Set-Up Menu

Selecting and Adjusting the Program Settings

Switch on the transmitter and press ENTER to switch to the Set-Up Menu program. (If the System Menu is active, press ENTER twice).

The Multi-Data Information Display now switches from the basic information (normal operation or stopwatch) to the Set-Up Menu, and you will see the last selected function from this menu on the screen. If you wish to adjust a different function you should press ROLL UP or ROLL DN repeatedly (or hold it down) until the required function appears in the display.

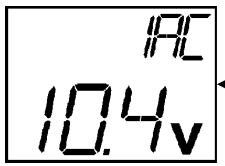
You can switch to the channel (CH) or to any allowed sub-routine you want to adjust by pressing the CH SEL or the ◀ button.

The actual values are always adjusted using the INC or DEC buttons, or a 2-way momentary switch (Part No 4160.44) if fitted. The switch is connected to the INC and DEC sockets on the transmitter circuit board. We strongly recommend installing the switch if you want to be able to alter parameters while you are flying / operating your model aircraft, boat or car.

The adjusted values are automatically stored in the model memory once you press ENTER, or change to the next code.

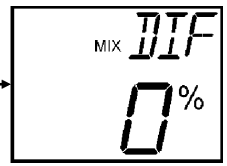
The menu can be left at any time by pressing ENTER. For the sake of clarity, we will describe only those functions which are available for all model types, and which are listed in the flow diagram. The multi-function programs for model aircraft are described in their own sections.

Normal Display



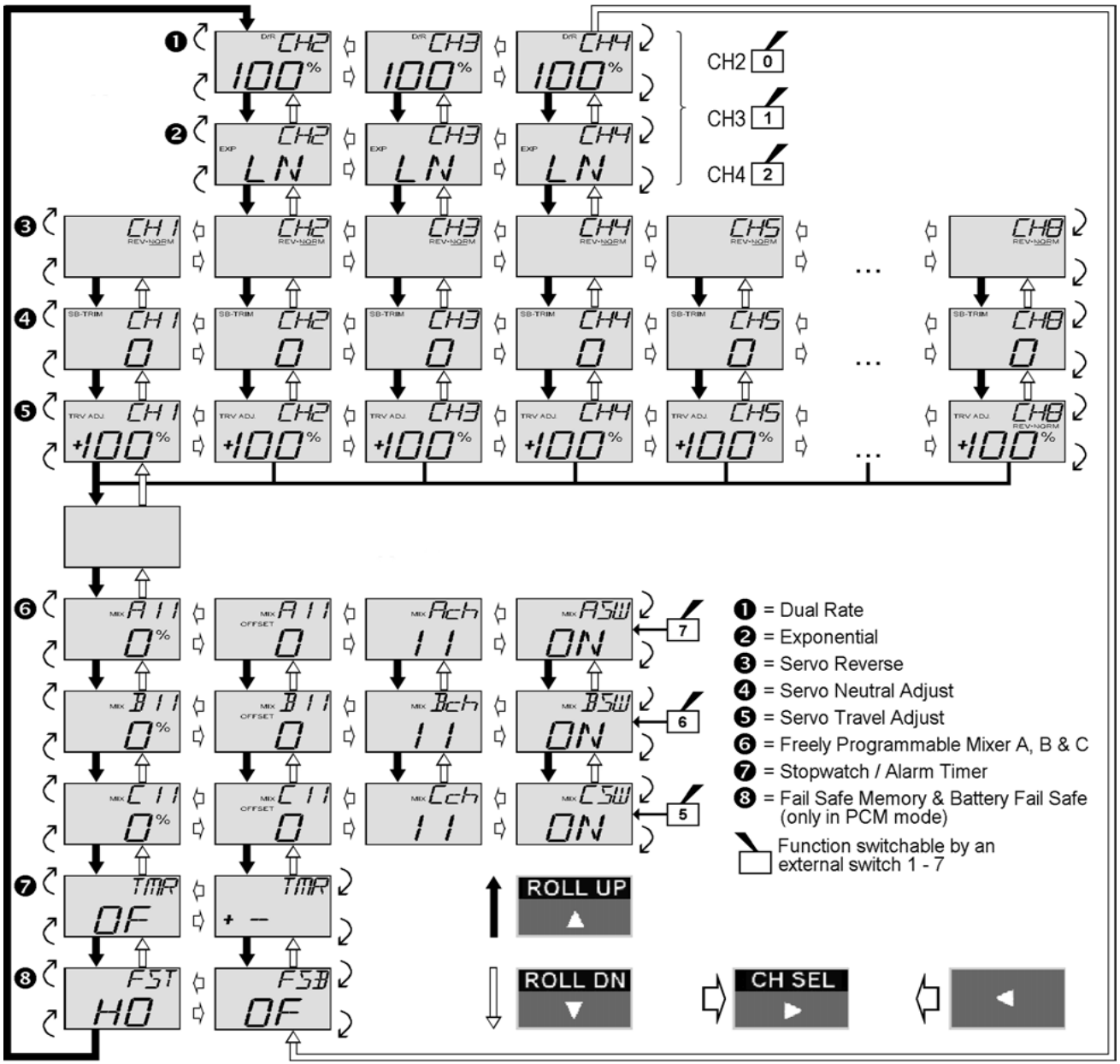
ENTER

Transmitter in Set-Up Menu mode. The display shows the last selected function



Flow Diagram of Set-Up Menu (Partial View)

(includes only those functions which are common to all model types)



DUAL-RATE

Switchable Servo Travel
(access via Set-Up Menu)

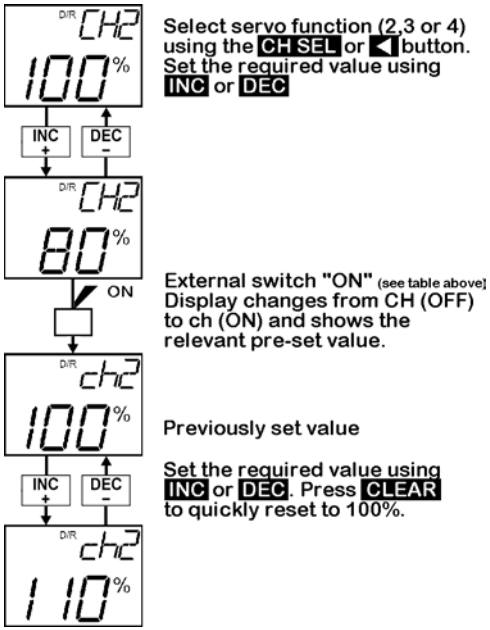
The Dual-Rate function lets you switch to a different amount of travel while the model is in flight, using an external switch. The travel for each of the two switch positions can be set to any value within the range 0 to 125% of normal servo travel. The “D/R” switches must first be connected to main circuit board in the transmitter (see page 10). After selecting the “D/R” code the first step is to select the channel (channel 2 to 4) using CH SEL:

Transmitter Ch.	Function	External Switch
2	Aileron	socket 0
3	Elevator	socket 1
4	Rudder	socket 2

Move the switch to the appropriate position, then set the required servo travel using INC and DEC.

Switch position in the display:
ch = closed (ON)
CH = open (OFF)

Never reduce the Dual-Rate value to 0, as this would mean that the function would not move at all after you’ve operated the switch.



EXPONENTIAL

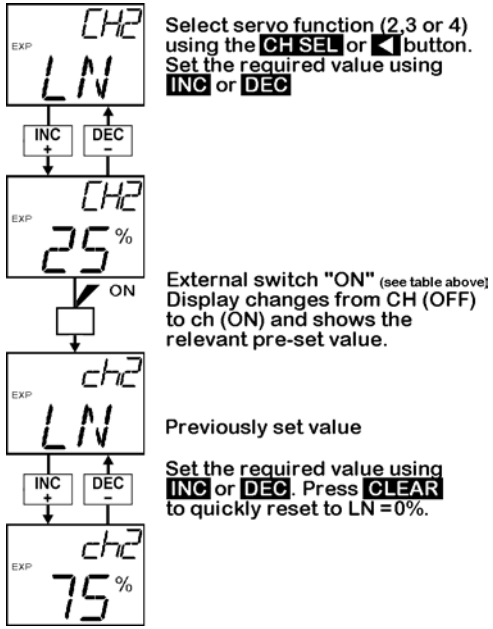
Progressive Servo Travel
(access via Set-Up Menu)

Exponential travel reduces the servo travel around the neutral position of the stick. Travel progressively increases towards the stick end-points, so that full servo travel is still available at the extremes. The degree of progression can be set from linear “LN” (or 0%) to 100%. The Exponential function therefore has no effect when set to “LN”. **Dual-Rates and the Exponential function are controlled by the same switch**, see EXPO-/DUAL-RATE:

Transmitter Ch.	Function	External Switch
2	Aileron	socket 0
3	Elevator	socket 1
4	Rudder	socket 2

Move the switch to the appropriate position, then set the required servo travel using INC and DEC.

Switch position in the display:
ch = closed (ON)
CH = open (OFF)

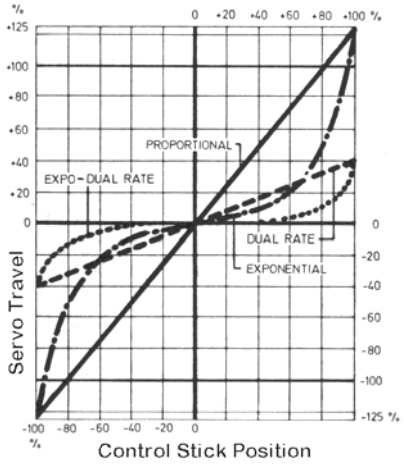


EXPO-/ DUAL-RATE

Coupled Exponential & Dual-Rate
(access via Set-Up Menu)

The Dual-Rate function provides a means of adjusting servo travel symmetrically around the neutral position to any point between 0 and 125%, and switching between the two settings by means of an external switch. The Exponential function alters the servo response curve. Since the external switches affecting control functions 2…4 control the Dual-Rate and Exponential functions simultaneously, it is possible for you to set-up the controls of your model very precisely, to suit your exact requirement. The combination of Dual-Rates and Exponential is particularly advantageous with very fast models. For example, the memory can be programmed with two independent values, separately for aileron, elevator and rudder, such as a servo travel of 20% for one external switch position and 125% for the other position, with an exponential curve of, say, linear or 80%. Note that this Exponential setting defines the “degree of progression” (the shape of the curve), not the extent of the servo travel itself. **For safety reasons the lowest the Dual-Rate value should be set to is 20% of normal travel.**

Characteristic Curves for various settings.



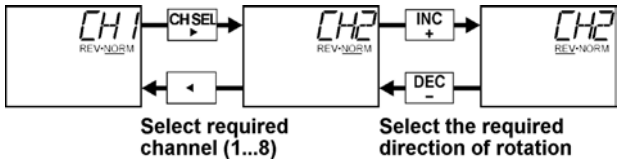
Dual-Rate	=	Linear reduction or increase of servo travel (0% to 125%)
Exponential	=	Progressive control characteristic with 100% servo travel
Expo-/Dual-Rate	=	Combined Exponential and Dual-Rate function

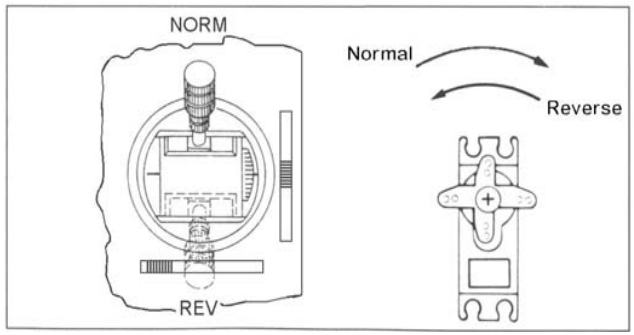
SERVO REVERSE

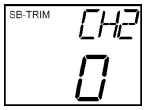
Reversing the Rotation of the Servos
(access via Set-Up Menu)

Using this option, you can reverse the direction of servo rotation.
The set servo rotation is shown in the display for all servo functions 1…8; you will see the cursor line under either “REV” or “NORM”. This eliminates the need to reconnect plugs in the transmitter or reverse the servos themselves. Press the CH SEL button repeatedly until the required channel you wish to alter appears in the display, then swap the direction using the INC or DEC buttons. The CLEAR button will always reset the direction to “NORM”.

Note:
The channel number refers to the receiver output to which the servo in question is connected. Any agreement with the numbering of the channel inputs is coincidental, and is unlikely to be the case when complex mixes are in use. For this reason a change in stick mode does not affect the numbering and direction of rotation of the servos.



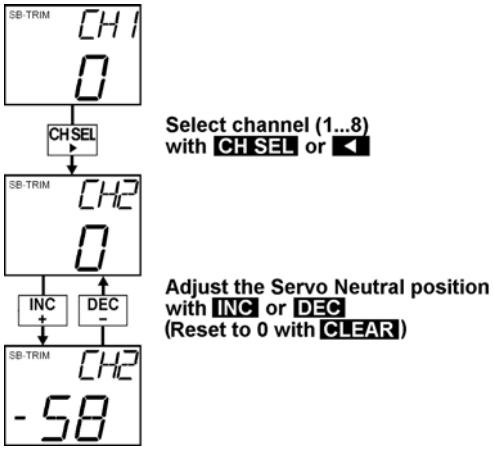


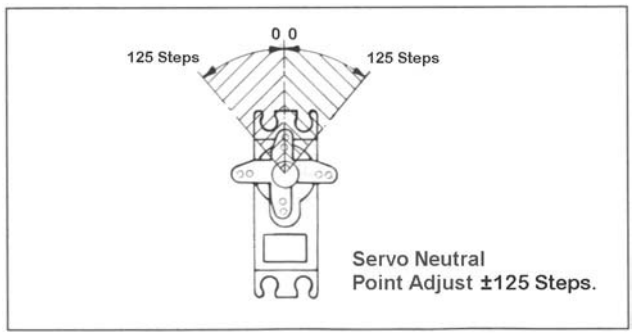


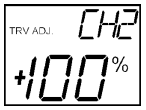
SERVO NEUTRAL POSITION

Servo Neutral Position
(access via Set-Up Menu)

This option can be used to match the system to non-standard pulse width servos or for other applications. The neutral position can be shifted within the range ±125 steps (approximately 70% travel) using the “SB TRIM” option, regardless of the trim lever position and any mixer settings.
Select the channel you want to adjust using the CH SEL button and then press INC or DEC repeatedly to shift the centre point, until the servo neutral is correct for you application. The CLEAR button can be used to reset the adjustment to 0, i.e. the servo the return to its original neutral position. This setting refers directly to the servo concerned, and is not affected by other trim and mixer settings.



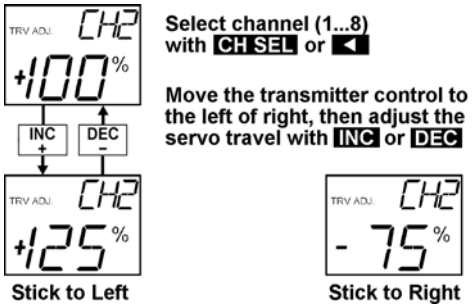


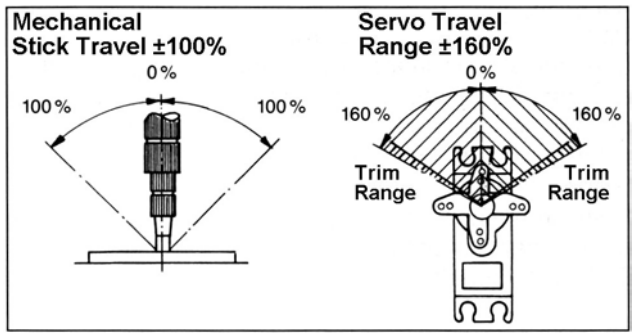


SERVO TRAVEL

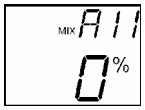
Servo Travel Adjustment
(access via Set-Up Menu)

The abbreviation “TRV ADJ” stands for Travel Adjust and provides adjustment of servo travel separately for either side of centre. The adjustment range is 0…160% of normal servo travel.
Press the CH SEL button repeatedly until the correct servo function (1…8) appears in the display. The bottom line of the display shows the servo travel set, with the prefix (+ or -) indicating the side of centre. If you wish to adjust (& display) a setting, you need to move the associated control (stick, slider, switch) to the relevant end-point. Adjust the travel with the INC or DEC buttons, and reset it to 100% with CLEAR.





MIXER FUNCTIONS



Freely Programmable Mixer

(access via Set-Up Menu)

The Multi-function menus "FL", "UN", "Fb", "AC" and "HE" contain numerous mixing functions, with which two (or more) control functions are mixed together. For example "Combi Mix ", here the rudder can be moved at the same time, without operating the rudder stick, on operating the ailerons. Nevertheless the rudder remains separately controllable. The amount the rudder is moved, by the Combi Mix, is determined by the mixing proportion and the mixing direction, which the model flier must program. The input signal of this mixer is the aileron control function (see the block diagram). The mixer output affects a control path, which before it affects the servo, will be influenced by the codes to the right of the “Input Point from Mixers” in the block diagram, sub trim and servo reversal.

To the mixers are besides external switches assigned, with which they can be switched on and off. A multiple reservation of an external switch is however because of the multiplicity of the mix functions inevitable

Additionally to the finished mixer functions three freely selectable mixers are programmable for each type of model (with the helicopter program two). First control function (mixer input) becomes and the control path (mixer output) of the user defines, then the mixing proportion or the mixing direction and the neutral point input.

The neutral point. in the following OFFSET mentioned. determines that point on the control way of a giver, with whom the mixer does not influence the control path attached at the output. I.d.R. is that the central position of a control stick.

The freely programmed mixer is by software always switched on, alternatively can for it in addition, an ON/OFF switch be assigned.

In addition to the finished mixer functions the model types “FL”, “UN”, “Fb”, “AC” have three, and the type "HE" has two, freely selectable mixers at your disposal. The mixers are accessed in the Set-Up menu by successively pressing the keys the ROLL UP or ROLL DN buttons. They are identified by the identification letters “A, B and C".

With the CH SEL or the ◀ button subroutines are branched to, in allow you to determine the mix proportion, offset (deviation of a control, e.g. joystick or sliding control, centre position), control function (=input signal), control path (=mix output) and mix switch.

Methodology, Example Mixer A:

CH SEL or the ◀ button is pressed repeatedly, until the display shows “Ach". Using the INC button the number the control function (=giver 1…8) and with the DEC button the number of the control path (=output 1…8) are determined. The selected channels are displayed in the lower line of the display. (pressing CLEAR resets this allocation).

Press CH SEL: The display changes to: “ASW”. Here, where the mixer is to remain constantly switched on, the display should show “ON”. Alternatively, an external switch can be assigned, in order to be able switch the mixer on and off. To change this setting press the INC or DEC buttons. In the lower line of the display the card connection number appears, to which an appropriate external switch should be attached:

Mixer	External Switch
A	Connection 7
B	Connection 6
C	Connection 5

Select either “ON” or " 7 " press the CH SEL button. A mix proportion between 0 and ±125%, symmetrical to the neutral point, can be set using the INC or DEC buttons (CLEAR resets the parameter to 0%). If an external switch was assigned, the mixer can be switched off and in the display would show “OF”.

One presses CH SEL again, for the OFFSET input: Move the control into the desired position and press CLEAR. The OFFSET is shown in the display (range approx. ±85). CLEAR resets the OFFSET to 0. If an external switch has been assigned and is switched off, the display also shows “OF” here. (The OFFSET position of the control function should again be stored as required.

Thus the programming of the mixer A is final. With the mixers B and C proceed in same way.

