

Advantages of the FASST system (Futaba Advanced Spread Spectrum Technology):

- No crystals • No need to select spot frequencies
- Maximum protection from same-channel interference
- Best possible interference suppression
- Broad bandwidth for greater security
- High-speed frequency hopping
- High range > 2000 metres*



Real-Time Response

The response speed (between moving the transmitter stick and the servo's movement) of the FASST system is twice as fast as that of previous 2.4 GHz systems. The result is virtually equivalent to real-time control, i.e. an extremely direct feeling of being in command.



Every 7 / 8 ms the transmitter and receiver jump from channel to channel at the same rhythm. The brief period of occupying any one channel avoids all signal conflicts or interruptions, and at the same time interference is suppressed extremely effectively.



The aerial diversity system constantly checks the signal level of the two aerial inputs, and switches to the stronger signal lightning-fast and without perceptible delay.



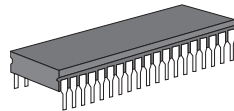
Easy Link – simple method of “binding”

To identify the equipment the transmitter broadcasts a code with more than 130 million possible combinations. This is stored in the receiver, thereby binding the receiver to that transmitter. The receiver now accepts signals from this one transmitter exclusively, regardless of the other transmitters which are logged onto the ISM band.



Customized IC Chip

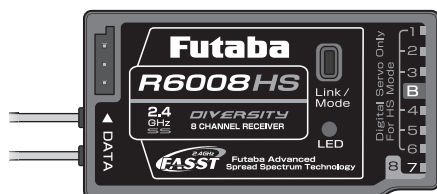
Customer-specific IC chips are employed for FASST technology; they have been developed by Futaba specifically for model radio control technology. This is the only means of ensuring the constant high standard of quality and reliability required.



FASST receivers constantly scan the input signal, and special software technology automatically corrects any data errors which may occur.



R 6008 HS 2.4 GHz FASST receiver No. F 1058



The R6008HS is a slim, lightweight, full-range 2.4 GHz receiver intended for models with narrow fuselages. The dual-aerial diversity system constantly checks the signal level at both aerial inputs, and switches lightning-fast to the stronger signal, without any interruption. The R6008 HS features a select switch for digital and analogue servos. Signals can be passed to digital servos connected to outputs 1 - 6 at a higher rate, resulting in even faster servo response. Compatible with TM-8, TM-10 and TM-14 2.4 GHz FASST RF modules.

Specification - R6008 HS 2.4 GHz receiver

Operating voltage:	4.8 - 6 V (4 - 5 NC / NiMH)
Current drain:	approx. 50 mA
Channel count:	8
Frequency channel spacing:	2048 kHz
Frequency band:	2.4 ... 2.4835 GHz
Alternatively:	2.4 ... 2.454 GHz
Frequency channels:	36 / 22
Transmission system:	FSK
Weight:	14 g
Dimensions:	47 x 25 x 14.3 mm
Temperature range:	-15° ... +55°
Aerial length:	approx. 13 cm
System range* :	
Ground - ground:	More than 2000 metres range (visual contact, receiver at 1.5 metres above ground)
Ground - air:	More than 3000 metres range (visual contact)

Receiver - binding

When the “Link/Mode” button is pressed, the receiver automatically stores the transmitter’s individual code number (130 million codes). This result of this “binding” process is that the receiver only responds to signals generated by the bound transmitter.

- Place the transmitter close to the receiver (approx. 1 m)
- Switch the transmitter on
- Switch the receiver power supply on
- Hold the Link/Mode button on the receiver pressed in for at least one second, and then release it again: this “binds” the receiver to the transmitter.
- If the binding process is successful, the LED on the receiver glows green.



This permanent assignment between transmitter and receiver provides a superb basis for suppression of interference signals. Suppression is even better than that of conventional systems, since a digital filter is used to allow through only those control signals which emanate from the receiver’s bound transmitter. The net result is extremely effective suppression of interference and signals from other transmitters.

Multiple receivers can be “bound” to the same module. If you subsequently wish to bind a receiver to a different module, simply press the Link/Mode button again after switching on.

