electric-powered, **the motor may burst into life** and make the interference even worse - which of us has not experienced that at launch or on the landing approach when the receiver aerial is poorly positioned?
A crash is simply inevitable.

At the development stage we also placed considerable importance on the **digital post-processing (apd, apdr)** applied to the received signal for this very reason.

Our techniques allow the receiver to detect interference, **suppress** it, and replace the invalid signal by previously received valid values (similar to PCM techniques). The signals passed to the servos always lies within normal limits, and the servos are usually able to process them without problem.

The servo jitter which occurs when the signal is weak is greatly reduced. Some conventional PPM receivers are so bad in this respect that we were obliged to program a suitable filter for our **future** heli speed controllers to avoid them responding with fluctuations in rotor head speed.

If interference persists, the receiver switches off the servo signals completely. Under certain circumstances the servos may then be moved back towards neutral by aerodynamic pressure.

Every time you switch on the system **the receiver counts the channel signals** in order to ensure that a receiver signal with the incorrect number of channels is not passed to the servos. **If** a PCM transmitter on the same RF channel is switched on, it will not cause the servos connected to an alpha receiver to jitter (that does not mean that you can use the channel twice).

That was a brief description of the advantages provided by **apd** technology. **apdr** technology goes one stage further: **It** can **generate (r = restoration)** either the actual transmitted signal (suppressing a glitch caused, say, by an electric motor) or a signal close to the original signal. This it does by **analysing the interference** contained in the received signal.

CAUTION: all this sophistication is no guarantee for problem-free flying.

If you fly close to the range limit, or even at close range if the aerial is poorly positioned, a problem may arise which the receiver automatically corrects, leaving you unaware that there ever was a problem. That is why we have also installed a **reception quality indicator LED.**

2 Ensuring safe, trouble-free operation

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

Watch for oversizes pulses from MPX-trans- mitters. 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 ca- bles 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 particu- lar 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 pushed into a metal holder (a very popular solution in RC cars!).

... in model aircraft: half of the receiver aeri- al's length should be routed along the fuse- lage, the other half should be allowed to trail freely (take care not to tread on it). Do not at- tach the end of the aerial to the fin!

... in helicopters where the receiver is locat- ed 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 sys- tem - 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 posi- tion (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 fea- ture 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 po- sition. Collapse the transmitter aerial. Let the assistand walk away with the model to a dis- tance of about 50-60 m (200'). Make sure that you still have full control of the system at this range.

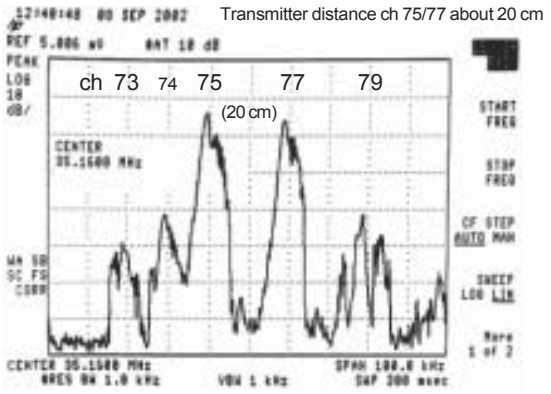
Be sure that other pilots do not stand less than 5 meters (16') to each other and that your transmitter with the collapsed antenna has the closest distance to the model. Other- wise it could be possible that the transmit- ters(!) produce a frequency mix on exactly your channel, which seems to reduce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

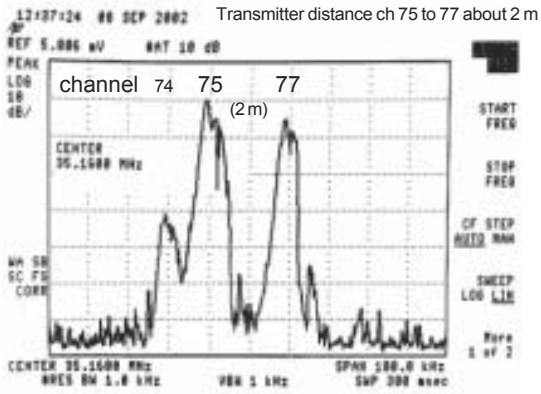
Example 1: Pilots are airborne with channel 63 and 64. If they are too close to each other the transmitters produces additional frequen- cies on the channels 62 and 65 with the same intensity as your transmitter with the col- lapsed antenna. Your range check is nega- tive, because your transmitter signal 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)**
Signal on channels 73 and 79 only by transmitter caused mixing products.
Control signal on channel 74 with collapsed antenna.





3 Intended applications

alpha-4:

A small receiver with „full range“.

The compact dimensions, low weight, automatic gain control and good separation characteristics of the receiving section make this receiver 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 receiver channels, and a short aerial can safely be used.

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).

4 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 opti- mum 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

5 Installing and connecting the receiver, auxiliary cable

5.1 Installing in the fuselage

As ceramic filters and crystals work by mechanical vibrations of the filter elements they can be **disturbed** by vibrations of the whole receiver.
Because of this we recommend hook-and-loop (Velcro) tape on vibration damping foam rubber for fixing the receiver in the fuselage; packing it in foam rubber also works well.
Ensure that the reception quality indicator LED is visible or easy to check.
alpha-4: we recommend that you apply a piece of tape over the crystal to ensure that it cannot slip out.

5.2 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.

5.3 Connecting the channels

5.3.4 alpha-4:

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 must 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.

If you need to use a particular function which your transmitter sends on, say, channel 5, you must re-program your transmitter in such a way that all the functions you need are transmitted on the first four channels.

5.3.8 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.

5.3.12 Hints:

However, 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)

If your receiver lacks a vacant socket for an airborne voltage indicator, you can use a Y-lead (alpha-vkab) to produce the necessary socket.

6 Legal matters

6.1 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).

6.2 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.

6.3 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!

7 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 (V1=2220 µs), pulse interval: 11...32 ms

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.**

Order-term	Freq. [MHz]	Channel count	Size [mm]	Current [mA]	Weight w/o crystal [g]	Application	Servo-connectors
-835w	35 (red)	8	52*21*13	8,5	13,5	Aircraft	horizontal
-835s	35 (red)	8	45*21*13	8,5	13	Aircraft	vertical
-835wW, -835sW	as listed above, PCB splash water protected					for seaplanes	
-840w	40 (green)	8	52*21*13	8,5	13,5	Air,Boat,Car	horizontal
-840s	40 (green)	8	45*21*13	8,5	13	Air,Boat,Car	vertical
-840wW, -840sW	as listed above, PCB splash water protected					for boats	
-435	35 (red)	4	36*19*7	6,5	9	small & leight-	horizontal
-440	40 (green)	4	36*19*7	6,5	9	weight models	horizontal
-435W	35 (red)	4	37*20*9	6,5	10	seaplanes	horizontal
-440W	40 (green)	4	37*20*9	6,5	10	boats	horizontal

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).

<- Power supply with double cross-sectional area

Crystals

Normal crystal **for alpha-8** | Mini crystal **for alpha-4**

Order term:
RX-###-n **RX-###-m**
= channel number