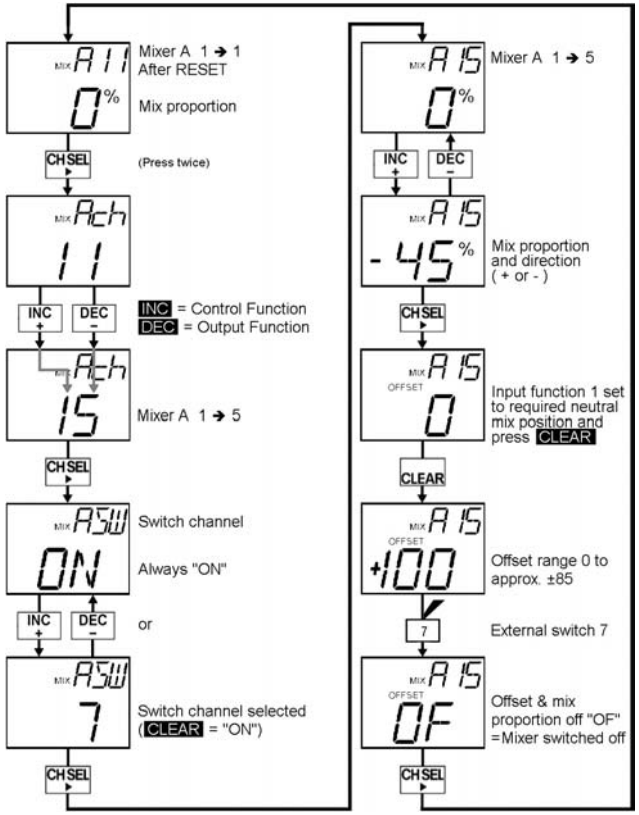
Note:

Mixing proportions of different mixers can be overlaid in such a manner that uneven servo movement is compensated for. E.g.: With the model types “UN” and “Fb”, receiver outputs 2 & 5 are already linked, by software, to the aileron control. If a freely programmable Mixer is set 2 ➔ 5 is set now with a mix quotient of +100%, then only servo 5 would move, and with -100% set only servo 2 moves.

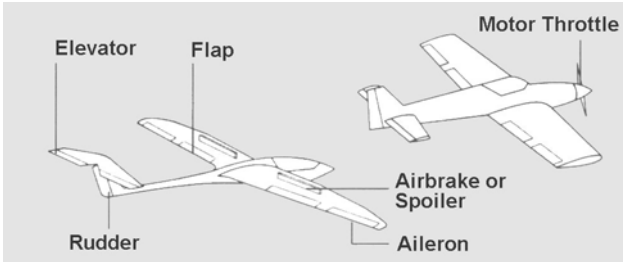
In the helicopter program control function 6 cannot be used as input signal for a mixer, since for this function the pitch trim with external potentiometer is reserved (see appropriate diagram page 61). The signal affects directly only the receiver output 6, whereby the control trim is limited to 25% of the normal throw. Depending on the type of swash plate (Swash Mixer), certain control paths are linked together (as with all finished mixers), so that similar considerations apply as with the types “UN” and “Fb”. E.g. the initial standard wash-out mixer links the "N" control function 1 with channel 6.

Programming Example

Aileron as landing aid with the type of model “UN”



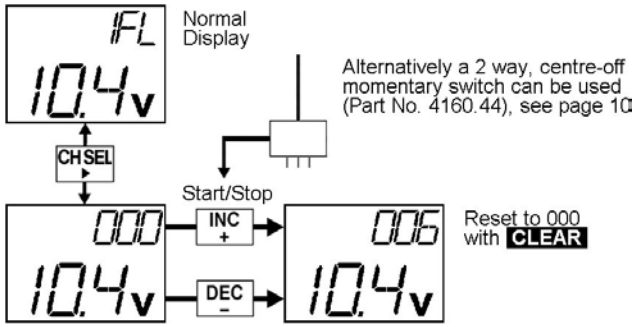
Note:
With the model type “Fb” this program flow is already completed at initialisation, see page 48.



STOPWATCH and ALARM TIMER

Stopwatch and Countdown Clock
(access via Set-Up Menu)

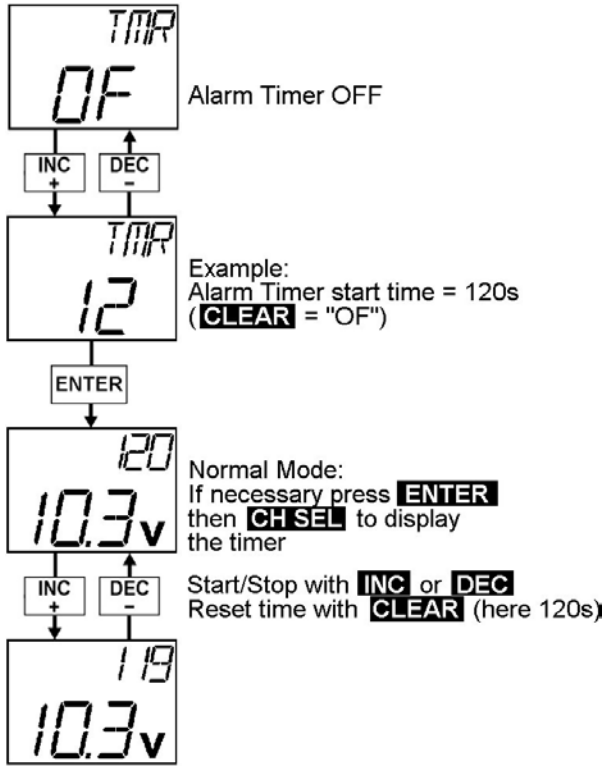
In normal operating mode the display can be set to timer display with the CH SEL button. The default, without having called code “TMR”, is a stopwatch (0...999s). The Start/Stop is using either INC or DEC and reset to “000” is by using CLEAR. If the transmitter is switched off & back on, the display last selected appears, i.e. either model name or "000".



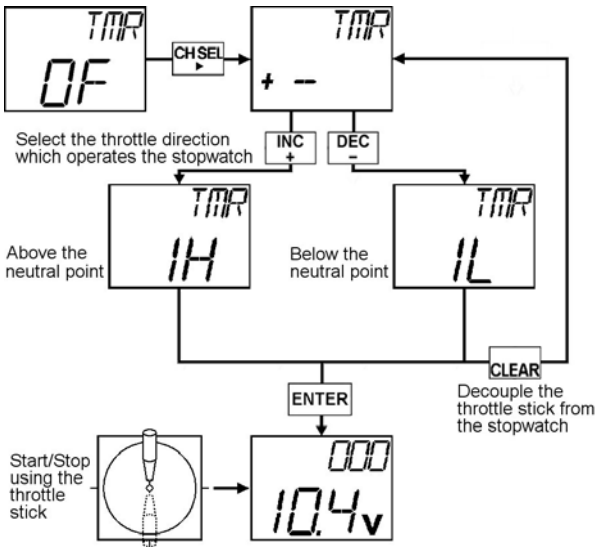
The code “TMR” allows the application possibilities to be extended:

1. **Countdown Clock** (Alarm Timer), which has an audible warning tone. The start time is set by the user and ranges from 10s to 900s. 20s before the end of the time, an internal buzzer sounds every 2s, below 10s every second to 0s. The clock then continues to run counting up to 999s. This additional time is shown by a "+" displayed in the lower line before the battery voltage. Start/Stop of timing is controlled by the INC / DEC buttons.
2. **Throttle Stopwatch**, as normal except the start/stop is controlled by the throttle stick. The switching point set independently to the position of the control lever centre. Additionally it can be determined whether the timer start is by pushing or pulling the throttle stick. With this option the true engine run time can be measured.
3. **Alarm Timer**, a countdown timer as 1 above, but controlled by the throttle stick as in option 2.

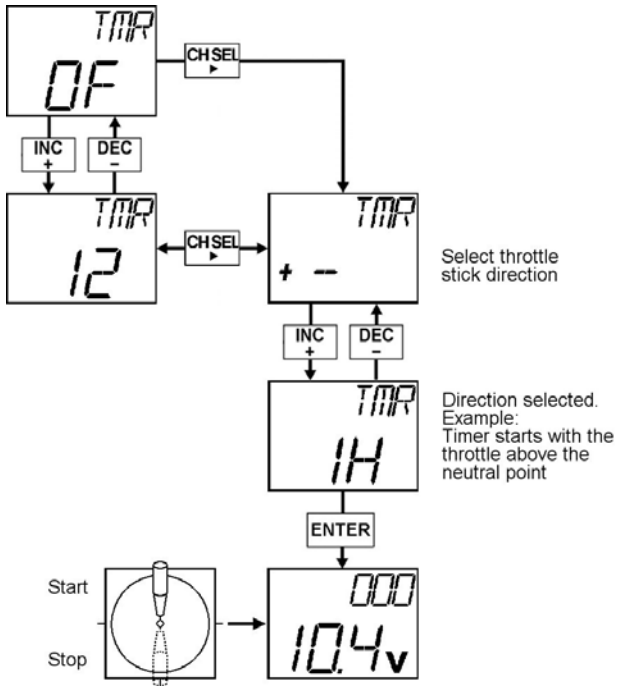
Programming:
Example 1: The display of “OF” shows the Alarm Timer is off, and stopwatch mode active. Pressing the INC button increases the time in 10s steps, up to a maximum of 900s, and actives the Alarm Timer mode. In the lower line of the display only the steps are counted, e.g. for a initial time of 360s, a display of “36" would be seen. Using the DEC button, the interval can be reduced (CLEAR sets the alarm timer off display “OF”).
In normal mode the transmitter the display can be swapped to timer mode by pressing the CH SEL button. Start/Stop is achieved using the INC or DEC button, and the CLEAR button resets the timer to its initial programmed value.



Example 2: To link the stopwatch with the throttle, CH SEL is pressed when the display shows “OF” (timer OFF). The display changes to "+-" indicating the switching direction needs to be selected using the INC / DEC buttons. This controls whether the stopwatch runs with the throttle above the neutral position, display "1H" (ch 1 = High), or below the neutral point with display “1L” (ch 1 = Low).
If CH SEL is pressed again, the direction is retained and will be used later. Where the display indicates "OF", it means only that the alarm timer is off and the stopwatch is active. This control only works with either "1H" or "1L" selected. To deactivate throttle stick operation, with the display showing "OF", press CH SEL and the display will show "1H" or "1L". Press CLEAR to return the display to "+ -", showing the throttle stick has been decoupled. Pressing CH SEL again returns to the display to "OF".
In the active condition the stopwatch does not run with the throttle stick in idle position. CLEAR returns the transmitter counter to the initial setting of “000".



Example 3: The switching function, described in (2.), can also be used with the alarm timer. Select the switching direction described above ("1H" or "1L") then press CH SEL (display shows "OF"). As in (1.) the time interval is adjusted in 10s steps using INC / DEC. In the normal display mode, the alarm timer is now controlled by the throttle stick.
To deactivate: Select code "TMR" and press CLEAR. The display changes to "OF" (alarm timer OFF = stopwatch mode). A press of CH SEL changes the display to "1H" or "1 L", which is cancelled by pressing CLEAR.The display will now show "+ -", indicating that the throttle control is decoupled from the timer.



FAIL SAFE MEMORY and Receiver Battery FAIL SAFE

Storage of Fail Safe data; only in PCM mode
(access via Set-Up Menu)

This function is only possible when in PCM mode and with receiver models mc-12, mc-18, mc-20 and DS 20 mc!

FAIL SAFE MEMORY

The higher working reliability of Pulse Code Modulation (PCM) in relation to the simple Pulse Position Modulation (PPM) results from the fact that the microprocessor built in the receiver recognizes, whether a received control signal was falsified or damaged by external interference. In these cases the receiver automatically replaces this disturbed signal by the last correctly received, which was stored in the receiver just in case. In this way brief interference, where the radio signal is weak or the like, is managed which would otherwise lead to the well-known "glitching".

When a longer lasting disturbance to the transmission between transmitters and receivers occurs, the mc-16/20 software offers two different options of FAIL SAFE programming. Using the INC / DEC keys, the "FST" (Fail Safe Time) can be selected:

1. HOLD program (display "HO"):
   In this case the Servos stops, in the case of a transmission disturbance to the receiver, in the position set by the last intact control signal. It remains in that position until a new, recognizable, control signal is detected by the receiver.
2. Variable programmable fail-safe with delay option (display: 0.3, 0.5 or 1.0):
   The servo moves to a pre-programmed set position, until the receiver receives an intact control signal. It is possible to set a delay time from the beginning of the interference to the operation of the fail safe program. This is settable in three steps (0.3s, 0.5s and 1.0s using the INC/DEC keys, taking into account different model speeds.

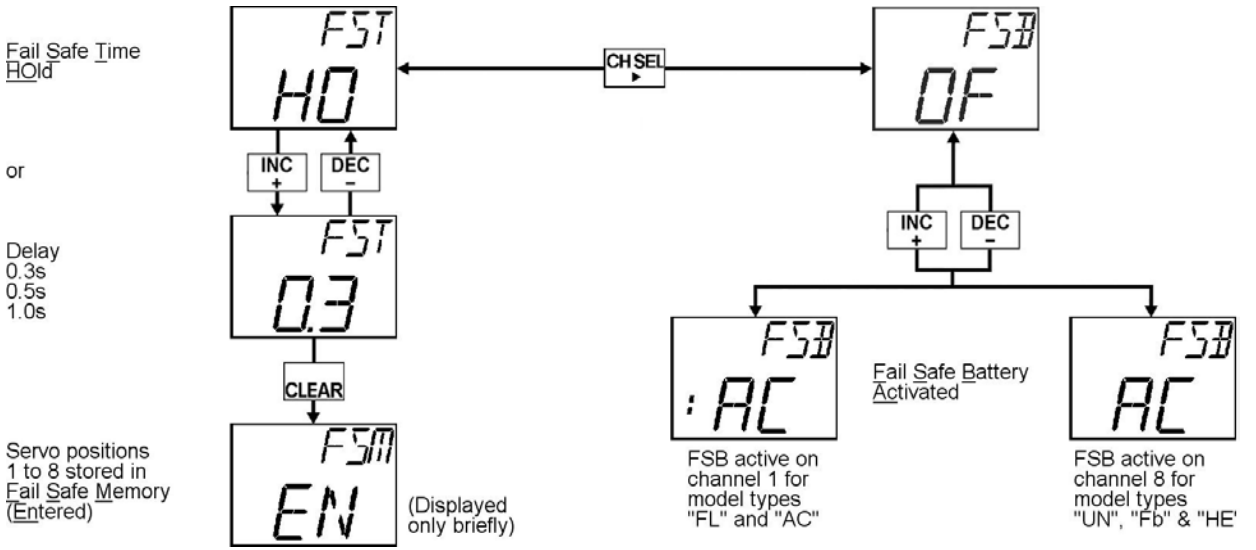
The desired positions of the servos on control functions 1 to 8, during the operation of fail safe, are simultaneously set at the transmitter and then the CLEAR key is pressed. These momentary positions are stored now as the fail safe positions. During operation these values are transferred to the receiver's memory, so that the receiver can fall back to them during interference. Storing is confirmed, in the display, by the brief display of "FSM EN", (Fail Safe Memory Entered). The fail-safe servo positions can be reset at any time, even in flight, by selecting the code and pressing CLEAR to be overwrite the existing settings.

This function is only possible when in PCM mode and with receiver models mc-12, mc-18, mc-20 and DS 20 mc!

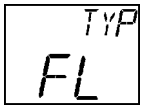
Receiver Battery FAIL SAFE

The output channel for the Receiver Battery FAIL SAFE is preset for model types "FL" and "AC" on channel 1 (throttle/spoiler), and for the types "UN", "Fb", "HE" on the channel 8.

As soon as the voltage of the receiver battery falls below a certain value, the associated servo goes to it's central position, to indicate the low battery voltage. By movement of control stick (1 or 8) the FAIL SAFE servo is release, so that servo again operates as desired by the pilot. The model must be landed immediately after the first FAIL SAFE message.

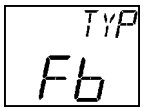


Summary of Ready-Made Multi-Function Programs



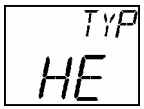
Standard (Fly)
Described on page 28.

Unifly
Described on page 34.



F3B / Butterfly
Described on page 42.

Acrobatic
Described on page 52.



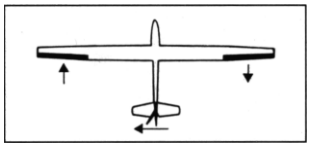
Helicopter
Described on page 60.

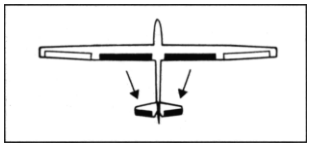
The five ready-made multi-function programs simplify programming considerably. Once you have determined the model type using the System Menu, you can call up any of the special functions listed in the following section. Most of the mixer functions can be switched on and off via external switches. You have to complete adjustment of the mixer values, to match the particular model, by flight testing.

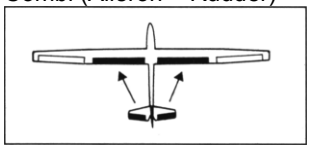
FL = STANDARD

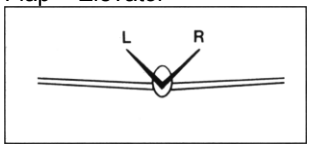
Described on page 28.

Mixer Function	Code	Switch	Std Value
Combi (Aileron – Rudder)	A-R	3	0%
Flap – Elevator	F-E	5	0%
Elevator – Flap	E-F	4	0%
V-Tail	WNG (VTL)	-	OFF
Delta	WNG (DLT)	-	OFF
Freely programmable mixers	A, B, C	7, 6, 5	0%

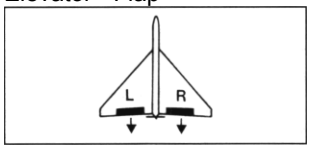

Combi (Aileron – Rudder)


Flap – Elevator

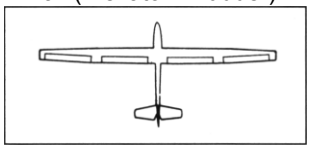

Elevator - Flap

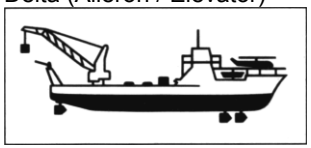


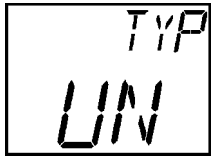
V-Tail (Elevator / Rudder)



Delta (Aileron / Elevator)


Freely Programmable

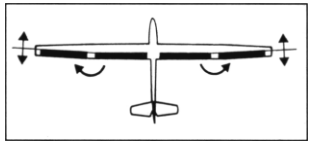

NAUTIC – channel 7, 8

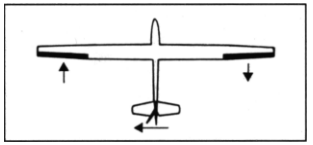


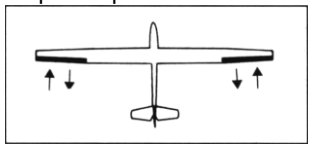
UN = UNIFLY

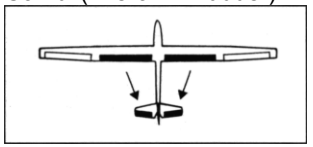
Described on page 34.