RECEIVER LED STATUS INDICATOR

LED green	LED red	Function/Status
OFF	ON	Transmitter signal NOT received
ON	OFF	Transmitter signal received
Flashing	OFF	Transmitter signal received, but code number incorrect
Alternately flashing		Unrecoverable error

Switching from analogue to digital servos

The receiver is pre-programmed to “Normal” mode by default; this means that it is set up for use with normal analogue servos.

However, channels 1 to 6 can be set to generate faster output signals, and this results in an even faster response if digital servos are used. This is the procedure:

Setting Digital mode:

1. Switch the receiver off after completing the binding process.
2. Hold the Link/Mode button pressed in for about 2 to 3 seconds while you switch the receiver on; the red LED will now flash.
3. Release the Link/Mode button again: the monitor LED glows red and green.
4. Switch the receiver off to store the new value.

The method of switching from Digital to Analogue mode is the same. While you are changing the setting, the monitor LED flashes red and green to indicate Analogue mode when the button is held pressed in. The red LED glows when you release the button.

Note:

Digital mode is only available for channels 1 - 6! Caution: do not connect analogue servos to these channels if you have selected Digital mode, as the high pulse frequency may ruin the servos. Check each new setting on your receiver! Ensure that no FASST transmitters are switched on in the vicinity when you carry out the process.

TIPS FOR INSTALLING 2.4 GHZ FASST RECEIVERS

Over the years every RC user gathers his own experience in the installation and use of RC components. 2.4 GHz technology has ushered in a new epoch which brings enormous advantages. At the same time this new equipment is different in nature from previous technology, and we need to adopt appropriate measures when installing and operating a 2.4 GHz system.

One of the most common mistakes is to wrap the receiver in foam or fit it in a foam tube as we have always done with 35 MHz receivers, in order to protect the unit from vibration. This is not necessary with 2.4 GHz FASST receivers, as they do not contain ceramic filters, and are therefore not vulnerable to vibration in the same way.

This "well meant" measure is actually counter-productive, as 2.4 GHz receivers contain high-performance ICs with a fairly high current drain, and this results in heat generation. Wrapping the receiver in foam prevents waste heat being dissipated from the receiver.

We recommend that you install 2.4 GHz receivers using double-sided foam tape (or Velcro tape). If possible the tape mounting should not cover the full area of the case; it is better to fit tape "feet", so that air can circulate freely around and under the receiver. Installing the receiver vertically also enhances air circulation.

The temperature range for radio control system components is generally stated as -15°C ... +55°C: this is the typical range which is stated by manufacturers of electronic components. This temperature range applies to virtually all electronic apparatus used in our daily lives.

The same range (-15 ... +55°C) also applies to RC system receivers, has done for many years, and is equally applicable to the new generation of 2.4 GHz FASST receivers. For other 2.4 GHz systems this temperature range is significant because they employ ICs developed for WLAN applications; these are generally operated under normal conditions, and their temperature limits are therefore the same. Of course, the stated maximum is a theoretical 'safe' limit, and in practice these receivers can cope with considerably higher ambient temperatures (approx. 70 - 75°C). Nevertheless, manufacturing tolerances mean that the component manufacturers cannot guarantee higher values.

For these reasons we recommend that you handle your 2.4 GHz equipment with appropriate caution, and in particular observe the following points:

- The use of two LiPo cells without voltage reduction is not recommended.

- Voltage converters used with LiPo cells generate their own waste heat, and should not be positioned in the same compartment as the receiver, or too close to it.
- On hot, sunny days you should not leave models in the car, to avoid the model and electronics becoming too hot.
- Provide effective ventilation, or - even better - take the model out of the car, and park it in the shade of the vehicle.
- If your model is fitted with a clear canopy, or one painted a light colour, the sun shining through the canopy can heat up the fuselage and RC components. You can avoid this problem by removing the canopy to ensure good air circulation in the fuselage, or by covering the area with a light-coloured cloth.
- Cover dark-coloured models with a cloth, or park them in shade.
- Never leave slim / black CFRP / GRP fuselages containing a receiver in the car or in bright sunlight.
- Do not install the receiver close to a motor and / or exhaust system, as the radiated heat may cause the receiver to overheat.
- Silencers installed inside fuselages should be partitioned off using balsa panels or similar to avoid heat transfer and prevent excessive temperatures in the fuselage.
- Take measures to ensure that air can circulate through the fuselage.
- You may wish to cut ventilation openings in the canopy or fuselage.

