robbe
Futaba

INSTRUCTION MANUAL
NOTICE D'UTILISATION

Illustration shows expanded version of the transmitter,
fitted with optional accessories.
L'illustration présente l'émetteur pourvu d'extensions et équipé de divers accessoires.

FX-18

FM 35 MHz NC	No. F 4090	FM 35 MHz NiMH	No. F 4095
FM 40 MHz NC	No. F 4091	FM 40 MHz NiMH	No. F 4096
FM 41 MHz NC	No. F 4092	FM 41 MHz NiMH	No. F 4097

Contents

Safety notes: please observe at all times.

Be sure to read right through these instructions before you use the system for the first time. This applies in particular to the safety notes. If you are new to radio-controlled model aircraft, boats or cars, we recommend that you ask an experienced modeller for help.

This radio control system is designed and approved exclusively for the operation of radio-controlled models. robbe Modellsport accepts no liability of any kind if the equipment is used for any other purpose.

Safety notes
Radio-controlled models are not toys or playthings in the usual meaning of the term, and they should only be operated by young people under 14 years if an experienced adult is available to supervise them. Building and operating these models requires technical expertise, manual skills, a careful attitude and safety-conscious behaviour. Errors, negligence and omissions in building or flying these models can result in serious personal injury and damage to property.

The manufacturer and vendor of the equipment have no means of checking that the models are built and operated correctly, and for this reason we can do no more than bring these hazards expressly to your attention. We deny all further liability. Technical faults, whether electrical or mechanical, can cause electric motors to burst into life unexpectedly, causing other parts to come loose and fly around at high speed. Switching on the receiving system when the transmitter is not active can also have the same effect. In either case there is a serious risk of injury. Propellers, helicopter rotors and any other rotating object which is driven by a motor represent a constant hazard and a potential source of injury.

Avoid touching such parts at all costs. It is sobering to think that a propeller revolving at high speed could cut off your finger.

Whenever an electric motor is connected to a drive battery, never stand in or close to the primary danger area of the propeller or other rotating parts. Take care to keep all other objects from making contact with revolving parts. Protect your radio control system from dust, dirt and damp. Do not subject your equipment to excessive heat, cold or vibration.

Radio control systems should only be used in "normal" conditions, i.e. within a temperature range of -15°C to +55°C. Use recommended battery chargers only, and do not charge your batteries for longer than the stated periods. Read and observe the information supplied by the battery manufacturer. Overcharging or incorrect charging methods can cause batteries to explode. Maintain correct polarity at all times.

Avoid subjecting this equipment to undue shock or pressure. Check your system regularly for damage to cases and wiring. If a unit is damaged in a crash, or gets wet, it should not be used again even after you have dried it out thoroughly. The only safe course of action is to replace damaged equipment, or at least have it checked by a robbe Service Centre. Faults caused by damp or crash-induced shock may not be obvious to the layman, but after a short period of further use they may cause terminal failure. Please use only the components and accessories which we expressly recommend.

Installing the option modules requires the use of tools. Please take particular care when using them, to avoid injury. Always use genuine robbe-Futaba connectors and original robbe-Futaba plug-in crystals.

It is not permissible to make modifications of any kind to the system components.

Routine pre-flight checks
If there are several modellers at your site, ensure that yours is the only transmitter on "your" frequency before you switch on the transmitter.

- Always extend the transmitter aerial fully before operating your model, and check that it is firmly screwed into its socket.
- Ensure that the throttle stick is at stop / idle before you switch on the receiver.
- Always switch on the transmitter first, then the receiver.
- Always switch off the receiver first, then the transmitter.
- Carry out a range check before the flight or run.
- Have you selected the correct model memory?
- Check all the working systems. Ensure that the control surfaces respond to the stick commands in the correct "sense" (right stick = right rudder etc.), and that the travels are as recommended.
- Are all the mixer functions and switches set correctly?
- Are the batteries sufficiently charged?
- If you are not sure of any point - don't fly!

Operating the model
- Never fly above spectators or other pilots.
- Do not fly in any way which could endanger humans or animals.
- Never fly close to high-tension overhead cables or residential areas.
- Don't operate your model in the vicinity of canals, locks or other public shipping routes.
- You must not operate your model from public roads, motorways, paths, squares etc.

Never operate your equipment in stormy weather.

The transmitter aerial must always be extended fully when you are actually controlling a model. Don't "point" the transmitter aerial straight at the model when flying. The signal generated by the transmitter is at its weakest in an imaginary line extending straight from the aerial. It is always best if the long side of the aerial points towards the model.

If several radio control systems are in use at the same time on adjacent channels, the operators or pilots should always stand together in a loose group. Pilots who insist on standing away from the group endanger their own model as well as those of other pilots.

Insurance
Ground-based models and gliders (unpowered model aircraft) are usually covered by standard personal third-party insurance policies. To fly powered model aircraft you will need to extend the cover of your existing policy, or take out a specific policy. Check your insurance policy and take out a new one if necessary.

Liability exclusion
robbe Modellsport are not in a position to influence the way you install, operate and maintain the radio control system components, and are not able to ensure that you follow the **operating instructions.**

For this reason we are obliged to deny all liability for loss, damage or costs which are incurred due to the incompetent or incorrect use and operation of our products, or which are connected with such operation in any way.

Unless otherwise prescribed by law, the obligation of the company to pay compensation is limited to the invoice value of the robbe products which were immediately and directly involved in the event which caused the damage.

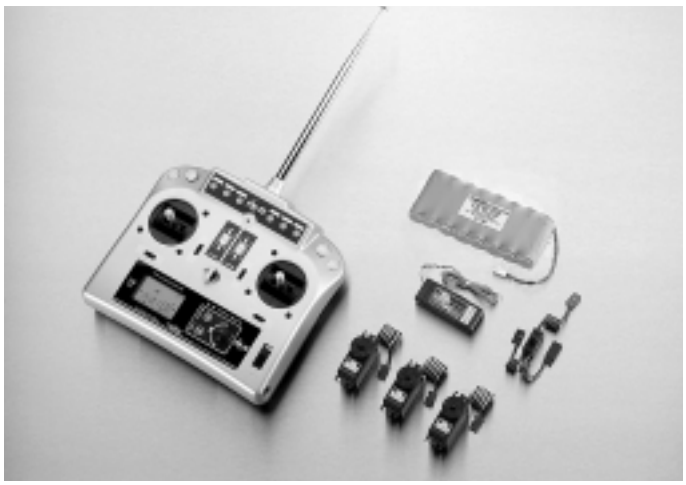
This does not apply if robbe is found to be subject to unlimited liability according to binding legal regulation on account of deliberate or gross negligence.

1. Set contents

FX-18 NC
1 FX-18 transmitter, with 8 RSZ 750 mAh NC transmitter battery
1 R-147F receiver
3 S-3001 servos, with accessory pack
1 Switch harness with charge socket
1 Pair of crystals

Order Numbers

No. F 4090	FX-18 FM 35 MHz 4/7/3 NC
No. F 4091	FX-18 FM 40 MHz 4/7/3 NC
No. F 4092	FX-18 FM 41 MHz 4/7/3 NC (export)



FX-18 NiMH
1 FX-18 transmitter, with 8 NiMH 1400 mAh transmitter battery
1 R-147F receiver
3 S-3001 servos, with accessory pack
1 Switch harness with charge socket
1 Pair of crystals

Order Numbers

No. F 4095	FX-18 FM 35 MHz 4/7/3 NiMH
No. F 4096	FX-18 FM 40 MHz 4/7/3 NiMH
No. F 4097	FX-18 FM 41 MHz 4/7/3 NiMH (export)

Foreword
We are delighted that you have decided to purchase the robbe-Futaba FX-18 radio control system. This equipment is particularly easy to operate and includes many forward-looking features, setting new standards in the area of high-performance computer radio control systems.

Operating the FX-18 computer RC system is not difficult, and a range of convenient mixer functions can be activated simply by pressing a button. The program structure has been carefully designed and structured to ensure that you quickly become familiar with the transmitter's wide-ranging facilities. These instructions are intended to help you achieve this aim with minimum effort.

Please read right through these instructions conscientiously before using the equipment for the first time.

2. General description

2.1 Transmitter

The FX-18 transmitter is a sophisticated unit which covers virtually all the requirements which are made on a modern radio control transmitter. The FX-18 is a high-performance PCM/FM computer system, designed for beginners and advanced modellers alike, and is equally suitable for use with model aircraft, boats, cars and helicopters. The transmitter case is of ergonomically refined design and modern appearance, and can be used equally well hand-held or in a transmitter tray.

The transmitter's specially moulded side panels fit the hands snugly. All the controls are arranged in easily reached positions, where they can be operated without having to take your hands off the sticks. Linear sliders can be mounted on the rear panel as well as the front face, where they can be operated comfortably with the index fingers.

A unique feature of this transmitter is the wide range of expansion options which it can accept, making the unit able to cope with all modelling applications, i.e. complex boats and cars as well as model aircraft, boats and cars. It is an ideal choice for multi-function model trucks and boats.

The FX-18 transmitter is equipped with digital trims for all stick channels, which eliminate the tiresome task of re-adjusting the trims when you switch to a new model memory. The stick units are precision-made high-quality assemblies, with variable stick length and centring spring tension.

The transmitter features an internal PC interface for direct connection to a personal computer, enabling the user to archive model data or print out the information.

In contrast to most conventional hand-held transmitters, the FX-18 is designed to accept a range of auxiliary switches to suit the user's individual needs. The system provides a wealth of functions and expansion options which make it unique in its class. Whether you require multi-channels for auxiliary working systems or a flight mode switch for the helicopter program - everything you need is available.

Several option wells are provided in which up to ten switches can be installed in easily reached positions. Special stick switches are also available for installation in the stick units themselves. Up to two pairs of mix trimmers can also be fitted. These comprehensive expansion options give you the means to equip the transmitter in such a way that all your personal requirements are met in full.

In its standard form the transmitter can be used both as trainer and pupil transmitter in a Trainer ("buddy box") setup, and a DSC facility is also provided.

A comprehensive range of accessories is available, including transmitter tray, shell handles, various aerials and neckstraps, giving you the opportunity to customise the transmitter just as you wish. The standard sets are also available with two different types of battery for extra versatility.

In addition to its comprehensive hardware facilities, the software of the FX-18 includes features which go well beyond the standard for this class of equipment. The programming is based on flight modes, making it even easier to set up the mixer functions. The user-friendly software provides many new functions and caters for all types of model, while the 3-D hotkey makes navigation and setup straightforward and fast.

For the sake of clarity some options feature sub-menus; this applies in particular to the Parameter menu, in which all the basic adjustments and settings are carried out. For this reason these operating instructions deal with this section of the software first (see Section 7.1).

The transmitter can directly store and manage data for up to 12 models, but if CAMPac modules are employed there is really no limit; a single module can store the data for up to 49 models. The software is present in three languages as standard, so you can carry out the essential dialogue with the system in German, English or French. The overall structure of the software is based on the rotation principle, i.e. the individual menus are arranged in a continuous loop, one after the other, and can be selected easily and conveniently using the 3-D hotkey.

2.2 R147F receiver

This ultra-compact, lightweight FM receiver with PPM modulation is manufactured using the latest SMT micro-technology, and yet offers full effective range. Its slim case design, with the servo sockets in the practical position on the end of the case, makes it an excellent choice for use in mini- and small models generally, and even in park-fly models and HLG gliders.

The active front end of this receiver provides outstanding narrow-band characteristics, high adjacent channel separation and very good interference suppression. A regulatory stage including automatic gain control (AGC) ensures optimum reception at close range and long range alike.

2.3 S 3001 servo

This ballraced servo is of standard case size. It is a high-quality, high-performance unit suitable for use in all areas of modelling,

The special high-quality potentiometer features a 6-finger wiper, and is housed in a sealed enclosure. The pot is operated by an 'Indirect Drive' linkage which provides effective protection from vibration. The ballrace and a special bronze bearing ensure that the servo has minimum slop and a long effective life.

3. Specification

3.1 FX-18 transmitter

No. of channels:	4
Optional channel expansion:	4 additional
Frequency bands:	35/40/41 MHz
Spot frequencies:	20 (+10), 22, 20
Transmission system:	PPM (FM) / PCM
Channel spacing:	10 kHz
Power supply:	9.6 V battery
Current drain:	40/250 mA (excl./incl. RF section)
Dimensions:	205 x 170 x 52 mm
Weight (incl. battery):	approx. 650 g

3.2 R147F receiver

No. of channels:	7
Frequency bands:	35/40/41 MHz
Intermediate frequency:	455 kHz
Transmission system:	PPM (FM)
Channel spacing:	10 kHz
Aerial length:	100 cm
Operating voltage:	4.8 - 6 V (4-5 cells NC/NiMH)

3.3 S 3001 servo

Torque:	30 Ncm
Transit speed:	0.165s/45°
Nominal voltage:	6.0 V
Operating voltage:	4.8 - 6 V
Dimensions:	40.4 x 19.8 x 36 mm
Weight:	45.1 g

4. FX-18 transmitter

4.1 External transmitter features

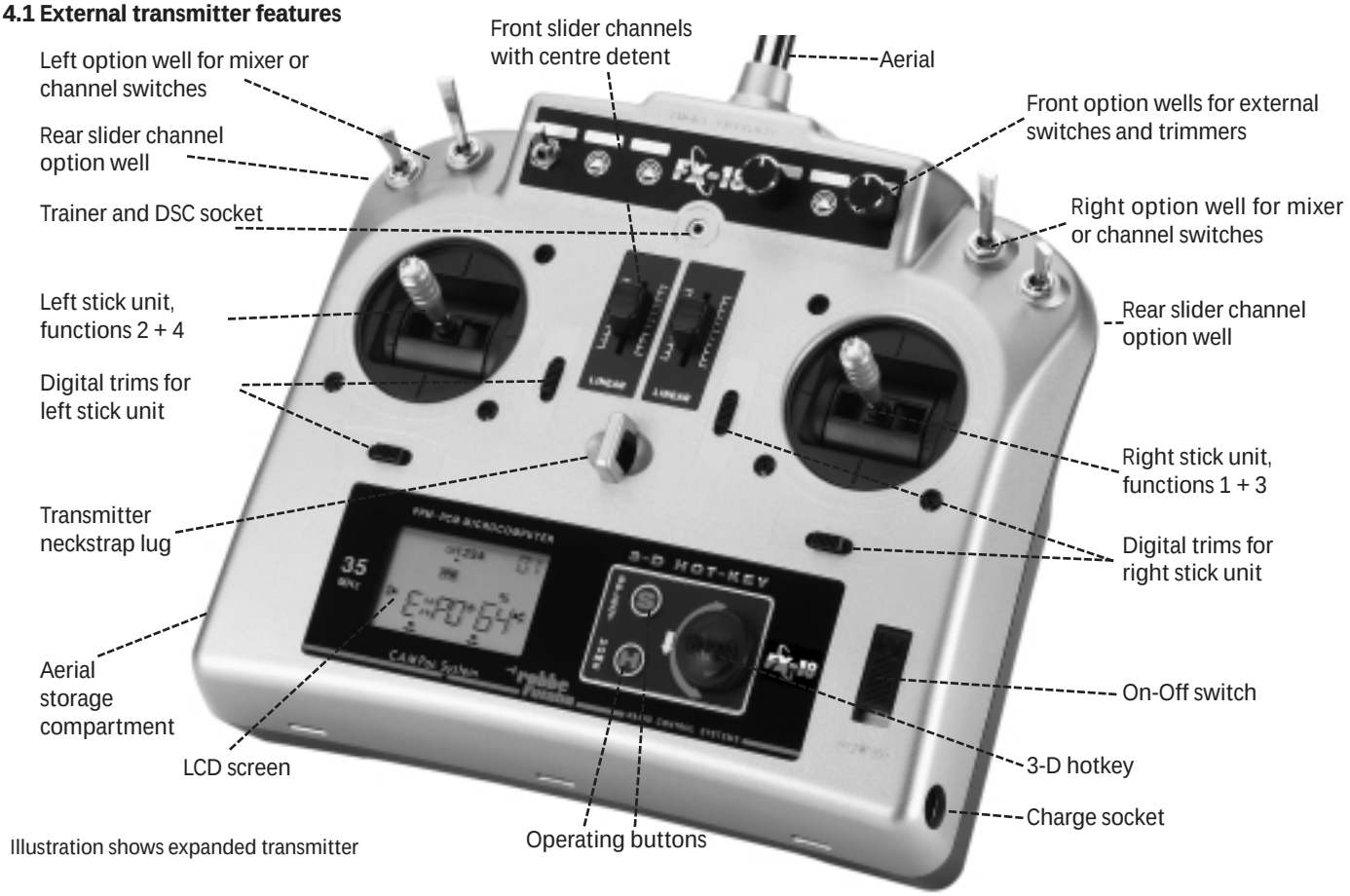


Illustration shows expanded transmitter

4.2 Removing the back panel

The back panel is secured by means of three lugs at the bottom and two rotating latches at the top.

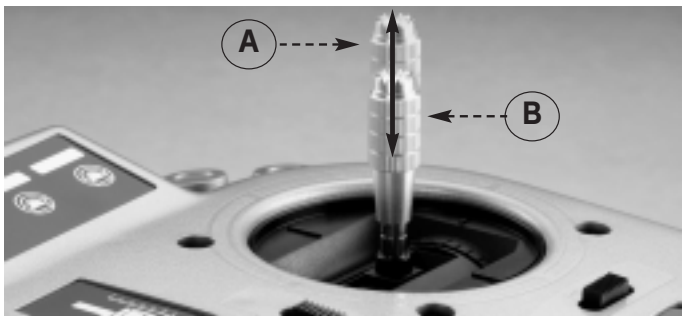
Opening the back panel
- Using a coin, rotate both latches inwards through 45° in the direction of the aerial.
- Fold the top part of the back panel down until it is almost at right-angles to the case. **Take care if there are linear sliders installed in the back panel - don't pull on the cables.**
- Lift the back panel up and off.

Closing the back panel
- Hold the back panel almost at right-angles to the case and engage the lugs at the bottom.
- Arrange the cables from the linear sliders and mixer switches etc. neatly between the circuit board and the aerial base. Take care that there are no wires between the circuit board and the back panel, nor close to the latches.
- Rotate the latches outwards until the coin slots are vertical.

4.3 Stick adjustments

Adjusting the stick length

The sticks are infinitely variable in length, and can easily be adjusted to suit the pilot's preference.



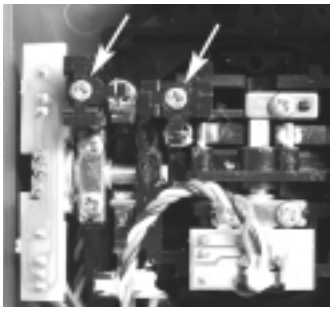
- **Hold part A firmly and unscrew part B,**
- **Set the stick top to your preferred length,**
- **Lock part A against part B again.**

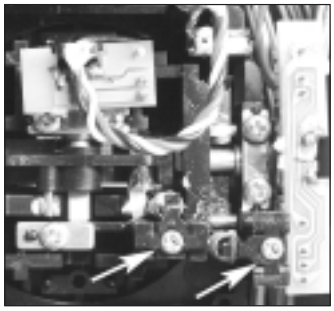
The short stick tops fitted as standard are ideal for pilots who prefer to use their transmitter hand-held. If you wish to use the transmitter in a tray, long stick tops can be used; they are available as optional accessories.

Spring tension

The tension of the centring springs on both stick units is infinitely variable, and can be adjusted to suit the individual pilot's preference.

The first step is to remove the back panel from the transmitter. The spring tension for each stick function can now be adjusted using a small screwdriver.



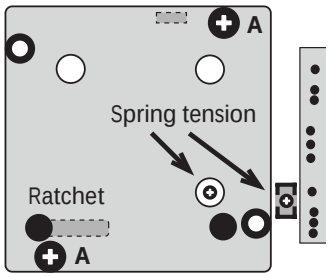


- Rotate the screw clockwise -> higher spring tension
- Rotate the screw anti-clockwise -> lower spring tension

The white arrows in the illustration indicate the adjustment screws; the screws on the inside adjust the horizontal stick functions.

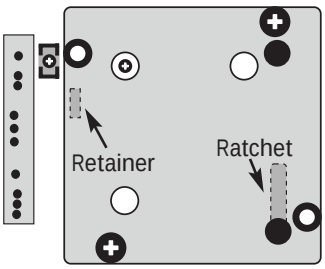
Throttle ratchet function

The transmitter is supplied as standard with four self-neutralising stick functions. The ratchet plate is fitted in such a way that the ratchet has no effect. The illustration also shows how the spring tension adjustor screws are accessed when the ratchet plate is fitted.

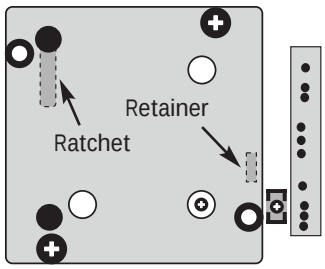


One of the two vertical control planes can be converted to ratchet action to cope with functions for which a self-neutralising action is not required. In this case the stick stays at any intermediate position in the fore-and-aft plane, instead of returning automatically to the neutral position. The ratchet is generally used to control the throttle of a glowplug motor and similar functions.

If you wish to engage the ratchet spring, the ratchet plate must be mounted on the corresponding stick unit as shown in the illustrations below.



Throttle right



Throttle left

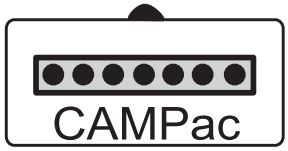
- First undo the two screws (**A**) and remove the ratchet plate.
- To place the throttle function on the **right stick, the plate has to be rotated through 90° to the left, and mounted on the left-hand stick unit** (as seen from the rear).
- To place the throttle function on the **left stick, the plate has to be rotated through 90° to the right, and mounted on the right- hand stick unit**.
- To do this, press the return rocker of the stick unit down using the pin (retainer, on the back face of the plate). The rocker is located directly adjacent to the outside spring adjustment screw; it has a spring attached to it.
- Place the ratchet plate on the stick unit screw dome in this position, and re-fit the screws.
- The pictures above show the final installed position of the ratchet plate.

4.4 CAMPac model memory modules

The transmitter's model memory capacity can be expanded by fitting "CAMPac" modules. Various CAMPac modules are available, offering different numbers of additional model memories:

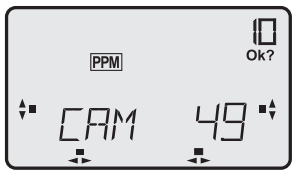
4k	**CAMPac 3 model memories**	**No. F 1508**
16k	**CAMPac 12 model memories**	**No. F 1509**
64k	**CAMPac 49 model memories**	**No. F 1566**

The CAMPac module is plugged onto the pin row with the appropriate legend on the circuit board inside the transmitter.

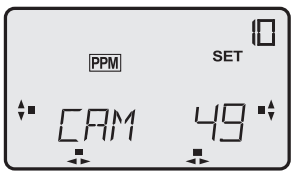


Switch the transmitter off. Carefully insert the module with the legend and lug on the module matching the diagram printed on the circuit board itself.

CAMPac modules have to be "initialised" when they are first plugged into the transmitter.

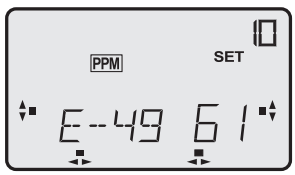


The screen initially shows the message "CAM 49", confirming the memory size of the CAMPac you have fitted.
To prevent accidental over-writing of CAMPac data, a flashing "**OK?**" appears on the screen, requesting confirmation.
Press the **"S" button** to start the initialisation process.



The initialisation process commences, and the screen counts down the possible number of model memories as it proceeds. In our example a 64K CAMPac is fitted, containing 49 model memories. Once the count-down has reached zero, the beeper sounds to indicate that the process is completed.
The CAMPac module is now ready for use in the FX-18.

The CAMPac module is formatted using the FX-18 format.
If you ever wish to use it in a different transmitter type, you will need to re-initialise the module. This process erases the FX-18 data.



Individual CAMPac model memories which have not been assigned a name are indicated by the letter **"E"** and a sequential number. The **"E"** stands for external model memory.

4.5 Changing crystals

Within the fixed frequency band the transmitter and receiver can be operated on different spot frequencies (channels) by changing the plug-in crystals. The crystals are located in sockets in the transmitter and the receiver, and must be changed together.

The spot frequency of the transmitter and receiver must always be the same. You must use a pair of crystals designed for the frequency band of your system. Remove the transmitter back panel: the crystal is on the left-hand side of the main circuit board.

Transmitter crystals bear the abbreviation TX + channel number.

Receiver crystals bear the abbreviation RX + channel number.

Dual-conversion receiver crystals bear the abbreviation RX-DS + channel number.

It is not possible to use, say, a 40 MHz crystal in a 35 MHz unit; the system simply will not work.

Equipment designed for the 35 MHz B-band can also be operated with crystals for the 35 MHz A-band, and vice versa, but a conversion is required. This work can be carried out by the robbe Service Department, and is offered at a fixed price.

Be sure to use only genuine crystals from the robbe-Futaba range, and use only those frequencies which are approved for model use in your country, as listed in the frequency table supplied.

4.6 Changing the transmitter battery

The FX-18 radio control system is available with two different types of transmitter battery:

1. NC sets (No. F 4090 to F 4092) with 8-cell nickel-cadmium (NC) battery, capacity 750 mAh;
2. NiMH sets (No. F 4095 to F 4097) with 8-cell nickel-metal-hydride (NiMH) battery, capacity 1400 mAh.

Changing the transmitter battery

- Remove the transmitter back panel (see Section 4.2)
- Disconnect the battery connector from its socket
- Release the transmitter battery from the battery cradle - it is secured with double-sided adhesive tape
- Peel off any adhesive residue if necessary
- Attach the new battery with the double-sided tape supplied
- Connect the battery lead.

The following replacement battery types are available:

No. 4462	8 RSZ 750 mAh NC	Operating time approx. 3 hours
No. 4461	8 RSZ 1500 mAh NC	Operating time approx. 6 hours
No. 4463	8 NiMH 1400 mAh	Operating time approx. 6 hours
No. 4460	8 NiMH 2200 mAh	Operating time approx. 9 hours

4.7 Installing and connecting option modules

An outstanding feature of the FX-18 transmitter is the wealth of expansion options it offers.
You can install linear sliders, mixer switches and external mix trimmers to suit your own requirements. The first step is to decide on an option well where you can reach the control most easily, without having to let go of the sticks.

A total of 4 option wells is available for linear sliders, plus 12 option wells for mixer switches, channel switches and mix trimmers.

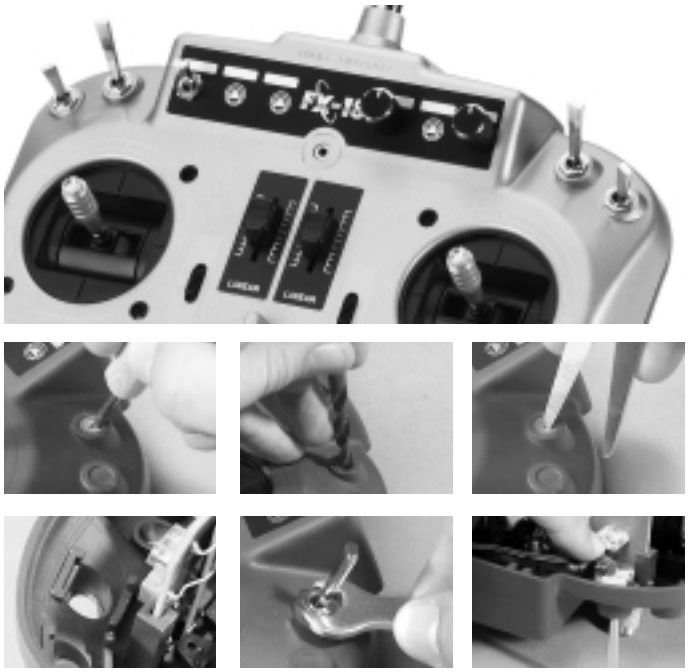
The following expansion modules can be installed and connected:

- **2 linear sliders (front panel), 2 linear sliders (back panel)**
- **up to 10 mixer switches or channel switches**
- **up to 2 pairs of external mix trimmers (No. F 1506)**
- **1 Multi-Switch module (up to 32 switched channels, see Section 11)**
- **2 stick-top switches**

Please work carefully when connecting expansion modules to avoid damaging the transmitter electronics.

- Switch off the transmitter before installing an option module
- Remove the back panel (Section 4.2)
- Disconnect the battery lead.

Installing mixer and channel switches in the outer option wells



- To install switches in these wells, push through the thin inner skin at the prepared hole position using a pointed object.
- Open up the hole to the final diameter of 6 mm using a 6 mm Ø drill or scissor blade, holding the tool in your hand.
- Place the switch in the hole from the rear and position it in the holder, then fit the nut on the front and tighten it carefully using an 8 mm A/F spanner.
- Bend the cable from the switch virtually at right-angles, to ensure that there is still adequate space for any slider which you may wish to install in the back panel.

Take care to arrange the cables neatly!

Installing the mixers and channel switches in the inner option wells

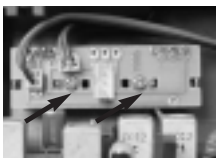
There are two alternatives for installing controls in the inner option wells:

1. Cut a hole in the aluminium panel at the switch symbol position, using a hand-held 6 mm Ø drill bit, or

2. Use a ready-made die-cut panel, which is available under No. F 1589. The set includes 12 rubber plugs which are used to seal any openings which are not used, e.g. after re-positioning switches.

In all other respects the switches are installed and secured exactly as described previously in this section.

Installing mix trimmers (F 1506) in the inner option wells


Here again there are two alternative methods of installation:

1. Cut two holes in the aluminium panel at the switch symbol position, using a hand-held 6 mm Ø drill bit, or

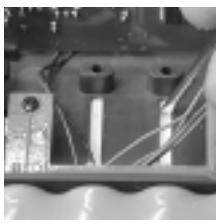
2. Use a ready-made die-cut panel, which is available under No. F 1589. The set includes 12 rubber plugs which are used to seal any openings which are not used, e.g. after re-positioning switches.

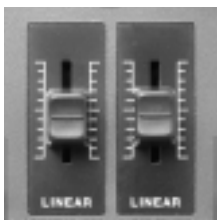
Each mix trimmer module takes up three inner option wells. A maximum of two modules can be installed: one right, one left.

- Drill holes in switch well positions 1 and 3.
- Fit the module from the rear with the connecting lead terminating in the **2-pin plug at the top**, pointing towards the aerial.
- Fix the module to the transmitter using the screws supplied (see arrow).
- Push the trimmer knobs onto the pot shafts.
- Ensure that the index line on the knob lines up with that on the pot shaft.
- Secure the trimmer knob with a 1.5 mm allen key.

Take care to arrange the cables neatly!

Installing the front linear sliders





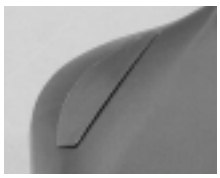
- To install the front linear sliders, press the blind cover out from the rear of the transmitter using a screwdriver.
- **Carefully install the slider with the cable pointing down (towards the battery).**
- Route the cable under the main circuit board and connect the slider.

The circuit board is mounted on stand-off pillars to provide space for the cables.

Do not run the cables over the circuit board, otherwise they will be jammed between the circuit board and the back panel.

- Carefully fix the slider in place from the front using the screws supplied.
- Peel off the protective film and apply the self-adhesive scale label.
- Carefully push the knob onto the slider shaft.
- Check that the slider works smoothly, then re-attach the back panel.

Installing the rear linear sliders

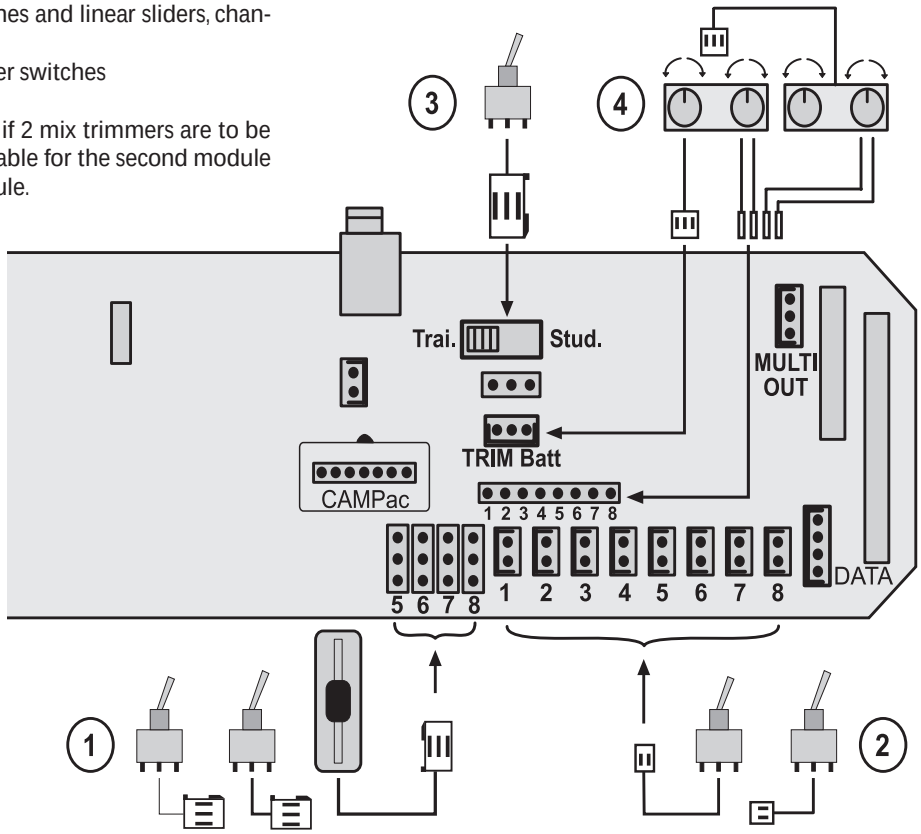






- Carefully push out the rear blind cover of the slider slot from the inside of the transmitter using a screwdriver.
- Install the slider from the rear, with the **cable pointing up**, towards the latch.
- Carefully fit the retaining screws from the outside to secure the unit.
- Each linear slider is supplied complete with one left-hand and one right-hand knob.
- Select the appropriate knob to suit the side of the transmitter, and push it onto the slider shaft.
- Check that the slider works smoothly, then re-attach the back panel.

Connecting the option modules to the circuit board

1. Connector for channel switches and linear sliders, channels 5 to 8
2. Connector for 8 external mixer switches
3. Trainer switch socket
4. Connector for mix trimmers; if 2 mix trimmers are to be installed, the power supply cable for the second module is plugged into the first module.