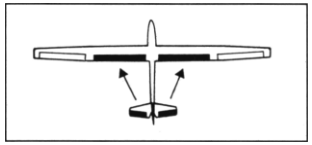
Mixer Function	Code	Switch	Std Value
Flap - Flaperon	F-A	-	0%
Combi (Aileron – Rudder)	A-R	3	0%
Differential	DIF	6	0%
Flap – Elevator	F-E	5	0%
Elevator – Flap	E-F	4	0%
V-Tail	WNG (VTL)	-	OFF
Spoiler	S-E	7	0%
Freely programmable mixers	A, B, C	7, 6, 5	0%

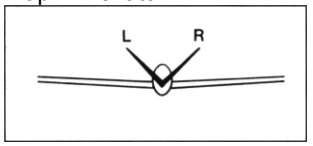

Flap – Flaperon


Combi (Aileron – Rudder)

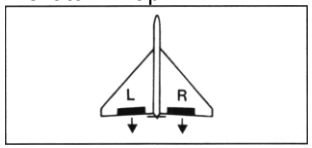

Differential


Flap – Elevator

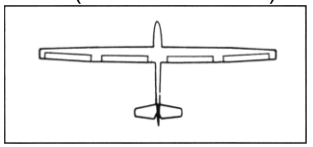

Elevator - Flap

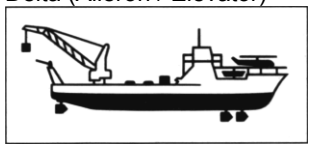


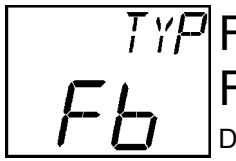
V-Tail (Elevator / Rudder)



Delta (Aileron / Elevator)


Freely Programmable

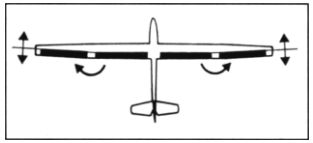

NAUTIC – channel 7, 8

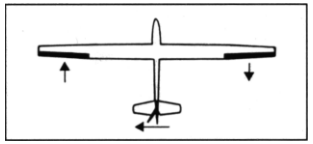


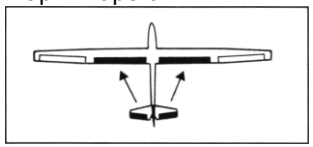
Fb = F3B, Butterfly

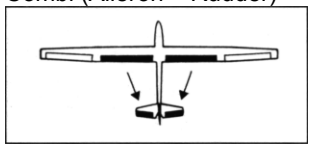
Described on page 42.

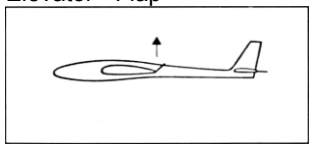
Mixer Function	Code	Switch	Std Value
Flap - Flaperon	F-A	-	0%
Combi (Aileron – Rudder)	A-R	3	0%
Differential	DIF	6	0%
Flap – Elevator	F-E	5	0%
Elevator – Flap	E-F	4	0%
V-Tail	WNG (VTL)	-	OFF
Butterfly – Flaperon	SA	7	0%
Butterfly – Elevator	SE	7	0%
Butterfly – Flap	SF	7	0%
Freely programmable mixers	A, B, C	7, 6, 5	0%

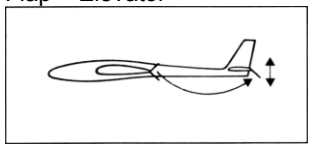

Flap – Flaperon

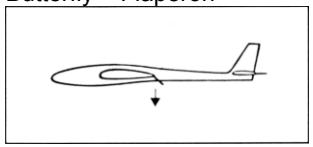

Combi (Aileron – Rudder)


Elevator - Flap

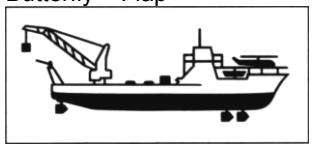

Flap – Elevator

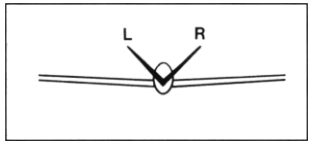

Butterfly – Flaperon


Butterfly – Elevator

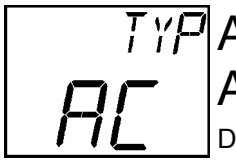

Butterfly – Flap


Differential


NAUTIC – channel 7, 8



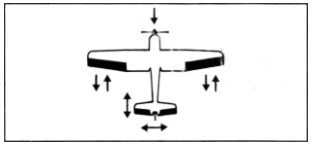
V-Tail (Elevator / Rudder)

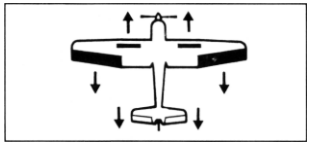


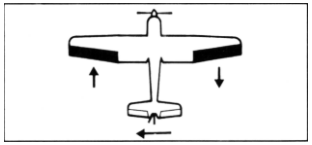
AC = ACROBATIC

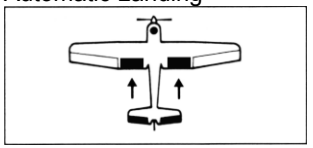
Described on page 52.

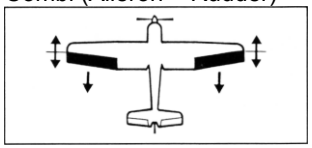
Mixer Function	Code	Switch	Std Value
Automatic Manoeuvre	SR…	6, 7	OFF
Auto-Coupled Dual Rate/Exp	AT4	-	OFF
Automatic Landing	LD…	5	OFF
Combi (Aileron – Rudder)	A-R	3	0%
Elevator – Flap	E-F	4	0%
Flaperon	WNG (FLP)	-	OFF
V-Tail	WNG (VTL)	-	OFF
Freely programmable mixers	A, B, C	7, 6, 5	0%

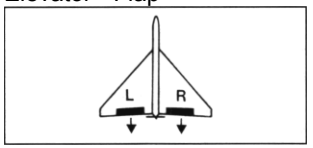

Automatic Manoeuvre


Automatic Landing

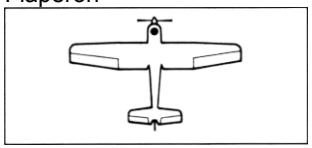

Combi (Aileron – Rudder)

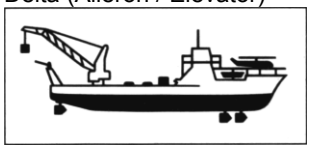

Elevator - Flap

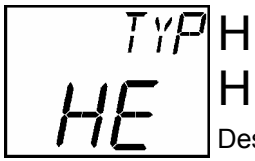

Flaperon



Delta (Aileron / Elevator)


Freely Programmable

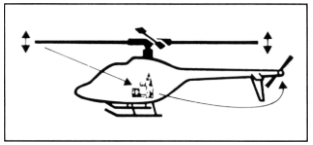

NAUTIC – channel 7, 8

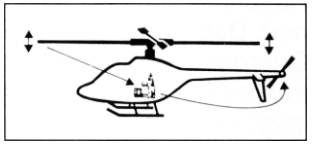


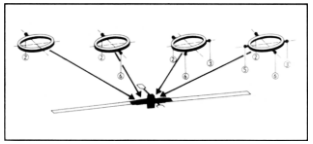
HE = HELICOPTER

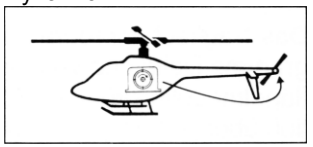
Described on page 60.

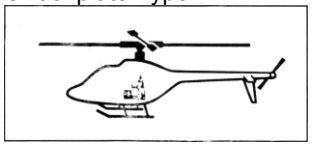
Mixer Function	Code	Switch	Std Value
Autorotation	ATR	3	OFF
Idle Up / Throttle Curve	T…	4, 5	±85%; 0
Pitch Curve	P…	4, 5	±85%; 0
Static Mix	ST…	6	0%
Dynamic Mix	DYN	6	0%
Swashplate Type	SWA	-	N
Gyro Control	GY…	7	OFF
Freely programmable mixers	A, B, C	7, 6, 5	0%

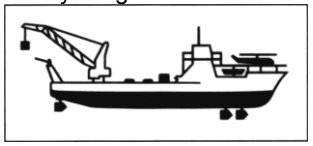

Static Mix


Dynamic Mix


Swashplate Type


Gyro Control


Freely Programmable


NAUTIC – channel 7, 8

STANDARD

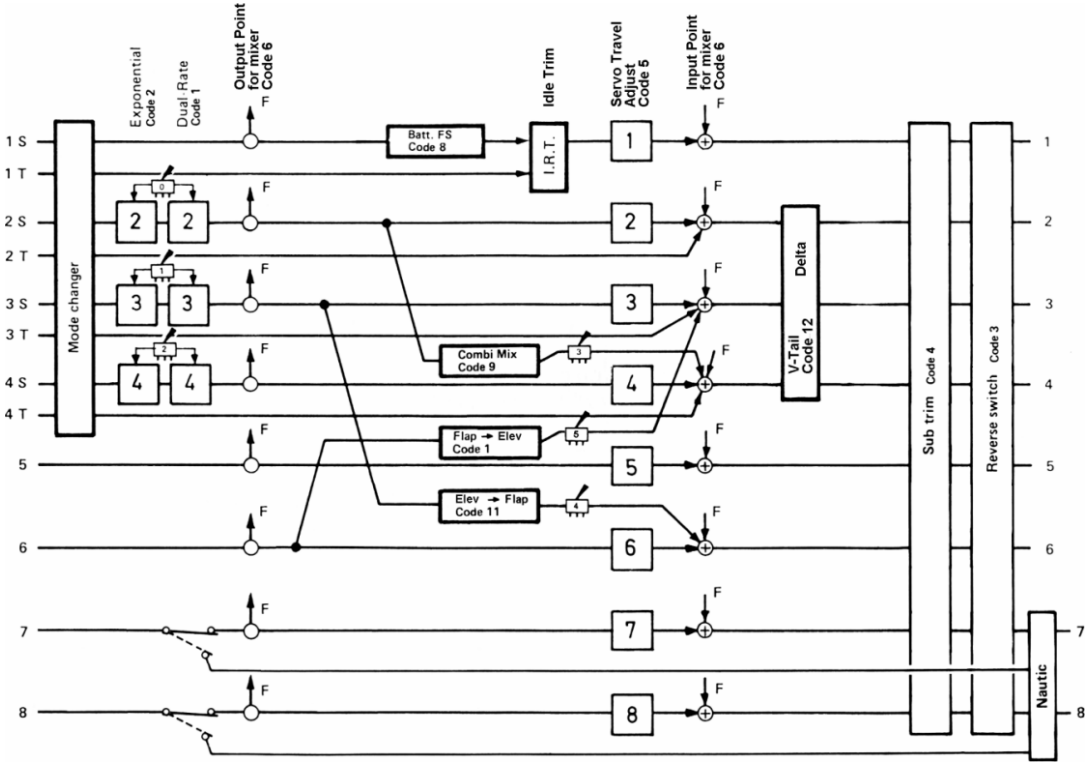
Model Type Described

Included under the STANDARD type are all motor and sailplane models, with which control over elevator, rudder, ailerons, engine throttle or rpm (and/or airbrakes for sailplane models) is possible. In this programme it is also possible, via additional control paths for auxiliary functions, to control features like retractable landing gear, cable release, mixture adjustment or also landing flaps (and/or variable flaps for sailplane models). All options, which are for this configuration possible and meaningful, are available here.

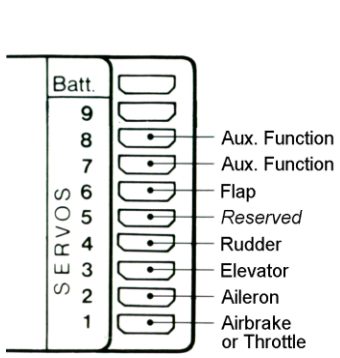
Some special mixers, such as combi-mix (aileron - rudder), elevator adjustment during flap operation and an elevator - flap mixers to the assist the elevator in manoeuvring, are already configured. Beyond that three freely programmable mixers are available for applications such as aileron or flap control using two separated servos or more complex mixing functions.

The program area titles "WING" covers the programs for delta and V-tail models. With delta and flying wing models, elevator and aileron share the same control surfaces on the left and right trailing edge of the wing. With V-tail models the elevator and rudder functions are linked with one another in an appropriate way to control the model.

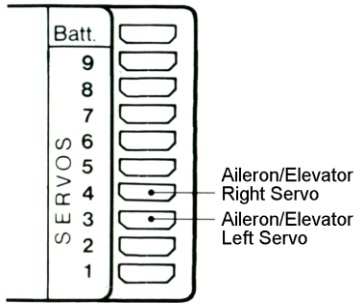
Block Diagram STANDARD (Fly) “FL”



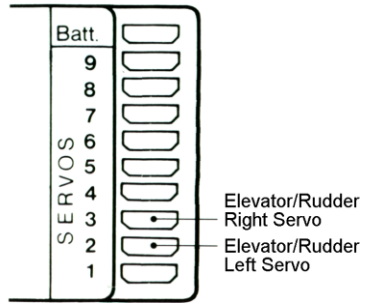
Allocation of Receiver Connections (ch 1 – 8)
The servos must be connected to the receiver connections as follows:



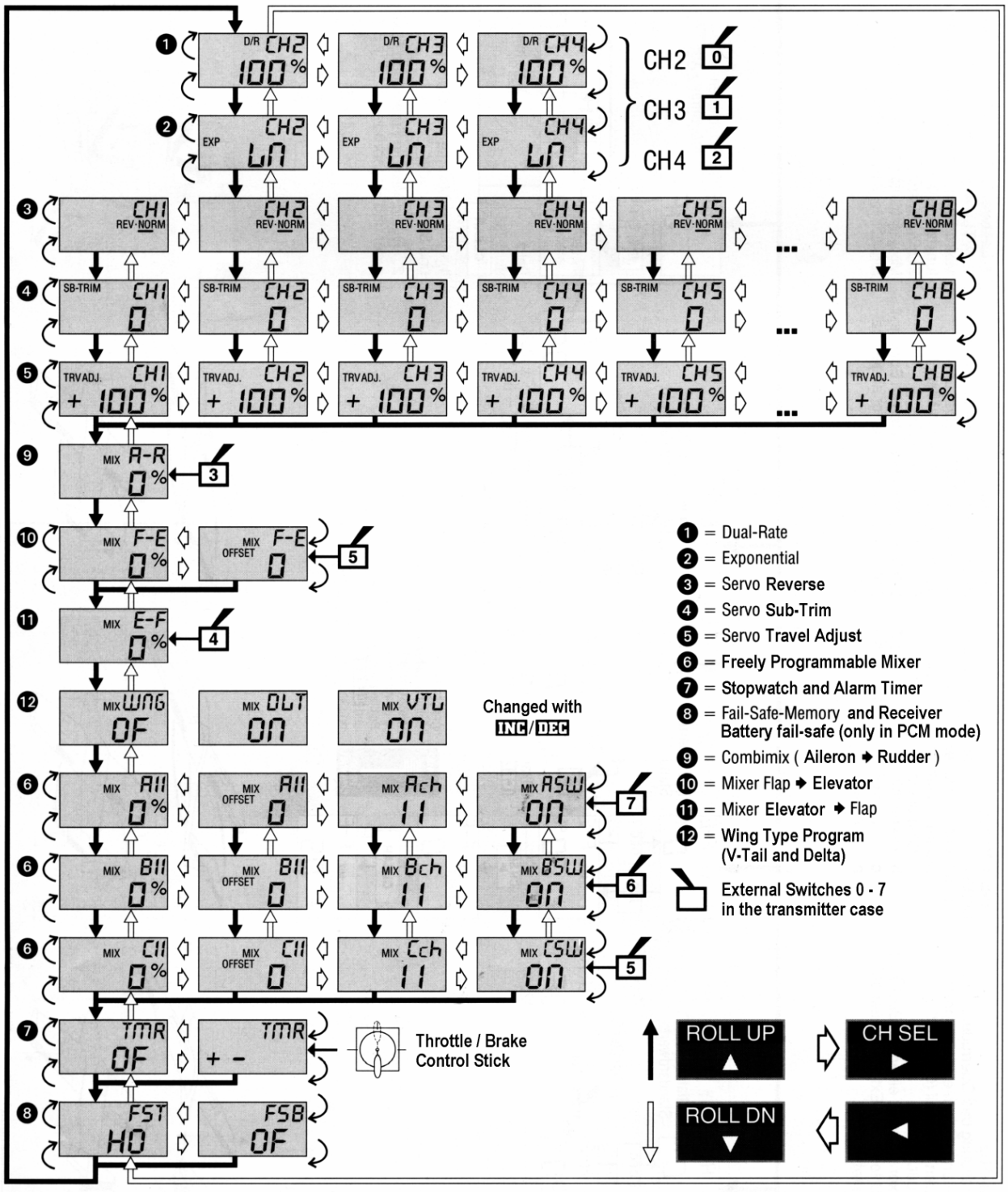
V-Tail



Delta + Tailless



Block Diagram STANDARD (Fly) »FL«



Set-up Diagram

TYP FL Model Type “FL” = STANDARD

All the mixers and adjustment values are set to 0 (= mixer off).
To adjust the mixer and adjustment values, while flying, we recommend fitting the 2-way momentary switch, Part No. 4160.44 (see page 10)

❶ ... ❺, ❼, ❽ | ❾ MIX A-R (Aileron ➧ Rudder) | ❿ MIX F-E (Flap ➧ Elevator) | ⓫ MIX E-F (Elevator ➧ Flap) | ⓬ MIX WNG (Wing)

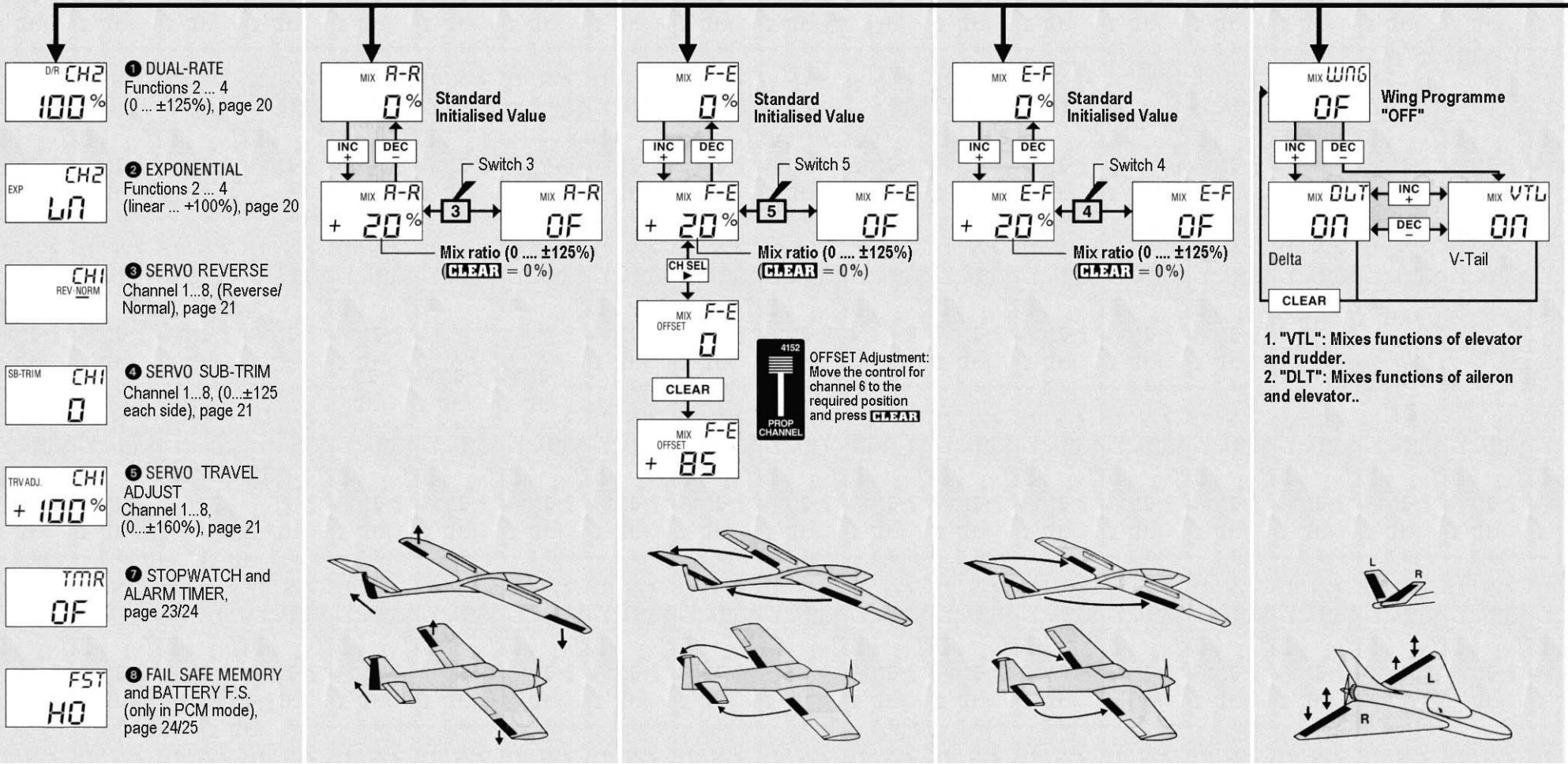
Adjustments ❶ ... ❼, ❽ are available for all model types

Combi-Mix
When an aileron command is given, the rudder also moves to a pre-programmed extent (0 ... ±125%).
The mixer can be switched on and off via an external switch connected to socket 3.