Supplementary notes regarding additional RC components

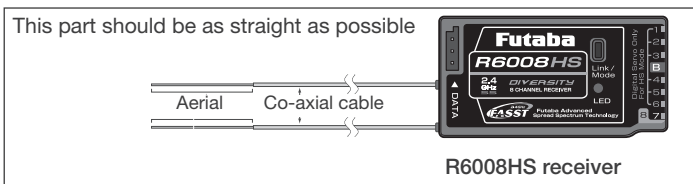
Although receivers are a special case, most other electronic components will also benefit from the measures suggested above.

- Speed controller heat-sinks which are already warm or hot are not so efficient at dissipating heat, and this may result in components overheating in use.
- At temperatures of about 45°C and above, LiPo batteries have a much worse energy yield (approx. 10 - 12%), which in turn will have an adverse effect on your model's performance.
- Servos also lose a proportion of their power when hot: the higher the temperature of the motor winding, the worse its efficiency. This means that the power of a servo may be reduced by up to 20% at temperatures of 55°C and above compared with cold conditions. This figure is quickly reached, as servo motors generate their own heat.

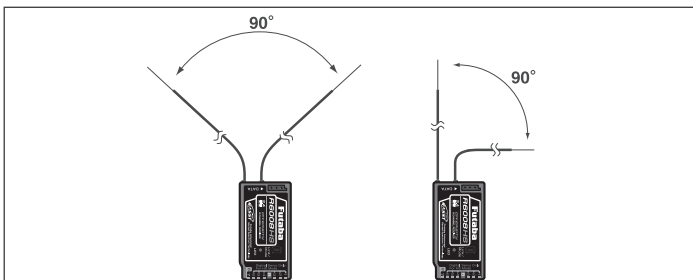
General information on the subject of 2.4 GHz RC systems

- In general terms the range of 2.4 GHz FASST systems is greater than that of 35 MHz equipment. Close to the ground the range is around 2000 metres, and in the air it is more than 3000 metres. The potential range reductions described in the following section, caused by unfavourable weather conditions and obstacles, have no adverse effect on the system's function; all they do is reduce the safety margin.
- Large obstacles between the transmitter and the receiver can have a damping or blocking effect on the signal.
- Close to the ground the transmitter signal is damped more severely than is the case with 35 MHz systems. On foggy days and / or when the ground is wet the range may be reduced at very low altitudes.
- If a model is close to the ground, and if an obstacle (person, vehicle, object etc.) moves between the transmitter and the receiver, then effective range may be significantly reduced.
- 2.4 GHz signals radiate from the transmitter virtually in a straight line, for which reason it is essential to maintain visual contact with the model at all times.
- The FASST R R607, R617, R608, R6008 and R6014 receivers feature a diversity system with dual aerials and corresponding input stages. This system constantly checks the signal level at both aerial inputs, and switches lightning-fast to the stronger signal, without any interruption.
- Arranging the two aerials at an angle of 90° to each other significantly improves the attitude-dependency which is usual with a single aerial, and this in turn provides a clear improvement in security of reception.

- The PRE-VISION software constantly scans the input signal, and carries out error-correction as and when necessary. To obtain optimum reception results, please note the following points regarding aerial deployment:
- The two aerials should be deployed in a straight line.



- The angle between the two aerials should be approximately 90°.



- Large models often contain quite large metal parts which may have a damping effect on RF reception; in such cases the aerials should be positioned to left and right of the offending object.
- The aerials should not be deployed parallel with each other, and should always be positioned at least 1.5 to 2 cm away from the following items:
- Anything made of metal or carbon, electrical cables, control 'snakes', control cables, carbon fibre pushrods, carbon roving reinforcements, etc.;
- High-current speed controller cables and motor leads;
- Sparkplugs, glowplugs, glowplug heating circuits;
- Locations liable to static charge build-up, e.g. toothed belts, turbines etc.
- Where the fuselage includes materials with a shielding effect (carbon, metal, etc.), route the aerials out of the fuselage by the shortest possible route.
- The aerial ends should never be attached to electrically conductive materials (metal, carbon) either inside or outside the model.
- This applies not only to the co-ax cable but also to the end part of the aerials.
- Avoid bending the co-axial cables through tight radii, and do not kink the leads.
- Protect the receiver from damp at all times.