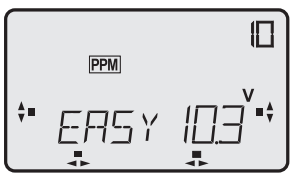


Basic menu

Mixer switch assignment:
1 = On-Off V-mix 1
2 = On-off V-mix 2
3 = On-off V-mix 3
4 = On-Off Dual Rates
5 = Throttle cut
6 = unused
7 = unused
8 = unused

Mix trimmer assignment:
1 = Mixer input V-Mix 1
2 = Mixer input V-Mix 2
3 = Mixer input V-Mix 3
4 = unused
5 = unused
6 = unused
7 = unused
8 = unused

4.8 Transmitter battery voltage display

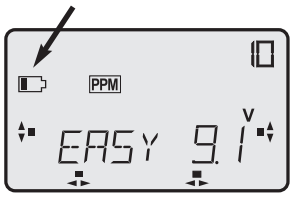


The voltage of the transmitter battery is displayed in Volts on the large LCD screen.

In the example shown the voltage of the transmitter battery is 10.3 V.

4.9 Low battery voltage alarm

As soon as the battery voltage falls to a certain pre-set value, visual and audible alarms are triggered to alert you to an impending flat transmitter battery.



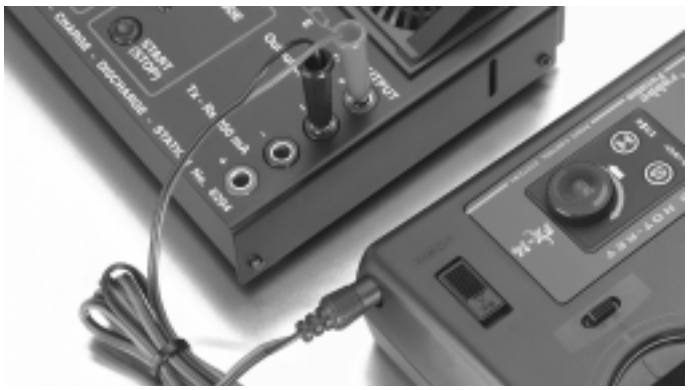
The battery symbol on the screen flashes, and the beeper sounds. The trigger threshold for the battery alarm can be set to any value in the range 8.5 - 9.6 V in increments of 0.1 V. (See also Section 7.1.8)

4.10 Charging the transmitter battery

The battery should be charged for 24 hours at a rate of 1/10 its nominal capacity before the transmitter is used.
After use, and after any long period of storage, all the RC system batteries should be given a charge lasting at least 14 hours at the 1/10 rate (slow charge rate), regardless of the length of the preceding usage. The slow charge compensates for the batteries' self-discharge characteristic, and balances the cells' state of charge.

(Example: 750 mAh battery: standard charge current = approx. 75 mA)

The self-discharge rate of **NC cells** is around 1% per day. This means that after 100 days a previously fully charged battery will be completely discharged, without ever having supplied current to any load.
NiMH cells have the same self-discharge characteristic, but at a higher rate of around 2-3% per day; the pack will be completely flat after about 35-50 days.



The transmitter battery can be charged and discharged without removing it from the case.
The charge socket is located next to the On/Off switch in the right-hand side panel.

If you wish to charge the transmitter or receiver batteries at a higher current than the 1/10 rate, be sure to use an automatic charger with a "Delta-Peak" termination system.

We recommend the following battery chargers:

1. For simple charging, e.g. Lader 5, No. 8308

2. For optimum battery maintenance we recommend the "Reflex Charger", No. 8363. The special reflex charging process prevents undesired memory and "lazy battery" effects; using this charger ensures that you always have full battery capacity available.

If your system includes an NiMH battery you must use a charger with a reliable automatic charge termination system, as these battery types are sensitive to overcharging. The advantage of the reflex charging process with these packs is that only the quantity of energy removed from the pack is charged back into it.

In principle all rapid chargers with "automatic charge termination" can be used.

The transmitter and receiving system can only be charged if they are switched off beforehand.
Note that the maximum charge current for the transmitter battery when using a rapid charger must not exceed 2 Amps.

The charge circuit in the transmitter is equipped with an electronic fuse (polyfuse), which provides effective protection to the transmitter battery if it is charged at too high a current, or if the charge lead is short-circuited.
However, the point at which the fuse is triggered varies according to the charge current and the battery type, so it is still essential to avoid short-circuiting the charge lead.

Always start by connecting the banana plugs on the charge lead to the charger.
Ensure that the charge lead is connected with correct polarity; the fuse does not provide protection against reverse polarity.

The receiver battery can be left in the model for recharging.
You can use a switch harness with integral charge socket (No. F 1407) if you wish to avoid disconnecting the battery from the switch harness every time you charge the battery.

After a lengthy period of storage (Winter break), the batteries should be cycled (discharged and recharged) several times before re-use. This process balances the packs, and restores them to full capacity and operating time.

To protect the environment, take defective or exhausted batteries to your local toxic waste collection centre. NC batteries in particular are categorised as toxic waste. On no account dispose of old batteries in the domestic waste. These batteries can be recycled.

4.11 Trainer mode

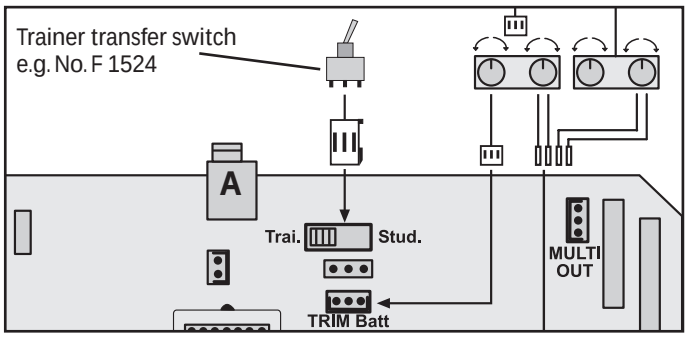
Trainer mode (sometimes known as a "buddy box" system) is an excellent way for learners ("students") to learn the art of model flying with the help of a flight tutor ("trainer").

The tutor controls the model during the launch and landing phases, but transfers control to the learner by operating a push-button or switch when the model is in a safe position.

If the model gets into a potentially dangerous flight attitude or situation, the tutor releases the Trainer button and resumes control of the model. This method provides a very easy way for beginners to learn the art of model control in easy stages, without having to worry constantly about damage or loss of the model.

The FX-18 transmitter is fitted as standard with a Trainer socket (**A**) for Trainer operations; it is located on the front panel of the transmitter. The FX-18 can be used either as Trainer or Student transmitter.

The circuit board features a miniature switch marked TRAI - STUD. This is used to determine whether the transmitter is to be operated as the Trainer unit (TRAI) or Student (STUD) unit.



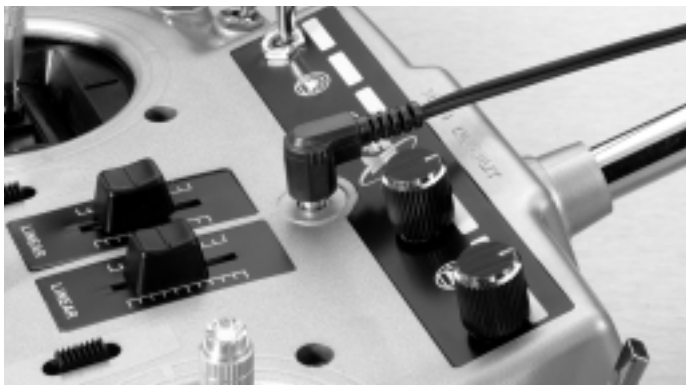
Carefully move the switch to the appropriate position using a pair of tweezers.

The trainer and student transmitters are inter-connected using a 2-core Trainer lead.

The following cables are available:
(see also the diagrams and recommended accessories on page 54.)

- No. 8377 FX trainer lead, connects two FX-18 transmitters to each other or one FX-18 to an FX-14 transmitter.

- No. 8362 F->FX trainer lead. This lead is required if you wish to use an FX-18 transmitter as student transmitter, connected to an F-series RC system (F-14, FC-16, FC-18 or FC-28) fitted with a Trainer Module 4.



An adaptor lead is also available under No. F 1581 for connecting this lead to the F-series Trainer Module 3 (DIN 6-pin plug), and robbe-Futaba hand-held transmitters. Read the instructions regarding Trainer mode in the operating instructions supplied with these transmitters.

If the FX-18 system is to be used as the Trainer transmitter, you will also need to install a Trainer transfer switch, e.g. No. F 1524, which is used to transfer control between the two transmitters.

On the circuit board you will find a socket for this switch, located adjacent to the TRAI-STUD selector switch.

A battery must be fitted to the student transmitter for Trainer mode operations.
- Remove the transmitter crystal or RF module from the student transmitter, so that it cannot radiate an RF signal.

- Install the Trainer transfer switch in the Trainer transmitter, and connect it to the appropriate socket.
- Move the "**TRAI-STUD**" switch to the appropriate position.
- **The Student transmitter must be set to the same modula tion (PPM or PCM) as the Trainer transmitter.**
- The channel sequence of both transmitters must be the same, any mixers in use must be the same, and the throttle function must be on the same stick. If the settings are different, you must change the stick mode in the Parameter menu (MODE) on the Student transmitter.
- Connect the Trainer and Student transmitters using the Trainer lead.
- Switch on both transmitters.
- Check that all functions work correctly, then operate the Trainer switch and check that the Student transmitter has full control.
- Check that the Trainer transmitter regains control when you switch back.
- The model aircraft is launched with the Trainer at the controls, and taken to a safe height. At this point the Trainer transfers con trol to the Student. In critical or difficult situations the tutor releases the Trainer switch, regains control, and rescues the model.

4.12 DSC mode / use with a flight simulator

A DSC lead (Direct Servo Control) can be connected to the barrel socket on the transmitter front panel. This provides a direct means of controlling the receiver and the servos connected to it, without the transmitter radiating an RF signal. This can be very useful, for example, if you want to carry out adjustments on your model, but "your" spot frequency is in use by another modeller. To complete the connection you will need the FX DSC lead (Order No. 8335).
Note: to prevent Radio Frequency transmission the transmitter crystal must be removed.

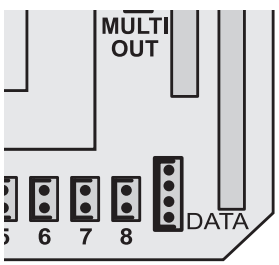
The "TRAI-STUD" switch must be at the "STUD" position.
DSC mode can only be carried out in conjunction with a receiver which features a DSC socket (marked "C"), e.g. R-118F receivers. Set the appropriate modulation (PPM/PCM) to match the receiver.

To connect the transmitter to a flight simulator you require the adaptor lead, No. 8383, and the transmitter must be set to PPM (FM) modulation. The "TRAI-STUD" switch must also be set to the "STUD" position.

4.13 Data transfer to a PC

The FX-18 transmitter is equipped internally with a PC interface socket. This socket is marked "DATA", and is located on the right-hand side of the circuit board.

Special software is in preparation which allows you to call up, store and print out model data stored on the PC.



5. Connecting the servos

The sequence of servo connections at the receiver is pre-defined, as many mixer functions in the **model type menus Glider, Power and Heli** are pre-programmed. These mixers are described in the appropriate section.
If you have not activated any mixers, the servo sequence can be chosen at will, but we recommend that you set up and adhere to your own standard sequence, or keep to the pre-set assignment, otherwise you will end up with models which require different arrangements, and this can easily lead to potentially dangerous confusion.

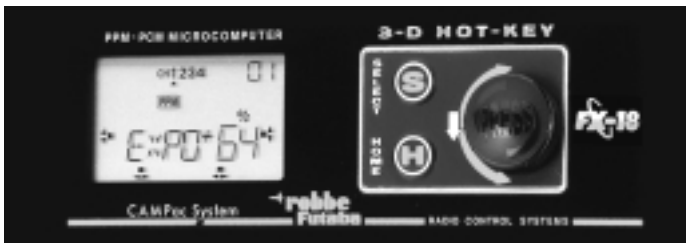
Servo assignment in the Basic menu:

Channel 1:	Aileron
Channel 2:	Elevator
Channel 3:	Throttle / airbrakes / landing flaps
Channel 4:	Rudder
Channel 5:	Auxiliary channel
Channel 6:	Auxiliary channel
Channel 7:	Auxiliary channel
Channel 8:	Auxiliary channel

Please refer also to Section 7.1.2, Transmitter stick mode (MODE), with regard to servo assignments.

6. Using the transmitter for the first time

6.1 Screen and keypad



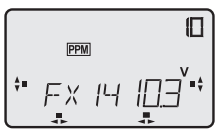
The user controls the software of the FX-18 radio control system by programming and "conversing" with it, and the means of this dialogue is the large LCD screen, the input buttons Select (S) and Home (H), and the multi-function 3-D hotkey.

The 3-D hotkey, with its convenient handling, is an important part of the system, as it provides a fast method of moving through the individual menus and a quick, simple method of setting the appropriate mixer values.
Section 6.3, "**Summary of the menu structure**", describes the method of finding your way through the menus using the controls provided.

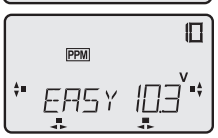
If necessary, choose the function "Language select" now (see section 7.1.7).

6.2 Selecting a Home menu

When you first switch on the transmitter you initially see the "FX-18" name displayed briefly, which is replaced by the name of the model (model memory) you last used; in this case EASY. The name flashes.



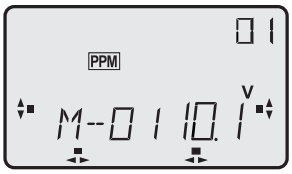
Press the 3-D hotkey briefly to confirm the model memory.



If you have not assigned a model name, the memory number (M-01) appears as the name.
In the top right-hand corner the screen displays the spot number of the selected model memory.
This process is intended to ensure that the user is deliberately made aware of the model memory he has selected.
However, the selected model memory remains active even if you do not confirm it.

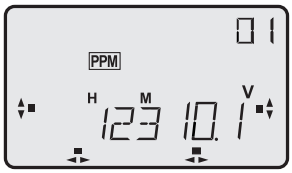
If you now rotate the 3-D hotkey (to left or right), you will find four different Home menus.

Home menu 1



Display of:
- model name (M-01)
- Voltage (10.1V)
- Model memory number (01)

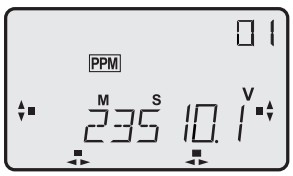
Home menu 2



Display of:
- Model memory operating time (1 hour 23 min)
- Voltage (10.1V)
- Model memory number (01)

The operating hours timer is useful as it gives you a constant check of the transmitter battery capacity. When you recharge the transmitter battery you should remember to reset the timer to zero by pressing the 3-D hotkey twice briefly.
The timer depends on the model memory.

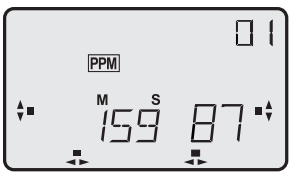
Home menu 3



Display of:
- Stopwatch (2 min 35 sec)
- Voltage (10.1V)
- Model memory number (01)

The stopwatch settings are adjusted as described in Section 8.15. This menu is only used to display the stopwatch and reset it to the initial value; this is done by pressing the 3-D hotkey twice.

Home menu 4



Display of
- Stopwatch (1 min 59 sec)
- Operating time (87 minutes)
- Model memory number (01)

This is a combination display of the two timers; the operating time is displayed in minutes = 87 minutes (max. display 199 minutes), in contrast to Home menu 2 = 1 hour 27 min.

In this menu you can reset the stopwatch to the initial value by pressing the 3-D hotkey twice. The operating hours display is reset in Home menu 2.

6.3 The FX-18 menu structure

The software of the FX-18 makes available comprehensive set-up facilities for the various types of radio-controlled models. The FX-18 transmitter is equipped with a tried and tested method of software control which allows you to navigate both forward and back within the menu structure.

This saves the constant, tiresome need to "leaf through" the setup menus, if you have accidentally skipped the function you wished to use. The menu structure is shown in graphic form in these instructions for each of the model types.

Home menu level
The top Home menu level embraces all those functions which are important when the system is actually in use, such as model name, voltage, operating time, stopwatch.
Rotate the 3-D hotkey to change to the display you wish to see.

Select menu level
The next level down is the menu in which you select functions.
- To eliminate the danger of changing a setting accidentally, you must hold the 3-D hotkey **pressed in for one second** in order to reach this level.
- **Rotate** the 3-D hotkey to "leaf through" within this menu until you arrive at the desired function. At this point the selected function flashes.
- **Pressing** the 3-D hotkey takes you to the setup menu for the function you have selected.
- Hold the **"H" button pressed in for one second** to return to the Select menu level.
- Holding the **"H" button pressed in for one second again** takes you back to the Home menu level.

Setup menu level
- Within the setup menu you **move around** using the **"S" button** (forward) and the **"H" button** (back).
- The **3-D hotkey** is used to **adjust the selected setting** (change the percentage value, switch the mixer on/off etc.). The set-up feature you have selected flashes on the screen.
- To quit the Setup level hold the **"H" button pressed in for one second**; this takes you back to the Select menu level (selected function flashes).
- A further **one-second press of the "H" button** takes you back to the Home menu level.

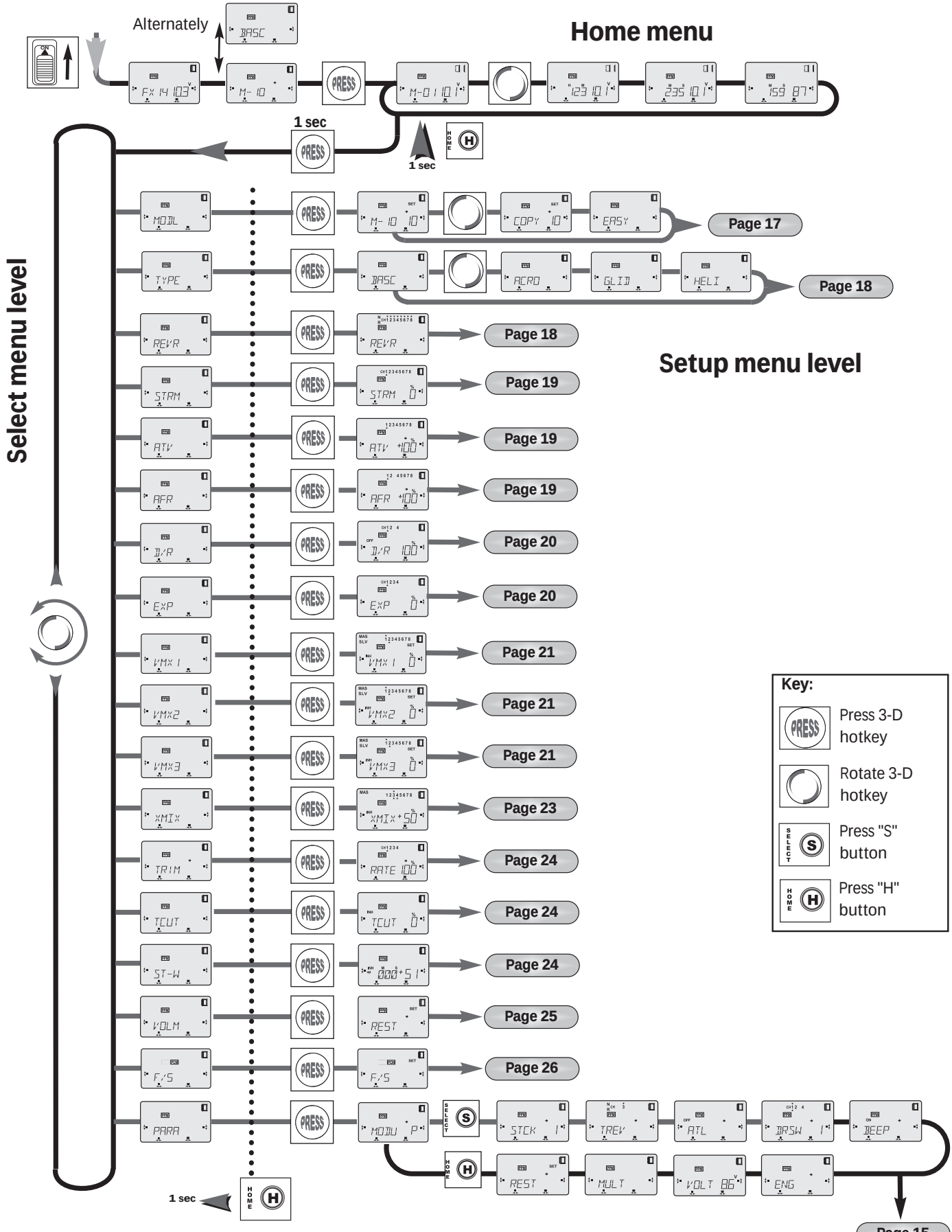
All adjustments and changes apply only to the currently active model memory. All changes and settings are stored immediately, and do not need to be confirmed separately.

The transmitter reads the data into an area of working memory, and saves the data in the corresponding model memory when it is switched off.

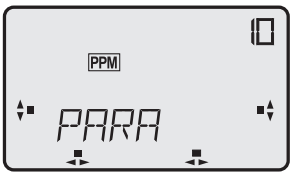
7. Basic functions menu structure (BASC)

The basic transmitter settings are grouped together in the (BASC) menu. The Basic program is intended for simple models, and also for use with model boats and trucks. If you wish to operate more complex models such as power model aircraft (ACRO), gliders (GLID) and helicopters (HELI), special mixer functions are provided under the menu point "TYPE" (see Section 7.3). The specific mixers are described in detail in Sections 8, 9 and 10.

The following flow chart shows the menu structure of the BASC functions; it also shows the associated sub-menus and the Home menus.

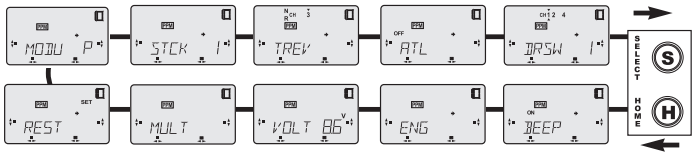


7.1 Parameter menu (PARA)



The Parameter menu, like all the other menus, is incorporated in the endless rotation loop of the Select menu level. All the basic (global) settings are adjusted in this menu.
Paradoxically the last menu point is described here first; there are good ergonomic reasons for this.
If you rotate the 3-D hotkey to the **left**, then "**PARA**" is the first menu you see, and it is also the first one you need in order to set up the global functions for a particular model.
When you are using the system, however, the most common menu you need will be "**Model**", which is also the first one you reach when you rotate the hotkey to the **right**.
This eliminates the time-consuming business of leafing through unnecessary menus.

The Setup level also operates using this logic; if you jump to the left with the **"H" button**, a mixer function is switched on or off. If you jump to the right with the **"S" button** you jump to the percentage value setting in the menu, which is the most frequently used option when setting up a new model.



Move to the Setup menu level "**PARA**" via the Select menu, as shown in Section 7.

The setup menu "PARA" contains 10 sub-menus which are explained in the following section.

The ten options are arranged in a loop, and within this loop you can always move **forward** with the **"S" button**, and **back** with the **"H" button**, in each case giving a short press.
A longer press (about 1 second) on the "H" button takes you back to one level higher in the menu system.

7.1.1 Modulation setting (MODU)

This function is required in order to set the desired modulation, i.e. PCM or PPM (FM). If you are using an FM receiver, you must set PPM mode (P) on the transmitter.

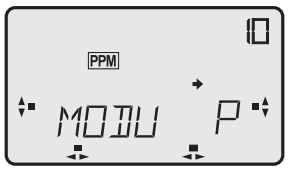
A PCM receiver requires PCM mode (**C**).

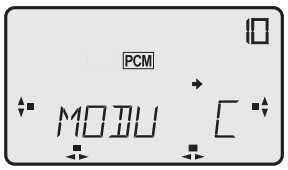
In PCM mode you can only use genuine robbe-Futaba and Futaba receivers. Do not expect other makes of PCM receiver to be compatible.

PCM modulation differs in practice as follows: when an FM system is operated at the extreme limit of range, or when motor interference occurs, the servos tend to jitter, and PCM modulation suppresses this effect. The receiver achieves this by storing the signals briefly. If invalid or incorrect signals are picked up by the receiver, it continues to give out the stored signals until it picks up correct signals from the transmitter again.
See also F/S (Fail-Safe), Section 7.16.

We recommend that you use a PCM connection if you know that reception conditions are difficult. For example, if your model is powered by a large petrol engine with magneto ignition, or a powerful electric motor.

Switching modulation



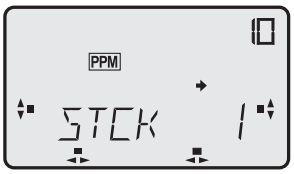


- Select the MODU sub-menu in the PARA menu
- Rotate the 3-D hotkey
  - to the left for PPM (FM), screen shows (P)
  - to the right for PCM, screen shows (C)
- If you change the setting, the PPM or PCM symbol on the screen flashes.
- **The actual transition to the new transmission mode only occurs when you switch the transmitter off, and then on again.**
- The fact that the transmission mode only changes when you switch the transmitter on and off is particularly important when you are selecting a new model, as the type of modulation is stored individually in each model memory. See also Section 7.2.

Check that the modulation setting is correct when you switch the transmitter on again. The screen will show the symbol PPM or PCM.

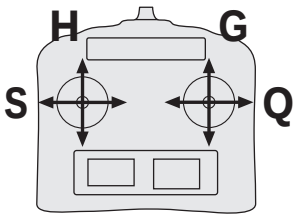
7.1.2 Stick mode (STCK)

The assignment of the receiver outputs is pre-defined, in order to allow for the pre-programmed electronic mixer functions.

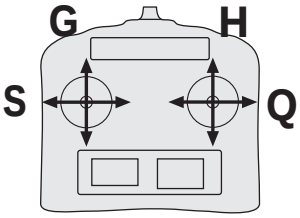


It is still necessary to set up the transmitter to suit your chosen stick mode, and this is carried out in this sub-menu.
Basically all you have to do here is define the stick to which the non self-neutralising ratchet function (to control the motor or airbrake function) is to be assigned (see also Section 5).

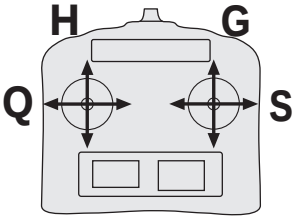
There are four alternative stick modes (modes 1-4):



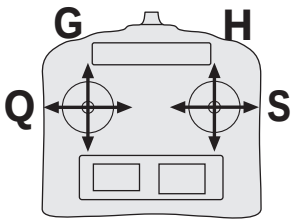
MODE 1: (default)
Aileron right (Q)
Elevator left (H)
Throttle right (G)
Rudder left (S)



MODE 2:
Aileron right (Q)
Elevator right (H)
Throttle left (G)
Rudder left (S)



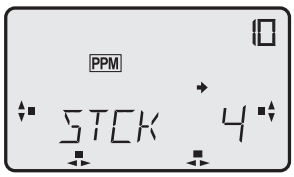
MODE 3:
Aileron left (Q)
Elevator left (H)
Throttle right (G)
Rudder right (S)



MODE 4:
Aileron left (Q)
Elevator right (H)
Throttle left (G)
Rudder right (S)

The servo connections at the receiver are the same for all stick modes.

Channel 1:	Aileron
Channel 2:	Elevator
Channel 3:	Throttle / airbrakes / landing flaps
Channel 4:	Rudder
Channel 5:	Auxiliary channel
Channel 6:	Auxiliary channel
Channel 7:	Auxiliary channel
Channel 8:	Auxiliary channel

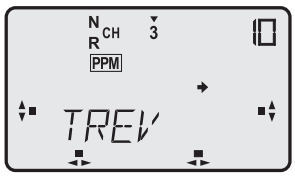


In the Parameter menu use the "S" button or "H" button to move to the menu point "MODE". Rotate the 3-D hotkey to select one of the four stick modes MODE 1-4.

7.1.3 Throttle reverse (TREV)

With this option you can determine whether the full-throttle position is to be at the forward or back end of the stick arc.

When you select this menu, the channel number "3" (throttle function) flashes on the screen. A small arrow below the channel number (reverse) or above the channel number (normal) indicates the current status.

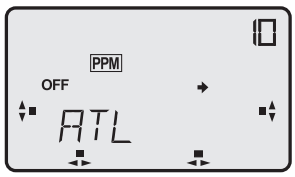


N = Normal = Full throttle forward
R = Reverse = Full throttle back

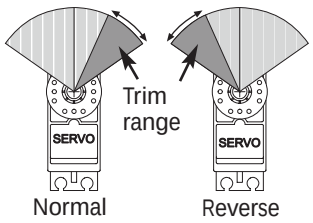
You can reverse the throttle function by turning the 3-D hotkey to the left; rotating it to the right restores the normal condition. (See also Section 7.1.4: Asymmetric throttle trim.)

7.1.4 Asymmetric throttle trim (ATL)

This function is used to determine whether the trim for the throttle function is to be effective over the full arc of travel, or only at the idle end. For controlling the carburettor of internal-combustion engines we recommend switching this function on, so that the trim only affects the idle end of the motor's range, and not the full-throttle position.



When you select this function, the symbol "OFF" flashes on the screen. Turning the 3-D hotkey to the right switches it "ON"; turning it left switches it "OFF".



This function must be combined correctly with the throttle reverse function; see Section 7.1.3. It is important to ensure that both the throttle direction and the throttle trim are set correctly.

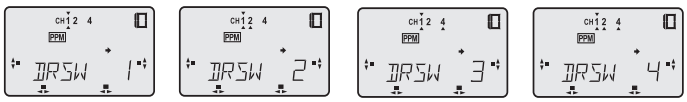
--

7.1.5 Dual Rates switch (DRSW)

In this menu you can determine the function or functions which are affected by the Dual Rates switch. The Dual Rates switch is connected to socket 4 on the circuit board (see illustration, page 10). You can set the switch functions you prefer by rotating the 3-D hotkey to left or right.

The associated DRSW number flashes on the screen, and a small arrow below the function number indicates the assignment clearly. (See Section 7.8 for an explanation of the D/R function and for details of setting the values.)

There are four options here:



DRSW 1
1 - Ailerons

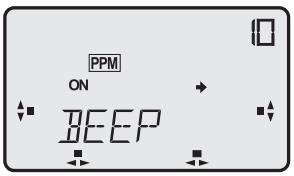
DRSW 2
1 - Ailerons
2 - Elevator

DRSW 3
1 - Ailerons
4 - Rudder

DRSW 4
1 - Ailerons
2 - Elevator
4 - Rudder

7.1.6 Audible sounder (BEEP)

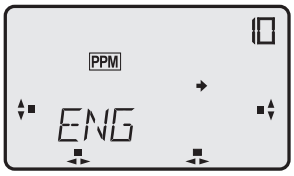
This option allows you to switch off the beep signal, which confirms each keypad action and each entry.
Even if you switch off the beeper, the alarm functions continue to trigger the beeper, i.e. the mixer alarm and the low battery alarm.
Of course, the audible confirmation beeps will only be heard if the beeper is switched on.



Turn the 3-D hotkey to the right to switch the beep "ON"; turn it left to switch the beep "OFF". The beeper sounds briefly when you switch it on.

7.1.7 Language select (ENG)

The FX-18 software is present in three languages as standard; the languages available are German, English and French. In this menu you can select the language of your choice.
When you select this option, the currently active language is displayed flashing on the screen.

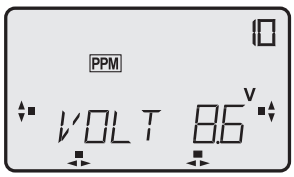


Rotate the 3-D hotkey to right or left to select a different language for the screen displays.

DEU = German
ENG - English
FRA - French

7.1.8 Low voltage alarm (VOLT)

In this menu point you can adjust the voltage at which the transmitter's low voltage alarm is triggered. The range of adjustment is from 8.5 to 9.5 Volts in 0.1 Volt increments.



When you select this option, the currently set low-voltage threshold flashes on the screen.
Rotate the 3-D hotkey to set your preferred voltage threshold.

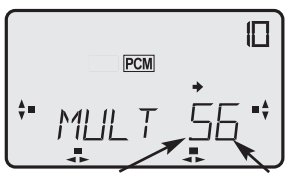
The purpose of this function is to adjust the low-voltage alarm to suit different types and capacities of battery.

Caution:
Please don't be tempted to see too low an alarm threshold. For safety's sake it makes more sense to set the threshold slightly too high than too low. The nominal voltage of an 8-cell transmitter battery is 9.6 Volts, and the pack is capable of maintaining this value for a long time before it slowly starts to decline towards 8.8 Volts. Around this value the battery voltage starts to fall off more rapidly. Usually this "kink" in the voltage curve occurs around 1.1 Volts per cell, i.e. 8.8 Volts for the transmitter battery as a whole.

If you use a battery of relatively low capacity, or an NiMH battery, we recommend setting a slightly higher threshold value (approx. 9 Volts), so that there is still plenty of time for you to land your model safely, especially if you are flying a glider at a great height.
In some other applications you will always be able to switch off the transmitter safely very soon after the low voltage alarm is triggered, and in such cases it may well be safe to reduce the threshold to 8.6 Volts in order to obtain longer operating times. You can establish exactly how long the residual operating time is by switching on the transmitter in your modelling workshop, with the aerial fitted and extended. Measure the time between the low voltage alarm and the absolute bottom limit for the operating voltage, which is 7.5 Volts.

7.1.9 Multi-Switch-Prop function (MULT)

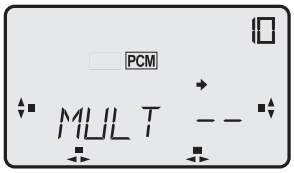
If the transmitter is set to PCM modulation, it is necessary to select the transmission channel or channels for the Multi-Switch or Multi-Prop expansion modules at the transmitter. This processes switches those channels to the special modulation required for Multi-modules. **A channel set up for Multi-Switch-Prop transmission is no longer available for a "normal" control function and mixers.**
Important: the system will only work with PCM modulation if the slide switch on the Multi-Switch or Multi-Prop decoder is also set to PCM mode. If you use FM mode no changes are required at the transmitter; however, the Multi-decoders must still be switched to PPM modulation.
You can select up to two channels from channels 5…8 for Multi-Switch-Prop operations by rotating the 3-D hotkey.



1st Multi-channel 2nd Multi-channel

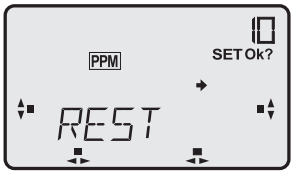
- **Turning the hotkey to the left activates the 1st channel (left number) from 5…8, or de-activates it if you select "-".**
- **Turning the hotkey to the right selects the 2nd channel (right number) from 5…8, or de-activates it if you select "-".**

In our example channels 5 and 6 are active for Multi mode.