Flap ➧ Elevator
When the flap servo is operated, the elevator is fed a pre-set corrective signal (0 ... ±125%)
The mixer can be switched on and off if an external switch is connected to socket 5.

Elevator ➧ Flap
When the elevator servo is operated, the flaps are fed a pre-set signal (0 ... ±125%)
The mixer can be switched on and off if an external switch is connected to socket 4.

V-Tail "VTL", Delta "DLT"
1. "VTL" = V-Tail
Mixer ratio adjustable via Dual-Rate, control functions 3 + 4.
2. "DLT" = Delta
Mixer ratio adjustable via Dual-Rate, control functions 2 + 3.



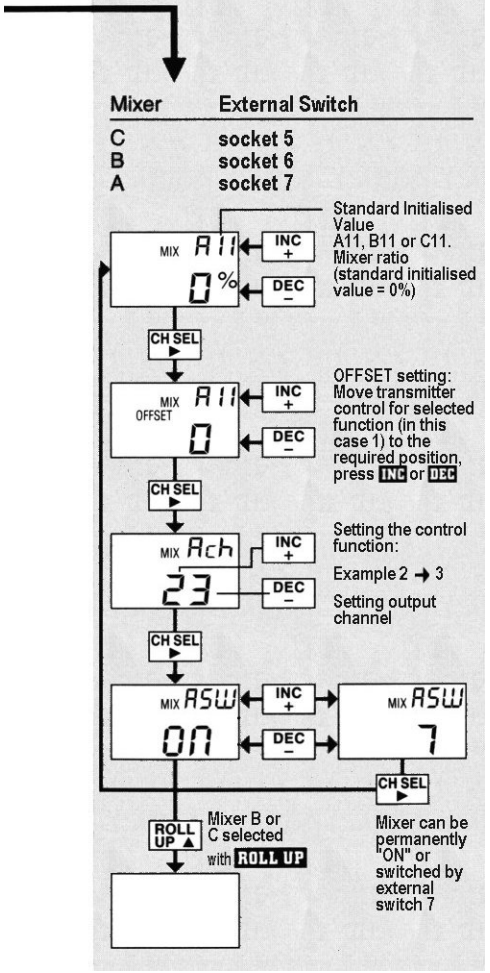
All mixer data can be reset to 0 by pressing the CLEAR button, i.e. turned off. When the display shows “OF” the external switch controlling the mixer is switched off.

For your Notes

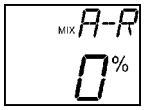
❻ MIX A11, B11, C11

Freely Programmable Mixer

Both the mixer program (servo functions 1 ... 8) and the mixer ratio (0 ... ±125%) can be selected individually.
The mixers can be set permanently "ON" or switched on and off via the associated external switch



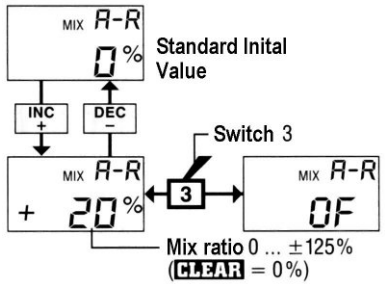
❾

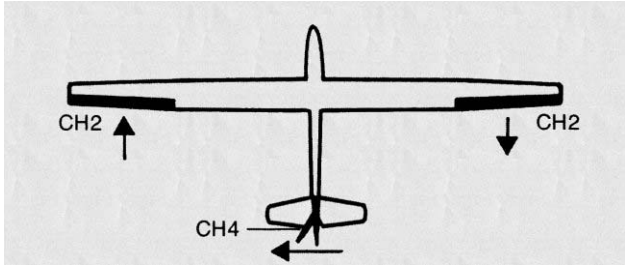


COMBI-MIX

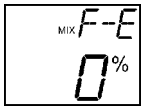
Aileron ➡ Rudder Mixer
(access via Set-Up Menu)

When an aileron command is given, the rudder also moves to a pre-programmed extent. The rudder can be separately steered at any time with priority over the mixer.
After calling the code, the INC and DEC buttons are used to adjust the ratio up to the maximum of ±125%. The Combi-Mixer can be turned on and off using an external switch connected to socket 3.





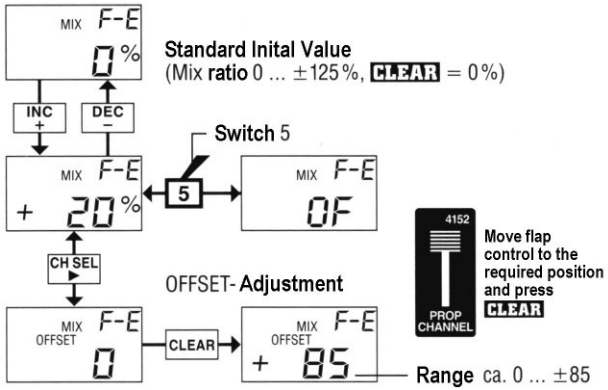
❿

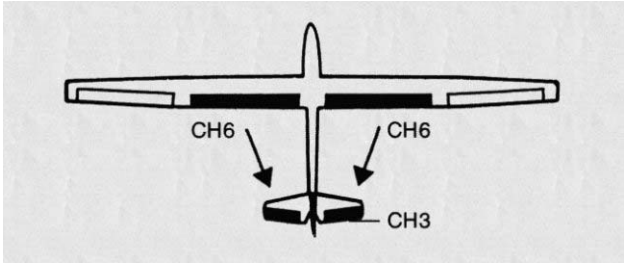


FLAP ➡ ELEVATOR MIXER

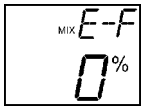
Flap ➡ Elevator Mixer
(access via Set-Up Menu)

During slow flight when extending flaps, automatic proportionally correction of elevator is made, thus the pitch attitude of the model becomes independent of the position of the flaps. The mix portion is entered in the code "F-E", the INC and DEC buttons, between 0 and ±125%. Next the mixer neutral point must be specified. The mixer must be informed which position of the input (normally sliding control 6) for the flaps, corresponds to normal flight (flaps neutral). Thus the elevator takes this position to be its neutral, and only when the flaps are moved from this position does the mixer affect the elevator. pressing the CH SEL button to call up the offset screen. Move the control to the required neutral position (e.g. the end position of the flap control) and press the CLEAR button. The offset, the deviation from the control centre position, is indicated in the display. A switch connected to socket 5 of the transmitter board can be used to switch off this function.





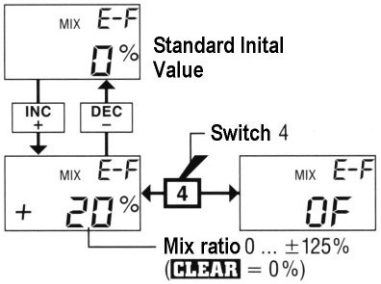
⓫

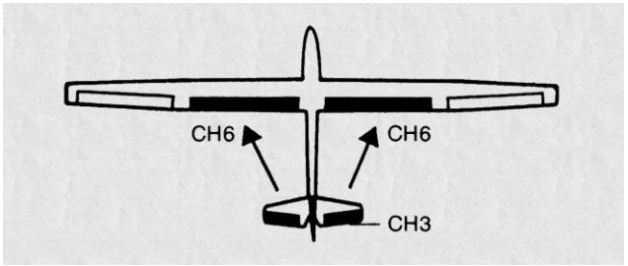


ELEVATOR ➡ FLAP MIXER

Elevator ➡ Flap Mixer
(access via Set-Up Menu)

To assist the elevator with close turning flight and aerobatics, the flaps can be linked to the elevator and are driven out proportionally to the increase the wing lift. The value in the code "E-F" can be varied using, the INC and DEC buttons between 0 and ±125%. The mixer can be also switched off with an external switch connected to socket 4.



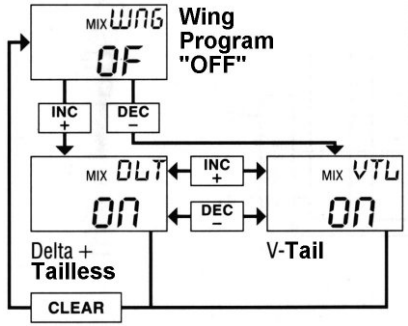


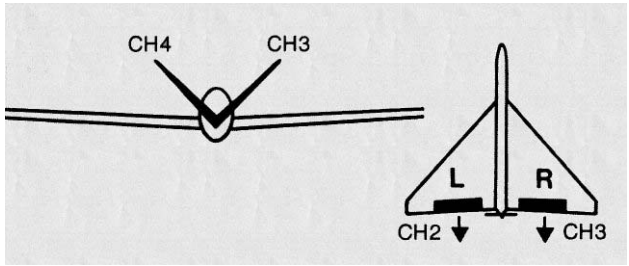
⑫

WING TYPE PROGRAMS

Wing Mixer for V-Tail, Delta and Tailless models (access via Set-Up Menu)

1. For models with a V-tail, "VTL", must be used to mix the functions of elevator and rudder.
   Elevator function: Both surfaces of the V-tail move in the same direction. The mix relationship is adjustable by the dual-rate function for channel 3, see page 20.
   Rudder function: The surfaces of the V-tail move in opposite directions. The mix relationship is adjustable by the dual-rate function for channel 4, see page 20.
2. With delta and flying wing models, "DLT", is used to mix the functions of aileron and elevator. The mix relationship is also determined using the dual-rate function (page 20): Elevator functions: D/R channel 3 and aileron functions: D/R channel 2.





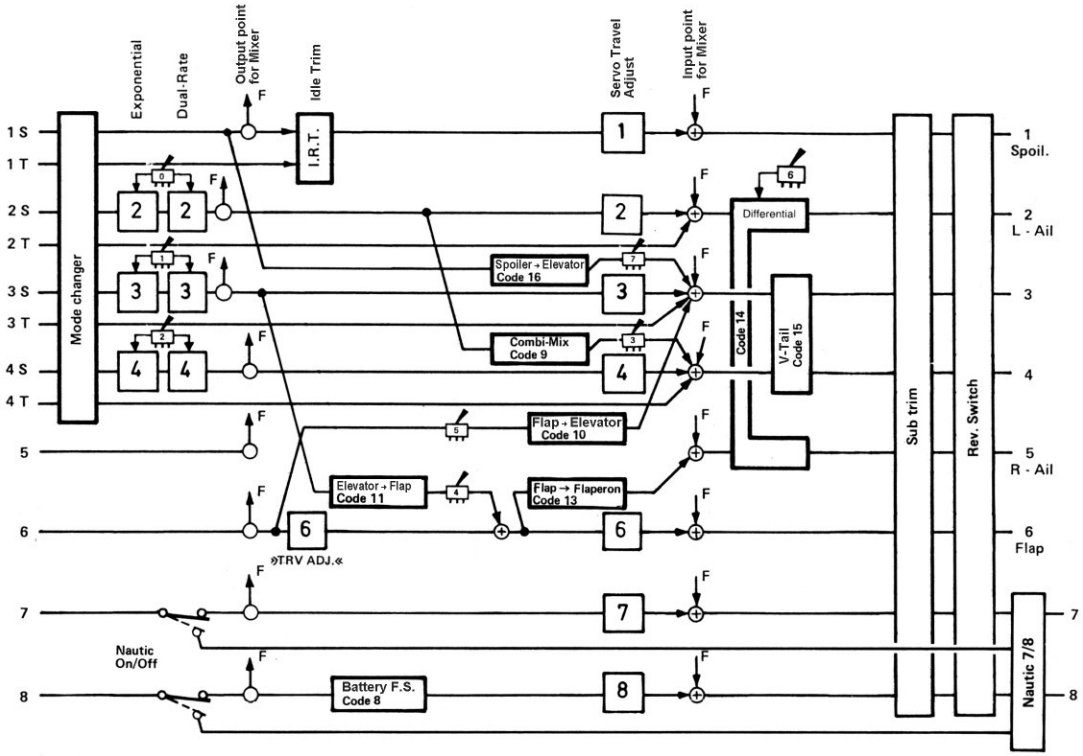
For your Notes

UNIFLY

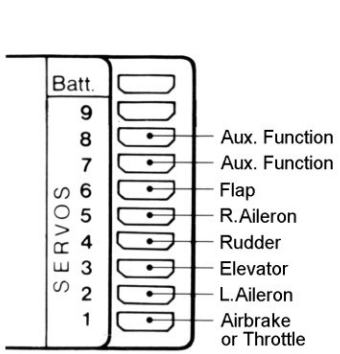
Model Type Described

In contrast to the Standard model type, the "UNIFLY" type is used where separate aileron servos are used, in place of a single common servo, which are by already software coupled. This permits independent adjustment of the aileron deflections upward and downward, which allows a differential mixer to be used.
In addition, the separate controlling of the aileron surfaces makes it possible to operate the both surfaces in the same direction giving a flap function, or Flaperons, e.g. realized using the mixer Flap ➡ Flaperon.
Also set-up is spoiler ➡ elevator mixing, which can be used in order to maintain a constant pitch attitude when using the flaps.
For further linkages, there are also three freely programmable mixers available.
A delta mixer is not intended with this type.

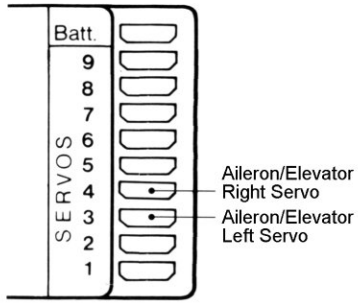
Block Diagram UNIFLY "UN"



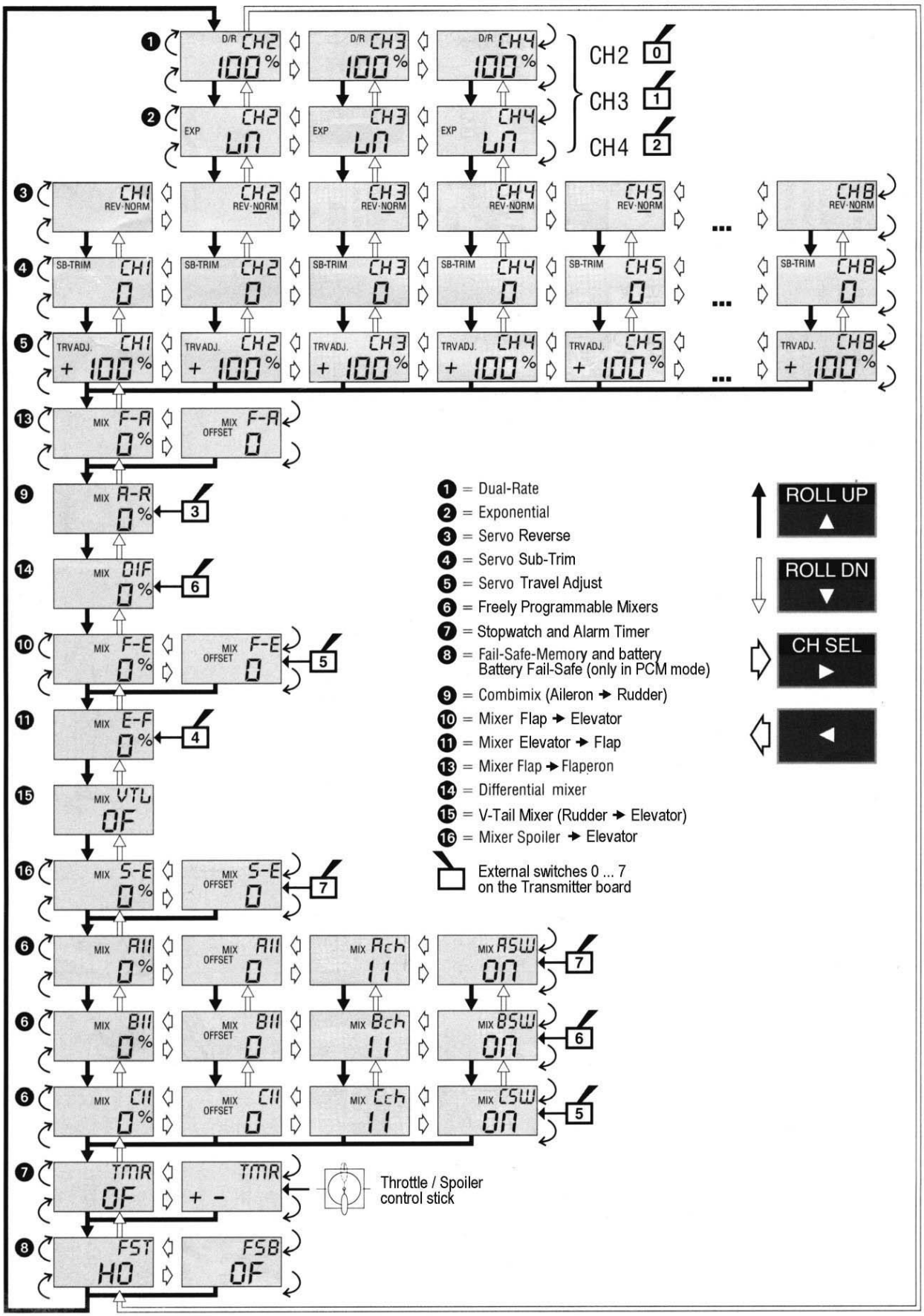
Allocation of Receiver Connections (ch 1 - 8)
The servos must be connected to the receiver connections as follows:



V-Tail



Block Diagram UNIFLY »UN«



Set-up Diagram

TYP UN Model Type “UN” = UNIFLY

All the mixers and adjustment values are set to 0 (= mixer off).
To adjust the mixer and adjustment values, while flying, we recommend fitting the 2-way momentary switch, Part No. 4160.44 (see page 10)

❶ ... ❺, ❼, ❽

Adjustments ❶ ... ❼, ❽ are available for all model types

❶ DUAL-RATE
Functions 2 ... 4
(0 ... ±125%), page 20

❷ EXPONENTIAL
Functions 2 ... 4
(linear ... +100%), page 20

❸ SERVO REVERSE
Channel 1...8, (Reverse/ Normal), page 21

❹ SERVO SUB-TRIM
Channel 1...8, (0...±125 each side), page 21

❺ SERVO TRAVEL ADJUST
Channel 1...8,
(0...±160%), page 21

❼ STOPWATCH and ALARM TIMER,
page 23/24

❽ FAIL SAFE MEMORY and BATTERY F.S.
(only in PCM mode),
page 24/25

⓭ MIX F-A (Flap ➧ Aileron)

Flap ➧ Aileron
When the flap slide control is moved (control input 6), this code moves both ailerons in the same direction as the flaps. This changes the camber of the entire wing. The adjustment range is 0 ... ±125%.