Notes on installing 2.4 GHz FASST receivers:

- Wherever possible the receiver should be powered by batteries consisting of low-impedance NC or NiMH cells.
- Pulsed BEC systems used as receiver power supplies must be adequately specified; if the voltage under load falls below 3.8 Volts, then the receiver will carry out a reset and restart, which equates to a period of signal loss lasting about two or three seconds. This can be prevented by using so-called RX capacitors at the receiver, which bridge brief voltage collapses (RX capacitor, 1800 µF, No. F 1621 or 22.000 µF, No. F 1622).
- FASST 2.4 GHz receivers are relatively immune to 'electro-smog' (such as metal-to-metal noise, stray RF signals, static charge effects, etc.) due to their high intermediate frequency of 800 MHz. At frequencies of about 300 - 400 MHz and higher the amplitude of these effects is quite small. Certain supplementary electronic devices are known to be powerful sources of interference, and under unfavourable circumstances it may be necessary to install a suppressor filter, No. F 1413, in order to keep such interference from the receiver. A range check will show up whether this type of filter is actually required or not.

To prevent the build-up of powerful static charges certain measures are required at the model.

Helicopters:

- Use an earthing strap to connect the tail boom to the chassis. Toothed-belt tail rotor drive systems may require a "copper brush" to dissipate electrical charges from the toothed belt. It may also be necessary to connect the toothed-belt pulleys electrically to the chassis.
- In electric-powered model helicopters it is generally necessary to connect the tail boom to the motor case.
- If the model is fitted with CFRP / GRP blades and a carbon fibre tail boom, massive static charges can be generated at high rotational speeds when air humidity is low. To avoid this an electrically conductive connection should be present between the tail rotor gearbox and the main rotor shaft. The use of anti-static sprays (e.g. Kontakt Chemie) has also proved effective.

Turbines:

- Connect an earthing strap to the turbine shielding plate to prevent the build-up of static charges.
- The high airspeeds of fast GRP model jets can result in high static charges (around 40,000 Volts), especially in conditions of low humidity. If this produces a problem, all the model's GRP components with a surface area larger than about 10 cm² should be interconnected using an electrically conductive material.
- Turbine connections which are routed out of the fuselage (fuel tank connections, etc.) should also be connected to each other electrically in order to avoid static charge problems. Static charges affecting the refuelling hose can even have the effect of operating shut-off valves.
- The tyres of the aircraft's undercarriage can also provoke static charge effects, and should therefore be fitted with copper brushes.

Range-checking:

- We recommend that a range check should be carried out every time before you fly a new model, or fly a model fitted with a new receiver. Note that the model should not stand on the ground for the check: it should be raised above the ground by about 1 to 1.5 m. Use a plastic or wooden table, box, carton etc. as a support - never a metal object (camping table, etc.). No electrically conductive objects (fences, cars, etc.) should be in the vicinity, and your assistant should not stand too close to the model.
- Start by switching the system on, but leave the motor or engine switched off. Walk slowly away from the model, and operate one control function slowly but continuously.
- While you increase the range, carefully watch the control function on the model, and observe whether it follows the stick movement accurately, or occasionally stops or wavers. You may find it easier to ask a friend to watch the control function from a certain distance. Turn the transmitter to left and right as you increase the distance from the model, in order to simulate different aerial positions relative to the model.
- In Power-Down mode (range-check mode) you should achieve a range of about 50 m. In most cases the ground-range will be about 80 to 120 m, which is a very good result. If the value is only about 40 m or less, then you should certainly not fly the model: seek out the cause of the problem and eliminate it before flying.
- If this initial range-check is successful, repeat the whole procedure with the motor running (caution: secure the model well beforehand). The range now achieved should be the same or only slightly less (approx. 20% reduction is acceptable). If the ground-range is substantially reduced, then the power system is causing interference to the receiver. Running through all the measures listed above should enable you to cure the problem.