If no Multi-modules are connected, you must not select a channel for this mode.
Set the display to "- -" to switch off the Multi-module function.

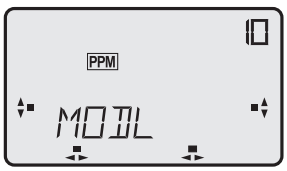
7.1.10 Model memory reset (REST)



In this menu you can erase the model data in the currently active model memory, i.e. set the memory back to the factory default settings (Reset).

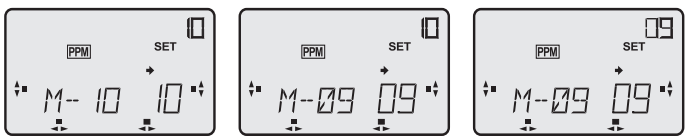
Reset (erase process)
- Press the 3-D hotkey; the screen displays OK? to check that you really want to erase the data.
- If you do not want to erase the data, release the 3-D hotkey immediately.
- If you do want to erase the data, hold the 3-D hotkey pressed in for about two seconds.
- The symbols "SET" and "REST" (reset) now flash in the initial display, and the beeper sounds once to indicate that erasure is actually taking place.
- When the memory has been erased, the beeper sounds twice and the "REST" display stops flashing.

7.2 Model memory select (MODL)



As standard the transmitter provides 12 model memories, and all the settings you make are stored in them. This is a very convenient method of storing individual settings for different models and applications, which can be called up again quickly when needed. To help you manage the memory system, each model memory is numbered, and you can also assign a short model name of 4 letters to each one.

CAMPac model memory modules can also be employed to expand the model memory capacity virtually without limit (see also Section 4.4).
Move to the Select menu level and turn the 3-D hotkey until "MODL" appears on the screen. A short press on the 3-D hotkey switches to Setup mode.



- The screen shows the active model memory; in this case No. 10.
- Turn the 3-D hotkey to select a new model memory (9). The screen displays the currently active memory (10) at the top, and the newly selected memory (9) at the bottom.
- Hold the 3-D hotkey pressed in for **two seconds**, and the system accepts the new model memory and makes it active.

The beeper sounds to confirm this, and the screen shows the newly selected model memory at both positions.

Important note:
The type of modulation - PCM or PPM - is stored with each model.
If the modulation stored in the newly selected model memory is different from the one you have just used, the PPM or PCM symbol on the screen flashes.

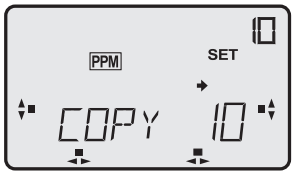
This indicates that you must switch the transmitter off and on again in order to confirm the switch to the new modulation.

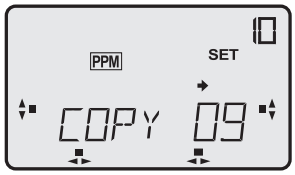
The menu for model memory selection (MODL) also includes further functions which are indicated by the right-pointing arrow. A brief press on the "S" button takes you to the next menu point: model memory copy.

Model memory copy (COPY)

This function is used to copy the contents of a model memory. This is a very useful function when you wish to program a model which is similar to an existing one.

All you do is copy the contents of one model memory to another free memory, change the model name and correct the settings for the new model. This saves the bother of entering the basic functions for the new model, and shortens the set-up time considerably.



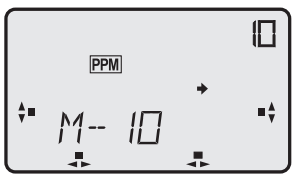


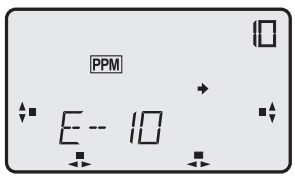
- Initially the COPY menu shows the same model memory in both positions.
- Turn the 3-D hotkey to select the model memory into which the copy is to be placed.
- The upper model memory number (10) shows the source, **from which** the data is to be copied, and the bottom one (9) the destination, **into which** it is to be copied.
- Hold the 3-D hotkey pressed in for 2 seconds.
- The beeper gives an audible indication of the progress of the copy process:
- 1 x beep -> start of the copy process
- 2 x beep -> end of the copy process

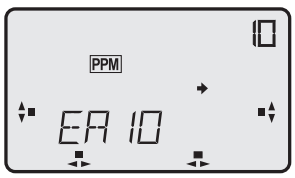
The model data from the current memory (10) has now been copied into the newly selected one, but you have not yet switched to the new model memory. If you want to activate the new memory, you must use the Model Memory Select menu, as already described; this is accessed by pressing the "H" button.

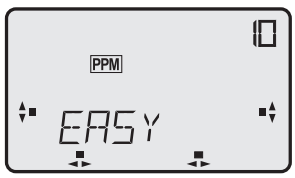
Entering the model name

If you press the "S" button again, you move to the Setup menu for the model name.



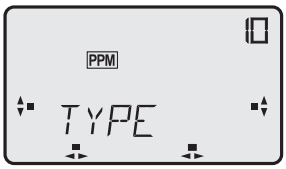






- First the initial letter (here "M") flashes; by rotating the 3-D hot key you can select any letter or numeral with which to start the model name. Some special symbols are also available.
- Press the "S" button again to move to the next letter; press "H" to move back again.
- A total of four letters can be entered for the model name. Once you have entered the last letter, the arrow on the screen disappears to indicate that you cannot enter any more letters. Hold the "H" button pressed in for one second to move one level hig her into the Select menu level.

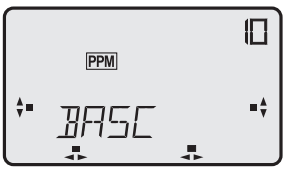
7.3 Select model type (TYPE)



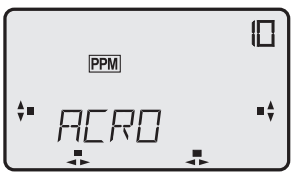
To control sophisticated model aircraft many automatic links (mixers) between the transmitter controls are generally required. To make it easier for the user to set up such models, the FX-18 transmitter provides a wealth of pre-programmed functions (mixer menus).
The new function menus are included in the existing Base menu; they are located before the base menu "PARA".

The 3-D hotkey and the screen are used to activate the mixers required for the model in question, and to set the mixer values.
The mixer menus have been carefully optimised to suit the model type you have selected.

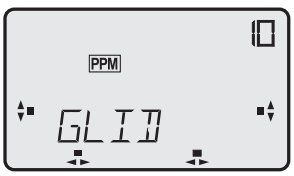
The following model types are available for you to select:



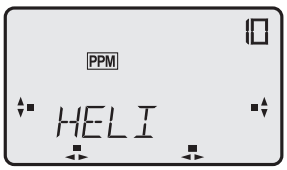
BASC
Base menu for setting up the standard functions, and for operating simple models; also for multi-function models such as boats and trucks.



ACRO
In addition to the base menu this option activates special pre-programmed mixer functions designed for powered model aircraft.



GLID
In addition to the base menu this option activates special pre-programmed mixer functions designed for model gliders.

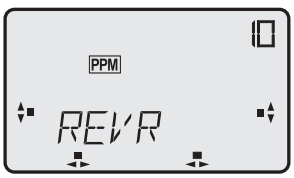


HELI
In addition to the base menu this option activates a comprehensive set of pre-programmed mixer functions designed for model helicopters.

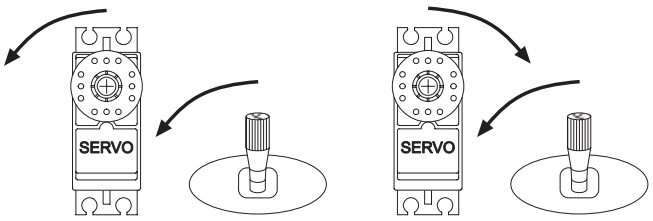
Selecting the model type:

- Select the **TYPE** menu and press the 3-D hotkey.
- Rotate the hotkey to select the model type BASC - ACRO - GLID or HELI.
- **Press the 3-D hotkey**, and the screen displays the security query **OK?**; **hold the hotkey pressed in** until the "Set" display appears. **After about 3-4 seconds** the transmitter emits a double beep to confirm that the model type has changed.
- If you wish to interrupt the process, release the 3-D hotkey after the OK? query appears on the screen.

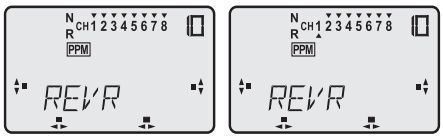
7.4 Servo reverse (REVR)



This function is used to reverse the direction of rotation of any servo or all eight servos electronically. This means that you do not need to take into account the servos' direction of rotation when installing them in the model.



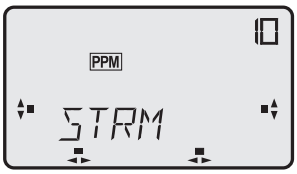
You can simply install the servos in the position which produces the most direct pushrod linkages, and later select the appropriate direction of servo rotation.



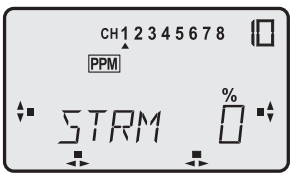
Press the "S" or "H" button to select the desired channel; the number flashes.

Turn the 3-D hotkey left to switch it to "reverse" (R), and turn it to the right to reset it to "normal" rotation (N) again. An arrow above or below the servo channel number clearly indicates the set direction of rotation.

7.5 Servo centre offset (STRM)

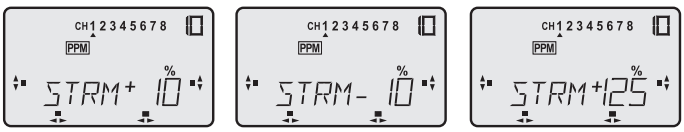


When installing servos in a model it is always best to fit them in such a way that the servo output arm is at neutral when the transmitter trim is also at centre. Sometimes this is just not possible, and sometimes servos of a different make may not centre properly, and this function can be used to set the servos of all eight functions exactly to the correct neutral position.



Move to the Setup menu, and select the desired servo channel with the "S" or "H" buttons. Turn the 3-D hotkey to adjust the neutral position of the selected servo.

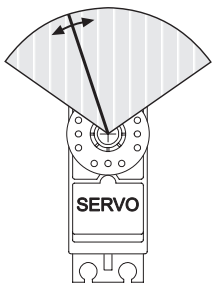
The adjustment range is -125% to +125%.
Hold the 3-D hotkey pressed in for 1 second to revert to the default value (0%).



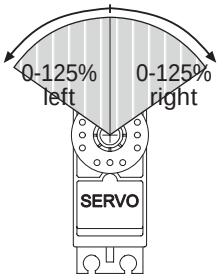
The screen shots above show a few typical settings.

It is important that the deviation from centre is not excessive, otherwise the servo travel will be distinctly different for each side of neutral. This function is not intended for correcting deficiencies in a model's control surface linkages.

For special applications the centre setting can be offset by as much as 125%, in which case the servo covers its full arc of travel, but only in one direction.



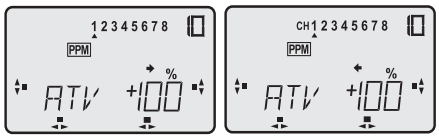
7.6 Servo travel adjustment (ATV)



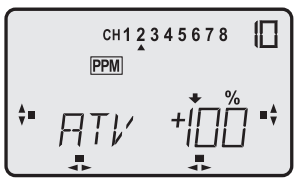
This function provides the means to adjust servo travel **separately for each side of centre**. The range of adjustment is 0 to +/- 125% of the total servo travel, including trim.
This is sometimes necessary where a mechanical restriction, e.g. the control system linkage, prevents the servo moving over its full travel. The servo travel can then be reduced to suit the installation. The function affects the selected servo channel, and also reduces all mixed functions involving that channel. Any change to the setting also affects the trim travel proportionally, together with any Dual Rate settings you have entered.

- At the top of the screen a small arrow under the row of numbers indicates the selected channel.
- Move to the Setup menu and press the "S" or "H" button to select the desired servo channel.

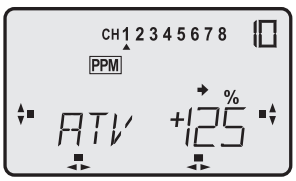
Any changes you make to the settings affect this servo channel only.



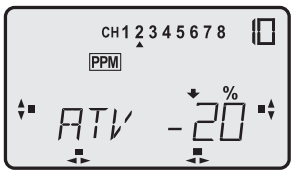
In the example shown here the system is set up to change the servo travel for the first channel (left aileron) of the model stored in memory number 10. The arrow indicates the direction of travel which can currently be changed. You select the other side of centre by moving the associated transmitter control.



In the case of the horizontal transmitter controls the arrow indicates right and left. With the vertical control functions the arrow indicates up and down. Press the "S" or "H" button to select a different channel.



Rotate the 3-D hotkey to adjust the travel as a percentage value from 0 to 125%, or from 0 to -125%. This process must be carried out separately for each side of centre for each function. Holding the 3-D hotkey pressed in for one second resets the value to the default setting (100%).



If you set a negative value (in this case -20%) using the 3-D hotkey, the servo runs in the same direction regardless of the direction in which you move the stick. This can be used to control special working systems on certain types of multi-function model.

7.7 Transmitter control travel (AFR)

Function for adjusting the travel of the transmitter control within the range 0…100%, **separately for each side of centre**.

0-100%	0-100%	In contrast to servo travel reduction (described above), this function also affects any associated mixer functions which you have activated. A reduction in transmitter control travel therefore affects the mixing rate when two functions are mixed onto one servo.

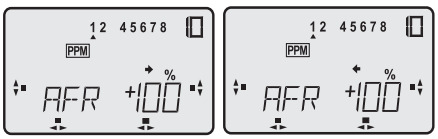
This means that two different transmitter controls with different mixer values can influence a single servo.

A further application arises in conjunction with modern gyro systems, which tend to increase or reduce servo travels.
This can be corrected by setting an appropriate value for transmitter control travel; the value you set affects the pirouette speed of a model helicopter.

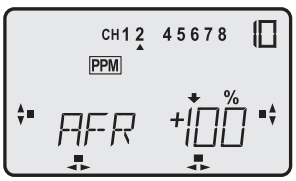
Another possible use for this function is to reduce the transmitter control travel to 0%; this disables the transmitter control completely, and the channel can then be used for a mixer (V-mix) without running the risk that an accidental movement of the transmitter control has an unwanted effect on the model.

The selected channel is indicated by a small arrow under the row of numbers at the top of the screen.
Adjustments affect all the mixed channels which are affected by the transmitter control channel in question.

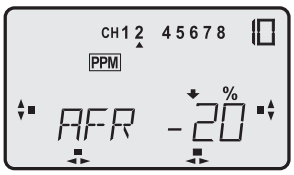
In the example shown here any adjustment made will affect the transmitter control travel for the 1st channel; this applies to model number 10.



The arrow indicates which direction can currently be programmed. The side can be changed by moving the associated transmitter control.

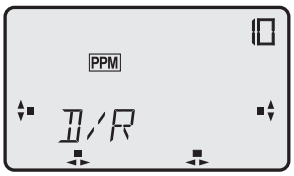


In the case of the horizontal transmitter controls the arrow indicates right and left. With the vertical control functions the arrow indicates up and down. Press the "S" or "H" button to select a different channel.



Rotate the 3-D hotkey to adjust the travel as a percentage value from 0 to 100%.
Holding the 3-D hotkey pressed in for one second resets the value to the default setting (100%).

7.8 Dual Rates - switchable reduced travels (D/R)

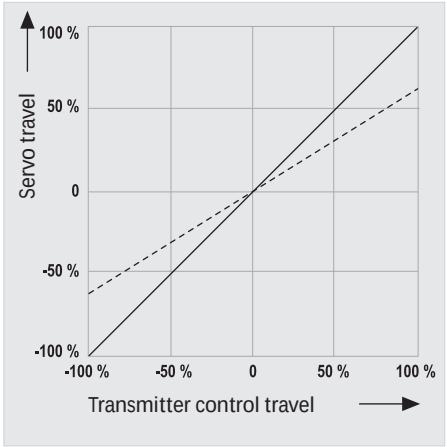


The Dual Rates facility allows the pilot to select different control travels during a flight simply by operating an external mixer switch. You can set up the function so that the switch selects either larger or smaller travels when you switch Dual Rates on.

If no switch is assigned, the D/R function can be used as a means of setting permanent travel reduction which affects both sides of centre equally.
In this case it affects the servo channel corresponding to the transmitter control you select, and also all other functions which are affected (through mixers) by the same **transmitter control**.
Other mixed signals which affect the same **servo output** are not affected, in contrast to standard servo travel limiting.

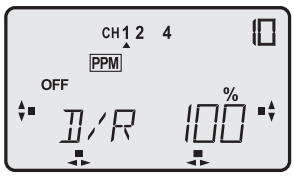
The external mixer switch should be connected to socket 4 (see illustration in Section 4.7). A single switch can control 1, 2 or 3 functions.
This is achieved by setting up the switches in the PARA/DRSW menu (see also "PARA" menu, Section 7.1.5).

The graph shows the characteristic curve of the different control travels. Note that the response is linear in both cases. When Dual Rates is selected, the servo travel at full stick deflection is only 60%.

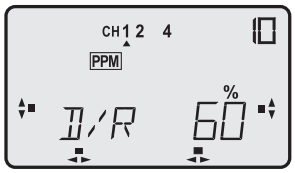


This option is available for the three primary control surface functions: aileron, rudder and elevator.

The top part of the screen displays the functions to which travel reduction can be applied. The arrow below the numbers indicates which function is currently selected.



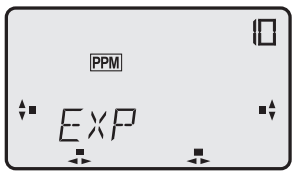
Press the "S" button to select the next function. The flashing "%" symbol shows that adjustment is possible; rotate the 3-D hotkey to set the value.



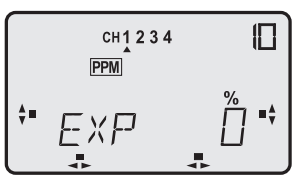
Turning the 3-D hotkey to the left reduces the control travel; turning it to the right increases the value. The screen displays the control travel you have set in the form of a percentage number between 0 and 100%. You can return to the default setting (100%) by holding the 3-D hotkey pressed in for about two seconds.

For reasons of safety you should never reduce the Dual Rates value to 0%, as this would give you no control at all for that function. We recommend 20% as the safe minimum value.
The exception to this rule is the case where you deliberately assign no function to a particular transmitter control, should you wish to use this channel to carry a self-generated mixer function (V-MIX).

7.9 Exponential function (EXP)

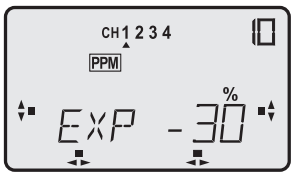


The "EXPO" function affects the characteristic curve of the transmitter sticks, i.e. the linear association between stick travel and servo travel is changed to a non-linear (exponential) curve. The basic purpose of EXPO is to provide fine control of the model around the neutral position.



The top part of the screen displays the transmitter controls 1…4, for which EXPO is available.
The arrow below "1" indicates that it is currently possible to alter the setting for transmitter control 1. The % symbol flashes to show that the value can be changed.

Note: the EXPO function is not available in the Heli program for the throttle function (3), as the curve for this channel is adjusted separately using a 3-point curve.

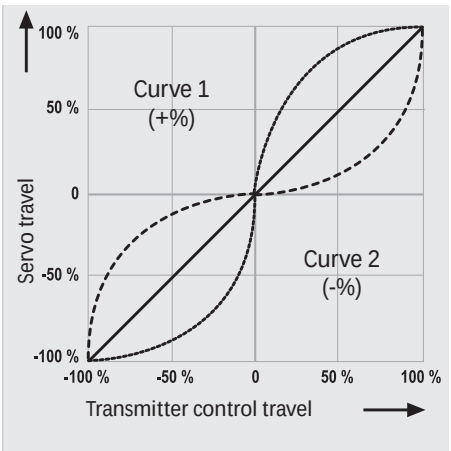


Rotate the 3-D hotkey to set the desired % value for the exponential function. You can reset EXPO to the default value (0%) by holding the 3-D hotkey pressed in for 1 second.

For high-speed model aircraft a degressive control characteristic (EXPO setting) is very often preferred.

This setting provides fine control of the model around the centre position of each function, without having to forfeit full travel at the end-points of stick travel.
Exponential can also offer advantages when beginners are learning to fly.

The exponential curve can be set to operate in either direction:



- Positive prefix -> powerful control effect around neutral, reducing towards the extremes (curve 1).

- Negative prefix -> reduced control effect around neutral, increasing towards the extremes (curve 2).

- In each case full servo travel is still available at the stick end-points.

The straight line represents the normal, linear association between the transmitter control travel (set value 0%) and the servo.

The selected exponential setting affects the function of the selected **transmitter control**, and also all other functions which are affected (through mixers) by this transmitter control.
Mixed signals from other transmitter controls which influence the same **servo output** are not affected by the EXPO setting.

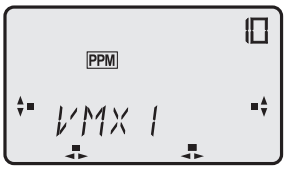
The exponential function is normally always active, but it can be switched between two settings using a switch connected to sokkett 4. This does not apply to channel 3 (throttle).
A switch connected to socket 4 affects both D/R and Exponential.

If the D/R switch is also in use for the Dual Rates function, the exponential setting is switched at the same time. In this case the same exponential settings should be set for both switch positions.

This does not represent a limitation, as usually either the D/R or EXPO function is set for a particular transmitter control or model; it is also possible to select the transmitter controls which are assigned to the switch connected to socket 4. This is done in the PARA/DRSW menu.

An exponential setting also affects a transmitter control for which a D/R travel reduction has already been set.

7.10 Linking mixers (VMIX1-3)

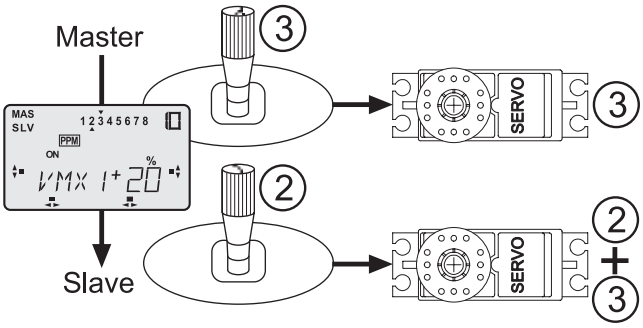


Operating the transmitter control normally affects only the servo connected to that channel. If the transmitter control is to affect additional servos, a mixer is required.

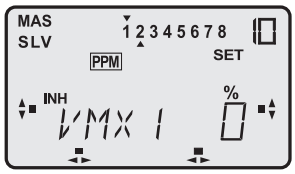
The software mixes part of the signal from the transmitter control into the signal for another channel. For each mixer the proportion of the signal and its direction are user-variable.

The software of the FX-18 includes three linking mixers, with a dummy function and an offset function. These mixers can be used to mix any control function with any other servo channel.
The mixer can be switched on and off in flight if an external mixer switch is fitted, and its effect can also be adjusted in fight by means of external mix trimmers. You can also select your preferred method of working of the trims.

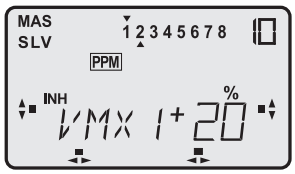
The method of operating and adjusting all three linking mixers (VMX1-3) is identical. The only difference is that the mixer switches and trimmers have to be connected to different sockets on the circuit board (see Section 4.7, Connecting the option modules).



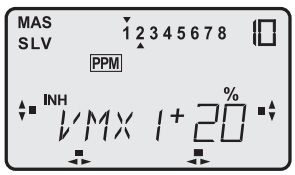
With a linking mixer the signal from one transmitter control (master) is passed to another transmitter channel (Slave).



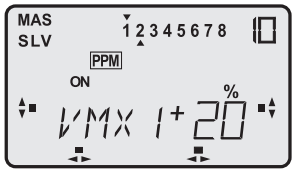
The first step is to find your way to the Setup menu for V-Mix 1. Initially SET and the "%" display on the screen flash, to indicate that the software is ready to accept your desired value.



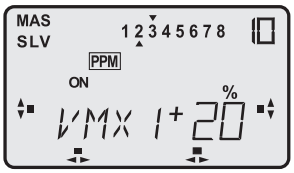
Rotate the 3-D hotkey to set the value you wish to use. Percentage values with a "+" prefix work in the same direction as the transmitter control; values with a "-" prefix work in the opposite direction.



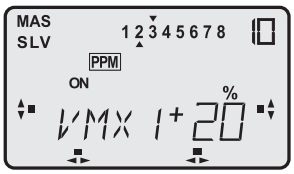
Press the "S" button until "INH" flashes. INH means "inhibit", i.e. not active.
Turn the 3-D hotkey to the left to activate the mixer. The screen now switches to "ON".



The mixer is now permanently switched on. The V-mixer can be switched off (screen displays "OFF") if you connect an external mixer switch to sokket 1.

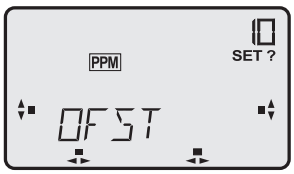


Press the "S" button until "MAS" (Master) flashes. Turn the 3-D hotkey and select the Master control, e.g. 3. The arrow above the "MAS" row indicates the selected Master channel.



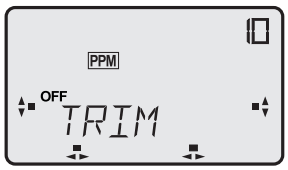
Press the "S" button, and "SLV" (Slave) now flashes. Turn the 3-D hotkey and select the Slave control; in our example we leave it at No. 2. The arrow below the SLV row shows the Slave channel you have selected.

Offset value (OFST)



Press the "S" button. You will now see "OFST" on the screen. Here you can set the point on the Master transmitter control's travel at which the mixing is to occur. Usually this is the centre position of the transmitter control.
For some applications - for example, landing flaps or spoilers - it can be useful to set the mixer to start its effect from one end-point of the transmitter control.
To set this up move the Master transmitter control to the desired position and hold the 3-D hotkey pressed in for 2 seconds. The query "OK?" appears on the screen, and the new position is stored. The beeper sounds twice to confirm this.
In our example we have set the Offset point to coincide with motor idle.

Trim mixing (TRIM)



Press the "S" button. This function allows you to select whether the digital trim of the Master channel is also to affect the Slave transmitter control. This may be necessary, for example, if your model features two separate elevator servos.
Both control surfaces are mixed together at the 100% rate, and you no longer need a Y-lead.
Of course, the trim must affect both elevators.
Rotate the 3-D hotkey to the left to switch trim mixing on, and to the right to switch it off.
In our example the setting is left at "OFF".

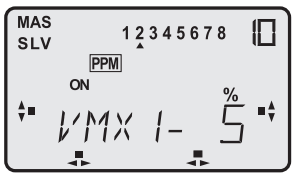
This completes the setup process. The screen shows a mixer completely programmed.
In this case the throttle (3) is set as the Master channel, with a mixer rate of +20% affecting the elevator (Slave channel 2).

The effect of this mixer is as follows: at full-throttle a 20% down-elevator deflection is automatically applied, to prevent the model climbing too strongly at full motor power.
This type of mixer is often recommended for highly-powered electric model aircraft (hot-line models) and power trainers.

You may find it necessary to change the prefix from "+" to "-", depending on the orientation of the elevator servo, in order to obtain down-elevator compensation rather than up-elevator.
In model aircraft the optimum mixer value often cannot be predicted accurately, and you have to establish it in a series of test-flights.

If you install an external mix trimmer, the convenient linking mixer facility of the FX-18 allows you to use it to override the pre-set percentage value by +/- 25% This makes it easy to determine the optimum value with the model in flight.
To achieve this, connect an external mix trimmer (as described on page 10) to socket 1, and switch the trimmer to active (see also Section 7.15).

Dummy function



As is shown in the adjacent screen shot, the software also allows you to select "no" Master channel. This means that the selected mixer value is mixed into the selected Slave channel.

In the example shown here a 5% proportion of the elevator signal (down-elevator) is mixed in. This can be used, for example, to avoid having to hold the elevator constantly in this position for a speed flying task. The function can also be used to set a fixed rotational speed or servo position.

The V-MIX 1 - 3 linking mixers are all set up, adjusted and operated in the same manner.

Sockets	Mixer switch	Mix trimmer
V-MIX 1	1	1
V-MIX 2	2	2
V-MIX 3	3	3

Special feature: stick-to-stick mixing
All the VMIX 1-3 mixer functions act directly on the Slave transmitter control.
If the Slave transmitter control already operates other pre-programmed mixer functions (V-tail, X-mixer etc.), this results in what is known as cascading, or superimposed mixer functions.
The advantage of this new type of "stick to stick" mixing is that one can mix directly into existing mixer functions.

Depending on the type of mixer, this means that you can mix a signal into the transmitter control in such a way that another servo function operates in the opposite direction, or in the same direction.

An interesting example is the combination of an X-mixer with a V-mixer, in order to connect separately actuated elevators and operate them in parallel as ailerons; a system known as "tailerons" (AILVATOR). This can be used on the robbe Hunter, for example, where the tailerons provide better and more axial roll response.

This is the procedure:

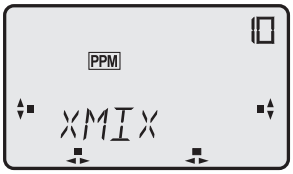
Connect the servos to the receiver:
1 = Ailerons
2 = Elevator
3 = Rudder
4 = Throttle (speed controller)
5 = Elevator (2nd servo)

Activate an X-mix (dual mixer). Set up channel 2 as the Master, channel 5 as the Slave, and a mixer rate of 100% in both cases. See also the description of the X-MIX mixers which follows.

Now select V-Mix 1, activate it and set it to operate from MAS 1 to SLV 5; mixer rate 50-100%, trim ON.

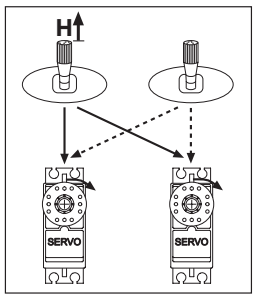
This concludes the setup procedure.

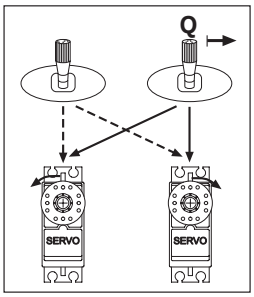
7.11 Dual mixers (XMIX)



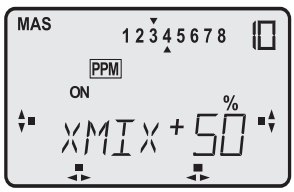
A mixer which combines two functions equally, with both superimposed on the other, is termed a dual mixer or cross-mixer. In this case there are two Master functions instead of a Master and a Slave.

A good example of a dual mixer is the type required for delta model aircraft. When up-elevator is applied, both wing flaps must move up together, but when an aileron command is given, the right flap should move up, the left flap down, i.e. they move in opposition to each other. When aileron is applied the aileron channel is the Master control. When elevator is applied the elevator channel is the Master, i.e. the signals are mixed equally, and neither takes precedence.

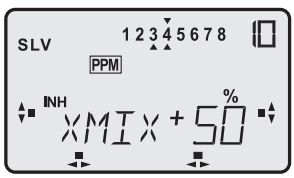




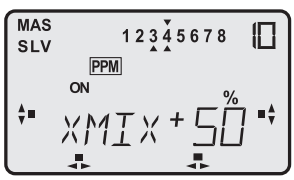
The software of the FX-18 includes one freely programmable dual mixer (XMIX), which means that you can select any two of the transmitter controls 1 - 8 for the mixer, without restriction. In the following example the control functions for a model delta are combined in a dual mixer. This means that the transmitter controls 1 (ailerons) and 2 (elevator) have to be mixed together.



Initially the % display flashes, and on the screen at top left you see "MAS". The arrow above the number, e.g. 3, shows that the mixer value (%) for control function 3 is available for adjustment. For the moment we will leave that value at +50%.

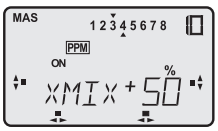


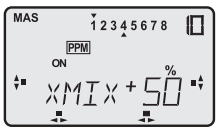
Press "S" to move on within the menu until "SLV" appears, and the arrow above the number changes to, say, 4. You can now set the mixer value (%) for control function 4. We will also leave its value at +50% for the moment.

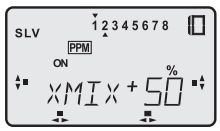


Move on with the "S" button until "INH" (INH - mixer function switched off) flashes, then turn the 3-D hotkey to the left to switch on the X-Mix dual mixer (ON).

Press the "S" button again until "MAS" flashes, and the arrow in the top row shows the control function you have selected.







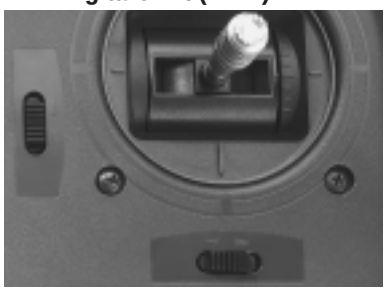
- Rotate the 3-D hotkey to select function 1 (aileron).
- Press "S" again; "SLV" flashes, and you can select the second control function.
- Move the bottom arrow under the number 2 (elevator) by rotating the 3-D hotkey.

The mixer is now set to combine the control functions aileron and elevator, in each case with 50% inputs for elevator and aileron. Depending on the physical orientation of the servos and the control surface linkages you may find it necessary to reverse the direction of servo rotation, or the direction of mixing, so that the servos move in the same direction for elevator control and in the "correct" opposite directions for aileron control.
The first step should always be to reverse the servos as required in order to make the elevator function work correctly.

If the mixer then works in the wrong direction, set the elevator mixer input (SLV 2) to -50% instead of +50%. as shown in the screen shot.
You may now find that you need more aileron response than elevator, in which case the percentage value for "MAS" 1 should be increased. The mixer inputs can be varied independently of each other within the range 0% to +/- 100%.

This type of X-mixer is also suitable for superimposing the motor and steering functions of chain-driven vehicles, and can be useful for twin-motor model boats. In this case the control functions motor (3) and steering (1 or 4) are usually mixed at a rate of 100% in each case.

7.12 Digital trims (TRIM)

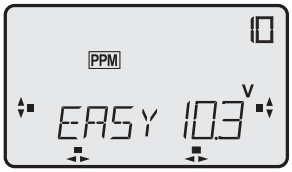


Stick function trims are required in order to make adjustments to the neutral settings, so that a model running or flying with the sticks centred actually runs straight ahead.
Minor corrections to the centre settings are carried out by adjusting the associated trim.
The FX-18 transmitter is equipped with a digital trim function. This modern type of trim offers the important advantage that the system automatically reverts to the previously set trim values when you switch to a different model memory, i.e. when you decide to use a different model.