Standard Initialised Value

Mix ratio 0 ... ±125% (CLEAR = 0%)

OFFSET Adjustment: Move the control for channel 6 to the required position and press CLEAR

Range ca. −85 ... +85

❾ MIX A-R (Aileron ➧ Rudder)

Combi-Mix
When an aileron command is given, the rudder also moves to a pre-programmed extent (0 ... ±125%).
The mixer can be switched on and off via an external switch connected to socket 3.

Standard Initialised Value

Switch 3

Mix ratio (0 .... ±125%) (CLEAR = 0%)

⓮ MIX DIF

Differential
Differential movement of the ailerons, i.e. the ailerons having greater movement in one direction than the other. The amount of differential can be varied from 0% (Normal) to 100% (Split - only one aileron moves). You can switch between two different settings using an external switch connected to socket 6.

NORMAL = 0%

DIFFERENTIAL

SPLIT = 100%

❿ MIX F-E (Flap ➧ Elevator)

Flap ➧ Elevator
When the flap servo is operated, the elevator is fed a pre-set corrective signal (0 ... ±125%)
The mixer can be switched on and off if an external switch is connected to socket 5.

Standard Initialised Value

Switch 5

Mix ratio (0 .... ±125%) (CLEAR = 0%)

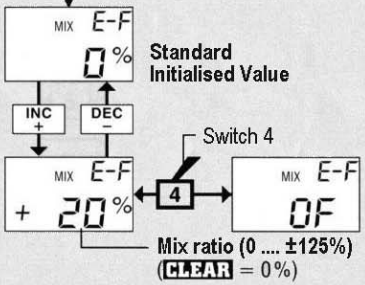
OFFSET Adjustment: Move the control for channel 6 to the required position and press CLEAR

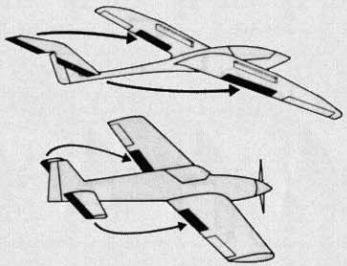
All mixer data can be reset to 0 by pressing the CLEAR button, i.e. turned off. When the display shows “OF” the external switch controlling the mixer is switched off.

⓫ MIX E-F (Elevator ➧ Flap)

Elevator ➧ Flap

When the elevator servo is operated, the flaps are fed a pre-set signal (0 ... ±125%) The mixer can be switched on and off if an external switch is connected to socket 4.

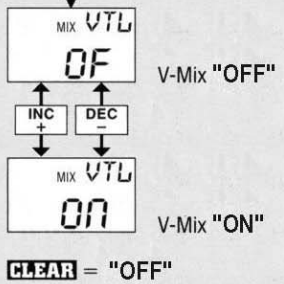


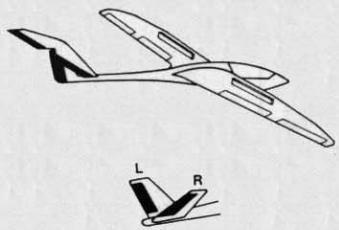


⓯ MIX VTL

V-Tail

This program couples channels 3 and 4 to provide rudder and elevator control. The mix ratio is adjustable using the Dual-Rates for channels 3 and 4.

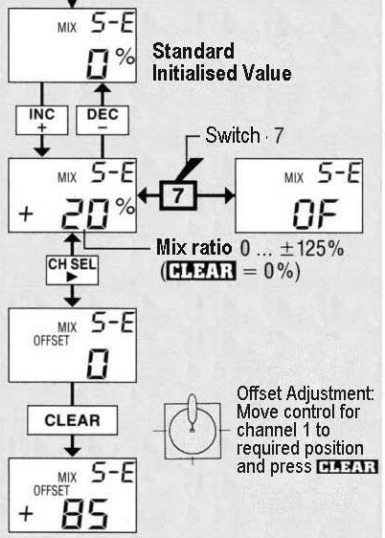


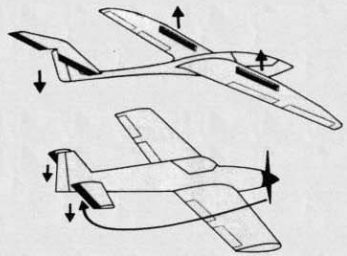


⓰ MIX S-E (Spoiler ➧ Elevator)

Spoiler ➧ Elevator

When the throttle / spoiler control stick is moved, this code allow the automatic movement of the elevator to compensate for any pitch trim change. The adjustment range is 0 ... ±125%.
The mixer can be switched on and off by an external switch connected to socket 7 on the transmitter board.

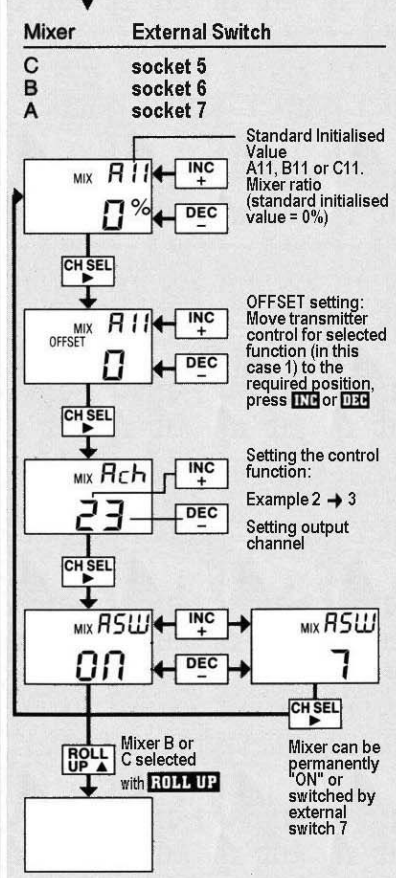




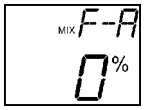
⓰ MIX A11, B11, C11

Freely Programmable Mixer

Both the mixer program (servo functions 1 ... 8) and the mixer ratio (0 ... ±125%) can be selected individually.
The mixers can be set permanently "ON" or switched on and off via the associated external switch



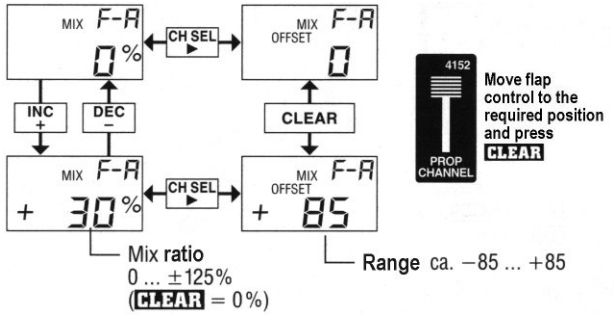
⓭

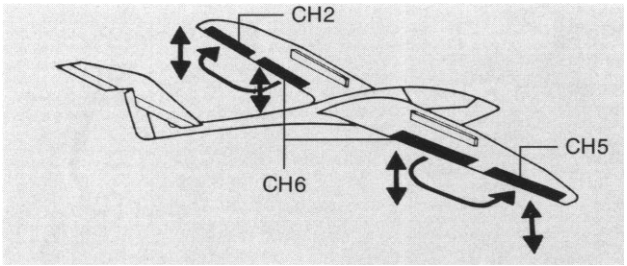


FLAP ➡ FLAPERON MIXER

Flap ➡ Flaperon Mixer
(access via Set-Up Menu)

The mixer "F-A" allows an adjustable portion of the flap control system to be fed to the aileron channels (2 and 5) so that the ailerons move with flap deflection in a manner like the flaps, but normally with smaller movement. The advantage is that a more even lift distribution over the span can be achieved. The mix proportion is entered using the INC and DEC buttons, between 0 and ±125%.
In order to tell the mixer, in which position of the control for the flaps relates to the normal flight position, CH SEL is pressed to call up the offset value. The value is set by moving the control to the required position and pressing the CLEAR button. The offset, the deviation from the control central position, is indicated in the display. You can also first set the offset and then adjust the mix proportion.





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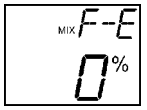
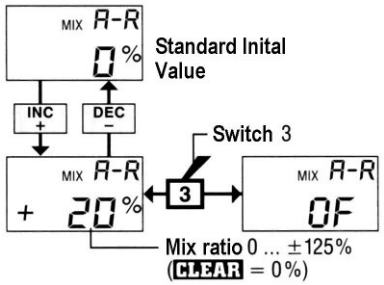
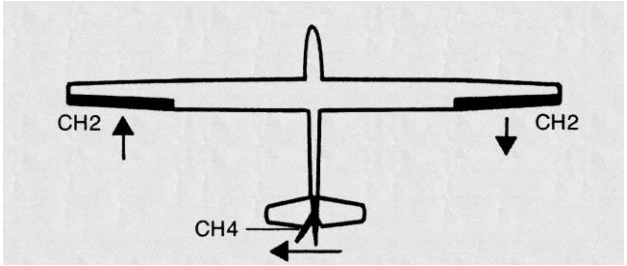


COMBI-MIX

Aileron ➡ Rudder Mixer
(access via Set-Up Menu)

In the case of operating the ailerons, the rudder is deflected by a programmable mix proportion. The rudder can, however, be steered separately at any time with priority.
After call of the code "A-R", the mix proportion is adjusted using the INC/DEC buttons and is stopped to automatically at the maximum value of ±125%.
The combi mixer can also be disabled by an external switch attached to socket 3 on the transmitter board.





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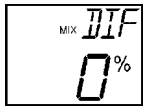


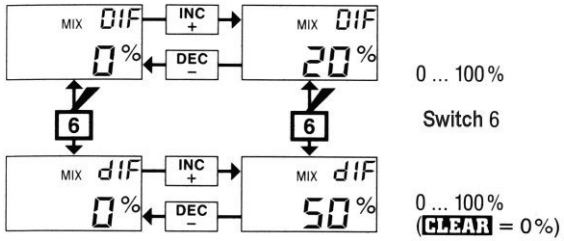
DIFFERENTIAL MIXER

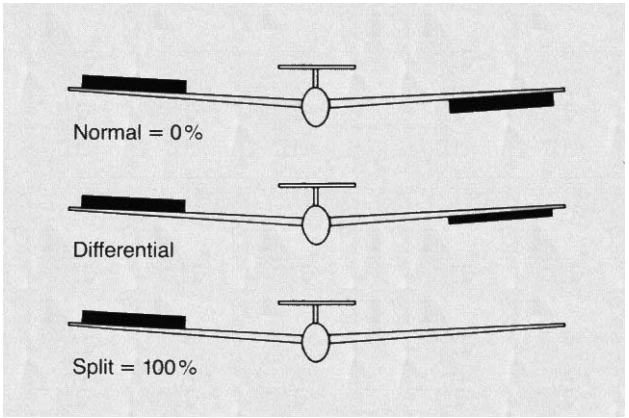
Aileron Differential Mixer
(access via Set-Up Menu)

The aileron differential is used to adjust for an unwanted yaw effect, which is called "negative yaw": The aileron deflecting downward creates a larger drag resistance than that developed by the upward deflecting aileron. This results in a torque around the vertical axis against the intended turn direction. This effect arises naturally and is more obvious with gliders with high aspect ratio wings, than with normal power planes, .due to the increased moment arm that the aileron drag has.
The aileron differential causes the downward aileron to deflect by a smaller distance than the upward moving aileron. The drag forces can be balanced and therefore the negative turning moment removed.
Using the INC/DEC buttons, the aileron differential is adjusted between the limits 0 and 100%:

0% = Normal, thus no differential.
100% = No downward aileron deflection, Split position mentioned above.

An external switch attached to connection 6, allows selection between two differential values. These are displayed as "DIF" and "dif" depending on the position of the switch. Each can have a different value to suit differing flight modes.





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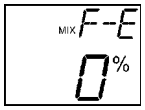
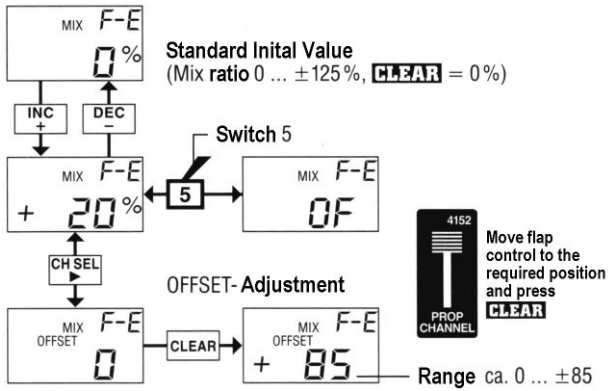
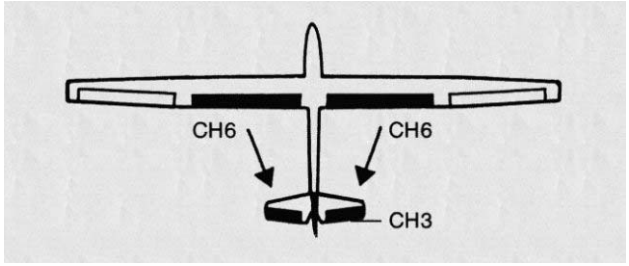


FLAP ➡ ELEVATOR MIXER

Flap ➡ Elevator Mixer
(access via Set-Up Menu)

During slow flight when extending flaps, automatic proportionally correction of elevator is made, thus the pitch attitude of the model becomes independent of the position of the flaps. The mix portion is entered in the code "F-E", the INC and DEC buttons, between 0 and ±125%. Next the mixer neutral point must be specified. The mixer must be informed which position of the input (normally sliding control 6) for the flaps, corresponds to normal flight (flaps neutral). Thus the elevator takes this position to be its neutral, and only when the flaps are moved from this position does the mixer affect the elevator. pressing the CH SEL button to call up the offset screen. Move the control to the required neutral position (e.g. the end position of the flap control) and press the CLEAR button. The offset, the deviation from the control centre position, is indicated in the display. A switch connected to socket 5 of the transmitter board can be used to switch off this function.



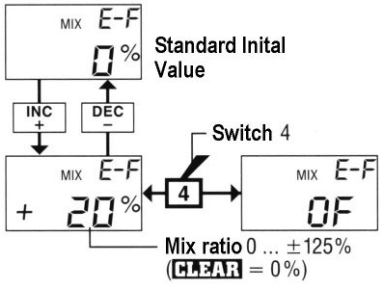


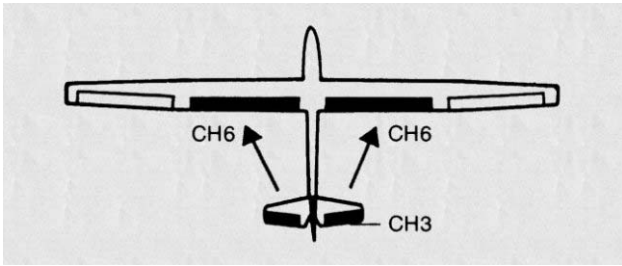
11

ELEVATOR ➡ FLAP MIXER

Elevator ➡ Flap Mixer
(access via Set-Up Menu)

To assist the elevator with close turning flight and aerobatics, the flaps can be linked to the elevator and are driven out proportionally to the increase the wing lift. The value in the code "E-F" can be varied using, the INC and DEC buttons between 0 and ±125%. The mixer can be also switched off with an external switch connected to socket 4.



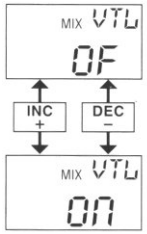


⑮

V-TAIL MIXER

Mixer for Models with V-Tails
(access via Set-Up Menu)

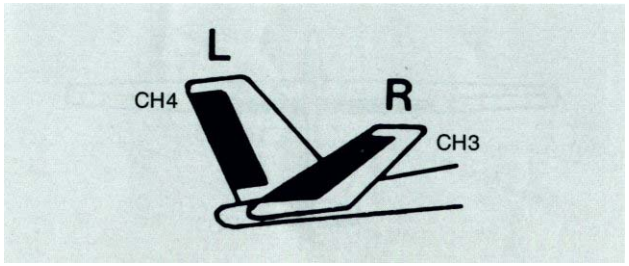
For models with a V-tail the functions of elevator and rudder must be mixed so with one another so that during elevator movement both surfaces are moved up or down in the same direction, and during rudder control the surfaces move in opposite directions , i.e. one surface upward and the other downward. The "VTL" Program contains the appropriate mixer, to control surfaces connected to separate servos. The function is activated using the INC / DEC buttons. Servos connected to outputs 3 and 4 of the receiver are automatically coupled with one another. The mix relationship is changed using the dual- rate setting, see page 20, where Ch4 changes the rudder effect and Ch3 the elevator effect.



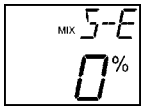
V-Tail "OFF"

CLEAR = »OF«

V-Tail "ON"



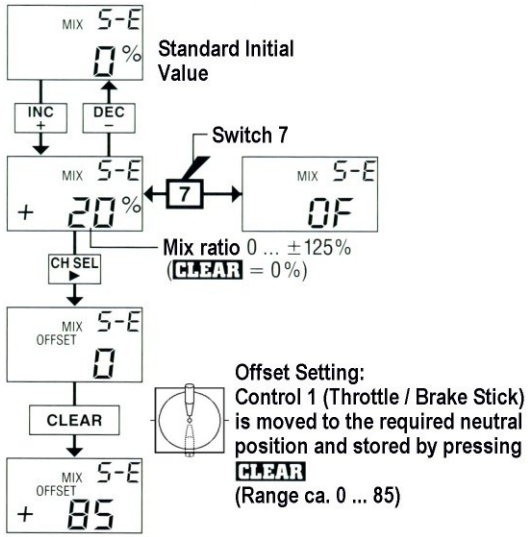
⑯

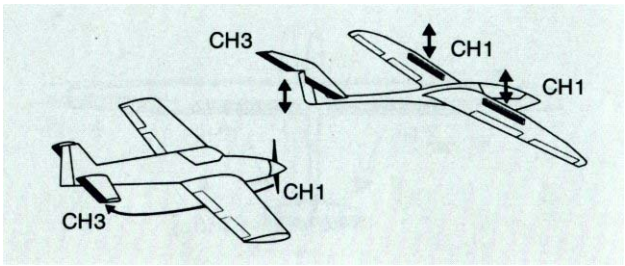


SPOILER ➡ ELEVATOR MIXER

Spoiler ➡ Elevator Mixer
(access via Set-Up Menu)

It is usually necessary to adjust the elevator when altering the spoiler setting due to the change in lift created by the wing.
This codes allows the elevator to be adjusted to suit the position of the spoiler stick (control function 1) during the landing approach, within the range of 0 to ±125%.
The mix proportion is determined using the code "S-E" and pressing the INC / DEC buttons.
Pressing the CH SEL button switches to the offset setting:
The mixer must be programmed, which position of the spoiler control (throttle / spoiler control stick 1) corresponds to normal flight. This would be the position with the spoilers retracted and therefore the neutral position of the elevator. To set this offset, the control is moved to the appropriate position and the CLEAR button is pressed. The offset, the deviation from the control centre position, is indicated in the display.
Using a switch connected to socket 7 of the transmitter board this function can be switched off.