OPERATING NOTES

All robbe-Futaba receivers continue to work at full range down to a power supply voltage of 3 V. The advantage of this is that the receiving system will generally continue to work normally even if one battery cell should fail (short-circuit), since robbe-Futaba servos still function down to 3.6 V; they just work slightly more slowly and with reduced power. This is very important in Winter when ambient temperatures are low, as it avoids problems caused by brief voltage collapses.

However, there is a disadvantage: under certain circumstances the user may not even notice the failure of the defective battery cell. For this reason it is important to check the receiver battery from time to time.

We recommend the use of the robbe battery monitor, No. 8409, which employs a row of LEDs to indicate the actual receiver battery voltage.

POWER-ON SEQUENCE

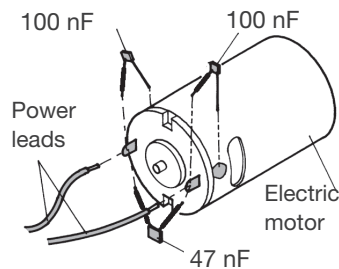
Always switch the transmitter on first, followed by the receiver; use the reverse order when switching off. When you switch the receiver on, the servos will run to their neutral position. It is advisable to check each function in turn by operating the transmitter controls. At the same time ensure that the control surfaces move in the correct "sense" (direction relative to stick movement). If a servo moves in the wrong direction, use the transmitter's servo reverse facility to correct it.

METAL-TO-METAL NOISE

For reliable operation it is important to prevent metal-to-metal 'noise'. This can occur when metallic parts such as control surface pushrods rub against each other intermittently in response to vibration. For this reason the carburettor linkage in particular should always terminate in a plastic clevis where it connects to the metal throttle arm. Do not allow a non-insulated metal-to-metal connection at the throttle arm.

ELECTRIC MOTORS WITH CARBON BRUSHES

All conventional electric motors must be suppressed, otherwise the sparks which are generated between the armature and the carbon brushes when the motor is running will cause interference, and have a serious effect on the radio control system. We recommend the use of robbe suppressor filters, No. 8306 or 8307, or a set of suppressor capacitors, No. 4008. Each motor must be suppressed individually, as shown in the drawing.



ELECTRONIC IGNITION UNITS

Ignition units for petrol engines are also powerful sources of interference which can have a negative influence on the working of the radio control system. Always provide a separate battery to power electrical ignition systems. Use only effectively suppressed spark-plugs and plug caps, and shielded ignition cables. Install the receiving system components well away from any parts of the engine's ignition system.

Post Office Regulations

The R&TTE (Radio Equipment & Telecommunications Terminal Equipment) Directive is the European regulation which applies to radio systems and telecommunications apparatus, and is applicable to all such equipment which has general conformity approval in the EC. One section of the R&TTE Directive regulates the setting up and operation of radio systems in the European Community.

An important change compared with earlier regulations is the abolition of approval procedures. The manufacturer or importer must submit the radio system to a conformity assessment procedure before marketing the equipment, and is obliged to notify the appropriate authority (register) when the process is completed.

Conformity declaration

robbe Modellsport GmbH & Co. KG hereby declares that this product satisfies the fundamental requirements and other relevant regulations contained in directive 1999/5/EG.

The original Conformity Declaration can be viewed on the Internet under www.robbe.com: click on the logo button marked "Conform" which is included in each device description.

Guarantee

As you would expect, all our products are guaranteed for the full statutory period of 24 months. If you wish to make a valid claim under guarantee, please contact your dealer, who is responsible for the guarantee and the processing of any guarantee claim.

During the guarantee period any material defects or faults in operation or manufacture will be corrected by us at no cost to you. All other claims, e.g. consequent damage, are excluded from the guarantee.

The system must be returned to us carriage-paid; we will pay the cost of transport back to you. We will not accept shipments sent C.O.D. We accept no liability for damage in transit or loss of your shipment; we recommend that you take out suitable insurance to cover this.

Send your equipment to the robbe Service Centre for the country in which you live.

To process your guarantee claims the following conditions must be fulfilled:

- The purchase receipt must be included with your shipment.
- The units must have been operated in accordance with the operating instructions.
- Recommended batteries and genuine robbe accessories must have been used exclusively.
- Damage due to damp, tampering, reversed polarity, overloading and mechanical damage are not covered.
- Please be sure to include a succinct description of the problem to help us locate the fault or defect.