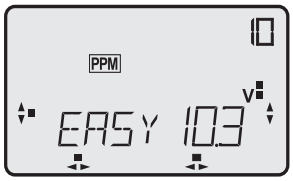
This eliminates the need to check and re-trim the new model. The trim values for each model are stored in the individual model memory.
Each stick function features a momentary micro push-button with two switch positions. These buttons can be operated with great sensitivity.

The position of the trim is indicated on the screen by a black square which moves a greater or lesser distance from the centre position in the direction of the trim offset.

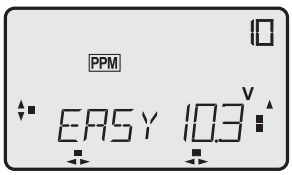
The beeper sounds every time you push one of the four digital trim buttons, so that you can also check the change in settings by ear, without having to look at the screen.



In this screen shot all four trims are in the neutral position. This is indicated by a double arrow for each trim, and a black square which is exactly in the centre.



If you now push the trim button of the right stick (vertical plane) forward, the associated square moves up by one increment. A total of 30 trim increments are available to each side of centre, and for each trim increment the servo moves through about 0.5°.
Since the length of the trim display bar is limited, the display alternates as you continue to push the trim: first one square, then two squares.

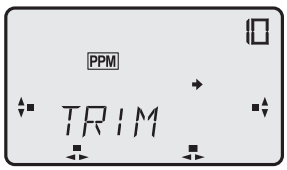


After the 6th trim increment the display reaches the top limit of the screen. At this point the display changes to a single arrow, which indicates the direction in which the trim has been moved.

The display scrolls in the appropriate direction, so that the complete bar travel can be seen. The display also changes, and the trim button must be pushed twice to update the display and add a further square.
To help you locate the neutral point easily, when the neutral position is reached the trim briefly "misses", and you will hear a double beep.

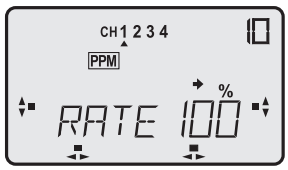
Release the trim button at this point, and you have found the exact neutral position. With a little practice you will find that you can adjust the trim values "blind", and can locate the exact neutral position without having to look at the transmitter itself.
Any major trim value offsets from the neutral point should be corrected at the servo output arm or pushrod, otherwise you will notice a difference in servo travel to each side of centre.
All the other trims work on the same principle.

7.12.1 Trim parameters



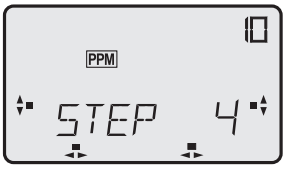
In this menu you can adjust the digital trim parameters "trim travel" and "increment size".
These are stored in the model memory, and thus can be optimised for each model separately.

7.12.2 Trim travel (RATE)



For some applications it is necessary to reduce the normal trim travel (approx. +/- 15%). If the trim travel is reduced, the value for the individual trim increments also becomes smaller, i.e. finer trim control becomes available.
This is essential in some cases, especially when using a Heading Lock gyro, in order to set the neutral position with great accuracy.
In the case of SMM gyros in AVCS mode it may even be desirable to switch off the trim entirely (Rate 0%), in order to prevent accidental trim changes.
To adjust the trim rate select the appropriate transmitter control (1…4) using the "S" or "H" button, and rotate the 3-D hotkey to set the desired value.

7.12.3 Trim increment (STEP)



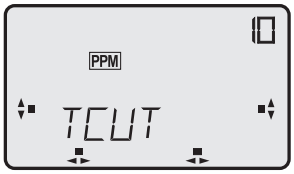
In this sub-menu you can set the size of each increment or step which occurs when the trim button is pushed.
The increment can be adjusted in steps of 0 to 30.

A small increment size produces very fine trim control, but requires more button-pushes in order to offset the trim by a relatively great amount.
At the other extreme a large increment means that the trim can be adjusted quickly, but the trim offset per increment is not so fine.

Table of trim increments:

Step 0	=		**Trim switched off**
Step 1	=	120	Button pushes
Step 4	=	30	Button pushes (default value)
Step 8	=	15	Button pushes
Step 10	=	12	Button pushes
Step 20	=	6	Button pushes
Step 30	=	4	Button pushes

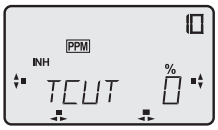
7.13 Motor cut (TCUT)

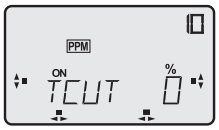


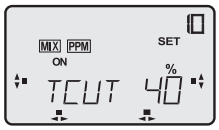
The purpose of this option is to enable you to cut the motor without adjusting the idle trim. You will require an external mixer switch for this function, connected to socket 5 (see Section 4.7).

Use the 3-D hotkey to adjust the position which the throttle servo is to take up when you operate the switch. The set value of 0…+/- 40% corresponds to the idle trim travel of around +/- 15%. The pre-set position varies according to the throttle stick position.

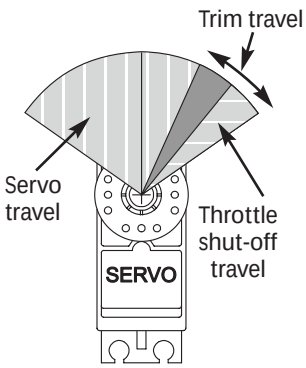
For use with internal-combustion engines asymmetric throttle trim should also be activated (see Section 7.1.4).



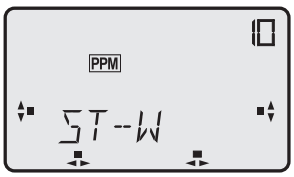




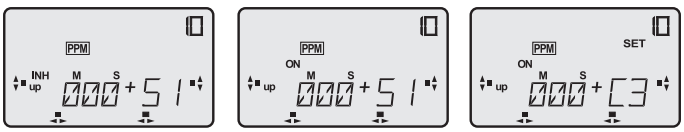
- Find your way to the Select menu "TCUT".
- A brief press on the 3-D hotkey takes you to the Setup menu; the "%" display flashes.
- You can now change the percentage value by rotating the 3-D hotkey; a good starting point is 25%. Hold the 3-D hotkey pres sed in for 1 second to revert to the default value (0%).
- Press the "S" button, and "INH" (OFF) flashes. Rotating the 3-D hotkey to the left switches the mixer on (ON); the symbol "Mix" appears on the screen to indicate an active mixer. **The screen shows the symbol "ON" or "OFF" depending on the position of the switch.**
- If the throttle cut is still switched on (ON) when you switch on the transmitter, the software activates a mixer alarm: the screen shows the symbol "MIX" and the beeper sounds. Reverse the position of the external mixer switch (5) once to switch off the alarm.
- This alarm function is intended to remind the user that the carburettor is completely closed, and the motor therefore cannot be started.
- To start the motor the throttle cut function must be set to "OFF".
- Now carefully set the percentage value so that the carburettor is closed, but the push rod does not strike its end-stop.
- If you operate the external mixer switch to switch off the throttle cut, i.e. for running the engine normally, the screen displays "OFF".



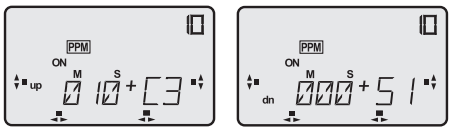
7.14 Stopwatch (ST-W)



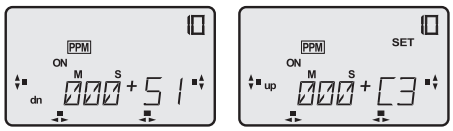
The software includes a stopwatch which can be set to count up or down, and is started either by a transmitter channel or a separate mixer switch.
This function can be used to record your model's flight times (counting up), or to record motor runs (counting down), e.g. with an electric-powered model. In either case the stopwatch can display the results on the screen.
The following section explains the stopwatch setup process using the example of an upward counting stopwatch with a pre-set time of 1 min 10 sec; the timer is to be controlled by the transmitter throttle channel 3.



- Move to the Select menu "ST-W".
- A brief press on the 3-D hotkey takes you to the Setup menu, and the display "0" under M (for minutes) flashes.
- Move on by pressing the "H" button until "INH" flashes. Turn the 3-D hotkey to the left to switch on the stopwatch. The screen now shows "ON".

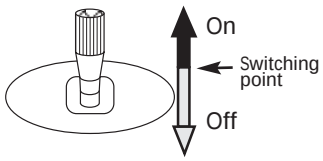


- Continue by pressing the "H" button until "up" flashes. By turning the 3-D hotkey to the left you can select whether the stopwatch counts up (up), i.e. from 0 seconds to the pre-set time, or down (dn), i.e. starting from the pre-set time. For our example we will leave it at "up".

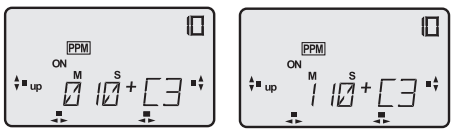


- Press the "H" button again; the mixer switch "S1" flashes.
- Rotate the 3-D hotkey to select the transmitter control you wish to use, or a mixer switch. In this case +C3 (C = Channel 3).
- This means:
  C1...C8 = Transmitter channels 1 ... 8.
  S1 ... S8 = mixer switch 1 ... 8
  +/- indicates the direction of switching, i.e. the position at which the switch is on or off.

- As soon as you select transmitter control "C" for the stopwatch, the screen shows "SET" to indicate that you can now set the switch trigger point to any position of the transmitter control.



  Set the transmitter control to the position of your choice, and hold the 3-D hotkey pressed in for 1 second; the new trigger point is accepted.

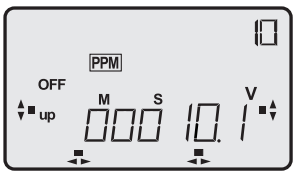


- Continue by pressing the "H" button, and the Seconds display flashes. Rotate the 3-D hotkey to set the seconds (10 sec).
- Continue by pressing the "H" button again, and the Minutes display flashes. Rotate the 3-D hotkey to set the number of minutes (1 min).

That concludes all the settings for our example. If you now move the throttle stick 3 forward past the set trigger point, the stopwatch starts running. If you move the stick back below the trigger point, the timer stops.

To check the timer function, switch from the Setup menu "ST-W" to HOME menu 3, where the stopwatch function is displayed.

Since we have programmed a count-up timer, the stopwatch starts at 0:00 and runs up to the pre-set time.
The beeper emits the following signals to keep you informed of progress:

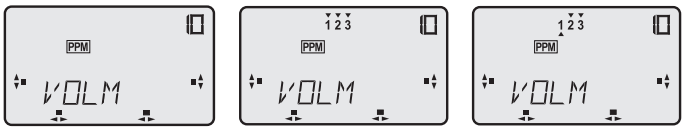


- Every time the stopwatch starts or stops (1 x brief)
- Every full minute (1 x brief)
- The last 10 seconds before reaching the pre-set time, every second thereafter (in each case 1 x brief)
- When the pre-set time has elapsed (1 x long)
- When the set time is exceeded, the timer continues running and the overall time is displayed on the screen.
- The stopwatch can be stopped and started again at any time; in each case it resumes running from the last stored value.
- **Reset the stopwatch by pressing the 3-D hotkey twice briefly. Switching off the transmitter also has the same effect.**

The stopwatch function is specific to each model memory; if you select a different model memory, you can configure a different type of stopwatch exactly as you wish.

7.15 External mix trimmers (VOLM)

If you wish to make adjustments when your model is flying or running, the mix trimmers must be switched to active. It is also possible to switch the trimmers off, to ensure that the correct values, once established, are not lost by mistake.



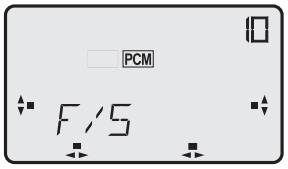
- Find your way to the Setup menu "VOLM"
- Press the "S" button to select the trimmer number you wish to configure; the selected number flashes. The sequence is identical to that of the physical sockets on the circuit board.
- Rotate the 3-D hotkey to move the arrow below the number; the arrow positions mean:
  Arrow above -> trimmer switched off
  Arrow below -> trimmer switched on

Basic model type

Mix trimmer - assignment:
1 = Mixer ratio V-Mix 1
2 = Mixer ratio V-Mix 2
3 = Mixer ratio V-Mix 3
4 = free
5 = free
6 = free
7 = free
8 = free

The mix trimmer and adjustor assignments vary according to the selected model type, and are described in detail in the separate Sections relating to power models, gliders and helicopters.

7.16 Fail-Safe settings (F/S)



This function is only available in PCM mode; you must first set the transmitter to this modulation (see Section 7.1.1, Parameter menu). The model must be fitted with a robbe-Futaba PCM receiver.

In the Fail-Safe menu you can carry out the following adjustments for channels 1…8.

1."NOR" (Normal), or Hold mode.
The receiver stores the last error-free signals, and passes them on to the servos if interference occurs.
These signals are maintained until valid signals are picked up again from the transmitter.

2. (F/S) Fail-Safe position.
In this case the servos run to a position pre-programmed at the transmitter; these values are also stored in the receiver. As standard the fail-safe value for the throttle channel is activated at a value of 20%.

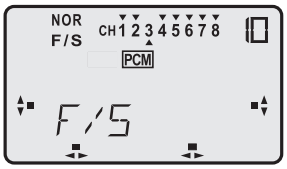
A "Battery fail-safe" function is also available.
As soon as the voltage of the receiver battery falls below a value of around 3.8 V, the throttle servo runs to a pre-set position (20%) in order to indicate to the pilot that the model's receiver battery is dangerously low.
You must land immediately if this should occur.

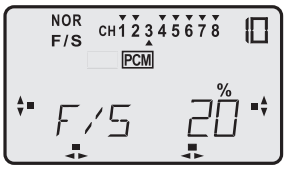
The battery fail-safe function can be reset for a period of 30 seconds by moving the throttle stick briefly below the programmed fail-safe position. The throttle servo will then revert to the pilot's control. This can be repeated as required.
This function is active even if you do not program a F/S setting for the throttle channel.

Don't set too low a value for the throttle, otherwise the motor could stop at an awkward moment. The default value of 20% can, of course, be overwritten.

The F/S settings should be carried out separately for each model type. For example, a helicopter should be set to a safe hover, whereas a fixed-wing model should be set to a broad turning pattern.
Program the settings which allow the model to fly by itself for a while in an inherently stable flight attitude. This should allow the model to survive unscathed if brief interference strikes, until contact with the transmitter is restored.
You can check the settings by switching off the transmitter, and watching the response of the servos in the model.

The Fail-Safe settings are automatically transmitted to the receiver at intervals of about 60 seconds.
To ensure that the data is actually stored in the receiver, you should wait for at least 60 seconds between switching on the transmitter and operating the model.



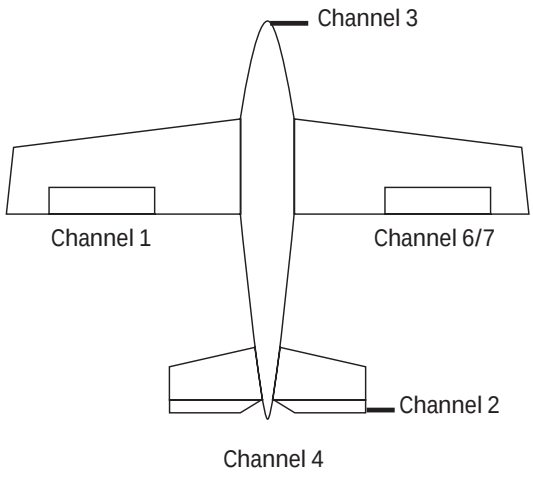


- Move to the Select menu "F/S".
- Press the 3-D hotkey briefly to move to the Setup menu.
- Use the "S" and "H" buttons to select the control channels which are to be set to Fail-Safe (F/S).
- Rotate the 3-D hotkey clockwise to activate the Fail-Safe option. If you wish to revert to the basic setting (NOR), turn the 3-D hot key to the left.
- The triangle symbol shows the status of each control channel.
- Now move the sticks for all the channels for which an F/S setting is to be made to the desired Fail-Safe position **simultaneously**, and hold the 3-D hotkey pressed in for at least 1 second to store the settings.

General notes on the Base program
The options listed for the 'BASC' mixer program are also available in the special programs (ACRO, GLID and HELI).
As a general rule you can make use of additional, model-specific functions by selecting the special programs; these are in addition to those in the Base menu.
The expanded functions are included in the rotation loop, and can be found in the screen sequence before the menu point PARA.

Servo assignment in the ACRO menu:

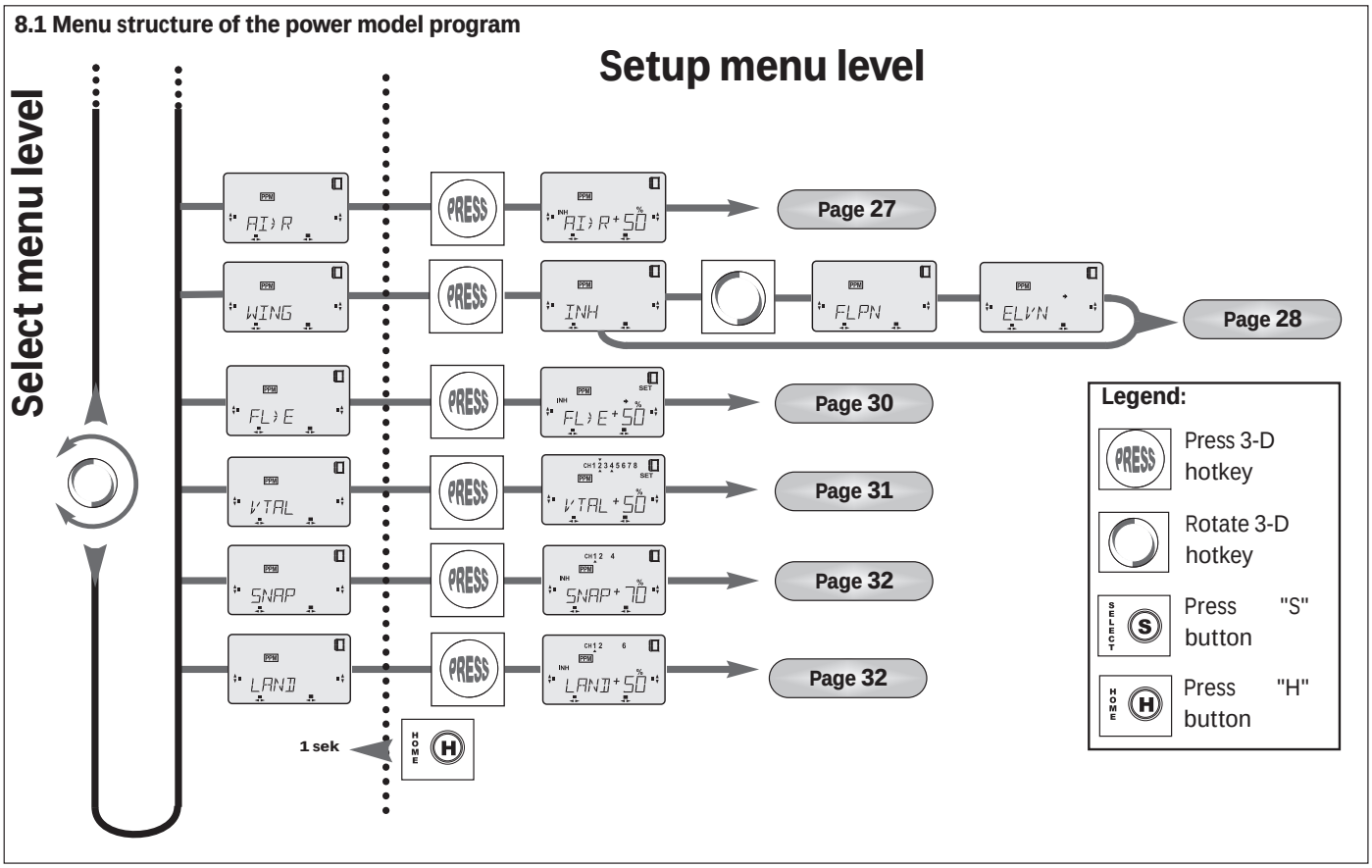
Channel 1:	Aileron
Channel 2:	Elevator
Channel 3:	Throttle
Channel 4:	Rudder
Channel 5:	Auxiliary channel (retracts)
Channel 6:	Aileron 2
Channel 7:	Auxiliary channel, optionally Aileron 2
Channel 8:	Auxiliary channel



8. Powered model aircraft (ACRO)
The mixer program for power models provides a range of special menus for this type of model aircraft, in addition to the basic functions already described.

These menus are integrated into the rotation loop, and can be found before the Parameter menu (PARA) when you have already selected the corresponding model type in the TYPE menu. See also Section 7.3.
Please note the servo sequence on the previous page.

8.1 Menu structure of the power model program



8.2 Assignment of external switches and mix trimmers (ACRO)

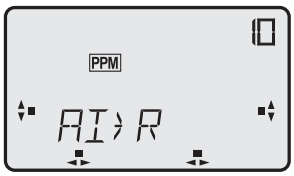
The assignment of the external mixer switches and mix trimmers varies according to the selected model type.

Switch assignment for power model program:
1 = V-mix 1
2 = V-mix 2 / Snap
3 = V-mix 3
4 = Dual Rates (D/R)
5 = Throttle cut (TCUT)
6 = Combi-switch (AI>R)
7 = Aileron differential (DIFF)
8 = Landing pre-sets (LAND)

Mix trimmer assignment for power model program:
1 = Mixer ratio, V-Mix 1
2 = Mixer ratio, V-Mix 2
3 = Mixer ratio, V-Mix 3
4 = Aileron differential input
5 = Mixer ratio, V-tail, elevator
6 = Mixer ratio, V-tail, rudder
7 = Mixer ratio flap - elevator
8 = Unused

8.3 Combi-mixer (AI-R)

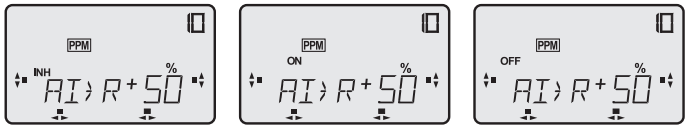
The software of the FX-18 includes a pre-programmed aileron - rudder compensation mixer which can be switched on and off in flight. The mixer couples the ailerons and rudder in such a way that only one stick needs to be operated when flying a turn.



This is especially useful when flying large power models, since the negative roll moment (adverse yaw) of the model works against the ailerons when the model is turning.

Automatic rudder compensation can eliminate this effect. This mixer function is similar to the V-MIX linking mixers: part of the aileron signal is passed to the rudder channel, and at the same time the rudder stick retains full control of its own function.

Coupled rudder can be an embarrassment on the landing approach and in some other manoeuvres, so this option can be switched on and off in flight by means of a switch connected to socket 6.



- Move to the "AI-R" display in the Select menu.
- Press the 3-D hotkey; "%" flashes.
- Press the "S" button; "INH" flashes.
- Turn the 3-D hotkey to the left, the display switches to "ON", the mixer is activated; it can be switched "OFF" by means of an external switch.

- Press the "S" button again; "%" flashes.
- Turn the 3-D hotkey, and you can set the mixer value you wish to use; 50% is a good starting point.
- Check that the rudder moves to the right when you give a "right aileron" command (right aileron up).
- If that is not the case, turn the 3-D hotkey left to set a negative mixer value of -50%. Check the function again. Holding the 3-D hotkey pressed in for 1 second reverts to the default value of 50%.

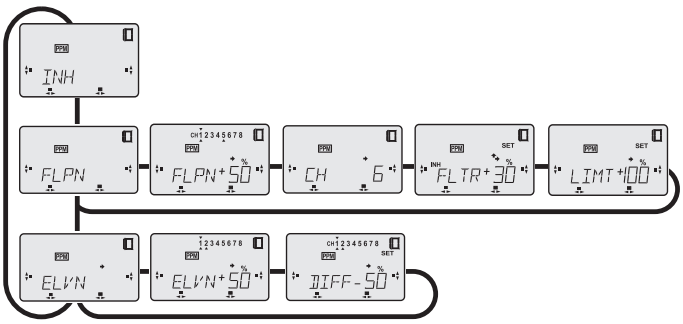
8.4 Wing mixers (WING)

This menu point groups together various mixers involving the control surfaces on the wings, and offers a very convenient method of setting them up.

FLPN sub-menu: with this function you can add differential travel to the two ailerons, and also (optionally) set up the ailerons to rise together to work as spoilers; this function is known as a flaperon mixer (flap + aileron = flaperon).

In the ELVN sub-menu you can activate a pre-programmed mixer for delta or flying wing model aircraft.

The flow chart below provides an overview of the individual sub-menus to help you find your way around.



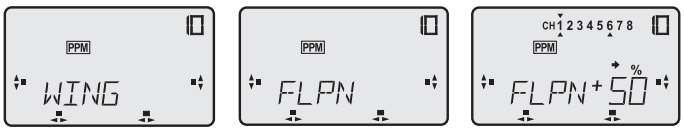
Explanation of terms:

Since the mixer inputs for the wing flap travels can be set separately for "up" and "down", the ailerons can be used for several functions; their function varies according to the flap travel:

- **Large deflection up -> spoilers**
- **Small deflection up -> speed flaps for high-speed flying**
- **Large deflection down -> landing flaps**

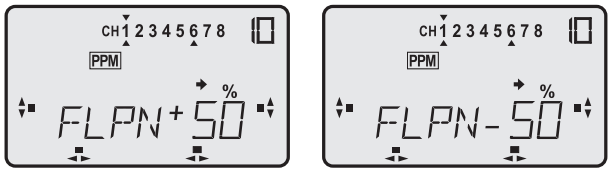
It is possible to program the wing flap deflection in the same direction for both sides of centre; for example: large "up" deflection as spoilers, at the other extreme only slight "up" as speed flight trim.

To help you understand and emulate the following adjustments, we recommend that you set up a model with two aileron servos (sockets 1 and 6), or just two servos on their own, and observe the effects of the mixer on the model.



Flaperon mixer FLPN

- Move to the Select menu "WING".
- Press the 3-D hotkey, and the display "INH" (Off) appears; the flaperon and delta mixers are switched off.
- Turn the 3-D hotkey to the right, and the Setup menu FLPN appears; confirm by pressing the "S" button, and the display "SET %" flashes.
- The two aileron servos (channels 1 and 6) are now mixed together; the flap function (FLPN) is also active, and aileron differential is set to the default of +50%.



- **The FLPN function can be operated over its full travel by means of a transmitter control (e.g. linear slider) connected to channel 6.**
- Check the "sense" of the aileron system: when you move the aileron stick to the right, the right-hand aileron should rise, the left aileron fall. If one or both servos runs in the wrong direction, reverse it in the Setup menu "REVR".
- Check also that the travel of the **down-going aileron is now smalle**r (correct differential).

If this is not the case, i.e. the travel of the **up-going aileron is smaller**, press the "S" button. The "+" prefix now flashes; rotate the 3-D hotkey to the left, and the prefix changes to "-", which reverses the differential.

0%	No differential
50%	Differential by half the maximum travel
100%	"Split" mode: only the up-going aileron moves

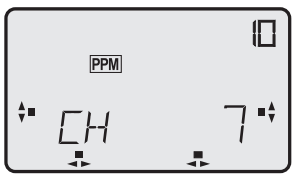
If you connect an **external mix trimmer to Pin 4** (see Section 8.2) the differential value can be over-ridden by +/- 25%; this enables you to set the correct differential in flight.

If you connect an **external mixer switch to socket 7**, you can switch off differential in flight, which produces greater aileron response for the landing approach.

Holding the 3-D hotkey pressed in for 1 second restores the default differential value (+50%).

Selecting the 2nd aileron output (CH)

Pressing the "S" button again activates the menu in which you can select the output to which the second aileron is to be connected.
The default arrangement is channel "6".
Turning the 3-D hotkey to the left switches it to channel "7".



If you select channel 7 for the second aileron output, the wing flpn mixer function is automatically switched off.

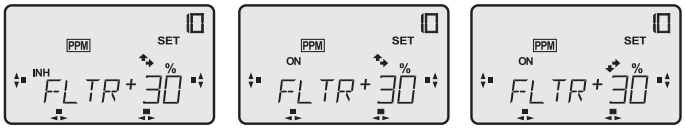
If you connect a transmitter control, e.g. a linear slider, to channel 6, it acts as a normal transmitter control on servo channel 6.

This is the correct setting for model aircraft which require aileron differential, but no superimposed flap function for the ailerons.

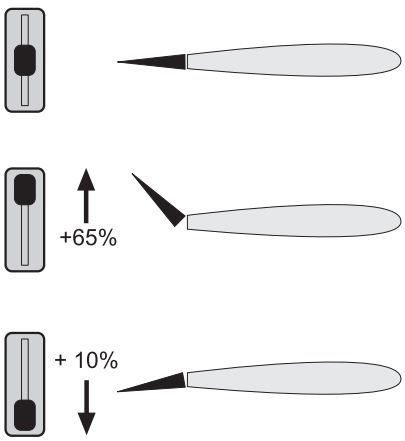
The second aileron servo must be connected to receiver output 7; re-connect the servo if necessary.

Setting flap travel (flaperon) (FLTR)

Provided that you have selected channel 6 as the second aileron channel, you can now press the "S" button to move on to a further sub-menu in which you can set the travels for the flaperon option (flaps). If the mixer is switched off (INH), flap travel is 100%.



- The first step is to activate the mixer.
- The "INH" symbol flashes; turn the 3-D hotkey to the left to "ON".
- Press the "S" button; the "%" symbol flashes.
- The flap servo travels can now be set for each direction of the transmitter control separately. The default setting is 30%.
- Move the linear slider 6 or the throttle stick forward; the arrow should point up. If the arrow points down, locate the plug from the linear slider at the circuit board and turn it through 180°.
- Travel is adjusted by rotating the 3-D hotkey. The adjustment range is -100% to +100%.
- Pull the linear slider 6 back, and set the flap travel for the "down" direction.
- Holding the 3-D hotkey pressed in for 1 second reverts to the default value (30%).



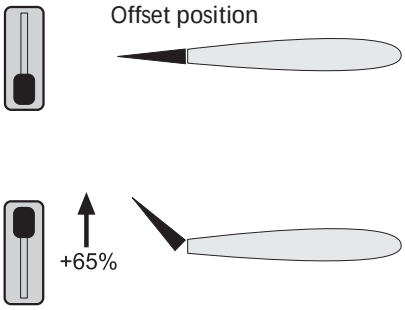
The diagrams show an example in which large "up" travel has been set for use as spoilers (65% = approx. 40º flap travel), while the "down" travel is smaller, for use as camber-changing flaps, intended to give a slight increase in wing lift.

Offset (centre offset)

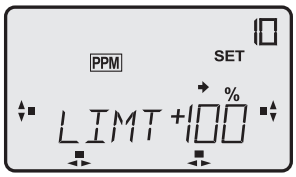
To make it easier to control the spoilers in flight it is desirable to set a defined position for the retracted and extended flaps when acting as spoilers.

This can be achieved by offsetting the centre position of the spoiler control (linear slider or stick) to any desired position.
In our example this is the end-point of the transmitter control.

- Press the "S" button until "SET" on the screen flashes.
- Move the linear slider or stick to the desired position, then hold the 3-D hotkey pressed in for 1 second.
- This causes the software to adopt the new transmitter control position as the "new zero setting".

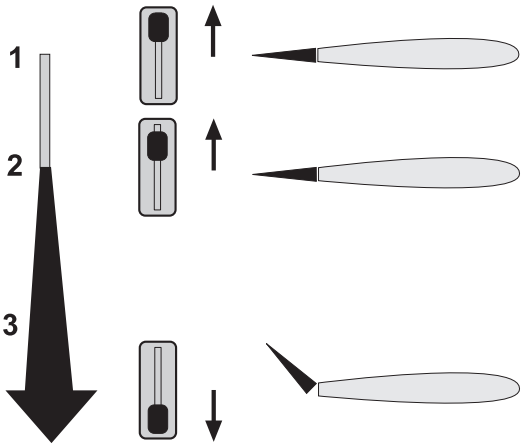


Dead zone range (LIMT); only active if FLTR = "ON"

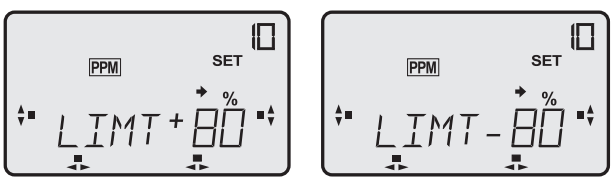


Pressing the "S" button again takes you to the "LIMT" menu, in which you can set a "dead zone".

This makes sense if the spoilers are operated by a linear slider, as it is easy (and unwanted) to extend the spoilers slightly by accident. To prevent this you can set a particular point on the spoiler travel after which the transmitter control starts to have effect; this is done in the LIMT menu.

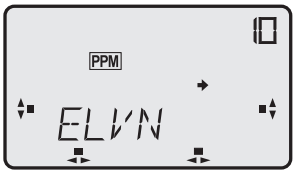


- 1 = "Dead zone"; transmitter control has no effect
- 2 = Limit point
- 3 = Active airbrake travel

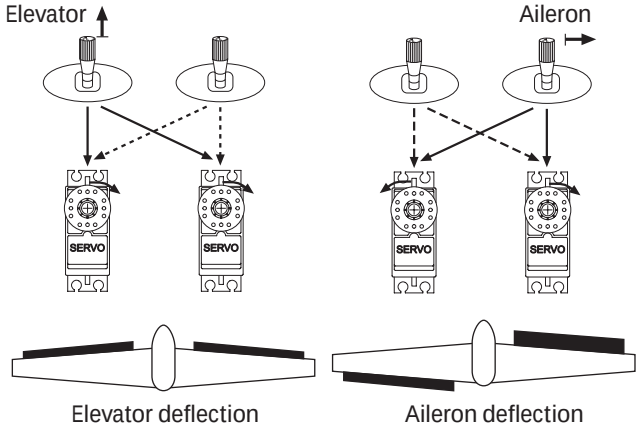


- Move the transmitter control (stick or linear slider) to the posi tion at which the Limit point (2) is to be located.
- Now hold the 3-D hotkey pressed in until the new position is displayed on the screen as a percentage of the control travel.
- Rotating the 3-D hotkey reverses the prefix, so that you can select whether the active brake range lies above or below the Limit point.