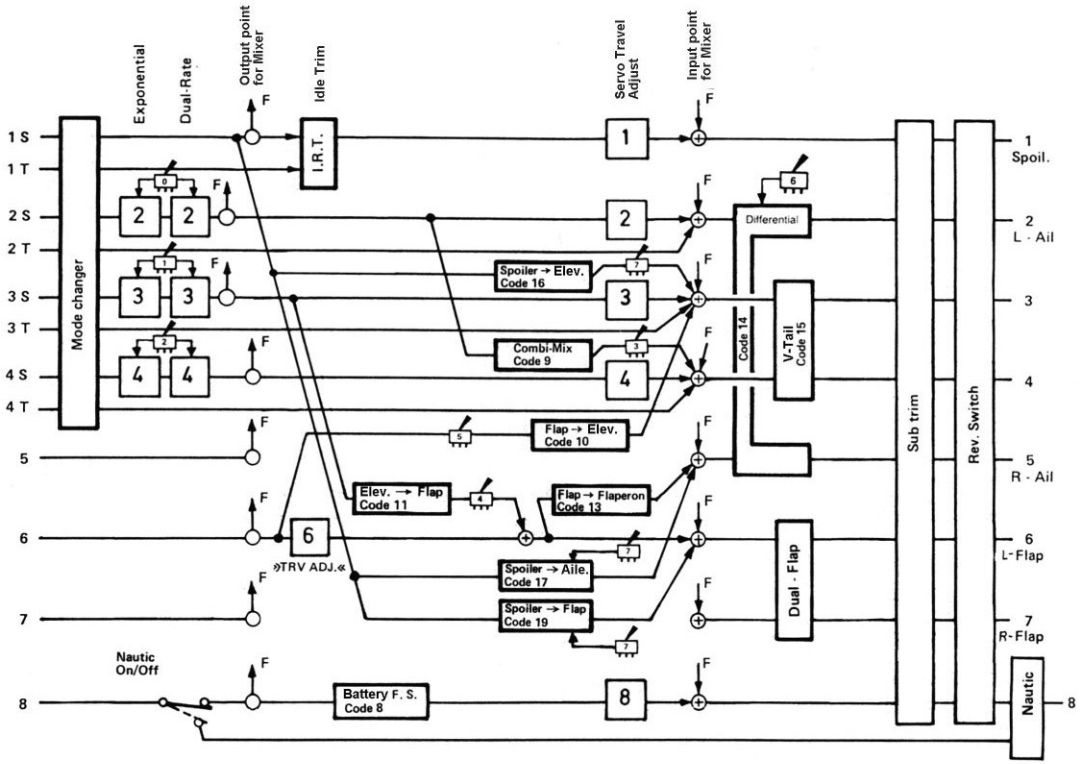
For your Notes

F3B/BUTTERFLY

Model Type Described

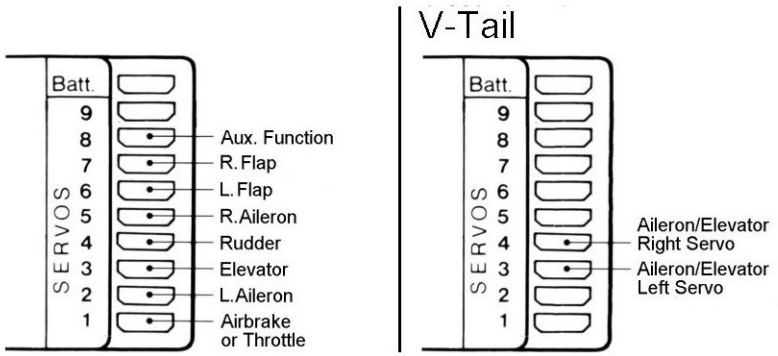
The F3B/BUTTERFLY type is intended for F3B competition models. It can be used, however, for other similar models. Depending on the external switches connected, functions can be switched on and off.
Beside two aileron servos, it is intended that two separate flap servos are used. This allows mixing flap ➡ elevator and/or elevator ➡ flap. Also the combi and differential functions plus flap ➡ flaperon and V-tail mixers with three further finished coupling functions. It is possible to extend the flaps downward and both ailerons upward (Butterfly) and adjust the elevator to re-trim so that when driving the pitch trim does not change from that of normal flight.
Additionally, an airbrake can be mixed with the above.
Also, without separate flaps, the ailerons can still be used as spoilers or as flaps (flaperons) and also in connection with the spoiler ➡ aileron and spoiler ➡ elevator mixes.

Block Diagram BUTTERYFLY “Fb”

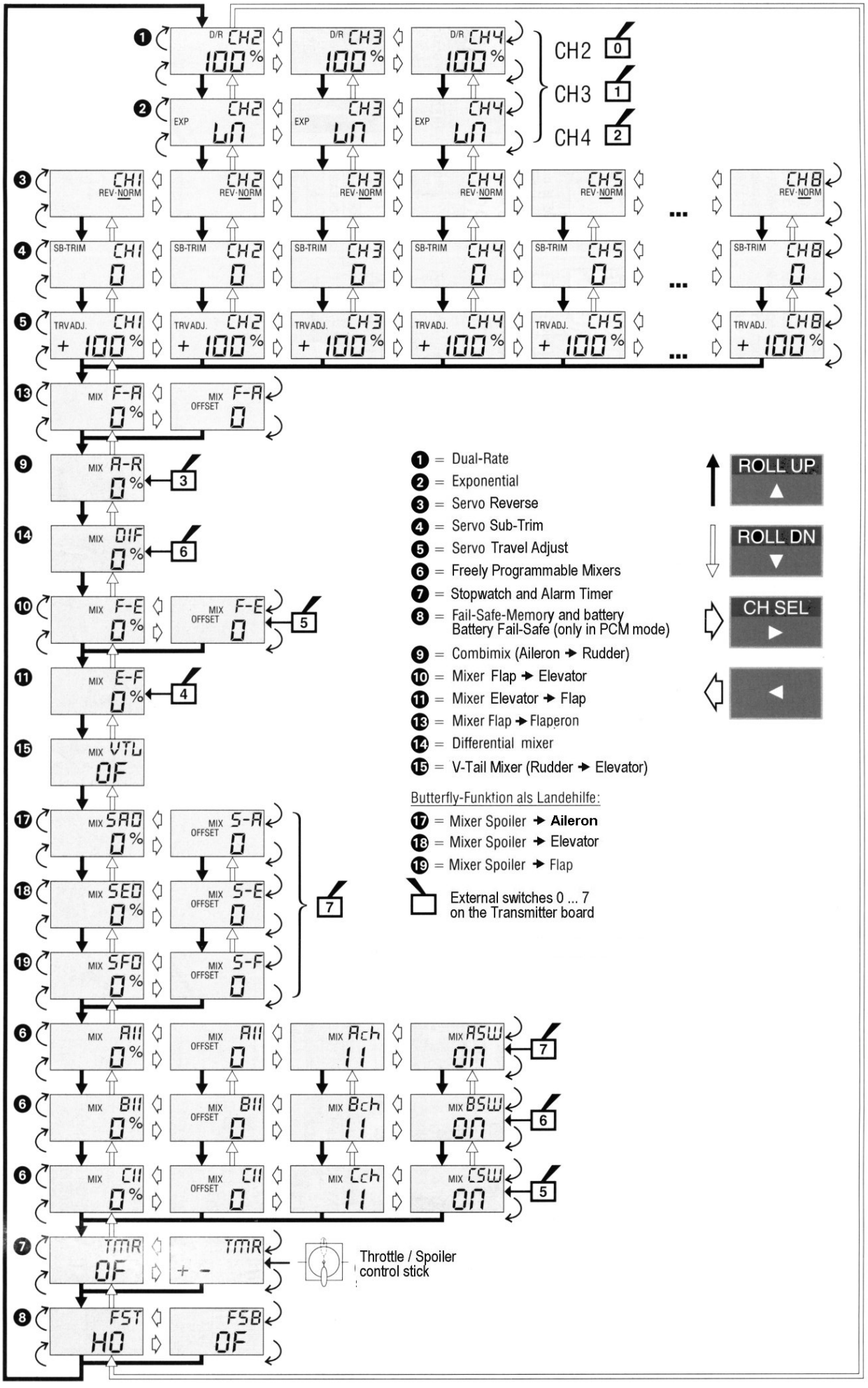


Allocation of Receiver Connections (ch 1 - 8)

The servos must be connected to the receiver connections as follows:



Block Diagram F3B/BUTTERFLY »Fb«



Set-up Diagram

TYP Fb Model Type “Fb”
= F3B/BUTTERFLY

All the mixers and adjustment values are set to 0 (= mixer off).
To adjust the mixer and adjustment values, while flying, we recommend fitting the 2-way momentary switch,
Part No. 4160.44 (see page 10)

❶ ... ❺, ❼, ❽

Adjustments ❶ ... ❼, ❽ are available for all model types

D/R CH2 100 % — ❶ DUAL-RATE
Functions 2 ... 4
(0 ... ±125%), page 20

EXP CH2 LN — ❷ EXPONENTIAL
Functions 2 ... 4
(linear ... +100%), page 20

CH1 REV·NORM — ❸ SERVO REVERSE
Channel 1...8, (Reverse/ Normal), page 21

SB-TRIM CH1 0 — ❹ SERVO SUB-TRIM
Channel 1...8, (0...±125 each side), page 21

TRV ADJ. CH1 + 100 % — ❺ SERVO TRAVEL ADJUST
Channel 1...8,
(0...±160%), page 21

TMR OF — ❼ STOPWATCH and ALARM TIMER,
page 23/24

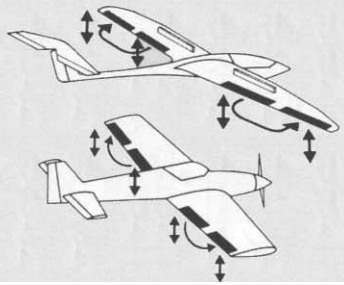
FST HO — ❽ FAIL SAFE MEMORY and BATTERY F.S.
(only in PCM mode),
page 24/25

⓭ MIX F-A (Flap ➧ Aileron)

Flap ➧ Aileron
When the flap slide control is moved (control input 6), this code moves both ailerons in the same direction as the flaps. This changes the camber of the entire wing. The adjustment range is 0 ... ±125%.

MIX F-A 0 % — Standard Initialised Value
INC + / DEC −
MIX F-A + 20 % — Mix ratio 0 ... ±125% (CLEAR = 0%)
CH SEL ▶
MIX OFFSET F-A 0
CLEAR
MIX OFFSET F-A + 85 — Range ca. −85 ... +85

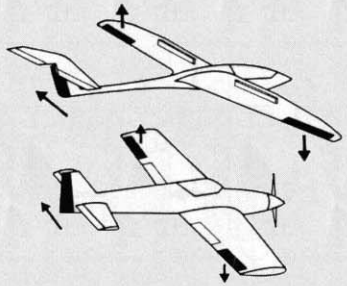
4152 PROP CHANNEL — OFFSET Adjustment: Move the control for channel 6 to the required position and press CLEAR



❾ MIX A-R (Aileron ➧ Rudder)

Combi-Mix
When an aileron command is given, the rudder also moves to a pre-programmed extent (0 ... ±125%).
The mixer can be switched on and off via an external switch connected to socket 3.

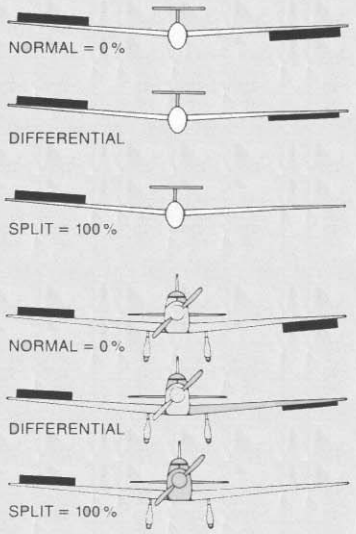
MIX A-R 0 % — Standard Initialised Value
INC + / DEC −
Switch 3
MIX A-R + 20 % ↔ 3 ↔ MIX A-R OF
Mix ratio (0 .... ±125%) (CLEAR = 0%)



⓮ MIX DIF

Differential
Differential movement of the ailerons, i.e. the ailerons having greater movement in one direction than the other. The amount of differential can be varied from 0% (Normal) to 100% (Split - only one aileron moves). You can switch between two different settings using an external switch connected to socket 6.

MIX DIF 0 % ↔ 6 ↔ MIX dIF 0 %
INC + / DEC −

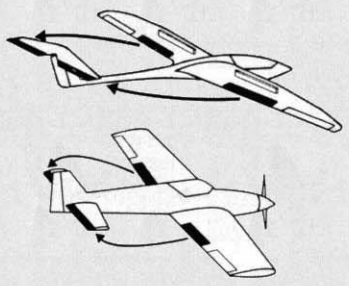


❿ MIX F-E (Flap ➧ Elevator)

Flap ➧ Elevator
When the flap servo is operated, the elevator is fed a pre-set corrective signal (0 ... ±125%)
The mixer can be switched on and off if an external switch is connected to socket 5.

MIX F-E 0 % — Standard Initialised Value
INC + / DEC −
Switch 5
MIX F-E + 20 % ↔ 5 ↔ MIX F-E OF
Mix ratio (0 .... ±125%) (CLEAR = 0%)
CH SEL ▶
MIX OFFSET F-E 0
CLEAR
MIX OFFSET F-E + 85

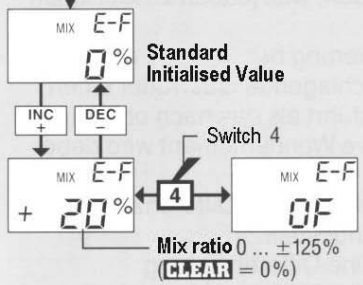
4152 PROP CHANNEL — OFFSET Adjustment: Move the control for channel 6 to the required position and press CLEAR

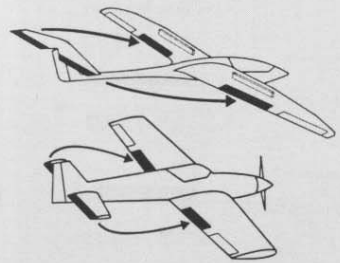


⓫ MIX E-F (Elevator ➧ Flap)

V-Tail

This program couples channels 3 and 4 to provide rudder and elevator control. The mix ratio is adjustable using the Dual-Rates for channels 3 and 4.

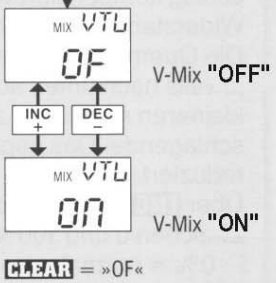


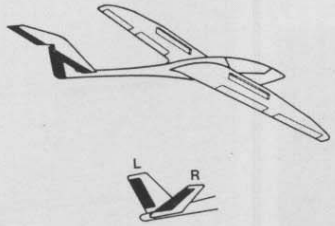


⓯ MIX VTL

Spoiler ➧ Elevator

When the throttle / spoiler control stick is moved, this code allow the automatic movement of the elevator to compensate for any pitch trim change. The adjustment range is 0 ... ±125%.
The mixer can be switched on and off by an external switch connected to socket 7 on the transmitter board.

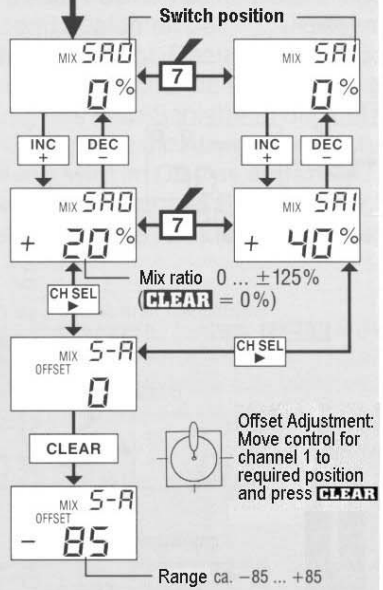


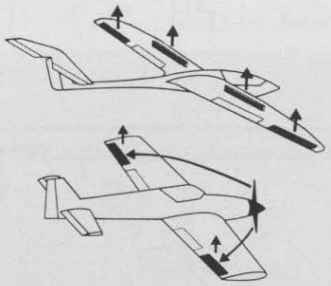


⓱ MIX SA0 (Spoiler ➧ Aileron)

Spoiler ➧ Aileron (Flaperon)

With movement of the throttle / spoiler stick both aileron servos can be moved in the same direction (= flaperon operation) between 0 and ±125%.
Using a switch attached to socket 7, the mixer can be switched between the settings "SA0" and "SA1".

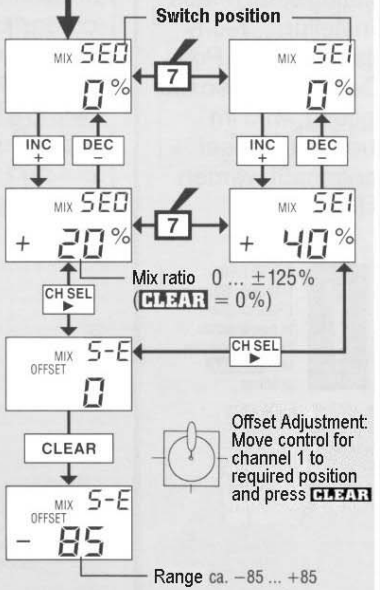


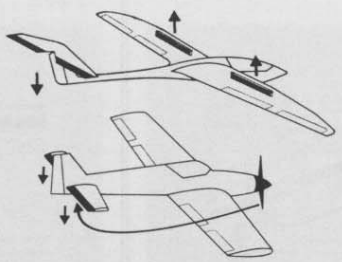


⓲ MIX SE0 (Spoiler ➧ Elevator)

Spoiler ➧ Elevator

With movement of the throttle / spoiler stick the elevator can be adjusted to assist in landing between 0 and ±125%.
Using a switch attached to socket 7, the mixer can be switched between the settings "SE0" and "SE1".

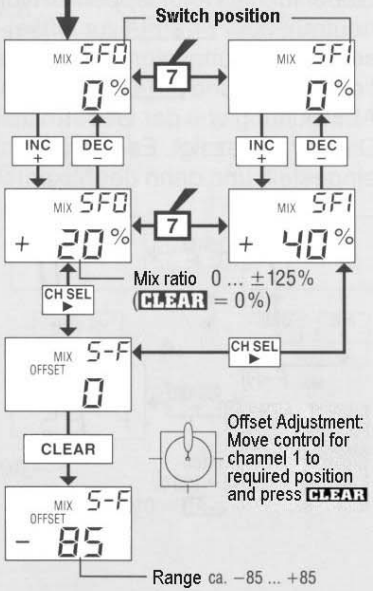


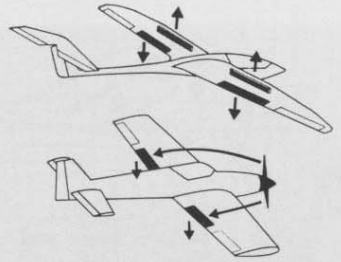


⓳ MIX SF0 (Spoiler ➧ Flap)

Spoiler ➧ Flap

With movement of the throttle / spoiler stick the flap can be adjusted to assist in landing between 0 and ±125%.
Using a switch attached to socket 7, the mixer can be switched between the settings "SF0" and "SF1".





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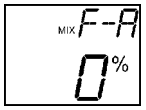
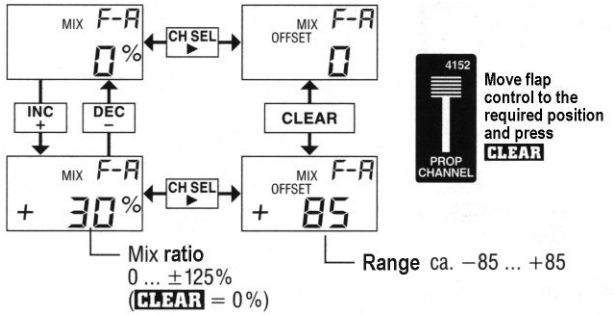
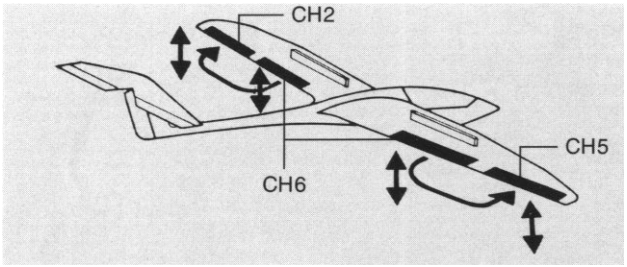


FLAP ➡ FLAPERON MIXER

Flap ➡ Flaperon Mixer
(access via Set-Up Menu)

The mixer "F-A" allows an adjustable portion of the flap control system to be fed to the aileron channels (2 and 5) so that the ailerons move with flap deflection in a manner like the flaps, but normally with smaller movement. The advantage is that a more even lift distribution over the span can be achieved. The mix proportion is entered using the INC and DEC buttons, between 0 and ±125%.
In order to tell the mixer, in which position of the control for the flaps relates to the normal flight position, CH SEL is pressed to call up the offset value. The value is set by moving the control to the required position and pressing the CLEAR button. The offset, the deviation from the control central position, is indicated in the display. You can also first set the offset and then adjust the mix proportion.