Summary of 2.4 GHz transmitter modules and receivers for robbe-Futaba systems

Transmitter	Module	Receiver							
		R6004 FF	R 606 FS	R 607 FS	R 617 FS	R 608 FS	R 6008 HS	R 6014 FS	R 6014 HS
T6EX (FF-6) 2,4G	-	ok	ok	ok	ok	-	-	-	-
T7C (FF-7) 2,4G	-	ok	ok	ok	ok	-	-	-	-
T7U, T8U, T9C, T9Z, FC-18, FC-28	TM7 2,4G	ok	-	ok	ok	-	-	-	-
T7U, T8U, T9C, T9Z, FC-18, FC-28	TM8 2,4 G	ok	-	ok	ok	ok	ok	ok	ok
Transmitter T10C	TM10 2,4G	ok	ok	ok	ok	ok	ok	ok	ok
T12Z, T12FG, T14MZ, FX-30, FX-40	TM14 2,4G	ok	ok	ok	ok	ok	ok	ok	ok



When electrical and electronic equipment reaches the end of its useful life, you must dispose of it separately from the general household waste. That is the meaning of the symbol printed alongside.

This symbol means that you must dispose of electrical or electronic apparatus separately from the ordinary household refuse when it reaches the end of its useful life. Take exhausted items to your local specialist waste collection point or recycling centre. This applies to all countries of the European Union, and to other European countries with a separate waste collection system.

SERVICE CENTRE ADDRESSES

Country	Company	Street	Town	Telephone	Fax	E-Mail
Andorra	Sorteney	Santa Anna, 13	AND-00130 Les escalades-Princip. D'Andorre	00376-862 865	00376-825 476	sorteney@sorteney.com
Denmark	Nordic Hobby A/S	Bogensevej 13	DK-8940 Randers SV	0045-86-43 61 00	0045-86-43 77 44	hobby@nordichobby.com
Germany	robbe-Service	Metzloser Str. 36	D-36355 Grebenhain	0049-6644-87-777	0049-6644-87-779	hotline@robbe.com
England	robbe-Schlüter UK	LE10-UB	GB-LE10 3DS Leicestershire	0044-1455-637151	0044-1455-635151	keith@robbeuk.co.uk
France	S.A.V Messe	6, Rue Usson du Poitou, BP 12	F-57730 Folschviller	0033 3 87 94 62 58	0033-3-87 94 62 58	sav-robbe@wanadoo.fr
Greece	TAG Models Hellas	18,Vriullon Str.	GR-14341 New Philadelfia/Athen	0030-2-102584380	0030-2-102533533	info@tagmodels.gr
Italy	MC-Electronic	Via del Progresso, 25	I-36010 Cavazzale di Monticello C.Otto (VI)	0039 0444 945992	0039 0444 945991	mcelec@libero.it
Netherl. / Belgium	Jan van Mouwerik	Slot de Houvelaan 30	NL-3155 Maasland	0031-10-59 13 594	0031-10-59 13 594	van_Mouwerik@versatel.nl
Norway	Norwegian Modellers	Box 2140	N-3103 Toensberg	0047-333 78 000	0047-333 78 001	per@modellers.com
Austria	robbe-Service	Puchgasse 1	A-1220 Wien	0043-1259-66-52	0043-1258-11-79	office@robbe.at
Sweden	Minicars Hobby A.B.	Bergsbrunnagatan 18	S-75323 Uppsala	0046-186 06 571	0046-186 06 579	info@minicars.se
Switzerland	Spahr Elektronik	Gotthelfstr. 12	CH-2543 Lengau	0041-32-652 23 68	0041-32 653 73 64	spahrelektronik@bluewin.ch
Slovak Rep.	Ivo Marhoun	Horova 9	CZ-35201 AS	00420 351 120 162		ivm2000@seznam.cz
Spain	robbe-Service	Metzloser Str. 36	D-36355 Grebenhain	0049-6644-87-777	0049-6644-87-779	hotline@robbe.com
Czech Rep.	Ivo Marhoun	Horova 9	CZ-35201 AS	00420 351 120 162		ivm2000@seznam.cz

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