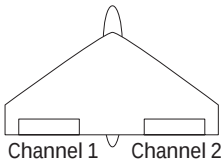
8.5 Delta mixer (ELVN)



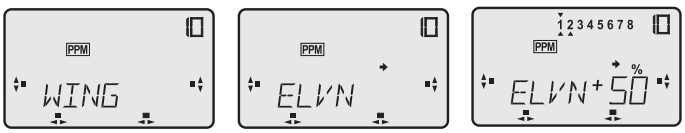
This mixer combines the signals of the ailerons and elevators for use in model aircraft of the delta or flying wing configuration.
It works in the same way as the XMIX mixer (see also Section 7.11), but is programmed permanently for the aileron and elevator channels.
When you operate the elevator stick, both servos run in the same direction; move the aileron stick, and they run in opposite directions.



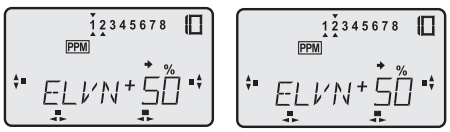
The travels for the aileron and elevator functions are separately variable, and aileron differential is also available as standard.



The left aileron servo is connected to receiver output 1 (Aileron) and the right servo to channel 2 (Elevator).



- Move to the Wing mixer (WING) menu at the Select level.
- A short press on the 3-D hotkey takes you to the sub-menu where you can select between the Flaperon (FLPN) and Delta mixers (ELVN); select ELVN by turning the hotkey to the right.



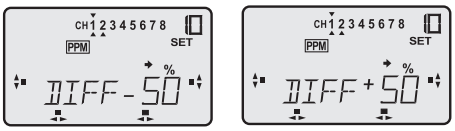
- Press the "S" button to reach the Setup menu level.
- The screen shows arrows under the numbers, indicating that the two functions 1 and 2 are mixed.
- The arrow above the numbers and the flashing "SET and %" indicate that the mixer value for Function 1 (Aileron) can now be adjusted.
- Rotate the 3-D hotkey to enter the servo travel as a percentage between -100% and +100%. The default value of 50% can be left in place for the moment.
- Press the 3-D hotkey for 1 second to revert to the default value (+50%).
- A further press on the "S" button highlights the Elevator channel (2). You can now set up the aileron servo travel in exactly the same way as just described.

Depending on the physical orientation of the servos and the control surface linkages you may find it necessary to reverse the direction of servo rotation, or the direction of mixing, so that the servos move in the same direction for elevator control and in the "correct" opposite directions for aileron control.
The first step should always be to reverse the servos as required in order to make the elevator function work correctly. If the mixer then works in the wrong direction, set the elevator mixer input (2) to -50%.

You may find it necessary to set different travels for the two functions. In our experience most models are more sensitive to the elevator, and therefore require slightly more travel for the ailerons.

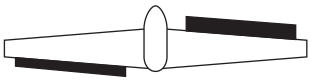
When setting the control surface travels, check that the servos do not strike their mechanical end-stops at full stick travel when the functions are superimposed.

Aileron differential



- Press the "S" button again to reach the aileron differential menu.
- Set the desired program values using the 3D-hotkey.

- **Check that the travel of the down-going aileron is now smaller.**


Aileron deflection

If this is not the case, i.e. the travel of the up-going aileron is smaller, press the "S" button. The "+" prefix now flashes; rotate the 3-D hotkey to the left, and the prefix changes to "-", which reverses the differential.

Explanation:

0%	No differential
50%	Differential by half the maximum travel
100%	"Split" mode: only the up-going aileron moves

Note: the **ELVN and VTAL** mixer functions are mutually exclusive, i.e. only one of them can be used. They are locked electronically to prevent this. If you have activated one mixer function, the other cannot be activated.

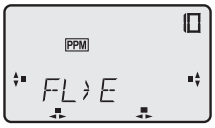
8.6 Camber-changing flaps -> elevator mixer (FL>E)

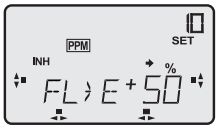
When you deploy the flaps (see also Section 8.4) many models exhibit a pitch trim change, i.e. nose up or down. The pilot usually has to compensate for this with an elevator command.

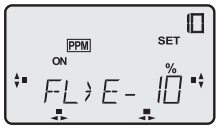
The FX-18 also provides a mixer to solve this problem, i.e. it automatically provides the corrective elevator movement.

The following example assumes that the ailerons have been programmed in the WING menu in such a way that they move up through about 45º in order to act as a landing aid. This generally requires a down-elevator trim correction of around -10%.

Note: it may be necessary to mix in a little up-elevator (+10%), depending on the model's layout and tail moment arm.







- Move to the Select menu "FL>E"
- A short press on the 3-D hotkey takes you to the Setup menu, and the "%" display flashes.
- Rotating the 3-D hotkey changes the percentage value; we recommend a starting point of -10%. Hold the 3-D hotkey pressed in for 1 second to revert to the default value (+50%).
- Press the "H" button, and "INH" (OFF) will flash. Turn the 3-D hotkey to the left and switch the mixer on (ON).
- The mixer function is now active; carry out a check on your model.

If you connect an external mix trimmer to Pin 7, the optimum value can be adjusted in flight. The trimmer allows you to over-ride the pre-set value by +/- 25%.

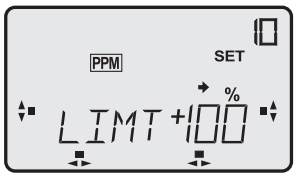
If you have activated the mixer FLTR in the WING menu (Section 8.4), any neutral point alterations (offset) and dead zone values (LIMT) you set at that point are automatically adopted by this mixer.

If you carry out a neutral point offset in this menu (hold the "S" button pressed in until "SET" flashes, then hold the 3-D hotkey pressed in for 1 second), this in turn is also adopted in the menu "WING".
This feature saves you having to switch between the two menus.

Special case
If the FLTR mixer has not been activated in the WING menu, the full aileron travel is available as a flap function. In this case it is necessary to set the neutral point here for the elevator compensation mixer.

This is the procedure:
- Press the "S" button until "SET" flashes.
- Move the transmitter control for the flaps to the position at which the flaps are retracted (neutral point)
- Hold the 3-D hotkey pressed in for 1 second; the elevator now moves to the new neutral position, and will be mixed in with the flaps from this position.

Dead zone (LIMT)

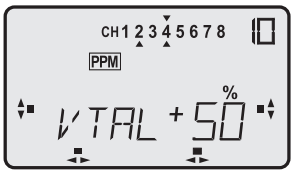


This function also only needs to be set if the FLTR mixer is switched off, otherwise the value is taken from the LIMT setting in the WING menu. As with the offset point, any adjustments made here also take effect in the WING / LIMT menu.

If the FLTR mixer in the WING menu has not been activated, the full aileron travel is available as a flap function. In this case the Limit function for the elevator compensation is set in this menu.

This is the procedure:
- Press the "S" button until "LIMT" flashes.
- Move the transmitter control for the flaps to the position at which the flaps are retracted (neutral point).
- Hold the 3-D hotkey pressed in for 1 second; the elevator now moves to the new neutral position, and will be mixed in with the flaps from this position.
- You can set whether the Limit function takes effect above or below the defined point by changing the pre-fix; this is done by rotating the 3-D hotkey.

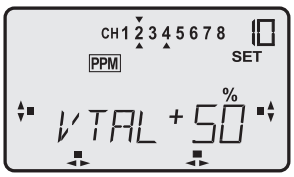
8.7 V-tail mixer (VTAL)



This mixer combines the signals of the rudder and elevator in order to control a V-tail on a model aircraft. It works in the same way as the XMIX mixer (see also Section 7.11), but is programmed to act upon the elevator and rudder channels.

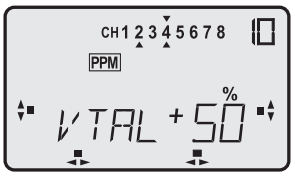
When the elevator stick is operated, both servos run in the same direction; when the rudder stick is operated, they move in opposite directions.

- Move to the Select menu "VTAL".
- A short press on the 3-D hotkey takes you to the Setup menu; the "%" display flashes.
- Arrows under the numbers on the screen indicate that the two functions 2 and 4 are mixed together.

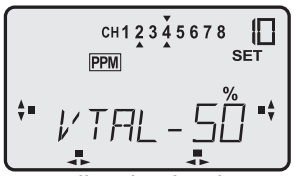


The arrow above the numbers, and the flashing "SET and %", indicate that you can now set the mixer value for function 2 (elevator).

- Rotate the 3-D hotkey to set the servo travel in the form of a percentage between -100% and +100%. To check this, move the appropriate stick to both end-points. The default value of 50% can be left for the moment.
- Holding the 3-D hotkey pressed in for 1 second reverts to the default value (+50%).



Press the "S" button again, and the rudder channel (4) is highlighted on the screen. You can now set the servo travel for the rudder using the method described above.



Depending on the physical orientation of the servos and the control surface linkages you may find it necessary to reverse the direction of servo rotation, or the direction of mixing, so that the servos move in the same direction for elevator control and in the "correct" opposite directions for rudder control.

The first step should always be to reverse the servos as required in order to make the elevator function work correctly. If the mixer then works in the wrong direction, set the elevator mixer input (2) to -50%.

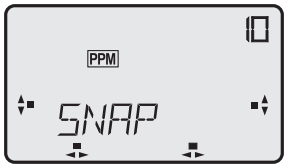
You may find it necessary to set different travels for the two functions. In our experience most models are more sensitive to the elevator, and require slightly more travel for the rudder.

Our recommended starting point:
Elevator (2) = 40%; rudder (4) = 70%

If you connect external mix trimmers to pins 5+6, they can be used to set the optimum mixer values while the model is in flight. Trimmers provide the means to override the pre-set values by +/- 25%.

When setting the control surface travels, check that the servos do not strike their mechanical end-stops at full stick travel when the functions are superimposed.

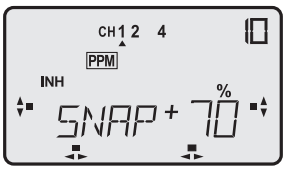
8.8 Snap-roll function (SNAP)



Snap-rolls are violent rolling manoeuvres. This function allows you to determine stick positions which result in a particular manoeuvre when a switch is operated.

This manoeuvre is then carried out automatically when you operate an external mixer switch (Pin 2). To operate and set up the manoeuvre this switch or push-button is absolutely essential, and should be connected before you start the set-up procedure.

- Move to the Snap Roll menu (SNAP) at the Select level.
- Press the "S" button to reach the Setup menu level



The screen displays arrows under the numbers, indicating which control functions can be assigned a pre-set position.

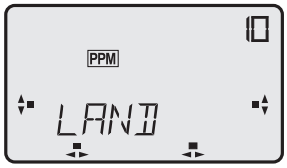
- Press the "H" button to activate the function: "INH" (OFF) now flashes. Turn the 3-D hotkey to the left to switch the mixer (ON). The symbol "OFF" or "ON" now appears on the screen, depen ding on the position of the physical switch. At the same time the symbol "Mix" appears to indicate that a mixer is switched on.

- Switch the SNAP function ON.
- Press the "H" button again, and an arrow appears under the number 4; the "%" symbol flashes.
- Now turn the 3-D hotkey to set the desired control surface tra vel for channel 4 - Rudder. The adjustment range is +/- 100%. Hold the 3-D hotkey pressed in for 1 second to revert to the default value of +70%.
- The settings for the other control functions are made in the same way; key to the numbers on the screen:
  1 = Aileron
  2 = Elevator
  4 = Rudder

If a mixer for a second aileron has been set up in the WING menu, both servos are actuated, as you would expect.
The SNAP function cannot be over-ridden, i.e. the control functions 1, 2 and 4 are switched off for the period of time that the SNAP function is active.

Note:
Switch position 2 has two functions, and affects both V-MIX 2 and the SNAP-ROLL function.
You should bear this in mind when programming your transmitter. V-Mix 2 can therefore only be invoked as an alternative to the SNAP-roll function.
If you wish to use both functions, use another free mixer (V-Mix 1 or 3).

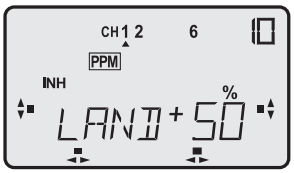
8.9 Landing pre-sets (LAND)



With this option you can determine the servo position of the landing flaps or spoilers and the elevator for the approach phase and landing.

This manoeuvre is carried out when you operate an external mixer switch (Pin 8). This switch or push-button is essential if you are to use and adjust this function, and should be connected before you start the set-up procedure.

- Move to the LAND menu within the Select level.
- Press the "S" button to move to the Setup menu level



The screen displays arrows under the numbers, indicating which control functions can be assigned a pre-set position.

- Press the "H" button to activate the function: "INH" (OFF) now flashes. Turn the 3-D hotkey to the left to switch the mixer (ON). The symbol "OFF" or "ON" now appears on the screen, depen ding on the position of the physical switch. At the same time the symbol "Mix" appears to indicate that a mixer is switched on.

- Switch the LAND function ON.
- Press the "H" button again, and an arrow appears under the number 2; the "%" symbol flashes.
- Now turn the 3-D hotkey to set the desired control surface tra vel for channel 2 - Elevator. The adjustment range is +/- 100%. Hold the 3-D hotkey pressed in for 1 second to revert to the default value of +20%.
- The settings for the other control functions are made in the same way; key to the numbers on the screen:
  1 = Left aileron (landing flap)
  2 = Elevator (default 20%)
  6 = Right aileron (landing flap)

This function assumes that a mixer to a second aileron has already been activated in the WING menu.
The pre-set LAND settings can be over-ridden.

The effect of the trim values for channels 1, 2 and 6 varies according to the output you selected for the 2nd aileron in the WING menu.

2nd aileron output: channel 6
In this variant the landing position settings affect channels 1, 2 and 6. The settings for the left and right ailerons are carried out separately.

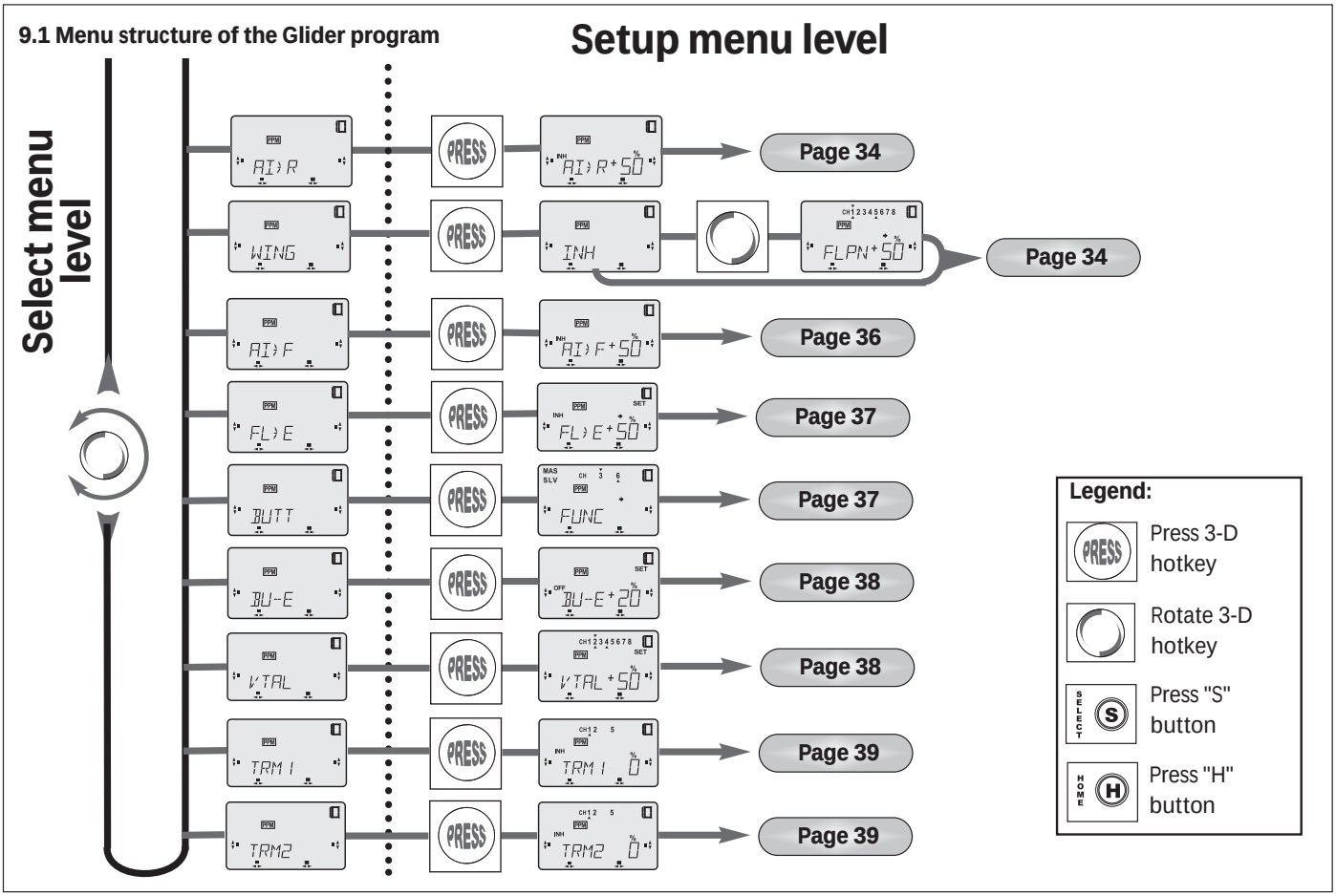
2nd aileron output: channel 7
In this variant the value which is set for channel 1 affects both channels (1 and 7). The value entered for channel 6 then only affects channel 6 as landing flaps. In each case the settings for the ailerons and flaps are carried out in pairs.

9. Model gliders (GLID)

The mixer program for model gliders provides a range of special menus for this type of model aircraft, in addition to the basic functions already described.

These menus are integrated into the rotation loop, and can be found before the Parameter menu (PARA) when you have already selected the corresponding model type in the TYPE menu. See also Section 7.3.

9.1 Menu structure of the Glider program



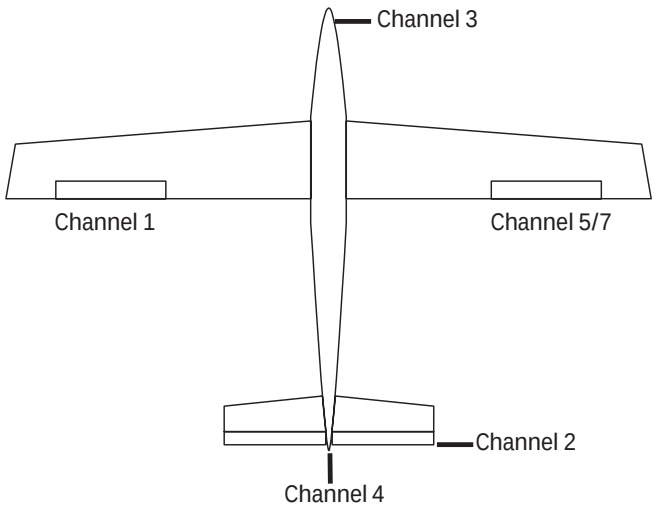
9.2 Servo assignment in the GLID menu:

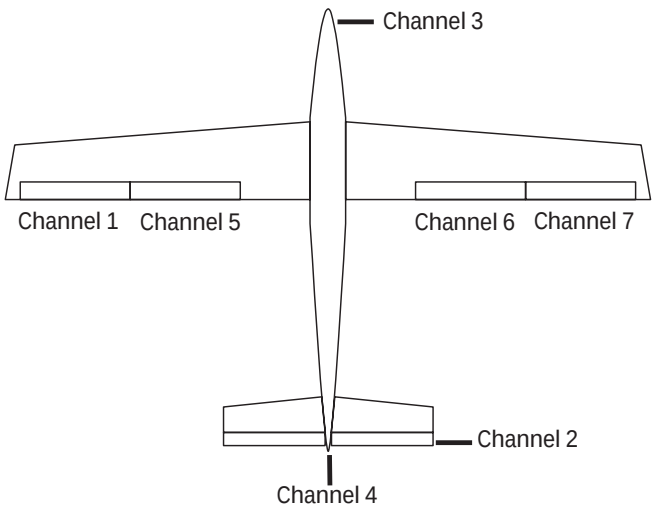
For models with 1 servo per wing

Channel 1:	Aileron 1 (flaperon)
Channel 2:	Elevator
Channel 3:	Auxiliary channel /speed controller
Channel 4:	Rudder
Channel 5:	Aileron 2 (flaperon)
Channel 6:	Auxiliary channel
Channel 7:	Auxiliary channel / optional aileron 2 (differential)
Channel 8:	Auxiliary channel

For models with 2 servos per wing

Channel 1:	Aileron 1 (flaperon)
Channel 2:	Elevator
Channel 3:	Auxiliary channel /speed controller
Channel 4:	Rudder
Channel 5:	Camber-changing flap 1
Channel 6:	Camber-changing flap 2
Channel 7:	Aileron 2
Channel 8:	Auxiliary channel





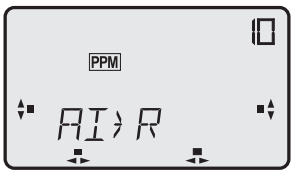
9.3 Assignment of external switches and mix trimmers (GLID)

The assignment of the external mixer switches and mix trimmers varies according to the selected model type.

Switch assignment for Glider program:
1 = V-mix 1
2 = V-mix 2 / aileron-flap mixer
3 = V-mix 3 / trim menu 2
4 = Dual Rates (D/R)
5 = Throttle cut (TCUT)
6 = Combi-switch (AI>R)
7 = Aileron differential (DIFF)
8 = Trim menu 1 (TRIM 1)

Mix trimmer assignment for Glider program:
1 = Mixer ratio, V-Mix 1
2 = Mixer ratio, V-Mix 2
3 = Mixer ratio, V-Mix 3
4 = Aileron differential input
5 = Mixer ratio, V-tail, elevator
6 = Mixer ratio, V-tail, rudder
7 = Mixer ratio flap - elevator
8 = Unused

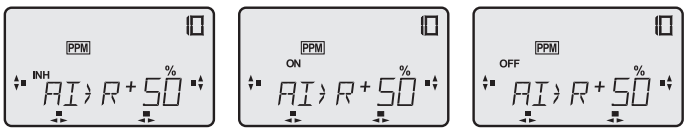
9.4 Combi-mixer (AI>R)



The software of the FX-18 includes a pre-programmed aileron - rudder compensation mixer which can be switched on and off in flight. The mixer couples the ailerons and rudder in such a way that only one stick needs to be operated when flying a turn. This is especially useful when flying large model gliders, since the negative roll moment (adverse yaw) of the model works against the ailerons when the model is turning.

Automatic rudder compensation can eliminate this effect. This mixer function is similar to the V-MIX linking mixers: part of the aileron signal is passed to the rudder channel, and at the same time the rudder stick retains full control of its own function.

Coupled rudder can be an embarrassment on the landing approach and in some other manoeuvres, so this option can be switched on and off in flight by means of a switch connected to socket 6.

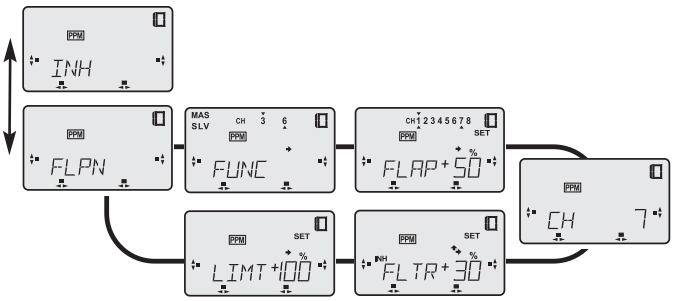


- Move to the "AI>R" display in the Select menu.
- Press the 3-D hotkey; "%" flashes.
- Press the "S" button; "INH" flashes.
- Turn the 3-D hotkey to the left, the display switches to "ON", the mixer is activated; it can be switched "OFF" by means of an external switch.
- Press the "S" button again; "%" flashes.
- Turn the 3-D hotkey, and you can set the mixer value you wish to use; the default setting is 50%, which is a good starting point.
- Check that the rudder moves to the right when you give a "right aileron" command (right aileron up).
- If that is not the case, turn the 3-D hotkey left to set a negative mixer value of -50%. Check the function again.
- Hold the 3-D hotkey pressed in for 1 second to revert to the default value of 50%.

9.5 Wing mixers (WING)

The software of the FX-18 includes a very convenient wing flap mixer.
This function can be used on the one hand to mix two separate aileron servos with variable differential travel, and also, as an option, to set the ailerons to rise together as a landing aid. This function is usually termed a flaperon (= flap + aileron) mixer.

The following flow chart is intended to help you find your way around the program.



Explanation of terms
Since the mixer inputs for the wing flap travels can be set separately for "up" and "down", the ailerons can be used for several functions; their function varies according to the flap travel:

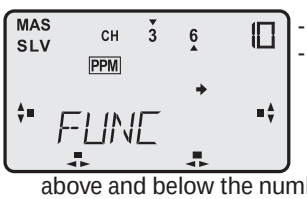
- **Large deflection up -> spoilers**
- **Small deflection up -> speed flaps for high-speed flying**
- **Large deflection down -> landing flaps**
- **Small deflection down -> camber-changing flaps for thermalling**

It is possible to program the wing flap deflection in the same direction for both sides of centre; for example: large "up" deflection as spoilers, at the other extreme only slight "up" as speed flight trim. This wing mixer is ideal for use in speed tasks and for thermal-hunting with an electric-powered hot-line model.

To help you understand and emulate the following adjustments, we recommend that you set up a model with two aileron servos (sockets 1 and 5), and observe the effects of the mixer on the model.
For the following description the 2nd aileron must initially be changed from channel 7 to channel 5 (see Section 9.5.3).

9.5.1 Selecting the transmitter control for flaperons / camber-changing flaps

In this sub-menu you determine which transmitter control (MASTER) is used to operate the flaperon mixer (landing / camber-changing flaps). As alternatives to channel "3" (throttle channel) you can choose a linear slider connected to channel "5" or a switch.

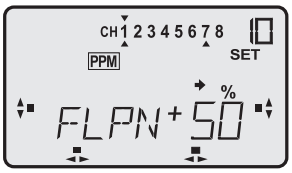


- Move to the Select menu "WING".
- Press the 3-D hotkey, and "FUNC" appears. The default setting is that the transmitter control (MAS 5) operates the flaps (SLV 5), which can be seen from the arrows above and below the number 5 on the screen.
- If you wish to control the flaps with the throttle stick, turn the 3-D hotkey to the left, and the screen display changes to "MAS 3".

In effect you have swapped over functions 3 and 5.
Note: since both the landing / camber-changing flap function (WING menu) and also the Butterfly function (BUTT) can be assigned to the throttle channel, check that both functions are not assigned to the throttle stick at the same time.

9.5.2 Flaperon mixer (FLPN) / Aileron differential (DIFF)

- Move to the Select menu "FLPN".



The default setting is a mixer to the 2nd aileron connected to output channel 7, with a differential value of 50%.

- The symbols "%" and "Set" flash to indicate that the differential value can be altered by rotating the 3-D hotkey.
- Check that the right aileron rises and the left aileron falls when you move the aileron stick to the right. If one or both servos ope rates in the wrong direction, move to the Setup menu "REVR" (Reverse) and reverse the offending servo.
- You should also check that the down-going aileron moves through a smaller (differential) travel than the up-going aileron.
- If this is not the case, i.e. the travel of the **up-going aileron is smaller**, press the "S" button. The "+" prefix now flashes; rotate the 3-D hotkey to the left, and the prefix changes to "-t", which reverses the differential.

Explanation:

0%	No differential
50%	Differential by half the maximum travel
100%	"Split" mode: only the up-going aileron moves

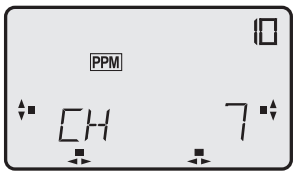
You can revert to the default value (+50%) by holding the 3-D hotkey pressed in for 1 second.

If you connect an **external mix trimmer** to Pin 4 (see Section 4.7) **the value can be over-ridden by +/- 25%**, allowing you to set the optimum value with the model in flight.
If you connect an **external mixer switch** to socket 7, **the differential can be switched off**, which produces greater aileron response for the landing approach.

This is the correct setting for model aircraft in which aileron differential is required, but without a superimposed flap function.

The second aileron servo must be connected to receiver output 7; please re-connect the servo accordingly.

9.5.3 Selecting the 2nd aileron output (CH)



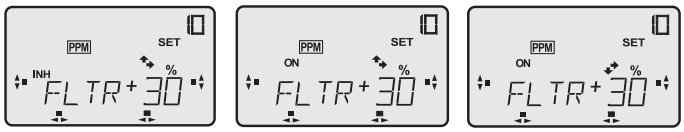
Pressing the "S" button again activates the menu in which you can select the output to which the second aileron is to be connected.
The default arrangement is channel "7".
Turning the 3-D hotkey to the left switches it to channel "5".

If you select channel 5 for the second aileron output, the wing flap mixer function is automatically switched on.

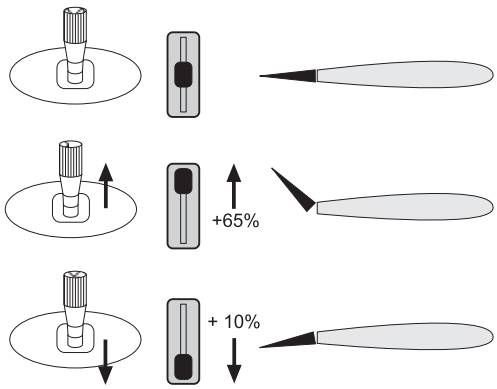
- Now the two aileron servos (channels 1 and 5) are mixed together; the flap function (FLPN) is also active, and the differential is set to +50%.
- If you connect a transmitter control, e.g. a linear slider, to channel 5, the flap function is operated over its full travel. Alternatively the throttle control can be used; see also Section 9.5.1.
- Check that the right aileron moves up and the left aileron down when you operate the aileron stick to the right. If one or both servos works in the wrong direction, reverse the servo in the Setup menu "REVR" (Reverse).

9.5.4 Setting flap travel, Flap Trim (FLTR)

You can now press the "S" button to move on to a further sub-menu in which you can set the travels for the flaperons (flaps) option. If FLTR is switched off (INH), flap travel is 100%.



- The first step is to activate the mixer.
- The "INH" symbol flashes; turn the 3-D hotkey to the left to switch it "ON".
- Press the "S" button; the "%" symbol flashes.
- The flap servo travels can now be set separately for each direc tion of the transmitter control. The default setting is 30%.
- Move the linear slider 5 or the throttle stick forward; the arrow should point up. If the arrow points down, locate the plug from the linear slider at the circuit board and turn it through 180°.
- Travel is adjusted by rotating the 3-D hotkey. The adjustment range is -100% to +100%.
- Pull the linear slider 5 back, and set the flap travel for the "down" direction. Press the 3-D hotkey for 1 second to revert to the default value (30%).



The diagrams show an example in which large "up" travel has been set for use as spoilers (65% = approx. 40º flap travel), while the "down" travel is smaller, for use as camber-changing flaps for thermal hunting.

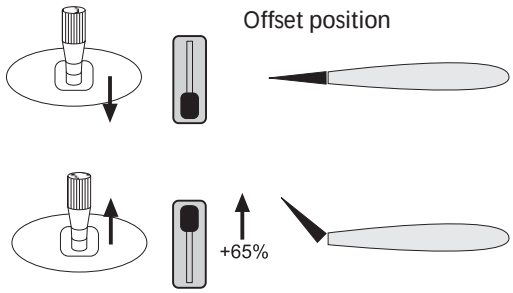
If your model has two servos per wing, it is possible to set up a Butterfly function in addition to a normal camber-changing flap control system. To achieve this the Butterfly mixer or aileron-flap mixer must be switched on. In this case the flaps are operated by means of the linear slider 5 or the throttle channel.

Offset (centre offset)
To make it easier to control the spoilers in flight it is desirable to set a defined position for the retracted and extended flaps when acting as spoilers.

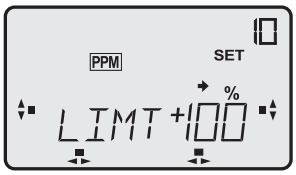
This can be achieved by offsetting the centre position of the spoiler control (linear slider or stick) to any desired position. In our example this is the end-point of the transmitter control.

- Press the "S" button until "SET" on the screen flashes.
- Move the linear slider or stick to the desired position, then hold the 3-D hotkey pressed in for 1 second.
- This causes the software to adopt the new transmitter control position as the "new zero setting".

See sketch on the following page.

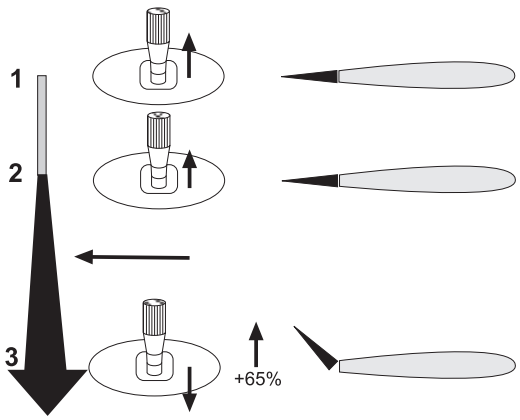


9.5.5 Dead zone range (LIMT); only active if FLTR = "ON"

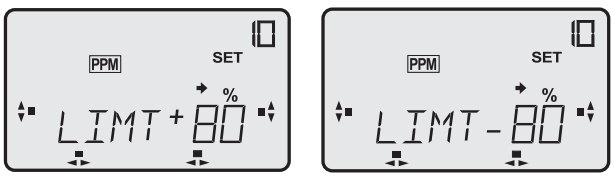


Pressing the "S" button again takes you to the "LIMT" menu, in which you can set a "dead zone" in the form of a percentage value in the range 0% to 100%.

This makes sense if the airbrakes or spoilers are operated by the throttle stick. Since the aileron function is on the same stick, it is easy to extend the airbrakes or spoilers slightly by accident when you give an aileron command. To prevent this you can set a particular point on the airbrake (spoiler) travel after which the transmitter control starts to have effect; this is done in the LIMT menu.



- 1 = "Dead zone"; transmitter control has no effect
- 2 = Limit point
- 3 = Active airbrake travel



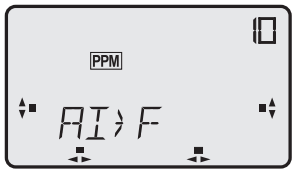
- Move the transmitter control (stick or linear slider) to the position at which the Limit point (2) is to be located.
- Now press the 3-D hotkey until the new position is displayed on the screen as a percentage of the control travel.
- Rotating the 3-D hotkey reverses the prefix, so that you can select whether the active brake range lies above or below the Limit point.