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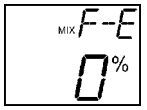
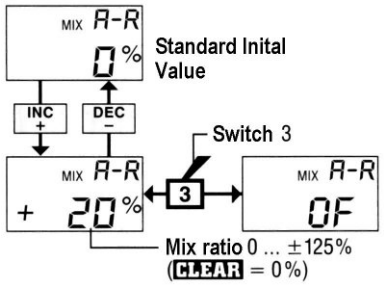
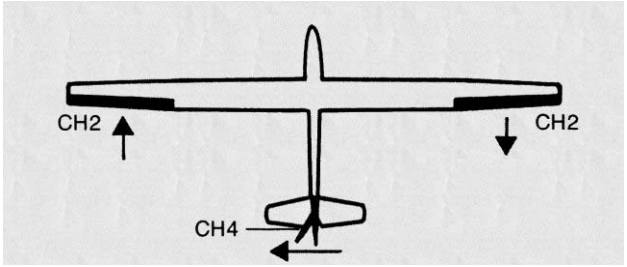


COMBI-MIX

Aileron ➡ Rudder Mixer
(access via Set-Up Menu)

In the case of operating the ailerons, the rudder is deflected by a programmable mix proportion. The rudder can, however, be steered separately at any time with priority.
After call of the code "A-R", the mix proportion is adjusted using the INC/DEC buttons and is stopped to automatically at the maximum value of ±125%.
The combi mixer can also be disabled by an external switch attached to socket 3 on the transmitter board.





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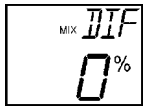


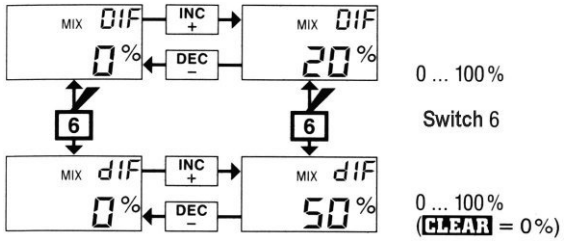
DIFFERENTIAL MIXER

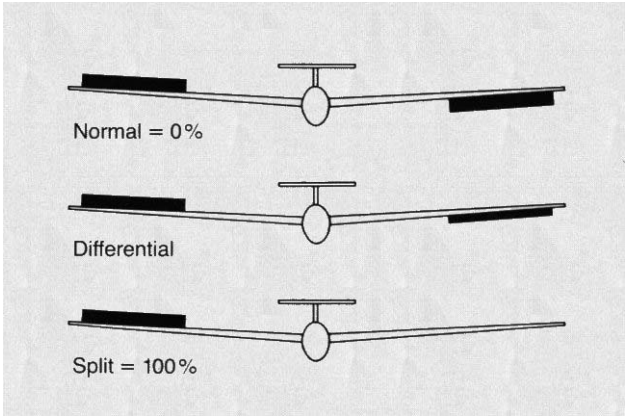
Aileron Differential Mixer
(access via Set-Up Menu)

The aileron differential is used to adjust for an unwanted yaw effect, which is called "negative yaw": The aileron deflecting downward creates a larger drag resistance than that developed by the upward deflecting aileron. This results in a torque around the vertical axis against the intended turn direction. This effect arises naturally and is more obvious with gliders with high aspect ratio wings, than with normal power planes, .due to the increased moment arm that the aileron drag has.
The aileron differential causes the downward aileron to deflect by a smaller distance than the upward moving aileron. The drag forces can be balanced and therefore the negative turning moment removed.
Using the INC/DEC buttons, the aileron differential is adjusted between the limits 0 and 100%:

0% = Normal, thus no differential.
100% = No downward aileron deflection, Split position mentioned above.

An external switch attached to connection 6, allows selection between two differential values. These are displayed as "DIF" and "dif" depending on the position of the switch. Each can have a different value to suit differing flight modes.





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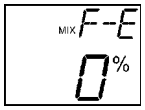
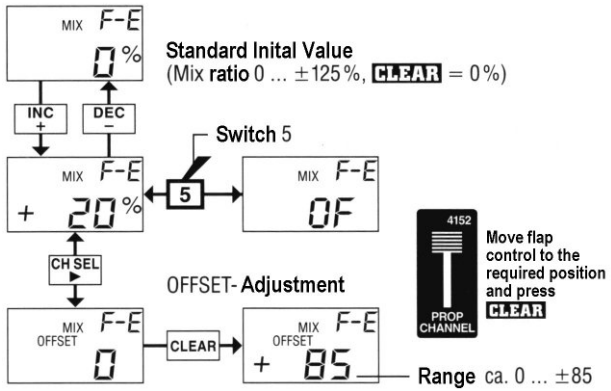
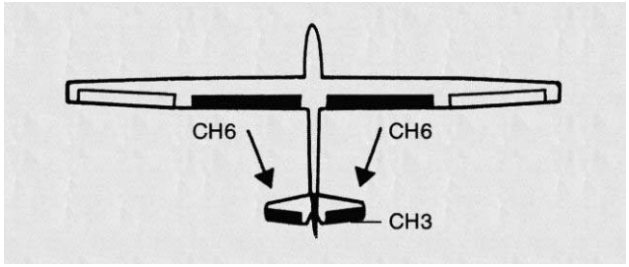


FLAP ➡ ELEVATOR MIXER

Flap ➡ Elevator Mixer
(access via Set-Up Menu)

During slow flight when extending flaps, automatic proportionally correction of elevator is made, thus the pitch attitude of the model becomes independent of the position of the flaps. The mix portion is entered in the code "F-E", the INC and DEC buttons, between 0 and ±125%. Next the mixer neutral point must be specified. The mixer must be informed which position of the input (normally sliding control 6) for the flaps, corresponds to normal flight (flaps neutral). Thus the elevator takes this position to be its neutral, and only when the flaps are moved from this position does the mixer affect the elevator. pressing the CH SEL button to call up the offset screen. Move the control to the required neutral position (e.g. the end position of the flap control) and press the CLEAR button. The offset, the deviation from the control centre position, is indicated in the display. A switch connected to socket 5 of the transmitter board can be used to switch off this function.



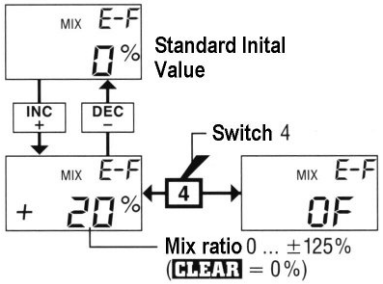


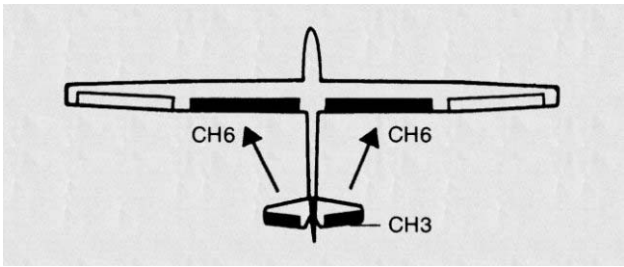
⑪

ELEVATOR ➡ FLAP MIXER

Elevator ➡ Flap Mixer
(access via Set-Up Menu)

To assist the elevator with close turning flight and aerobatics, the flaps can be linked to the elevator and are driven out proportionally to the increase the wing lift. The value in the code "E-F" can be varied using, the INC and DEC buttons between 0 and ±125%. The mixer can be also switched off with an external switch connected to socket 4.





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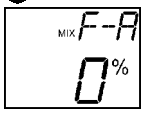
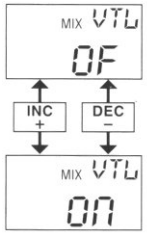


FLAP ➡ FLAPERON MIXER

Flap ➡ Flaperon Mixer
(access via Set-Up Menu)

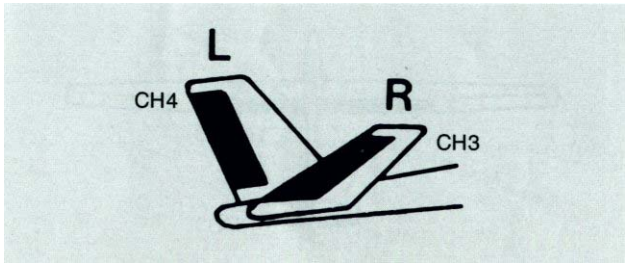
For models with a V-tail the functions of elevator and rudder must be mixed so with one another so that during elevator movement both surfaces are moved up or down in the same direction, and during rudder control the surfaces move in opposite directions , i.e. one surface upward and the other downward. The "VTL" Program contains the appropriate mixer, to control surfaces connected to separate servos. The function is activated using the INC / DEC buttons. Servos connected to outputs 3 and 4 of the receiver are automatically coupled with one another. The mix relationship is changed using the dual- rate setting, see page 20, where Ch4 changes the rudder effect and Ch3 the elevator effect.



V-Tail "OFF"

CLEAR = »OF«

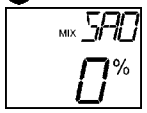
V-Tail "ON"



Butterfly Function as a Landing Aid Codes 17 … 19

The Butterfly function serves to increase the gliding angle as a landing aid; it can be used alone or additionally with existing airbrakes or spoilers.
The flight programme "Fb" contains finished mixers. Code 17 drives both ailerons downward with movement of the throttle/spoiler control stick so they act as flaperons. Code 19 drives them in the opposite direction so that they form Butterfly (or Crow) brakes. Code 18 allows the elevator to be trimmed with application of brakes to retain the same pitch trim. Each of these three mixers can be adjusted individually; and of course they can also be used individually.
So, for example, the spoiler ➡ elevator mixer, code 18, can be used in combination with normal airbrakes in order to maintain pitch trim when the airbrakes are deployed. The other two mixers would have the mix proportion set to 0%, so that they remain ineffective.
With ailerons that are full span, the mixers 17 (spoiler ➡ ailerons) and 18 (spoiler ➡ elevator) can be used together, to raise the flaperons at a large angle of deflection and also to re-trim the elevator accordingly.
However, particularly with the ailerons, the total travel must be considered with operation as aileron and flaperons. The settings in the dual rate function must be adapted, if necessary, in order not to let the servos reach their mechanical limits.
All three mixers can be changed between two programmable settings using a switch attached to socket 7 on the transmitter board. If the mix proportion is set to 0% in one switch setting it makes the respective mixer effectively inactive.

⓱



SPOILER ➡ FLAPERON MIXER

Spoiler ➡ Aileron Mixer
(access via Set-Up Menu)

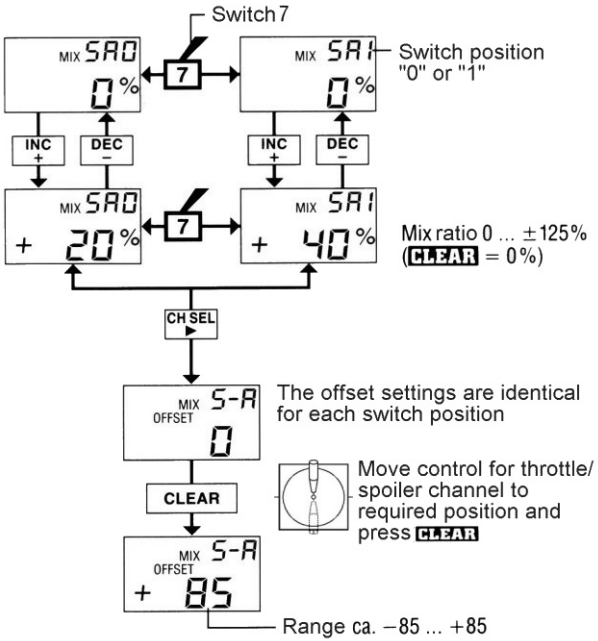
With movement of the throttle/spoiler control stick (control function 1) both aileron servos can be adjusted for landing using the INC / DEC buttons from 0 to ±125% (0% = mixer inactive).
A switch connected to socket 7 of the transmitter board, allows this function to be changed between two options "SA0" and "SA1" (spoiler ➡ ailerons).
The mixer must have the position, of control function 1, set that corresponds to normal flight, i.e. with the spoilers retracted, and the ailerons in their neutral position. The neutral point of this mixer is set after calling the subroutine "SA OFFSET" by pressing the CH SEL button: The spoiler control is moved into the appropriate neutral position, normally the bottom position of the control stick, and the CLEAR button is pressed. The display will indicate the offset, being the deviation from the control central position. The offset is identical for both switching positions and only needs to be set once.

Note:
When Butterfly landing mode is wanted, codes 17 & 19 are used with both ailerons (flaperons) deflected upward and the flaps extended downward.

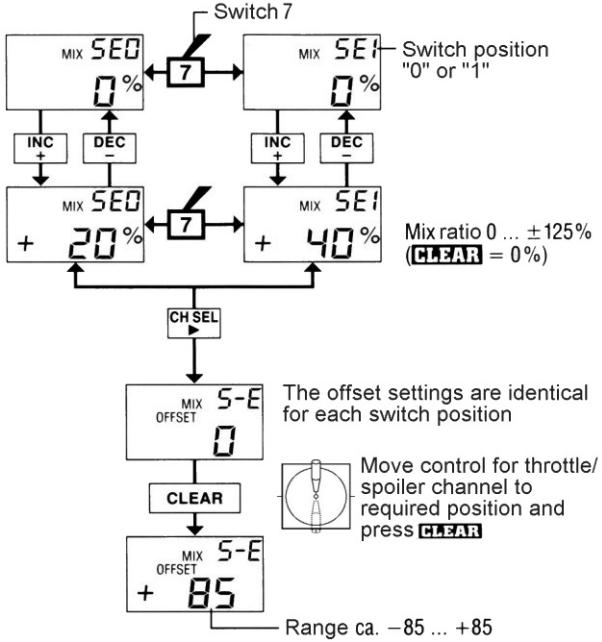
18

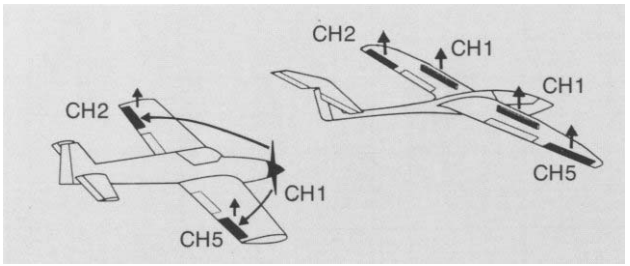
SPOILER ➡ ELEVATOR MIXER

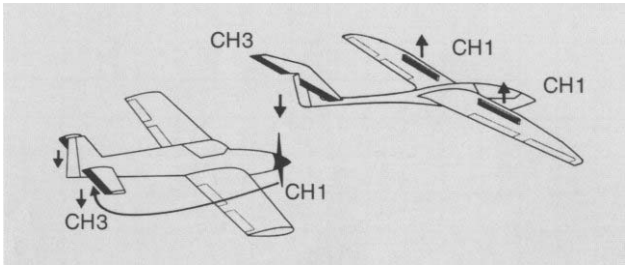
Spoiler ➡ Elevator Mixer
(access via Set-Up Menu)



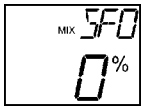
Due to the changing lift when extending the spoilers, the elevator must be adjusted by an appropriate amount to compensate.
The elevator compensation can be adjusted between 0 and ±125% of the spoiler stick travel for use during the landing approach (0% = mixers inactively).
A switch connected to socket 7 of the transmitter board, allows this function to be changed between two options "SE0" and "SE1" (spoiler ➡ elevator).
The mixer must have the position, of control function 1, set that corresponds to normal flight, i.e. with the spoilers retracted, and the ailerons in their neutral position. The neutral point of this mixer is set after calling the subroutine "SE OFFSET" by pressing the CH SEL button: The spoiler control is moved into the appropriate neutral position, normally the bottom position of the control stick, and the CLEAR button is pressed. The display will indicate the offset, being the deviation from the control central position. The offset is identical for both switching positions and only needs to be set once.







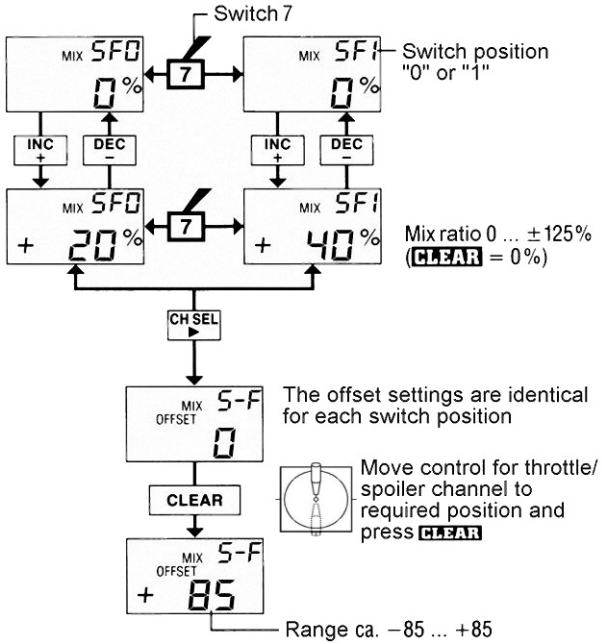
⑲



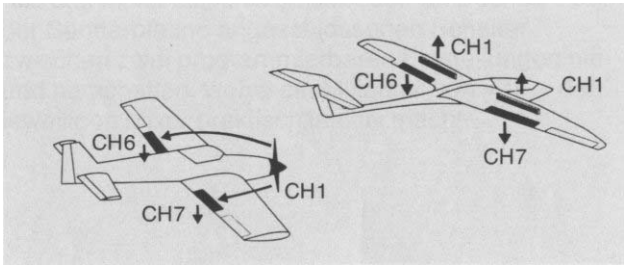
SPOILER ➡ FLAP MIXER

Spoiler ➡ Flap Mixer
(access via Set-Up Menu)

With movement of the throttle/spoiler control stick (control function 1) both aileron servos can be adjusted for landing using the INC / DEC buttons from 0 to ±125% (0% = mixer inactive).
A switch connected to socket 7 of the transmitter board, allows this function to be changed between two options "SF0" and "SF1" (spoiler ➡ flaps).
The mixer must have the position, of control function 1, set that corresponds to normal flight, i.e. with the spoilers retracted, and the ailerons in their neutral position. The neutral point of this mixer is set after calling the subroutine "SF OFFSET" by pressing the CH SEL button: The spoiler control is moved into the appropriate neutral position, normally the bottom position of the control stick, and the CLEAR button is pressed. The display will indicate the offset, being the deviation from the control central position. The offset is identical for both switching positions and only needs to be set once.



Note:
When Butterfly landing mode is wanted, codes 17 & 19 are used with both ailerons (flaperons) deflected upward and the flaps extended downward.
When only using 1 flap servo, connect it to socket 6 on the receiver.