9.5.6 WING "OFF"

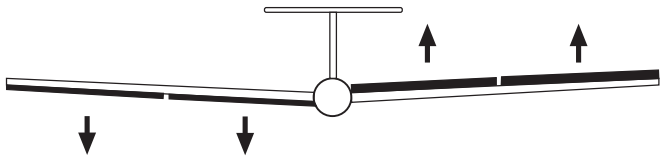
The wing mixer (mixing to a second aileron) can be switched off if you wish to operate a model with only one aileron. Turn the 3-D hotkey to the left to switch if "OFF".

9.6 Aileron -> camber-changing flap mixer (AI>F)

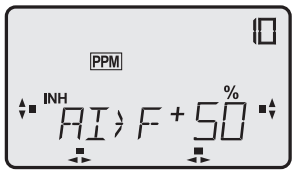
(2nd aileron output = channel 7)



With this mixer you can achieve improved roll response from a model glider, because the flaps follow the aileron movements, giving a more powerful rolling moment.



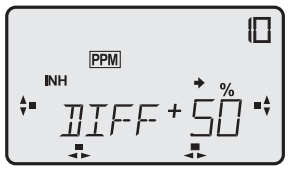
- Move to the Select menu "AI>F".
- Press the "H" button; "INH" (OFF) now flashes. Turn the 3-D hotkey to the left to switch the mixer ON.
- Press the "S" button to reach the Setup menu, where the "%" display is flashing.



Rotate the 3-D hotkey to set the rate (+/- 100%) to which the flaps are to follow the ailerons when an aileron command is given.

- The default value of 50% can be left for the moment.
- Holding the 3-D hotkey pressed in for 1 second reverts to the default value of +50%.

Differential flap movement (as ailerons)



Pressing the "S" button again takes you to the point where you can set the differential for the camber-changing flaps.

Check that the **travel of the down-going flap is now smaller**.

- If this is not the case, i.e. the travel of the up-going aileron is smaller, press the "S" button again.
- The "+" prefix now flashes; rotate the 3-D hotkey to the left, and the prefix changes to "-", which reverses the differential.

Explanation:

0%	No differential
50%	Differential by half the maximum travel
100%	"Split" mode: only the up-going aileron moves

Flaps working as ailerons can be undesirable on the landing approach and in some other manoeuvres, so this option can be switched on and off in flight by means of a switch connected to socket 2.

Note:

Switch position 2 has two functions, and affects both V-MIX 2 and the aileron-flap function.
You should bear this in mind when programming your transmitter. V-Mix 2 can therefore only be invoked as an alternative to the aileron-flap function. If you wish to use both functions, use another free mixer (V-Mix 1 or 3).

Important note re. flaperon mixer:

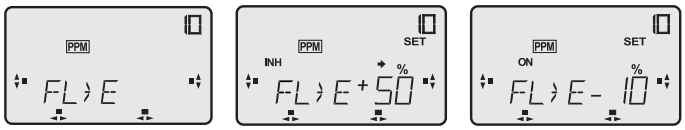
Link: if the 2nd aileron output is set to 7 and you activate the AI>F or BUTT mixer, the system automatically creates a means of controlling the camber-changing / landing flaps (servo channels 5 and 6). This is operated by a slider connected to channel 5, or the throttle function (see also Section 9.5.1). The flap travels are adjusted in the Flap Trim sub-point (FLTR); see Section 9.5.5.

9.7 Camber-changing flap -> elevator mixer (FL>E)

When you deploy camber-changing flaps or flaperons many models react with an unwanted pitch trim change (nose up or down). Normally the pilot has to correct this with the elevator stick. Once again the FX-18 software includes a tailor-made mixer which carries out this compensation automatically.

The following example assumes that the ailerons are programmed to deflect up by about 45º to act as landing aid; this is set in the WING menu. In nearly all cases this requires the addition of about 10% down-elevator trim to compensate.

Note: in some cases it may even be necessary to mix in slight up-elevator (+10%); this depends on the tail moment arm and model layout.



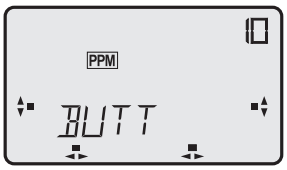
- Move to the Select menu "FL>E".
- A short press on the 3-D hotkey takes you to the Setup menu, and the "%" display flashes.
- Rotate the 3-D hotkey to change the percentage value; -10% is a good starting point. Hold the 3-D hotkey pressed in for 1 second to revert to the default value (+50%).
- Press the "S" button three times, and "INH" (OFF) flashes. Turn the 3-D hotkey to the left to switch the mixer on (ON).
- The mixer function is now active; check that the function works correctly.
- If you connect an external mix trimmer to Pin 7, the optimum value can be adjusted in flight. The trimmer allows you to override the pre-set value by +/- 25%.

If have activated the FLTR mixer in the WING menu (Section 9.5), any neutral point alterations (offset) and dead zone values (LIMT) you set at that point are automatically adopted by this mixer.
If you carry out a neutral point offset in this menu (hold the "S" button pressed in until "SET" flashes, then hold the 3-D hotkey pressed in for 1 second), this in turn is also adopted in the menu "WING".
This feature saves you having to switch between the two menus.

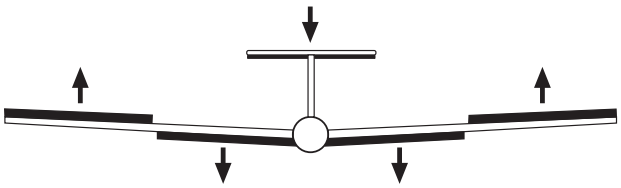
Special case
If the FLTR mixer has not been activated in the WING menu, the full aileron travel is available as a flap function. In this case it is necessary to set the neutral point for the elevator compensation mixer.

This is the procedure:
- Press the "S" button until "SET" flashes.
- Move the transmitter control for the flaps to the position at which the flaps are retracted (neutral point)
- Hold the 3-D hotkey pressed in for 1 second; the elevator now moves to the new neutral position, and will be mixed in with the flaps from this position.

9.8 Butterfly mixer (BUTT)
(2nd aileron output = channel 7)

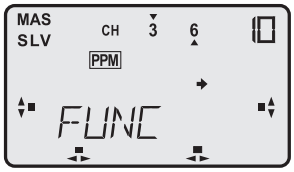


The Butterfly mixer function, also known as a "crow" system, provides a powerful braking effect on the model through moving both ailerons up and both camber-changing flaps down.



Selecting the transmitter control for the Butterfly function
In this sub-menu you can determine which transmitter control (MASTER) is to be used to operate the Butterfly function. The channels available are channel "3" (throttle channel) or a linear slider or switch connected to channel "6".

- Move to the Select menu "BUTT".

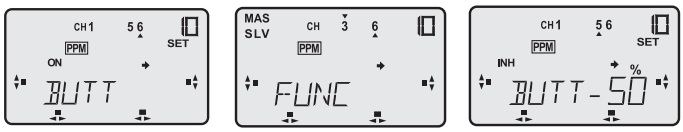


Press the 3-D hotkey, and the screen displays "FUNC". The default setting is that the transmitter control (MAS 6) operates the flaps (SLV 6), which can be seen from the arrows above and below the number "6".

- If you wish to operate the flaps with the throttle channel, turn the 3-D hotkey left, and the screen switches to "MAS 3".

In effect you have swapped over functions 3 and 6.
Note: since both the landing / camber-changing flap function (WING menu) and also the Butterfly function (BUTT) can be assigned to the throttle channel, check that both functions are not assigned to the throttle channel at the same time. For one of the functions you should use a linear slider or switch connected to socket 5 or 6.

Travel adjustment for ailerons and landing flaps
Pressing the "S" button takes you to a further sub-menu in which you can set the travels for the Butterfly function.



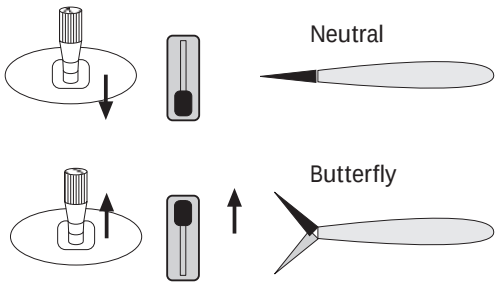
- The first step must be to activate the mixer. **It is essential that the 2nd aileron output is assigned to channel 7.** This is done in the WING menu, Section 9.5.
- Press the "H" button.
- The "INH" symbol flashes; turn the 3-D hotkey left to switch it "ON".
- Press the "S" button twice; the "%" symbol flashes, and the arrow stands under the number "1".
- Now rotate the 3-D hotkey to set the travel for both ailerons. Note that you should not set too large a travel, otherwise the glider's aileron response will be reduced almost to nothing. We recommend around 40 - 50%.
- Press the "S" button again, and the arrow moves to channel 5. You can now set the travel for the two flaps.
- Holding the 3-D hotkey pressed in for 1 second resets the percentage travels to the default values.

Offset value (centre offset)

It is desirable to set a defined position for the retracted and extended state of the wing flaps, in order to make it easier to operate the Butterfly function when the model is in flight.

This is achieved by offsetting the centre position of the Butterfly control (linear slider or stick) to any desired position. In this example it is moved to the end-point.

- Press the "S" button until "SET" flashes on the screen; the arrow moves under the number "6".
- Move the linear slider or stick to the desired position, then hold the 3-D hotkey pressed in for 1 second.
- The system now adopts the new position of the transmitter control as "new neutral position".

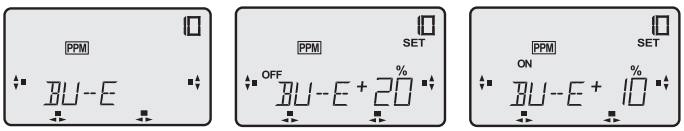


9.9 Butterfly -> elevator mixer (BU>E)

When you deploy the Butterfly mixer many models exhibit a pitch trim change, i.e. nose up or down. The pilot usually has to compensate for this with the elevator stick. The FX-18 also provides a mixer to solve this problem, i.e. it automatically provides the corrective elevator movement.

The following example assumes that the ailerons and flaps have been programmed in the BUTT menu in such a way that they move up and down through about 45º respectively in order to act as a landing aid. This generally requires a down-elevator trim correction of around -10%.

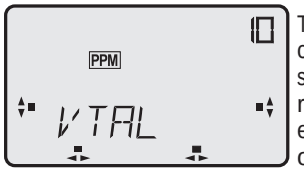
Note: it may be necessary to mix in a little up-elevator (+10%), depending on the model's layout and tail moment arm.



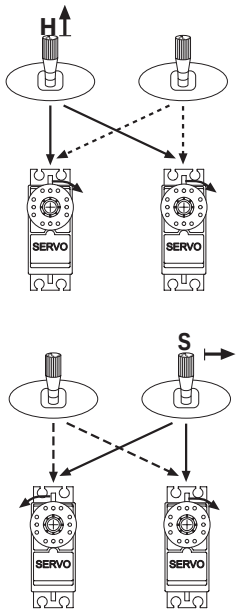
- Move to the Select menu "BU>E"
- Pressing the 3-D hotkey takes you to the Setup menu, and the "%" display flashes.
- Rotating the 3-D hotkey changes the percentage value; we recommend a starting point of -10%. Hold the 3-D hotkey pressed in for 1 second in order to revert to the default value (+20%).
- Press the "H" button twice, and "INH" (OFF) flashes. Turn the 3-D hotkey to the left and switch the mixer on (ON).
- The mixer function is now active; carry out a check on your model.

Note: if you press the "H" button the screen shows the flashing symbol "SET". At this point you can also set the offset point for the Butterfly function by holding the 3-D hotkey pressed in for 1 second. See also the description of Offset adjustment in Section 9.8: Butterfly mixer.
If you carry out a neutral point offset in this menu, this in turn is also adopted in the menu "BUTT".
This feature saves you having to switch between the two menus.

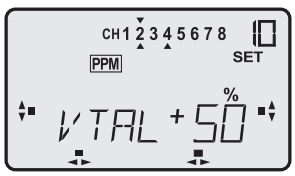
9.10 V-tail mixer (VTAL)



This mixer combines the signals of the rudder and elevator in order to control a V-tail on a model aircraft. It works in the same way as the XMIX mixer (see also Section 7.11), but is programmed to act upon the elevator and rudder channels. When the elevator stick is operated, both servos run in the same direction; when the rudder stick is operated, they move in opposite directions.

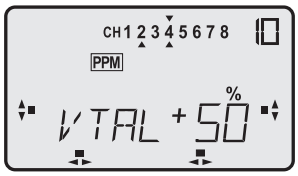


- Move to the Select menu "VTAL".
- A short press on the 3-D hotkey takes you to the Setup menu; the mixer is still "INH" = switched off.
- Press the "H" button, and turn the 3-D hotkey to the left to switch the mixer "ON".
- Press the "S" button again.

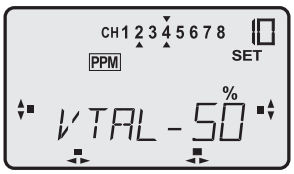


Arrows under the numbers on the screen indicate that the two functions 2 and 4 are mixed together. The arrows above the numbers, and the flashing "SET and %", indicate that you can now set the mixer value for function 2 (elevator).

- Rotate the 3-D hotkey to set the servo travel in the form of a percentage between -100% and +100%. To check this, move the appropriate stick to both end-points. The default value of 50% can be left for the moment.
- Holding the 3-D hotkey pressed in for 1 second reverts to the default value (+50%).



Press the "S" button again, and the rudder channel (4) is highlighted on the screen. You can now set the servo travel for the rudder using the method described above.

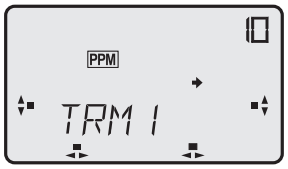


Depending on the physical orientation of the servos and the control surface linkages you may find that it is necessary to reverse the direction of servo rotation, or the direction of mixing, so that the servos move in the same direction for elevator control and in the "correct" opposite directions for rudder control. The first step should always be to reverse the servos as required in order to make the elevator function work correctly. If the mixer direction then works in the wrong direction, set the elevator mixer input (2) to -50%.

You may find it necessary to set different travels for the two functions. In our experience most model are more sensitive to the elevator, and require slightly more travel for the rudder.
Our recommended starting point: elevator (2) = 40%; rudder (4) = 70%

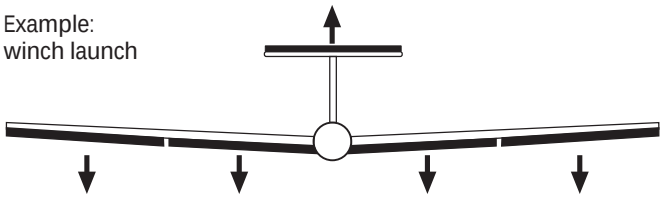
If you connect external mix trimmers to pins 5+6, they can be used to set the optimum mixer values while the model is in flight. Trimmers provide the means to override the pre-set values by +/- 25%.
When setting the control surface travels, check that the servos do not strike their mechanical end-stops at full stick travel when the functions are superimposed.

9.11 Trim program 1 and 2 (TRM1 / TRM 2)

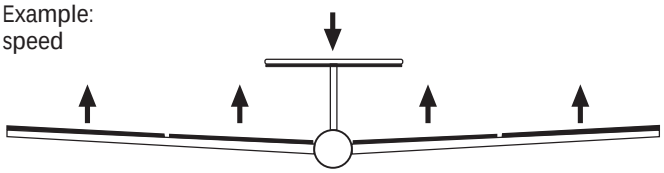


The software of the FX-18 transmitter provides two trim menus to cater for the different flight tasks of model gliders, in order to pre-set the optimum trim settings of the control surfaces and flaps for flight phases such as landing, launch and speed. Trim menus 1 and 2 are identical, for which reason this section only describes the method of setting up the Trim 1 menu.

Example:
winch launch

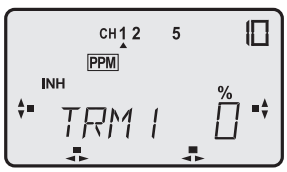


Example:
speed

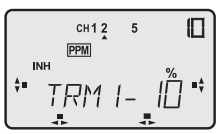


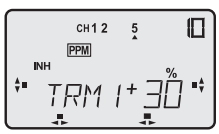
The pre-set flight phases can then be called up by means of external mixer switches. Of course, the settings can be over-ridden at any time.
To operate and set up the system this switch or push-button is absolutely essential, and should be fitted and connected before starting the set-up procedure.
Trim 1 = switch to socket 8
Trim 2 = switch to socket 3

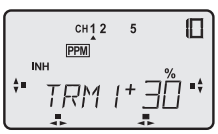
We recommend the use of a 3-position switch, No. F 1522, assigned as follows:
Forward = Winch launch
Centre = Neutral
Back = Speed



- Move to the menu TRM1 in the Select level.
- Press the "S" button to reach the Setup menu level.
- The screen now shows arrows under the numbers, indicating the control functions for which the position can now be defined.
- Press the "H" button to activate the function; the "INH" (OFF) symbol now flashes. Turn the 3-D hotkey left to switch the mixer ON. **The screen will display the symbol "OFF or "ON", depending on the physical switch position.**
- The symbol "MIX" also appears, to confirm that a mixer is switched on. This symbol is displayed, and an audible alarm sounds, if you switch on the system with one of the trim functions active, to warn you that an active mixer is in operation.



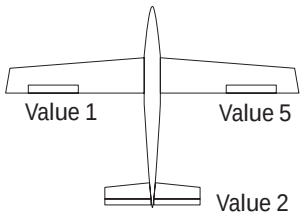




- Switch the TRM1 function ON.
- Press the "H" button again; an arrow appears under the number "5", and the "%" symbol flashes.
- Now rotate the 3-D hotkey to set the desired control surface travel for the landing / camber-changing flaps. The adjustment range is +/- 100%.
- Holding the 3-D hotkey pressed in for 1 second resets the . default value of 0%.
- Enter the settings for the other control functions in the same manner.

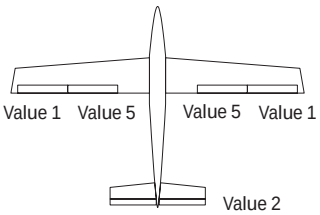
Please note the following special feature relating to mixers. The effect of the trim values for channels 1, 2 and 5 varies according to the output you selected for the 2nd aileron in the WING menu.

2nd aileron output: channel 5



In this variant the trim settings affect channels 1, 2 and 5, as shown in the sketch alongside.
The settings for the left and right ailerons are **adjusted** separately.

2nd aileron output: channel 7



This mixer function also requires that one of the two mixer menus "Butterfly" or "Aileron-flap" is active, in order to carry out the mixing of the two camber-changing flaps.
In each case the adjustments for the ailerons (1 & 7) and flaps (5 & 6) are carried out **in pairs**.

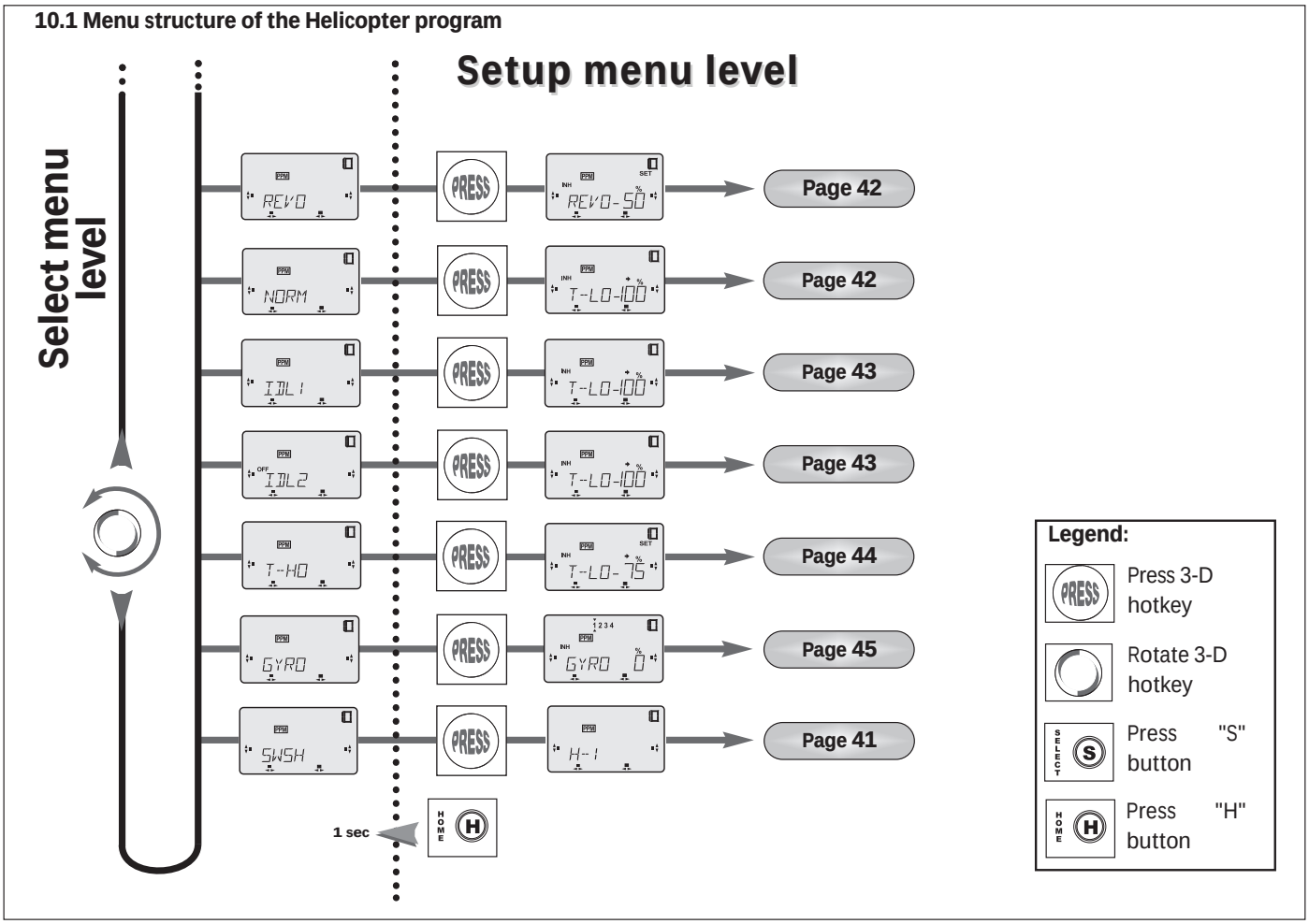
Note:
Switch socket 3 is a dual-purpose socket, and can be used both for V-mix 3 and also for the TRM2 function.
You should bear this in mind when programming your transmitter. V-Mix 3 can therefore only be invoked as an alternative to the TRM2 function.
If you wish to use both functions, use another free mixer (V-Mix 1 or 2).

10. Model helicopters (HELI)

The mixer program for model helicopters provides a range of special menus for this type of model aircraft, in addition to the basic functions already described.

These menus are integrated into the rotation loop, and can be found before the Parameter menu (PARA) when you have already selected the corresponding model type in the TYPE menu. See also Section 7.3.

10.1 Menu structure of the Helicopter program



10.2 Servo assignment in the HELI menu

The sequence of servo connections in the Heli menu varies greatly according to the helicopter type, i.e. the type of swashplate control system in use.
The table lists the servo assignment to the receiver outputs, according to swashplate type.
This assignment is fixed, and you must adhere to it, as the throttle and collective pitch functions are already mixed at the transmitter; the appropriate servos are also already mixed to suit your choice of swashplate type.
The special features of the individual swashplate mixers are explained under the swashplate menu (SWSH).
Transmitter channels 5 and 6 are pre-configured for gyro gain adjustment and collective pitch servo trim.

The second table shows that some of the transmitter's mixer functions are swapped over, and in some cases different settings can be called up according to the flight phase currently selected.
If you wish to be able to switch between different flight phases, external mixer switches must first be installed and connected.

Assignment of switches and mix trimmers (HELI)

Switch assignment for model helicopters

1 = V-Mix 1
2 = V-Mix 2
3 = V-Mix 3
4 = Dual Rate (D/R)
5 = Throttle cut (TCUT)
6 = Idle-up 1 (IDL-1)
7 = Idle-up 2 (IDL-2)
8 = Auto-rotation (T-HO)

Mix trimmer assignment for model helicopters:

1 = Mixer ratio, V-Mix 1
2 = Mixer ratio, V-Mix 2
3 = Mixer ratio, V-Mix 3
4 = Mixer ratio, revolution mixer (REVO)
5 = Throttle neutral setting (IDL-1)
6 = Throttle neutral setting (IDL-2)
7 = Throttle minimum for auto-rotation
8 = Unused

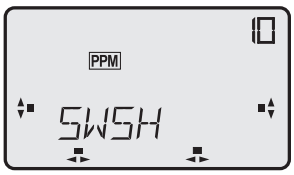
Number	Transmitter control assignment
Channel 1	Aileron (roll-axis)
Channel 2	Elevator (pitch-axis)
Channel 3	Throttle
Channel 4	Rudder (yaw-axis)
Channel 5	Gyro gain
Channel 6	Coll. pitch trim
Channel 7	Free
Channel 8	Free

Receiver servo connections for different swashplate types			
H-1	H-2	HR-3	H-4
Roll	Roll 1	Roll 1	Roll 1
Pitch-axis	Pitch-axis	Pitch-axis	Pitch-axis 1
Throttle	Throttle	Throttle	Throttle
Tail rotor	Tail rotor	Tail rotor	Tail rotor
Aux. gyro channel	Aux. gyro channel	Aux. gyro channel	Aux. gyro channel
Coll. pitch	Roll 2	Roll 2	Roll 2
Free	Free	Free	Free
Free	Free	Free	Pitch-axis 2

Flight phase	Throttle curve	Coll. pitch curve	Revo-Mix coll.-tail rotor	Gyro gain	Trim
Normal	Thr. curve normal	Coll. curve normal	Revo-Rate	Gyro rate 1 Gyro rate 2	Trim increment Normal / hover
Idle-up 1 Switch 6	Thr. curve hover	Coll. curve hover			
Idle-up 2 Switch 7	Thr. curve Cruise	Coll. curve Cruise		Gyro rate 3 Gyro rate 4	Trim value, cruise
Auto-rotation Switch 8	Thr. position Auto-rotation	Coll. curve Auto-rotation		Gyro rate 1 Gyro rate 2	Trim value Normal / hover

10.3 Swashplate setting (SWSH)

In this menu you set up the HELI mixer program to suit the type of swashplate present in your model helicopter.

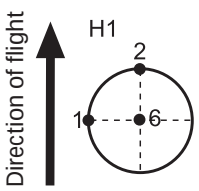


That is why this menu point is described first in these instructions, although it appears last in the sequence. The software carries out all the essential electronic changes automatically when you select the appropriate swashplate type.
The software of the FX-18 transmitter caters for all four of the most important swashplate types.

- Move to the Select menu SWSH and press the 3-D hotkey to enter the Setup menu.
- The screen shows "H-1", the basic setting.
- Rotate the 3-D hotkey to select one of the following types:
  H-1
  H-2
  HR-3
  H4
- When you have selected the appropriate type, hold the 3-D hot key pressed in for 1 second, and "OK?" appears on the screen.
- If you really want to select the new swashplate type, hold the hot key pressed in until you hear a double beep; this confirms your selection.

Swashplate type H-1

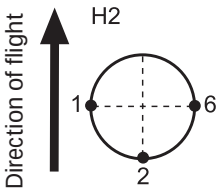
This is one of the most popular swashplate variants. The system is controlled by means of separate roll, pitch-axis and collective pitch servos. The roll control system tilts the swashplate right and left. If you give a pitch-axis command, the swashplate tilts forward or back. The collective pitch control system moves the swashplate up or down by means of another servo (channel 6).



The functions are **not mixed** with each other.

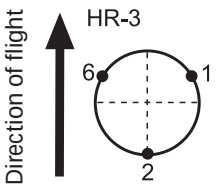
Swashplate type H-2

This is the control system used in "Heim-system" model helicopters. With this swashplate type one roll servo and one collective pitch servo (channels 1 and 6) are used; the collective pitch and roll control system tilt the swashplate right and left. If a collective pitch command is given, both servos move the swashplate up and down. Pitch-axis control is via a servo connected to channel 2. A bridge is required to the pitch-axis control system in the helicopter, as only the collective pitch and roll servos are mixed.



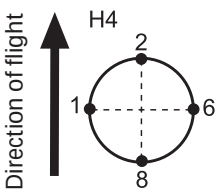
Swashplate type HR-3

The "HR-3" swashplate type requires one collective-pitch servo, one roll servo and one pitch-axis servo, arranged symmetrically as shown in the diagram alongside. The three servos are arranged at angles of 120° to each other, and actuate the swashplate directly. Opposed movements of the two servos 1 and 6 tilt the swashplate right and left. Pitch-axis control is obtained by all the servos tilting the swashplate forward and back. If the collective pitch stick is moved, all three servos move the swashplate up and down.



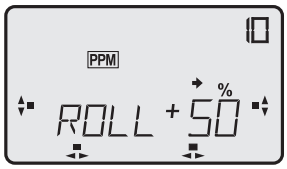
Swashplate type H-4

This control system requires two pitch-axis servos and two roll servos (channels 2/8 and 1/6). Both roll and pitch-axis travel are generated by opposed movements of the servos. If a collective pitch command is given, all four servos move the swashplate up and down. A variant of this system is a 3-point linkage with servos arranged at 90°, created by omitting the servo connected to channel 8; this is the system used by the ECO model helicopter.



Special feature: types H-2, HR-3 and H-4
The mixing of the swashplate functions makes it necessary to reverse the mixed channels. The overall travel produced by mixing the signals may also produce excessive movements, and the swashplate may jam as a result.

The software provides an answer to these problems: if you select one of the swashplate types listed above, Setup menus appear when you press the "S" button.

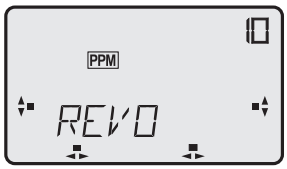


At this point you can set the travel of the corresponding control functions to maximum by turning the 3-D hotkey. (Control travel adjustment of the mixed functions.)

Turning the hotkey to the left generates a Rate with a negative prefix, which means that the function is reversed.

The first step is to use the REVR menu to **reverse the direction of servo rotation** as required; the aim is that all the servos run in the same direction when you operate the collective pitch control.
Once this is achieved, you should set the correct direction of running of the mixed swashplate functions using servo reverse and transmitter control travel rate adjustment; this is carried out in the SWSH menu.
At this stage set the maximum possible swashplate travel.

10.4 Revolution mixer (REVO)



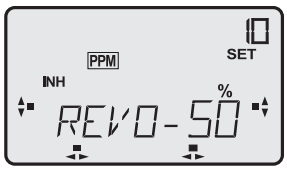
This function is designed to compensate for torque changes in the main rotor due to changes in the throttle or collective pitch setting, using an electronic compensation mixer involving the tail rotor.

Setting up this function accurately makes the work of a tail rotor gyro system much easier. On the other hand, an incorrectly adjusted Revo-Mix may even counteract the function of the gyro.
For this reason it is very important to set up this mixer carefully.
It has to be admitted that the inexperienced pilot does not find it easy to control a model helicopter without a gyro, in order to adjust the Revo mixer value accurately.
Modern gyro systems with piezo sensors are relatively sensitive, and do not necessarily require a perfect Revo-Mix setting; in this case it is perfectly feasible to fly the model with the guideline value of 25%.

Modern SMM gyros with semi-conductor sensors (e.g. robbe-Futaba GY 401 gyro) do not necessarily require more than a small amount of Revo-Mix support - if at all - particularly if you are an advanced pilot; in this case the Revo-Mix function can simply be switched off.

Special case:

If a piezo or SMM gyro is operated in Heading-Hold / AVCS mode, the Revo-Mix function must always be switched off.



The software provides a Revo-Mix setting which remains constant in all flight modes. See the flight mode table on this page.

- Move to the Select menu REVO and press the 3-D hotkey to move to the Setup menu.
- The "SET" and "%" displays flash. Rotate the 3-D hotkey to set the guide value of 25%.
- Press the "S" button, and the "INH" display flashes. Switch the mixer on by turning the 3-D hotkey to the left.

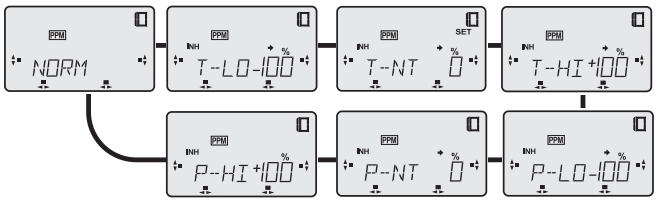
The **direction of rotation of the main rotor** must be taken into account when you are setting the percentage value. If you increase collective pitch on a right-hand rotation main rotor, the pitch of the tail rotor must also be increased - assuming that it rotates in the same direction. With a left-hand rotation main rotor the exact opposite is true.

(-) negative prefix = left-hand rotation main rotor
(+) negative prefix = right-hand rotation main rotor

It is generally necessary to carry out a series of test-flights in order to find the optimum set-up for the Revolution mixer.
Please note that the model should already be well trimmed, i.e. it should require no control commands to stay in a stable hover.
If you connect a mix trimmer to socket 4, the REVO mixer value can be altered while the model is in flight.

10.5 Idle-up Normal (NORM)

The software of the FX-18 transmitter offers a total of four different flight mode mixers:
Normal setting (NORM); Idle-up 1 (IDL-1), Idle-up 2 (IDL-2) and autorotation (AURO).



In the Normal menu you carry out all the adjustments for throttle and collective pitch, as they are needed for starting and stopping the motor, and for lifting the helicopter off at the start of a flight.

It is usually possible to leave the settings for throttle and collective pitch as they are, as these values are used as the base setting for the throttle and collective pitch travels, i.e. they represent maximum values.
Note that the collective pitch travel should also be set to the maximum value in the SWSH menu if you select an appropriate swashplate type (H-2, HR-3, H-4).

At maximum collective pitch travel the helicopter's collective pitch angle should be around +12°; at stick centre the pitch angle should be around +4°, and at minimum collective pitch a blade angle of -5° is correct.

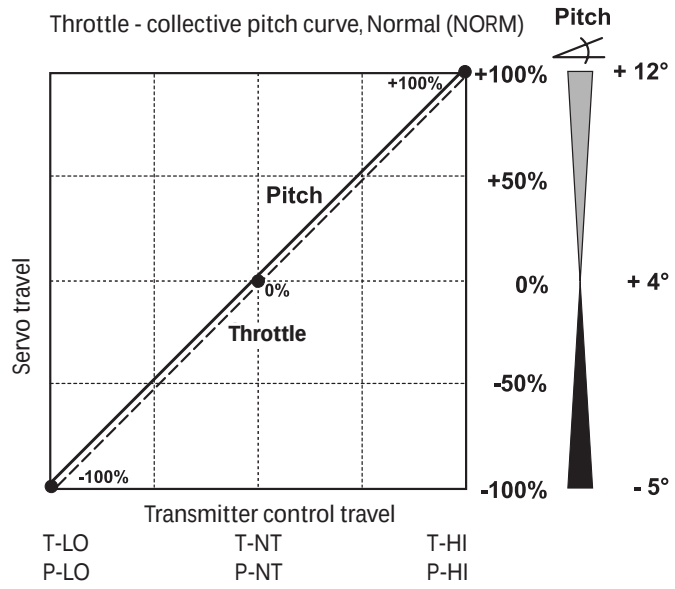
The carburettor linkage should be adjusted so that the throttle barrel is completely open at the full-throttle position. At the stick centre position it should be around 60% open, and at the idle position the aim is a reliable idle.

The settings can then be fine-tuned using the percentage adjustment facility in the sub-menus:

- Move to the Select menu NORM, and press the 3-D hotkey to move to the Setup menu.
- The Setup menu for the throttle idle point now appears. The following Setup menus appear if you subsequently press the "S" button:

T-LO = Throttle minimum (idle)
T-NT = Throttle neutral setting (hover point)
T-HI = Throttle maximum (full-throttle position)
P-LO = Collective pitch minimum (idle / maximum descent)
P-NT = Collective pitch neutral setting (hover point)
P-HI = Collective pitch maximum (maximum climb)

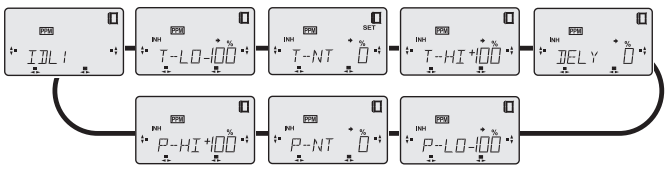
- Press the "S" button to move forward through the Setup menus, and the "H" button to move backward.
- Rotate the 3-D hotkey to change the percentage values.
- Holding the 3-D hotkey pressed in for about 1 second resets the original value.
- You can now enter the basic settings for the "Normal" flight mode as already described, and as shown in the graph below. Note that servo travel is displayed above the stick travel. Since a collective pitch curve must also be set up for each throttle curve, both curves are included in the same graph.



10.6 Idle-up (IDL-1), hover

This is the flight mode in which the helicopter is usually hovered. The bottom throttle value is raised compared with the "Normal" flight mode (NORM), to ensure that the motor maintains a certain minimum rotational speed even at quite low collective pitch settings.
The top collective pitch value is reduced to around +10°.

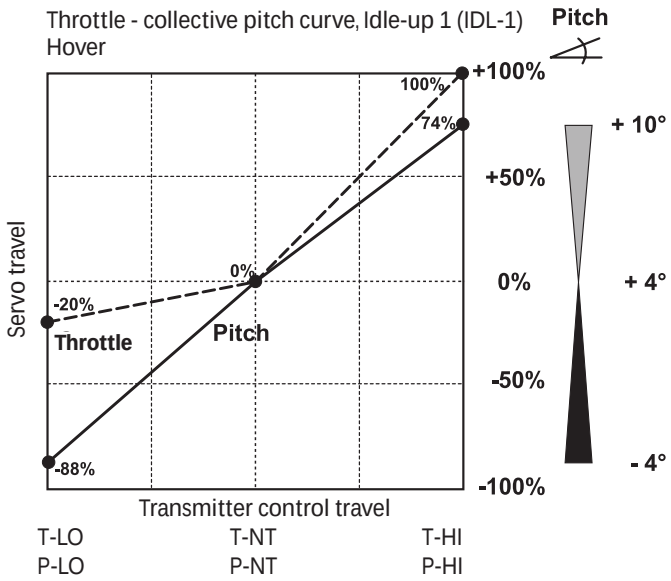
You can call up this pre-set flight mode by means of an external mixer switch; the settings can be over-ridden at any time.
A separate switch is essential in order to operate and adjust this function. Connect the switch to socket 6 before setting up the function.



- Move to the Select menu IDL-1, then press the 3-D hotkey to move on to the Setup menu.
- Press the "H" button to activate the function; "INH" (OFF) now flashes, and you can switch the mixer (ON) by turning the 3-D hotkey to the left. **The screen now displays the symbol "OFF" or "ON", depending on the physical position of the switch.**
- The screen also shows the symbol "Mix" to indicate that a mixer is switched on.
- Switch the IDL-1 function ON.
- Press the "S" button, and the Setup menu for the throttle idle point T-LO appears on the screen. Pressing the "S" button brings up additional Setup menus:
  T-LO = Throttle minimum (minimum throttle position)
  T-NT = Throttle neutral setting (hover point)
  T-HI = Throttle maximum (full-throttle position)
  DELY = Throttle servo delay
  P-LO = Collective pitch minimum (minimum coll. pitch position)
  P-NT = Collective pitch neutral setting (hover point)
  P-HI = Collective pitch maximum (maximum climb)

- Press the "S" button to move forward through the Setup menus, and the "H" button to move backward.
- Rotate the 3-D hotkey to change the percentage values.
- Holding the 3-D hotkey pressed in for about 1 second resets the original value.
- You can now set the basic settings for the "Idle-up 1" flight mode as shown in the graph below.

Note that servo travel is displayed above the stick travel. Since a collective pitch curve must also be set up for each throttle curve, both curves are included in the same graph.
The set-up procedure is essentially the same as for the "Normal" flight mode.

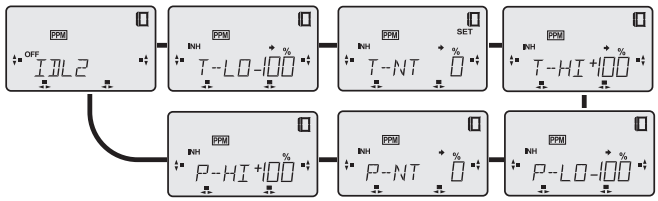


This Setup menu also includes the Delay sub-menu (DELY). At this point the program enables you to slow the transit speed of the throttle servo, so that the new, higher throttle position does not take effect abruptly.
We suggest setting a value of 60% here; the value can later be fine-tuned to suit the size of your motor and the response speed of its carburettor. This delay value also applies when you switch from IDL-1 to IDL-2.

Since the performance of the model motor (and therefore its rotational speed) varies greatly according to atmospheric conditions and ambient temperature, the hover throttle point (T-NT) can be over-ridden by +/- 25% by means of an external mix trimmer connected to socket 5. This allows you to optimise the value in flight.

10.7 Idle-up 2 (IDL-2), Cruise

At this point you can raise the bottom throttle value by a further amount, in order to maintain a minimum motor speed for all flight manoeuvres which require a lot of power. In contrast, the bottom collective pitch value is reduced to -3º in order to avoid an excessive rate of descent.



The set-up procedure is essentially the same as for the "Normal" and "Idle-up 1" flight modes.
Connect the external mixer switch to socket 7, and the external mix trimmer for throttle centre point adjustment (T-NT) to socket 6.
Note that the mixer switch for Idle-up 2 has priority, and over-rides the switch for Idle-up 1.

Cruise trim

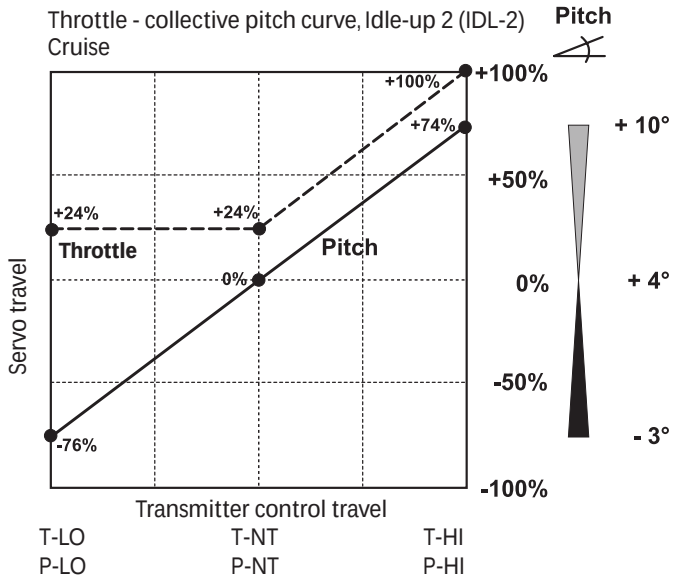
The flight mode Idle-up 2 also features a separate trim in addition to the Idle-up 1 menu. This is designed to cope with the distinct difference in trim values between hover and the cruise setting which is usually apparent in model helicopters. This effect is due to the dynamic effect of changing airflow over the main and tail rotors and the stabilisers.

When you operate the flight mode switch to activate Idle-up 2, the program also switches to a second internal trim value memory for the roll, pitch-axis and tail rotor functions.

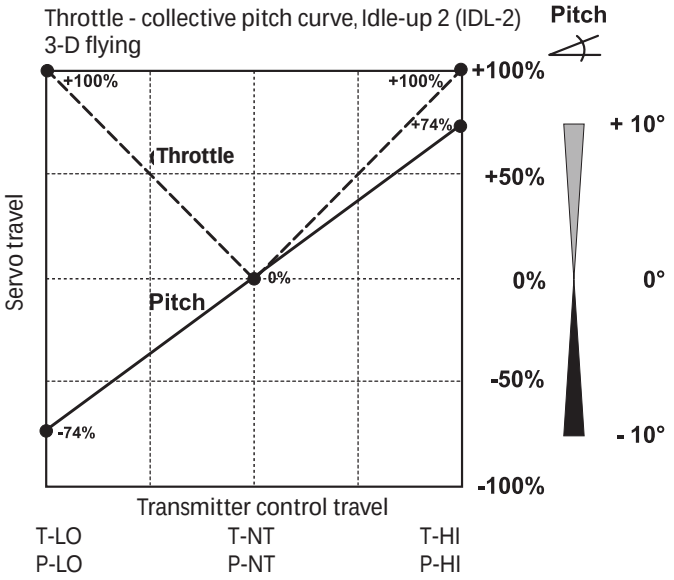
You trim your model in the usual way, but the transmitter internally assigns the trim value to the appropriate flight mode. You can check the trim values by moving the Idle-up 2 switch (7) between the two positions IDL-1 and IDL-2. The trim bars on the screen display the corresponding values.

An internal delay is pre-programmed for the roll, pitch-axis and tail rotor functions to ensure that the switch in trim values occurs gradually. This is fixed, and cannot be adjusted.

Caution: if you are using a gyro in AVCS (heading lock) mode, you must not store another value for the tail rotor function (channel 4).



Throttle and collective pitch curve for the flight mode
"Idle-up 2" for 3-D flying



You can set up Idle-up 2 in either of two ways: either for aerobatics, with an even greater increase in throttle compared with Idle-up 1, or, as in the example shown here, as a 3-D curve for "3-D flying" and inverted flight.

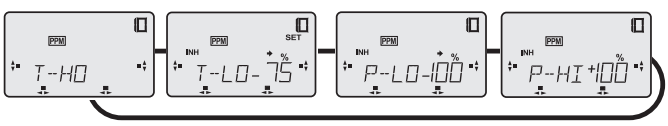
Please note that the collective pitch travels must be set symmetrically to +/- 10°; at stick centre collective pitch should be 0°.
Before you switch from Idle-up 1 to Idle-up 2 fly your helicopter to a safe height and place it in a climb, since the collective pitch setting is markedly different at the stick centre position, and the model will otherwise descend abruptly.
Expert 3-D pilots will know that the Idle-up 1 and Idle-up 2 curves should be set symmetrically.

10.8 Auto-rotation (T-HO)

When you switch the auto-rotation flight mode on, the program sets the motor to idle (or cuts it completely), regardless of the position of the throttle stick. The throttle servo immediately runs to the pre-set position.

At the same time the program reduces the bottom collective pitch value to -5°, in order to keep the rotational speed of the rotor head as high as possible while the helicopter is descending rapidly.

The program also raises the maximum collective pitch value to +12°, to enable the pilot to flare out as gently as possible with a high pitch angle, and then to touch down safely.



Once set up, this flight mode can be called up by means of an external mixer switch.

A separate switch is essential in order to operate and adjust Auto-rotation. Connect the switch to socket 8 before you start setting up the function.

Please note that the auto-rotation mixer switch always has priority, and over-rides both the switches for Idle-up 1 and Idle-up 2.

Check carefully that the auto-rotation switch is set to "OFF" before you attempt to start the motor, otherwise the motor will refuse to start. As with the other mixer functions, the screen displays the MIX symbol to indicate that a mixer function is active.

You can adjust the idle speed in flight, and even stop the motor, if you connect an **external mix trimmer** to **socket 7**. If the auto-rotation function is still active when you switch on the transmitter, the screen displays the symbol "MIX", to make the pilot aware of the active mixer.

The set-up procedure for the auto-rotation flight mode is essentially the same as for the preceding "Idle-up 1" and "Idle-up 2" flight modes. The program provides the following sub-menus:

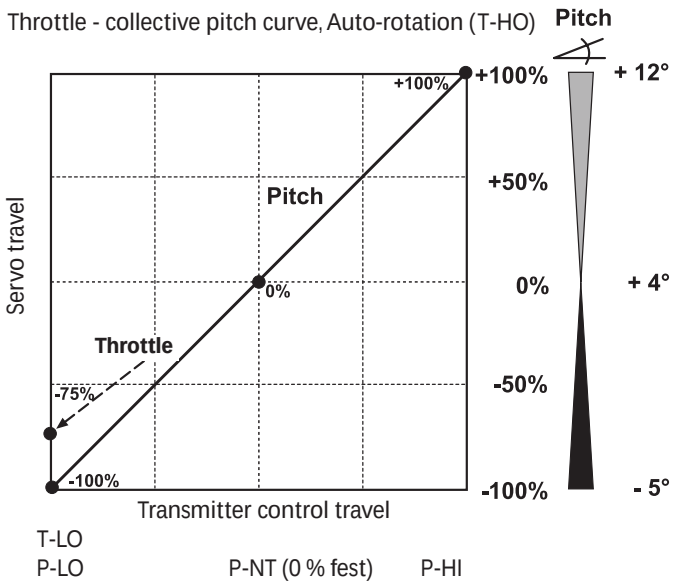
T-LO = Throttle minimum (idle position or motor stopped)
P-LO = Collective pitch minimum (maximum descent)
P-HI = Collective pitch maximum (maximum blade pitch)

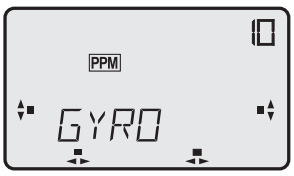
The collective pitch neutral position corresponds to the collective pitch setting you have already entered in the "Normal" menu.

You can now enter the basic settings for the Auto-rotation flight mode, as shown in the graph below.
Servo travel is shown above the transmitter stick travel in the graph.

Since a collective pitch curve must also be set up for each throttle curve, both curves are included in the same graph.

Throttle - collective pitch curve, Auto-rotation (T-HO)





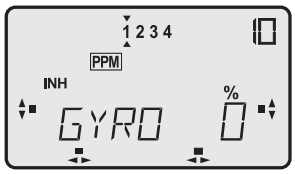
10.9 Gyro gain (GYRO)

This function enables you to switch the gyro gain between two settings from the transmitter. The (AUX) input on the gyro must be connected to receiver channel "5" for this to work.

The transmitter must be fitted with either a linear slider or a switch, connected to channel 5, if gyro gain is to be switchable. As already described for flight mode trim, the gyro gain value can be set separately for the flight modes NORM, IDL-1 and T-HO (Rate 1 or 2). See the table on page 41 for more details.

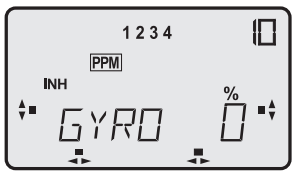
When you activate the flight mode switch for Idle-up 2, a second gyro gain setting becomes active (Rate 3 or 4). Once again, the reason for this lies in the flight dynamics of a helicopter: the airflow over the fuselage and tail makes the model more stable at speed than when hovering.

For this reason gyro gain is reduced when you are flying circuits (IDL-2), to prevent any tendency for the tail boom to oscillate.

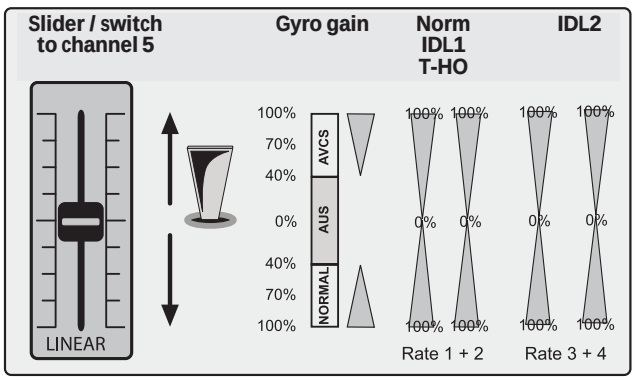


- Move to the Select menu GYRO, and press the 3-D hotkey to enter the Setup menu.
- Press the "H" button to activate this function; the symbol "INH" (OFF) now flashes on the screen.

Turn the 3-D hotkey to the left to switch the mixer (ON); the screen then displays the symbol "ON".



- Press the "S" button, and the "%" display flashes; the arrow symbol appears above and below the num ber "1". You can now set Rate 1 (-100% to +100%) for gyro gain by rotating the 3-D hotkey.
- Press the "S" button to move on to Rates 2 ... 4; the lower arrow indicates which Rate can be adjusted at any time.
- The upper arrow is controlled by the Idle-up 1 and Idle-up 2 switch, and also by the position of the slider or switch connected to channel 5. At any one time it shows which Rate is currently acti ve.
  In our example Rate 4 is ready to be adjusted, and Rate 1 is cur rently active.



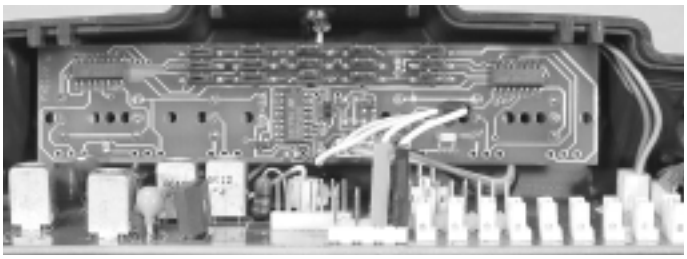
The graph above shows that Rates 1 ... 4 can be set to any value in the range 0% ... +/- 100%. This offers a wide range of possibilities in conjunction with a Heading Lock or AVCS gyro.

For example, it is possible to set two different Rates (gyro gain) for the flight modes Norm / IDL-1 / T-HO. These rates can be freely selected within the Normal and/or AVCS ranges.
The software again provides 2 Rates for gyro gain setting (Rates 3 and 4) for the flight mode Idle-up 2.

These features make it possible to set up optimum gyro values for all flight modes.
Note: even if a linear slider is used to control gyro gain, it can only switch between the pre-set Rates 1&2 and 3&4. No intermediate values can be set.

11. Installing channel expansion modules

The FX-18 transmitter can be expanded by installing channel expansion modules (Multi-modules) to provide extra switched and proportional channels. These additional channels are primarily needed for multi-function model trucks and boats. Assigning one or two of the system's proportional channels to Multi-modules provides up to 16 switched channels for each proportional channel.
Each FX Multi-module can control 2 Multi-decoders.
The signals are encoded at the transmitter via the Multi-modules, and must be used in conjunction with Multi-decoders at the receiver end in order to generate the signals required for the auxiliary units. These Multi-decoders also feature integral switching stages which can be used to control electrical units such as filament bulbs, low-power electric motors etc.
Three different Multi-modules are available for the transmitter; the method of installing and connecting them is described in the following section.



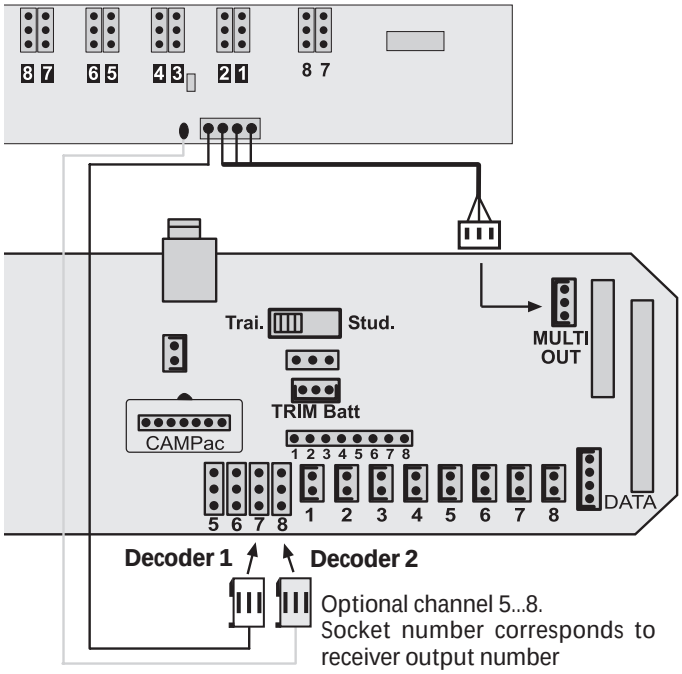
11.1 Installing and connecting Multi-modules

- Open the back panel.
- Disconnect the transmitter battery.
- For improved access, pull the main circuit board back out of its guides.
- Install the Multi-module circuit board in the upper central option well.
- Remove the aluminium panel, releasing it at the rear by pushing a screwdriver through the holes and pulling it forward.
- Apply the die-cut aluminium panel with its legend areas in the same position; this is available under No. F 1589. The set includes 12 rubber plugs which can be used to seal unused openings, e.g. after moving switches.

- Insert the Multi-module in the holes from the rear.
  Caution: the pin row must face up.
- Fit the nuts (supplied) on the projecting switch shafts, and tighten them with a suitable spanner (see also "Installing mixer switches", Section 4.7).
- Connect the cables as shown in the illustration, and arrange them neatly.
- The transmitter can accommodate the following additional controls:
  - 4 switched channels
  - 4 linear sliders
  - 2 stick switches (in the stick shafts)

Since the option wells can also be used for channel switches, mixer switches, linear sliders or Multi-modules, the maximum number of proportional or multi-channels may be limited by the number and position of extra controls you have fitted; i.e. the degree to which you have expanded the transmitter. For example, 4 proportional channels and 36 multi-functions are more than sufficient for most applications.

The physical controls, such as linear sliders or switched channels, are installed as described in Section 4.7.



11.2 FX Multi-Switch-Prop module No. 8380

The Multi-Switch-Prop module features 6 switches, each with 2 functions, which control the first 6 outputs (12 functions) of a Multi-Switch-Prop 12+2 decoder (1). Switch 1 controls decoder output 1, switch 2 -> output 2 etc. Each switch operates 2 functions, so the function sequence is as follows:

Switch 1 operates -> functions 1 + 2
Switch 2 operates -> functions 3 + 4
Switch 3 operates -> functions 5 + 6
Switch 4 operates -> functions 7 + 8
Switch 5 operates -> functions 9 + 10
Switch 6 operates -> functions 11 + 12
Slider or switch 7 operates -> functions 13 + 14
Slider or switch 8 operates -> functions 15 + 16

To control decoder outputs 7 and 8 (proportional channels for direct connection of servos or speed controllers) we recommend installing linear sliders in the transmitter, and connecting them to sockets 7 and 8 on the Multi-module; these are marked with black numbers. Naturally, a channel switch can be used instead of a linear slider, but in this case the servo channel would be switched, and not proportional.

The Multi-modules for FX-series transmitters feature two independent encoders on one circuit board, and can therefore control two Multi-decoders at the receiver end of the system. A unique feature is that the user can select the physical control he wants to use, and the location in the transmitter where it is to be fitted. This applies in particular to the controls of the second Multi-module, which is integrated into the same circuit board.

To achieve this, physical controls for all 8 channels must be fitted in the transmitter case.
It is possible to choose with complete freedom which physical controls operate the various functions. The controls for the second Multi-module are connected to sockets 1...8; these are marked with white numbers. These sockets are located on the rear face of the Multi-Switch-Prop module circuit board.

The choice of physical controls on the transmitter must match the Multi-decoder which is in use; alternatively the Multi-decoder type must be selected to match the physical controls which are present.

The following types of Multi-decoder are available:

- **Multi-Switch-Prop 12+2 decoder memory No. 8370**
  = 12 switched channels and 2 prop (servo) channels
- **Multi-Switch 16 decoder memory No. 8369**
  = 16 switched channels
- **Multi-Prop 8 decoder No. 8042**
  = 8 proportional (servo) channels

General note on the multi-function decoders:
The decoder type determines whether proportional functions (servos) or switched functions (lamps, motors) can be controlled. Each Multi-module can control any type of decoder, although some combinations may produce a system which is not particularly convenient in use.

Example 1:
A proportional channel at the decoder end can be operated with a switch; in this case the servo is switched (left-centre-right), and cannot be controlled proportionally.

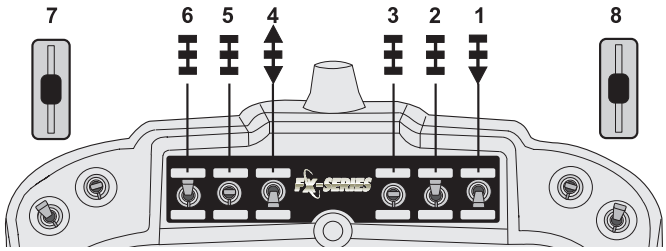
Example 2:
A switched channel at the decoder end can also be operated by a proportional control (linear slider). In this case the slider must be moved from the centre to the end-points to produce the switching effect.

Note:
If you want to use all 8 switch connections for the second part of the Multi-module, you will need to have stick switches installed, since there are not enough option wells present to accept the full number of switches. These stick switches are installed in the main stick shafts; the work must be carried out by a robbe Service Centre.

For a more detailed description of all the switches and accessories available please refer to Section 17, Accessories.

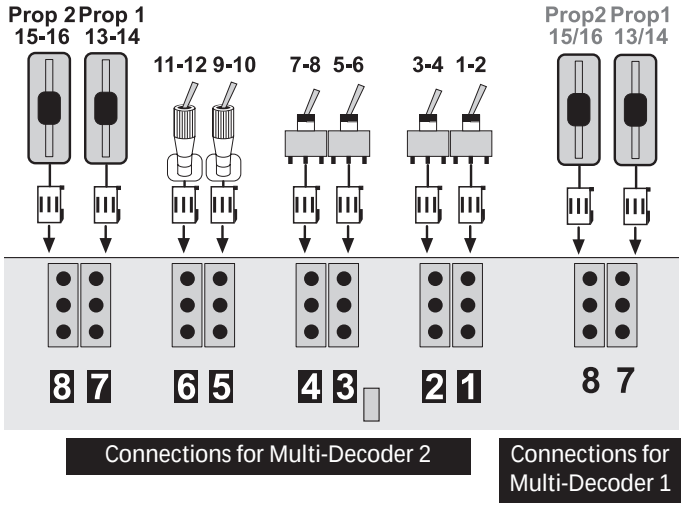
In this example 2 Multi-Switch-Prop decoders are used. It is also possible to use any other combination.

Please refer to the instructions supplied with each Multi-decoder for specifications, details of power supply requirements, maximum switchable currents and connection of electrical units.

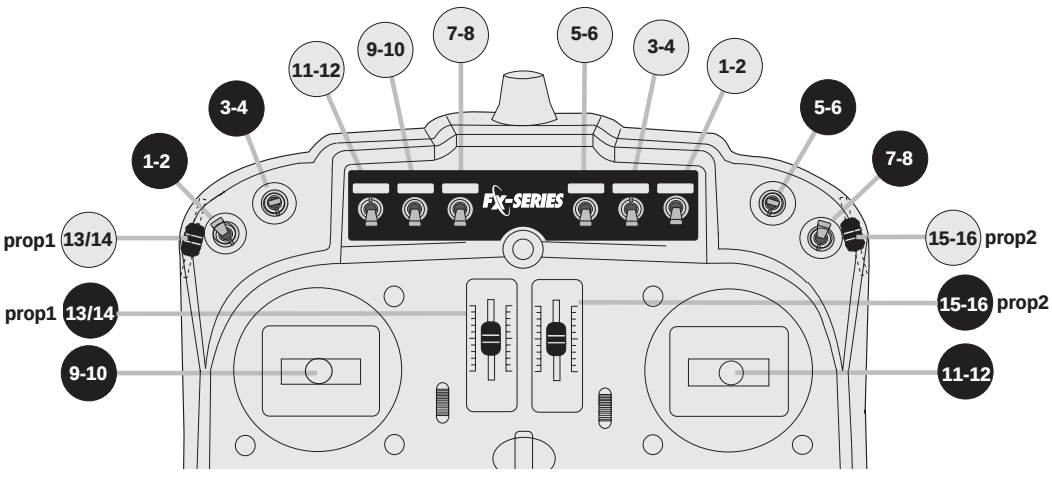


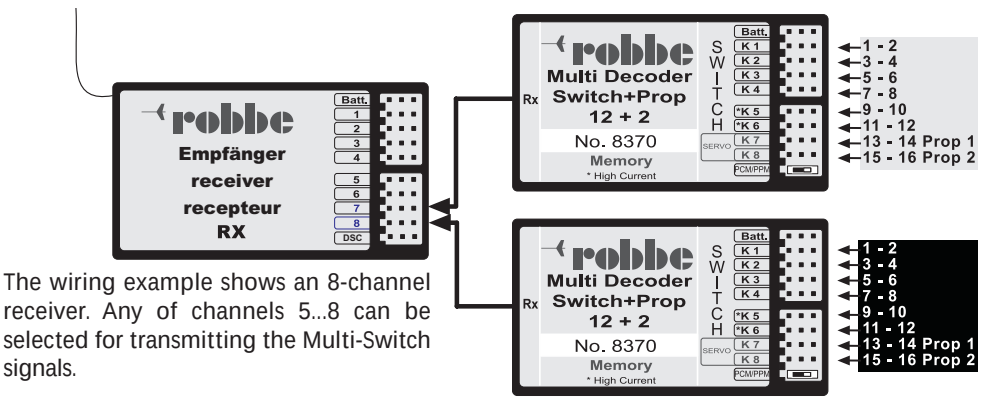
The illustration shows the numbering of the switches and their mechanical function.

Button Ratchet Button | Ratchet Ratchet Ratchet | Ratchet Ratchet Button



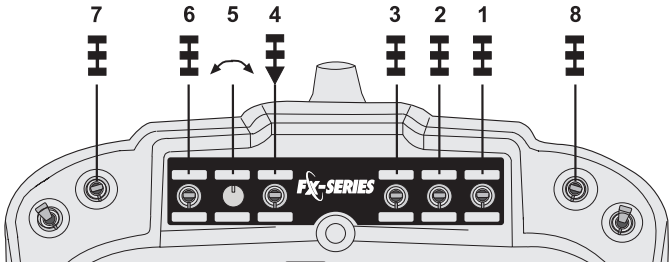
The illustrations clearly show the connection between the numbering of the switches (channels) and the numbering of the functions.





The wiring example shows an 8-channel receiver. Any of channels 5...8 can be selected for transmitting the Multi-Switch signals.

11.3 FX Multi-Switch module lighting set No. 8372



The illustration shows the switch numbering and the mechanical function of the switches.

Ratchet
Ratchet
Ratchet

Ratchet
Ratchet
Button

The methods of installing and connecting the module, and its general method of working, have already been described in detail in the preceding section. The following section describes the differing features of the "FX Multi-module lighting set", and the method of using it in conjunction with the Truck and Trailer super lighting set.

The physical controls, such as switches and pots, are arranged in such a way that all the functions of the Truck and Trailer lighting set can be controlled conveniently. The Multi-module is fitted as standard with 5 switches and one pot, which are used to control the first 6 outputs of the Multi-decoder which is an integral part of the Super lighting set. Switches 7 and 8 have to be installed separately.

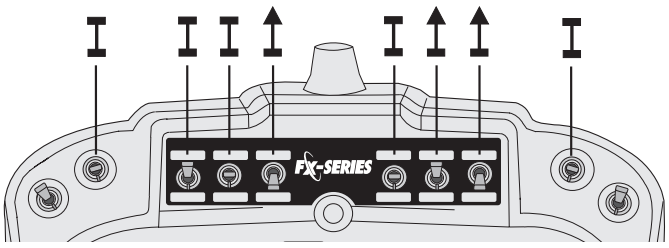
The switches and pot are used to control the following functions:

No.	Function on truck:	Function on trailer:
1	Supplementary servo, right-left	
2	Hazard flasher	Trailer on-off / hazard flasher
3	Running, parking, rear light	Running, parking, rear light
4	High beam, high beam flash	
5		Trailer strut, up-down
6	Coupling open-close	
7	Rear foglamp / flasher	Rear fog lamp
8	Flasher, left-right	Flasher, left-right

Please refer to the instructions supplied with the lighting set, as they include a full wiring diagram, specifications etc.

This Multi-module includes as standard an encoder to control a second Multi-decoder. To make use of this, connect the corresponding controls such as switches and sliders to the rear face of the circuit board (see also Section 11.1).

11.4 FX Multi-Switch module sound No. 8382



The illustration shows the switch numbering and the mechanical function of the switches.

Ratchet

Ratchet

Ratchet

Button

The methods of installing and connecting the module, and its general method of working, have already been described in detail in Section 11.1. The following section describes the differing features of the "Multi-module sound" and the way of using it in conjunction with the Navy and Truck sound modules.

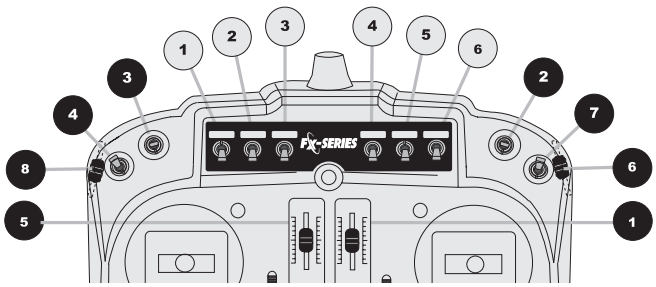
The switch controls are arranged in such a way that all the functions of both sound modules can be controlled conveniently, with the Multi-module controlling the Multi-decoder which is an integral part of the sound module. Switches 6 and 7 each control one further free channel at the sound module, and can be installed and connected as options if and when required.

The switches operate the following functions on the sound module:

No.	Sound module Truck	Sound module Navy
1	Release compressed air	Ship's bell
2	Horn	Foghorn
3	Martins horn	Martins horn
4	Horn	Destroyer siren
5	Engine	Engine
6	Free switched channel	Free switched channel
7	Free switched channel	Free switched channel
8	-	Typhoon

Please refer to the instructions supplied with the sound modules for a full wiring diagram, specifications etc. This Multi-module also features as standard an encoder which can control a second Multi-decoder. To make use of this, connect the corresponding controls such as switches and sliders to the rear face of the circuit board. For truck modellers we recommend that you install a Super lighting set as the second Multi-decoder, as this combination of decoders produces the optimum arrangement for controlling the auxiliary functions of a model truck.

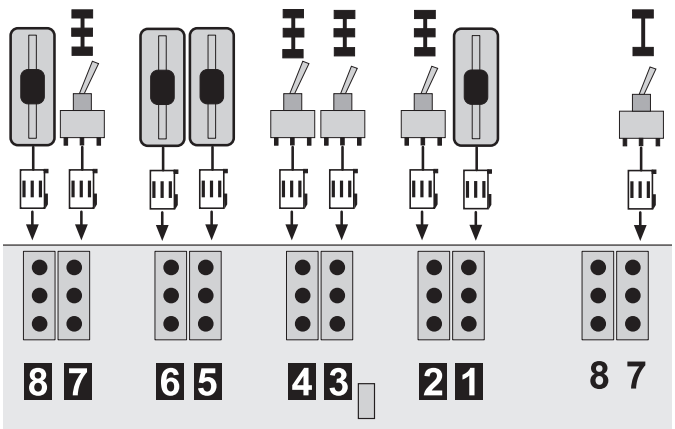
We recommend the following switch arrangement:



The switches numbered in black circles have the following functions with the Truck and Trailer lighting set:

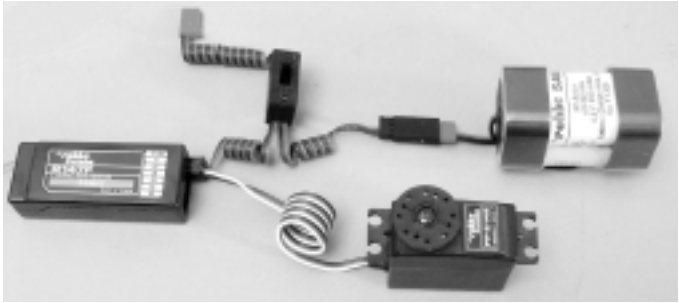
No.	Function on truck:	Function on trailer:
1	Supplementary servo, right-left	
2	Hazard flasher	Trailer on-off / hazard flasher
3	Running, parking, rear light	Running, parking, rear light
4	High beam, high beam flash	
5		Trailer strut, up-down
6	Coupling open-close	
7	Rear foglamp / flasher	Rear fog lamp
8	Flasher, left-right	Flasher, left-right

The following illustration shows the connections at the Multi-module.



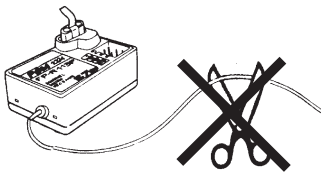
12. Connecting the receiving system, tips on installation

Connecting the receiver

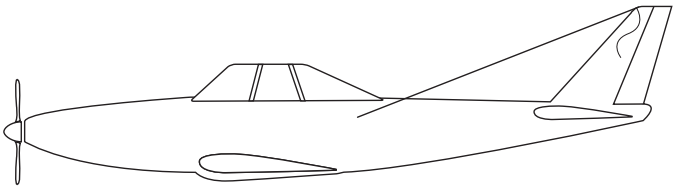


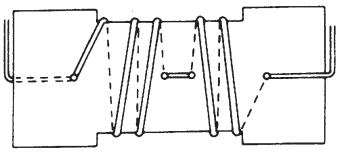
Receiver aerial

The receiver aerial is attached directly to the receiver. It is about 100 cm long and must not be shortened or extended. The aerial should be routed as far as possible away from electric motors, servos, metal pushrods and high-current cables.



Do not deploy the aerial in an exactly straight line. It is better to tension it to the fin tip with a rubber band and allow about 10 - 15 cm to trail freely, forming an L-shape. This helps to prevent "blind spots" and "glitches" when flying.





If this is not possible, we recommend that you deploy the aerial in an S-shape inside the fuselage, as it will take up little space in this configuration. Wind the wire onto a small plate made of card, plywood or plastic, as shown in the sketch here, and locate it close to the receiver if possible. This does not affect effective range.
Avoid aerial damage by fitting a tension relief and guide, e.g. a short piece of fuel tubing, where the wire exits the fuselage. It is essential to ensure that the aerial cannot foul the propeller.

If your model has a carbon fibre fuselage, the aerial must be deployed outside it, and should not even run parallel to the fuselage, as the shielding effect of this material can cause reception problems.

Switch harness

It must be possible to operate the receiving system switch easily, without mechanical restriction, i.e. the cut-out in the fuselage side must be large enough to avoid obstructing the mechanism. In powered models with internal-combustion engines the switch should be mounted on the opposite side to the exhaust, to avoid the danger of oil penetrating the switch and soiling the contacts.

Servo leads

When deploying servo leads ensure that they are not under any mechanical strain and are not kinked or bent tightly, as this might cause them to fracture over time. Make sure there are no sharp edges which might damage the cable insulation. All connectors must be firmly fitted and secure. When disconnecting them, pull on the plastic housings - not on the wires.

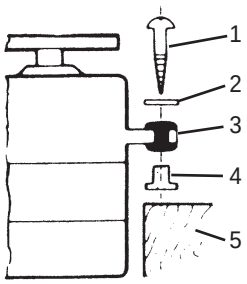
Servo leads should not just be left dangling inside the fuselage; it is far better to attach the leads neatly to, say, the fuselage side or the chassis using adhesive tape or cable ties.
It is not permissible for modifications of any kind to be made to the receiving system components. Avoid reversed polarity and short-circuits of all kinds, as the electronics are not protected against such errors.

Servo suppression filters for extension leads

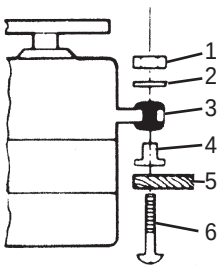
If you wish to use long servo leads or extension leads, e.g. for aileron servos installed outboard in the wings, please note that interference may be picked up via the servo leads. Where servo cables are longer than two normal leads (approx. 50 cm), you should at least use twisted cables (No. F 1452).
Even better: use suppressor filters, No. F 1413.

Installing servos

Always use the rubber grommets and brass eyelets supplied when installing servos. When you tighten the servo retaining screws, ensure that the screws are not tightened beyond the point where the brass eyelets make contact top and bottom; if they are compressed, the ability of the rubber grommets to absorb vibration would be lost. The following diagram shows two typical methods of mounting servos. Diagram "A" shows a wooden servo plate. Diagram "B" shows the use of a plastic or aluminium plate.



1 Woodscrew
2 Washer
3 Rubber grommet
4 Eyelet
5 Wood



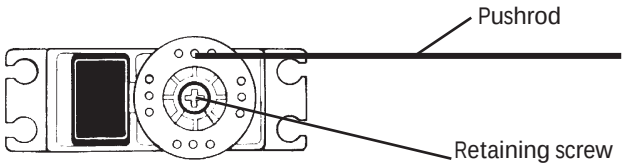
1 Nut
2 Washer
3 Rubber grommet
4 Eyelet
5 Aluminium plate
6 Screw

In model aircraft suitable servo plates or quick-release mounts normally have to be fitted. In RC model cars the servos are usually fitted in the openings provided for them in the RC installation plate. robbe quick-release servo mounts are a good choice for model boats. Please take great care over mounting servos, as they are sensitive to vibration.

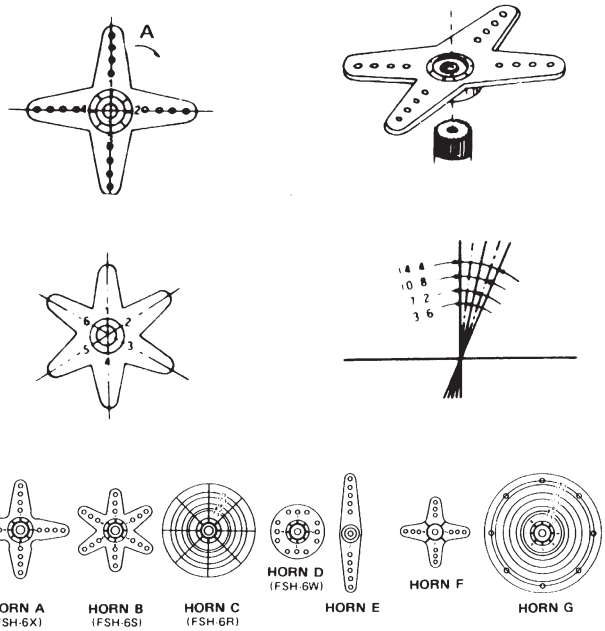
Servo travels

Each servo must be able to move through its full arc of travel without being mechanically obstructed by the control surface or its linkage. This applies in particular to the carburettor linkage. The "full throttle" and "idle" settings must be determined by the stick positions; never by the throttle's mechanical end-stop. If you ignore this warning, the servo motor will be under almost full load constantly, and will consume an extremely high current.

Servo output arms
Servos with splined output shafts permit mechanical adjustment of the servo neutral position. The position is adjusted by undoing the retaining screw and lifting off the output device.
Position the output device in the appropriate neutral position, push it down onto the splines, and tighten the retaining screw again. The following diagram shows a servo with pushrod connected.
A range of servo output arms is available for robbe servos, and they are illustrated in the picture below. The picture also shows the angular change per spline segment.



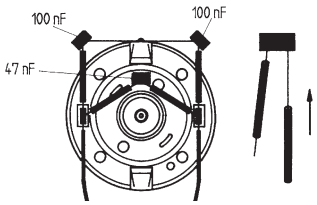
Installing linkages
The basic rule when installing mechanical linkages and control surfaces is that they must be extremely free-moving, otherwise the servos will draw excessive currents, and the effective operating time per battery charge will be greatly reduced. At the same time the centring accuracy of the control system will be worse, which in turn has a negative influence on the model's flying characteristics.



13. Using the system
All robbe-Futaba receivers continue to work with full range at reduced voltage, down to the point where the supply voltage falls to 3 V. The advantage of this is that normally the receiving system will continue to work even if one cell fails completely (short-circuit), as robbe-Futaba servos still work down to 3.6V, albeit at slightly lower speed and with less power. This is very important in Winter, when ambient temperatures are very low, otherwise any momentary voltage collapse could cause the loss of a model.
However, there is a drawback: under certain circumstances the user may not even notice the failure of a battery cell. For this reason it is important to check the receiver battery from time to time. We especially recommend the use of a robbe battery controller (No. 8248) or a robbe 10-LED switch harness (e.g. Order No. F 1404).

Power-on sequence
Always switch on the transmitter first, and only then the receiver.
Reverse the sequence when switching off.
When you switch the receiver on, the servos run to the neutral position. We recommend that you check each function in turn by operating the associated stick or other transmitter control. Check that each control surface functions in the correct "sense" (direction). If any control surface moves in the wrong direction, that servo must be reversed at the transmitter.

"Noise" interference
If your radio control system is to operate safely and reliably, it is essential to avoid what is known as electrical "noise" interference. This problem is due to metal parts, such as pushrods, rubbing against each other intermittently as a result of vibration. For this reason the linkage to the engine's carburettor must always terminate in a plastic clevis - never connect a metal linkage directly to the carburettor arm without insulation.

Electric motors


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

Electronic ignition systems

The ignition systems of spark-ignition petrol engines can also produce interference, which has an adverse effect on the radio control system. Never power an ignition system from the receiver battery; a separate battery is essential.

Be sure to use properly suppressed spark plugs, plug caps and shielded ignition cables.
Keep the receiving system as far away as possible from any ignition system.

Receiver battery capacity and operating times

This rule applies to all types of battery: at low temperatures battery capacity is severely reduced, i.e. safe operating times are shorter in cold weather.
The safe operating time varies greatly according to the number of servos connected to the receiver, the stiffness of the linkages, and the frequency of control commands which the pilot gives. A standard servo draws between 150 and 600 mA when the motor is running, and about 8 mA at idle. Super-servos and powerful digital servos can draw peak currents of up to 1300 mA at full power.

Be sure to select a receiver battery with ample capacity, bearing in mind the likely current drain and the number of servos.

Ensure that all mechanical linkages are free-moving, and that the servo is not obstructed in its travel. A servo running constantly against a mechanical stop or limit draws a very high current, and will also inevitably suffer damage in the long-term.

When the receiver battery is almost discharged, you may notice that the servos respond much more slowly. The moment you notice this, land the model immediately and recharge the battery. To monitor the receiver battery during a session we recommend the use of a battery controller, which gives you a useful idea of the state of charge of the battery between flights.

14. Guarantee

We guarantee this radio control system for a period of 24 months. Take care to keep the purchase receipt given to you by your model shop, as you will need it as proof of the guarantee period. The model shop will give you the receipt when you purchase your new radio control system. Any repairs carried out under guarantee do not extend the guarantee period.

During this period any faults in operation or manufacture or material defects will be corrected by us at no cost to you. Any other claims, e.g. in the case of 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 were used exclusively.
- Damage due to damp, tampering, reverse polarity, overloads and mechanical damage are not covered.
- You must include a succinct description of the problem to help us locate the fault or defect.

15. Service Centre addresses

Andorra
SORTENY
130 LES ESCALDES
Tel.: 0037-6-82 08 27
Fax: 0037-6-82 54 76

Denmark
MAAETOFT DMI
8900 RANDERS
Tel.: 0045-86-43 61 00
Fax: 0045-86-43 77 44

Germany
ROBBE - SERVICE
METZLOSER STRAßE 36
36355 GREBENHAIN
Tel.: 0049-6644-87-0
Fax: 0049-6644-74 12

England
ROBBE-SCHLUETER UK
LEICESTERSHIRE, LE10-1UB
Tel.: 0044-1455-63 71 51
Fax: 0044-1455-63 51 51

Finland
HOBBY-NOR KY
02100 ESPOO
Tel.: 0035-89-45 51 13 3
Fax: 0035-89-45 51 13 0

France / Belgium
S.A.V. MESSE
ROBBE / FUTABA
BP 12
F-57730 FOLSCHVILLER
Tel./Fax: 0033-387-946258

Greece
TAG MODELS HELLAS
143 41 NEA PHILADELFIA
Tel.: 0030-1-25 84 38 0
Fax: 0030-1-25 33 53 3

Italy
MC-ELECTRONIC
VIA DEL PROGRESSO 25
I-36010 CAVAZZALE (VI)
Tel.: 00390-0444-945992
Fax: 00390-0444-945991

Netherlands / Belgium
JAN VAN MOUWERIK
SLOT DE HOUVELAAN 30
NL-3155 VT MAASLAND
Tel./Fax: 0031-1059-13594

Norway
NORWEGIAN
MODELLERS A.S.
3101 TØNSBERG
Tel.: 0047-333- 78 00 0
Fax: 0047-333 -78 00 1

Austria
ROBBE - SERVICE
HOSNEDLGASSE 35
A-1220 WIEN
Tel.: 0043-01259-6652-14
Fax: 0043-01258-1179

Poland
JANTAR SP. O.O.
85-078 BYDGOSZCZ
Tel./Fax: 0048-52-34 54 291

Sweden
MINICARS HOBBY AB
75323 UPPSALA
Tel.: 0046-18-71 20 15
Fax: 0046-18-10 85 45

Switzerland
SPAHR ELEKTRONIK
GOTTHELFSTRASSE 12
CH-2543 LENGNAU
Tel.: 0041-032-6522368
Fax: 0041-032-6537364

Slovak Republic
FLY - FAN
91105 TRENCIN
Tel.: 0042-1831-74 44 20 3
Fax: 0042-1831-74 44 71 5

Spain
MODELIMPORT S.A.
28850 TORREJON DE
ARDOZ MADRID
Tel.: 0034-91-67 74 72 0
Fax: 0034-91-67 79 86 0

Czech Republic
MS Composit Modelsport
CZD25265 Tursko
Tel.: 00420-205-786 266
Fax: 00420-205-786 401

Turkey
FORMULA MODEL SPORTS
35060 PINARBASI-IZMIR
Tel.: 0090-232-47 91 25 8
Fax: 0090-232-47 91 71 4

16. Post Office regulations

The R&TTE (Radio Equipment & Telecommunications Terminal Equipment) directive is the new European directive applicable to radio systems and telecommunications equipment, and applies to all such equipment which has general conformity approval in the EC. Part 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 when the process is completed.

The CE symbol is applied to all such equipment, and indicates that it fulfils the currently valid European norms. An exclamation mark is also applied to radio transmitting equipment, as an indication that the approved frequencies are not uniform throughout Europe.

This symbol is used in all the countries of the European Union. Other countries such as Switzerland, Norway, Estonia and Sweden have also accepted this directive.

Your radio control system is registered (i.e. approved) in all these countries, and can legally be sold and operated there.

Please note that the radio control system may only be operated on the approved frequencies for your country. A frequency table is supplied with your system.

We are obliged to point out that the responsibility for this, and also for operating a radio system which fulfils the requirements of the directives, rests with you, the user.

In Germany radio control systems for models operating in the frequency bands of **27 MHz** and **40 MHz** do not need to be registered or licensed, and **no fee is payable**. This may not apply in the country in which you live. In Germany a General Licence to use these frequencies is granted by right. A copy of this "general licence" is supplied with your system.

In Germany the same does not apply to 35 MHz systems, for which a fee is payable on registration. The licence must be obtained from the appropriate RgTP centre before you use the system. An application form for this licence is supplied with the RC system; please refer to the form for further details.

Before using the system check whether you need to register or license your radio control equipment in the country where you intend to operate it.

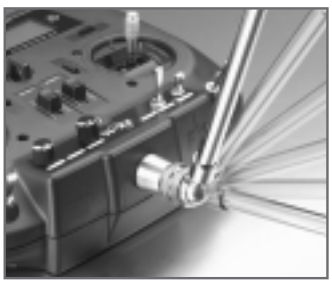
17. Accessories

FX transmitter tray No. 8373
A modern transmitter tray with handrests, moulded in carbon fibre-look material. Integral storage compartments for crystals and tools. The special form of the tray provides access to the rear-mounted linear sliders for transmitter tray users. The transmitter battery can also be recharged without removing it from the tray.

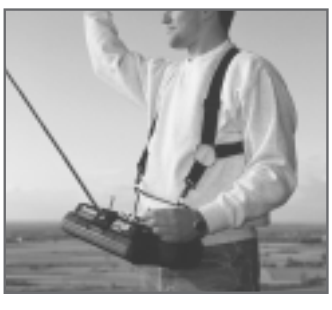
FX support system No 8374
Neckstrap with central plate for secure fixing to the transmitter back panel.
The bars lock in the vertical position. For transport the bars can be folded back, and for programming they can be folded to the side.

Single-point neckstrap
No. F 1550
Soft neckstrap, adjustable in length, with spring clip and swivel.

Helical aerial, 35 MHz
No. 8081
Helical aerial, 40/41 MHz
No. 8072
These short helical aerials can be used as an alternative to the telescopic aerial.
The principal advantages are: no wear, and greater freedom of movement. Effective range is about 30% lower.



FX ball and socket aerial base
No. F 1559
Ball and socket base for telescopic aerial. Variable aerial rake for optimum radiated power.



Cross-over neckstrap
No. 8151
Comfortable, adjustable-length cross-over strap for transmitter trays and support systems.
Promotes fatigue-free model flying even over long periods. Broad, soft strap for pleasant, comfortable flying.

FX carry handle No. 8375
A practical carry handle is available for pilots who prefer a hand-held transmitter.

FX shell handles No. 8376
Self-adhesive shell handles moulded in special non-slip plastic.
The handles provide even better moulding of the transmitter to fit the pilot's hands, and a secure transmitter grip even if you specialise in powerful "hand-launches".
Contents: 1 pair

FX long rear linear slider
No. F 1586
Linear slider for installation in the back panel of the transmitter. Supplied with 2 long operating levers; can be used left or right. The version with long levers is recommended for use in a transmitter tray. Also expands Multi-modules by one proportional channel.

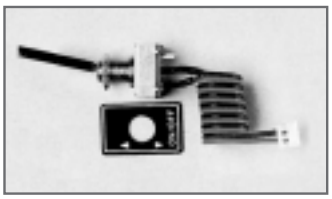
FX short rear linear slider
No. F 1590
Linear slider for installation in the back panel of the transmitter. Supplied with 2 short, low-profile operating levers; can be used left or right. The version with long levers is recommended for use in a transmitter tray. Also expands Multi-modules by one proportional channel.

FX front linear slider
No. F 1587
Expands the FX transmitter by one slider channel on the front panel. Supplied with operating knob and scale label. Also expands Multi-modules by one proportional channel.

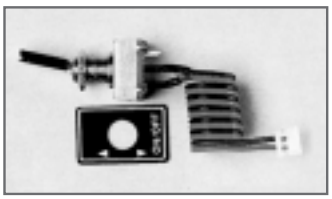
Long 3-position switched channel
No. F 1588
Expands the FX transmitter by one 3-position switched channel. Also expands Multi-modules by one proportional channel.

Short 3-position switched channel
No. F 1500
Expands the FX transmitter by one 3-position switched channel. Also expands Multi-modules by one proportional channel.

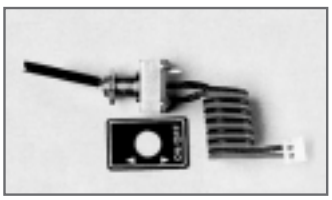
Long 2-position switched channel
No. F 1524
Expands the FX transmitter by one 2-position switched channel. Also expands Multi-modules by one proportional channel



Long 2-position mixer push-button
No. F 1504
For operating mixer functions.



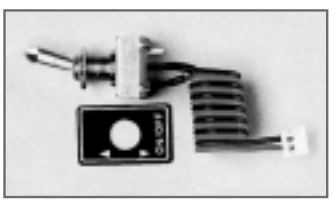
Short 2-position mixer push-button
No. F 1502
For operating mixer functions.



Long 2-position mixer switch
No. F 1521
For operating mixer functions.

Long 3-position mixer switch
No. F 1522
For operating mixer functions.

Short 3-position mixer switch
No. F 1503
For operating mixer functions.



Short 2-position latching mixer switch
No. F 1523
For operating mixer functions.

Double mix trimmer module
No. F 1506
Two mix trimmers for adjusting mixer values in flight. Supplied with aluminium knobs.

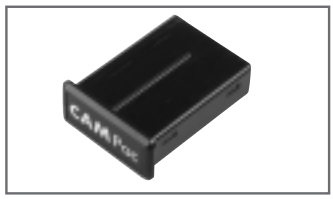
2-position stick switch
No. 8343
For operating mixer, channel or Multi functions.

3-position stick switch
No. 8344
For operating mixer, channel or Multi functions.

Push-button stick switch
No. 8346
For operating momentary functions such as stopwatch etc.

Stick top extension
No. 8086
Extends the sticks for use in a transmitter tray or with the neckstrap system. Variable length; 10.5 mm Ø, length 47 mm. Contents: 2 units

Mini battery controller
No. 8248
For 4.8 Volt receiver batteries. 10-stage chain of LEDs provides information about the current voltage level of the receiver battery while the model is in use.



CAMPac model memory modules

4 K	No. F 1508	3 models
16 K	No. F 1509	12 models
64 K	No. F 1566	49 models

10-LED switch harness, 4 NC
No. F 1404
Switch harness with integral battery controller and DSC/charge socket in a compact housing. The integral battery monitor shows the voltage of the receiver battery in 1/10 Volt increments.

FX DSC lead **No. 8385**
For direct servo control (DSC) without radiating an RF signal.

FX adaptor for flight simulator
No. 8383
Adaptor lead for connecting FX transmitter to flight simulators with 3.5 mm barrel plug (2.5 -> 3.5 mm)

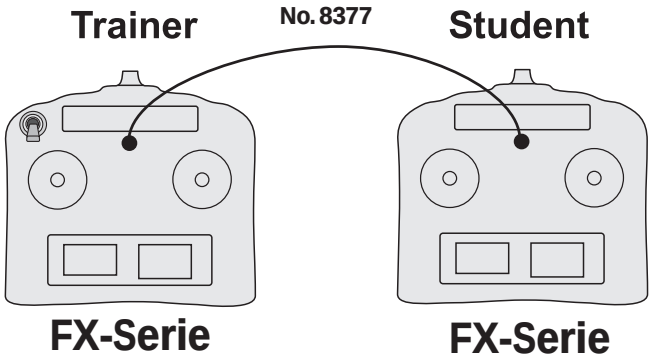
FX Trainer lead, 2.5 - 2.5 mm
No. 8377
Trainer lead for two FX transmitters.
Length approx. 2.5 metres.

FX Trainer lead, 2.5 - 3.5 mm
No. 8362
Trainer lead for FX transmitter to F transmitter with Trainer Module 4.
Length approx. 2.5 metres.

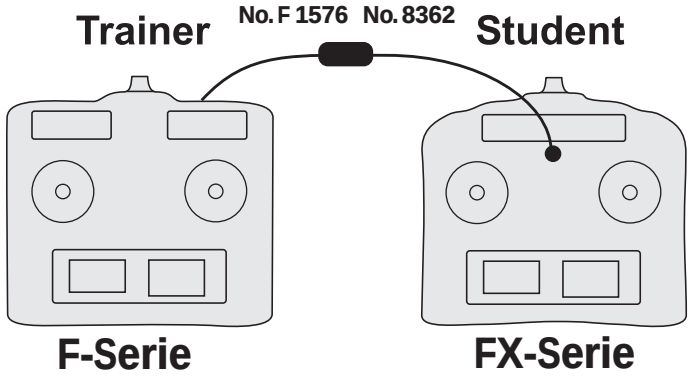
Trainer 4 adaptor
No. F 1576
Adaptor for connecting the Trainer lead, No. 8362, to trainer transmitters with Trainer module 1 or 3 and transmitters with DIN 6-pin Trainer socket.

Student 4 adaptor
No. F 1581
Adaptor for connecting the trainer lead, No. 8362, to student transmitters with Trainer module 1 or 3 and transmitters with DIN 6-pin Trainer socket.

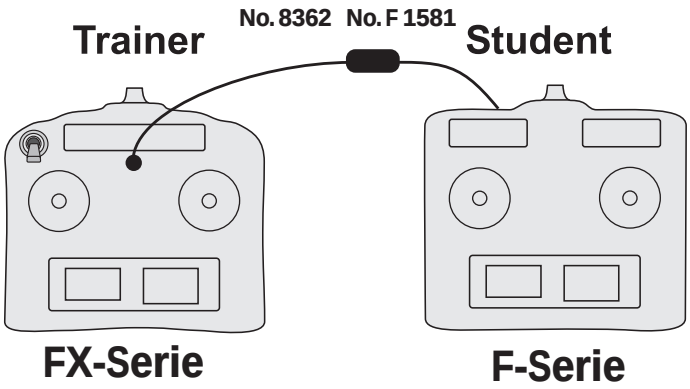
The illustrations below are schematic wiring diagrams of the trainer and adaptor leads required to connect the FX-18 transmitter to F-series transmitters and the hand-held transmitters of the international Futaba series.



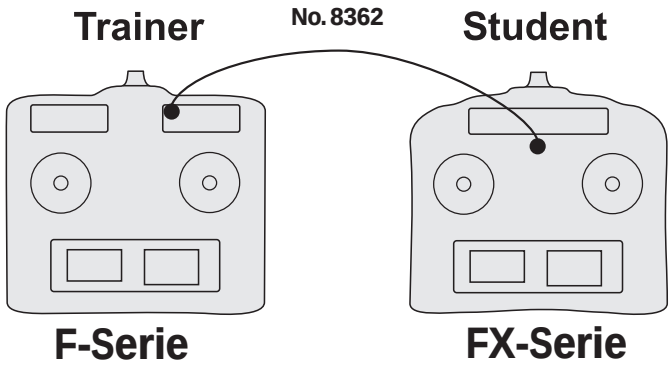
Use of 2 FX transmitters, trainer lead No. 8377 and switch No. F 1524.



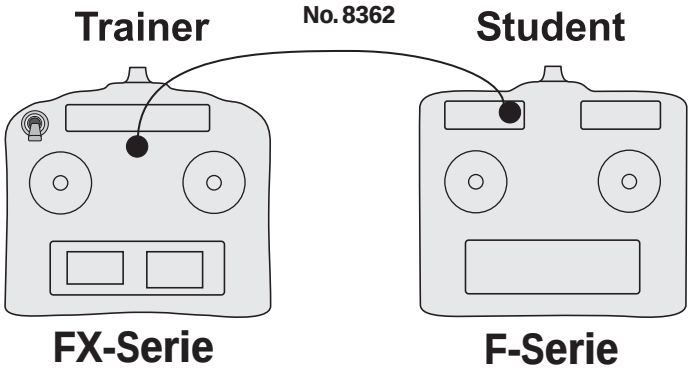
F-series transmitter in conjunction with integral Trainer module 1 or 3, also hand-held transmitters with DIN 6-pin socket.
Requires trainer lead No. 8362 and adaptor lead No. F 1576.



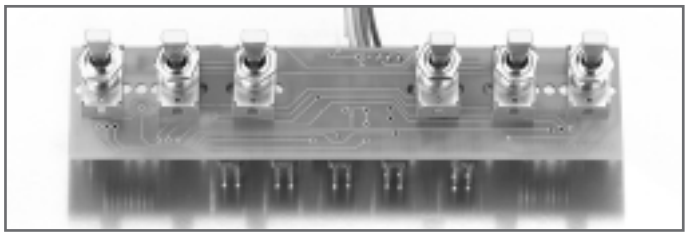
FX-18 in conjunction with F-series transmitters with integral Trainer module 1 or 3, also hand-held transmitters with DIN 6-pin socket.
Requires trainer lead No. 8362 and adaptor lead No. F 1581.



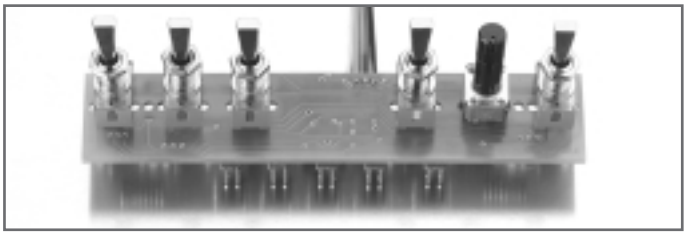
F-series transmitter with integral Trainer 4 module No. F 1574.
Requires trainer lead No. 8362.



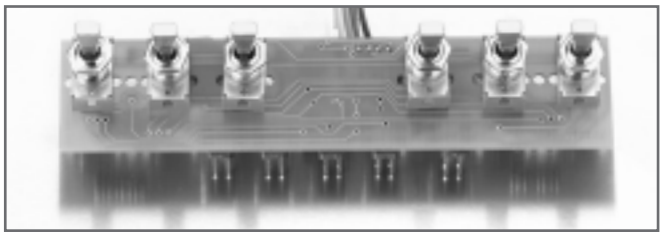
FX-18 in conjunction with F-series transmitters, with integral Trainer 4 module No. F 1574
Requires trainer lead No. 8362 and switch No. F 1524.



FX Multi-Switch Prop module **No. 8380**
Expansion module for switching auxiliary working functions. Expands 2 proportional channels of an FX transmitter to provide up to 32 switched channels. The switches are selected and arranged to afford optimum control of a **Multi-Switch-Prop** decoder.



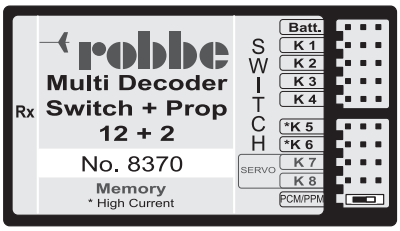
FX Multi-Switch module lighting set **No. 8372**
Expansion module for switching auxiliary working functions. Expands 2 proportional channels of an FX transmitter to provide up to 32 switched channels. The switches are selected and arranged to afford optimum control of a **Truck lighting set**.



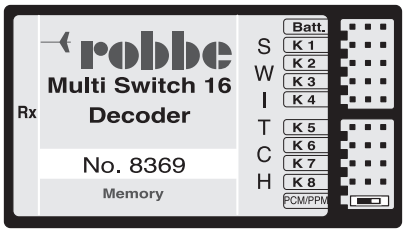
FX Multi-Switch module sound **No. 8382**
Expansion module for switching auxiliary working functions. Expands 2 proportional channels of an FX transmitter to provide up to 23 switched channels. The switches are selected and arranged to afford optimum control of a Truck or **Navy sound module**.

Truck super lighting set **No. 8411**
Multi-decoder module providing scale control of the lighting system and proportional auxiliary working systems in model vehicles such as trucks, etc. All the standard flashing and constant light functions can be controlled; the "throttle" channel of the radio control system is monitored, and automatically controls the brake lights and reversing lights.
Two additional proportional servo channels are switchable. Zero-contact control signal transfer to the Trailer lighting set by means of infra-red transmission system.

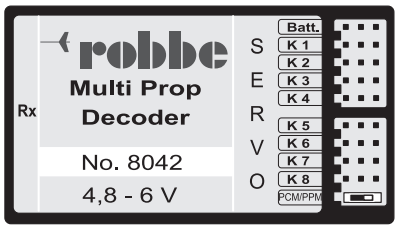
Trailer super lighting set **No. 8412**
Complements the Truck lighting set, used to control the lighting functions in the trailer.



Multi-Switch-Prop 12+2 decoder memory **No. 8370**
Multi-decoder required to decode Multi-module signals. The decoder takes up only one servo channel, and directly controls 12 switched channels and 2 servo channels.
Operating voltage 4.8 - 24 Volts, up to 2.7 A per output.



Multi-Switch 16 decoder memory **No. 8369**
Multi-decoder required to decode Multi-module signals. The decoder takes up only one servo channel, and directly controls 16 switched channels.
Operating voltage 4.8 - 24 Volts, up to 1.8 A per output.



Multi-Prop 8 decoder **No. 8042**
Multi-decoder providing additional proportional channels. The decoder takes up only one servo channel, but provides independent control of 8 servos or speed controllers connected to it.

Navy sound module **No. 8270**
Sound module for model boats containing six digitally stored original sounds.
Martins horn * foghorn * ship's bell * typhoon or destroyer siren plus motor speed-dependent diesel engine sound.
The sound module includes an integral multi-decoder which allows the individual sounds to be switched on and off independently of each other.

Truck sound module **No. 8268**
As the Navy sound module, but with the following sounds in addition to the diesel engine:
* compressed air release * Martins horn * horn * hooter
Operating voltage: 6-12 Volts, output stage power approx. 6 W into 8 Ohm.

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