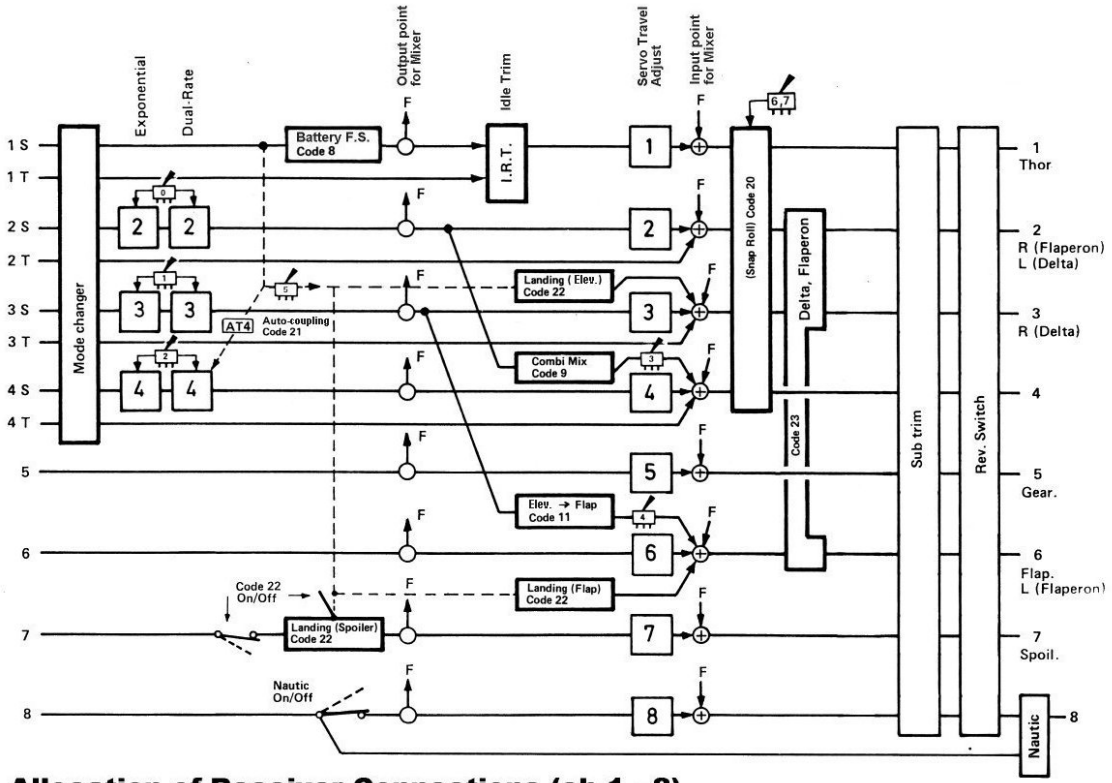
For your Notes

ACROBATIC

Model Type Described

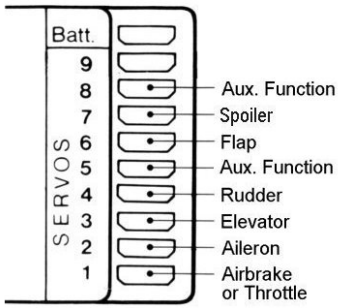
The basic version of this program allows Motor (or airbrake), Aileron, Elevator, Rudder, Flap and Spoiler. Receiver outputs 5 and 8 are available for auxiliary functions, e.g. retractable undercarriage, mixture control for the motor, etc. Also included is a ready made mixer for Elevator ➡ Flap mixing. Other mixing functions can be achieved using the 3 freely programmable mixers available.
The Combi-mixer for aileron ➡ rudder mixing is available. The main advantage of the ACROBATIC program is that many different tasks can be achieved by activating the preset mixers available.
The “Automatic Landing” program allows control of the motor, elevator, flaps and spoilers in a freely programmable set-up. The “Automatic Manoeuvre” program can be set-up to provide two different Snap-Roll directions by controlling the elevator, rudder and aileron whilst the motor servo is driving to a fixed position.
The wing programs allow Delta and Flaperon models to be accommodated. With Delta (or tailless) models, the elevator and aileron functions are mixed to the common surfaces full width along the trailing edge. The surfaces are moved in the same direction for elevator control and in opposition for aileron control. The servos must be connected to receiver outputs 2 and 6.

Block Diagram ACROBATIC “AC”

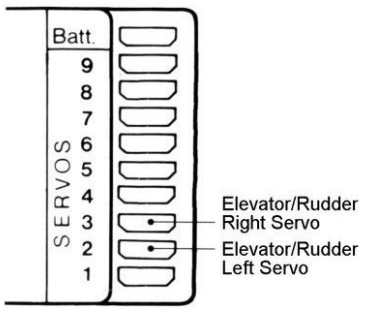


Allocation of Receiver Connections (ch 1 - 8)

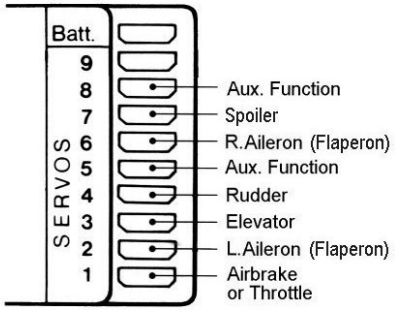
The servos must be connected to the receiver connections as follows:



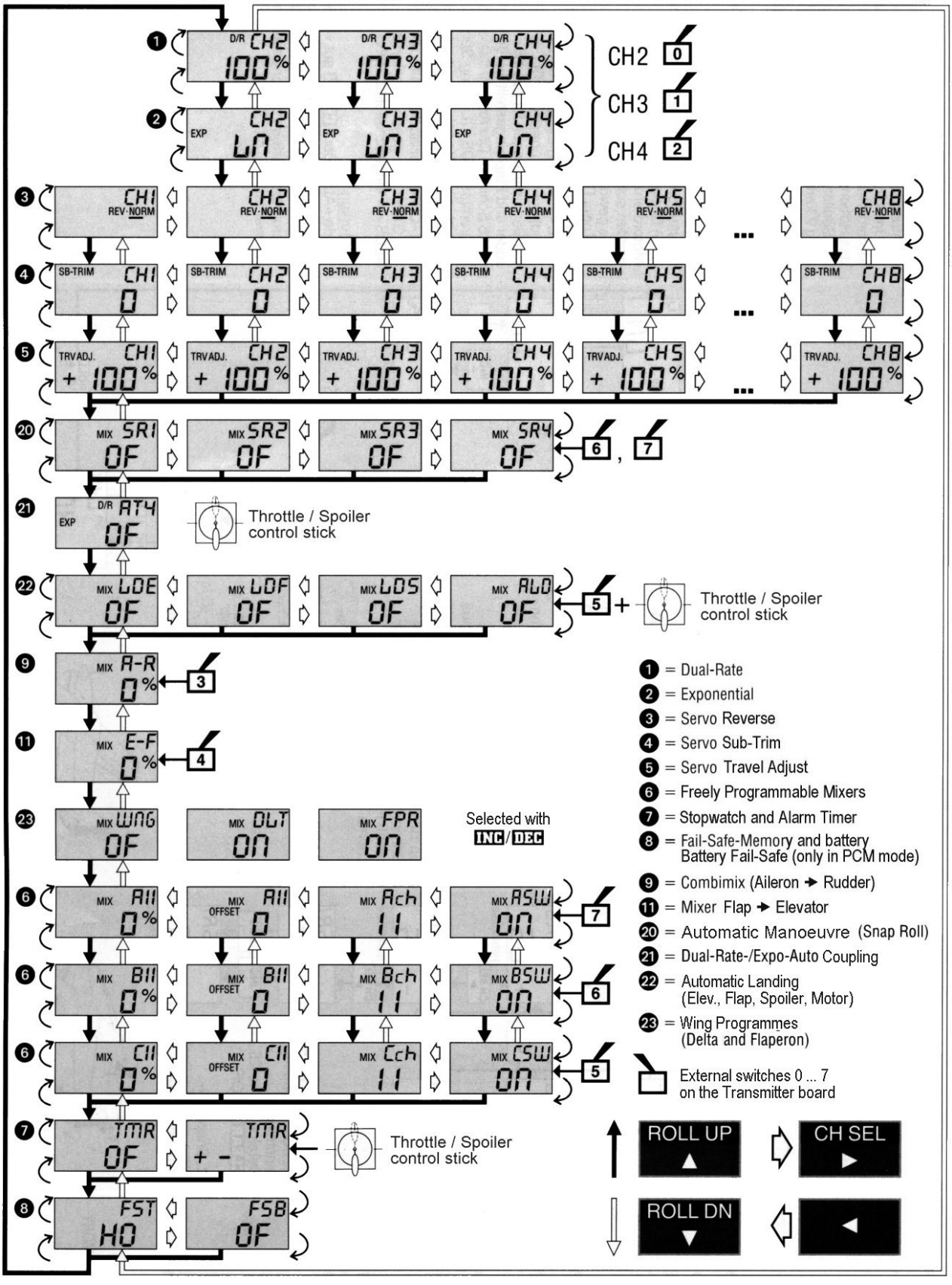
Delta + Tailless



Flaperon



Block Diagram ACROBATIC »AC«



Set-up Diagram

All the mixers and adjustment values are set to 0 (= mixer off).
To adjust the mixer and adjustment values, while flying, we recommend fitting the 2-way momentary switch,
Part No. 4160.44 (see page 10)

TYP AC Model Type "AC" = ACROBATIC

❶ ... ❺, ❼, ❽

Adjustments ❶ ... ❼, ❽ are available for all model types

❶ DUAL-RATE
Functions 2 ... 4
(0 ... ±125%), page 20

❷ EXPONENTIAL
Functions 2 ... 4
(linear ... +100%), page 20

❸ SERVO REVERSE
Channel 1...8, (Reverse/ Normal), page 21

❹ SERVO SUB-TRIM
Channel 1...8, (0...±125 each side), page 21

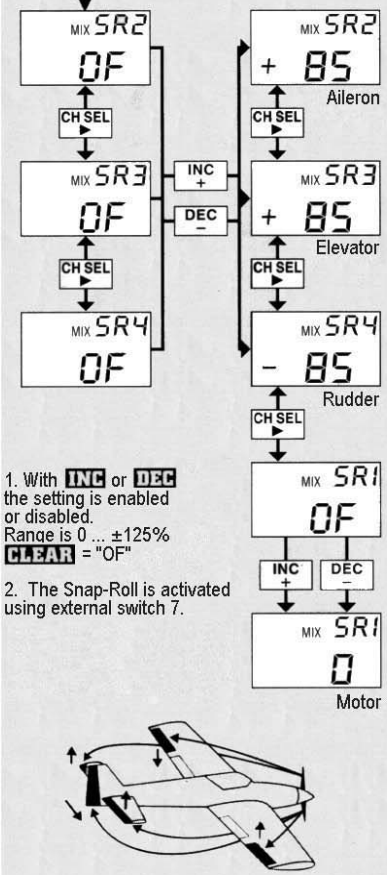
❺ SERVO TRAVEL ADJUST
Channel 1...8,
(0...±160%), page 21

❼ STOPWATCH and ALARM TIMER,
page 23/24

❽ FAIL SAFE MEMORY and BATTERY F.S.
(only in PCM mode),
page 24/25

⓴ MIX SR ... (Snap Roll)

Automatic Manoeuvre
With operation of the Snap-Roll switch the servos for ailerons, elevator, rudder and throttle move to a pre-programmed position.
There are two Snap-Roll programs available, i.e. Snap roll left & right.



1. With INC or DEC the setting is enabled or disabled.
Range is 0 ... ±125%
CLEAR = "OF"

2. The Snap-Roll is activated using external switch 7.

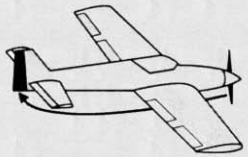
㉑ AT 4

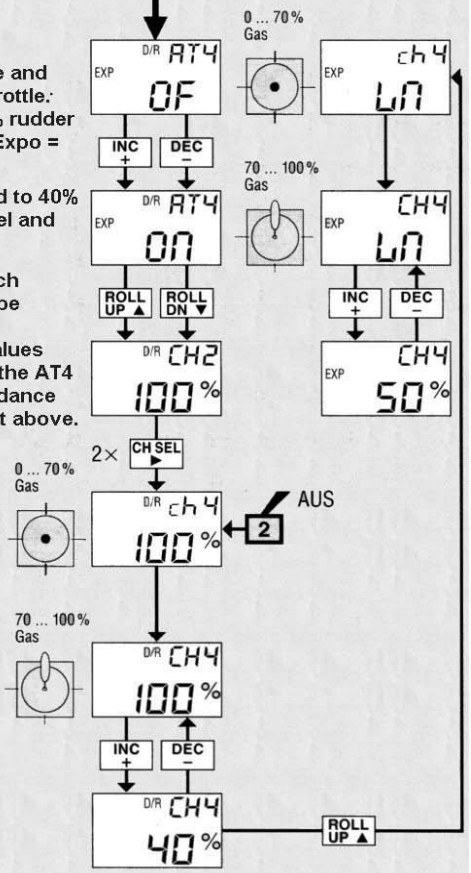
Dual Rate and Exponential Auto-coupling
When the position of the throttle stick is approx. 70% towards full power, the Dual-Rate and Exponential function for the rudder automatically switches to the alternate setting. This only works if the associated Dual-Rate / Exponential switch (in transmitter board socket 2) is switched off.

Programming Example:
Automatic switching of Dual-Rate and Exponential for rudder at 70% throttle.
0 ... 70% throttle: D/R at 100% rudder travel and Expo = LN (linear)

70% ... 100% throttle: D/R reduced to 40% rudder travel and Expo = 50%

The Dual-Rate / Exponential switch for channel 4 (in socket 2) must be switched off.
The dual rate and Exponential values can be programmed before with the AT4 function switched off or in accordance with the accompanying flow chart above.





㉒ MIX LD ...(Auto-Landing)

Automatic Landing
When the throttle stick is moved near the idle position, pre-programmed positions for flap "LDF", and elevator "LDE" are automatically selected. Additionally, a Spoiler attached to receiver output 7 can also be set-up to move to a pre-programmed position. The function can be switched on and off using an external switch connected to socket 5

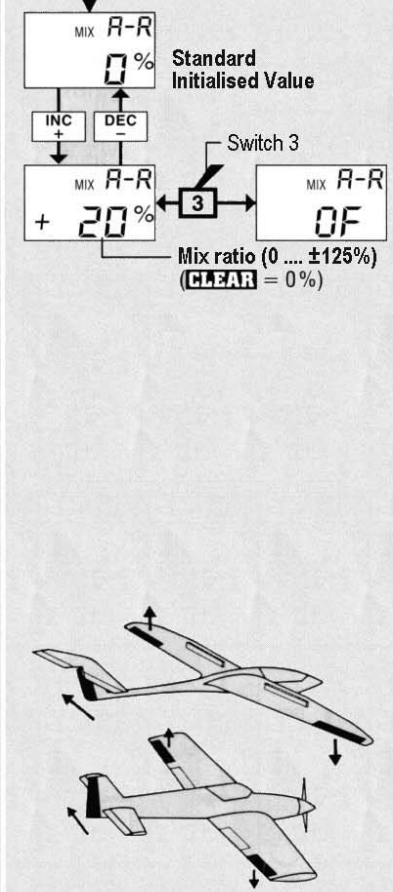
In the program "ALD" (Auto-Landing) it is necessary to specify below which throttle setting the program is to become effective. The value is adjusted by pressing INC or DEC until the desired throttle stick position is achieved. (CLEAR sets "ALD" to "OF"). After selection of "LDE" (Landing Elevator) or "LDF" (Landing Flap) using CH SEL the servo positions for the elevator or flap can be set (0... ±125 steps). The selection of the subroutine "LDS", permits, a spoiler servo attached to channel 7 to be switched on or off. The control for channel 7 is disabled so long as "LDS" is switched on.

Note:
If "ALD" was switched to "OF" using CLEAR the elevator, flap and spoilers can be driven to pre-programmed positions with switch 5 .

❾ MIX A-R (Aileron → Ruder)

Combi-Mix

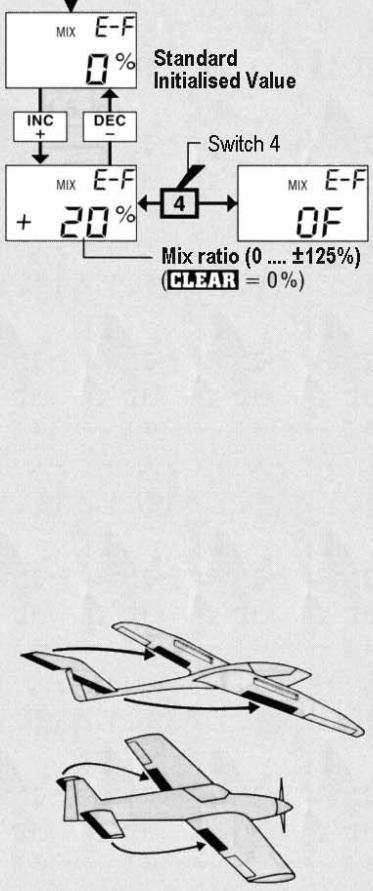
When an aileron command is given, the rudder also moves to a pre-programmed extent (0 ... ±125%).
The mixer can be switched on and off via an external switch connected to socket 3.



⓫ MIX E-F (Elevator → Flap)

Elevator → Flap

When the elevator servo is operated, the flaps are fed a pre-set signal (0 ... ±125%)
The mixer can be switched on and off if an external switch is connected to socket 4.

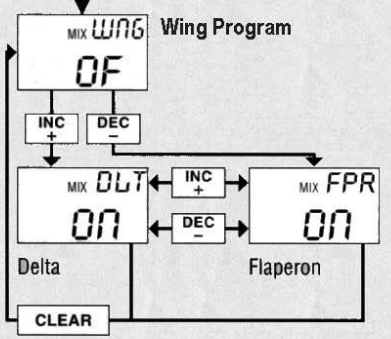


㉓ MIX WNG (Wing)

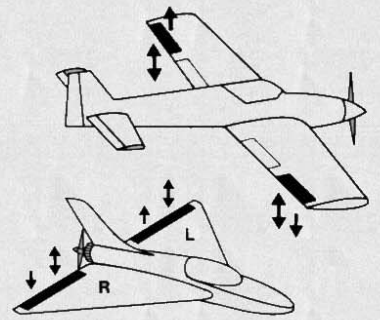
Delta "DLT" & Flaperon "FPR" mix

1. "DLT": Delta mixer operating channels 2 and 3.
2. "FPR": Flaperon

The receiver outputs 2 and 6 are mixed so that control stick 2 gives aileron operation and the flap slider gives a flap function.



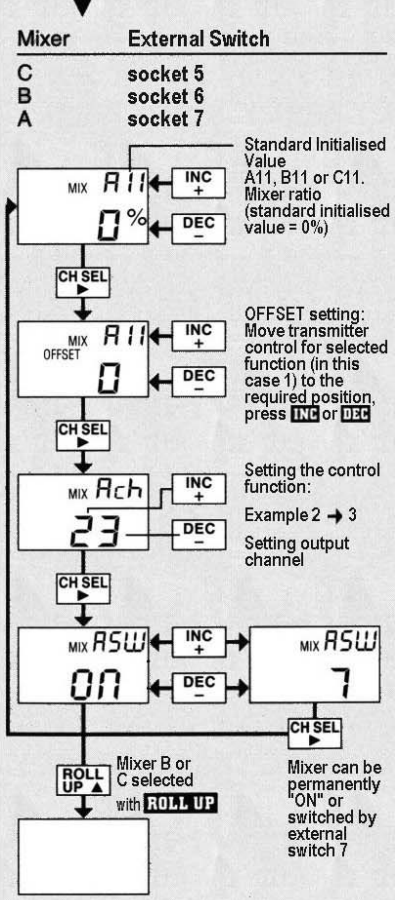
"DLT": The mix proportions are adjusted using the Dual-Rates function for control functions 2 and 3.
"FPR": The ratio for the aileron function is set using the Dual-Rate function for channel 2.
The flap setting is adjusted using the Servo Travel Adjustment code for control function 6.

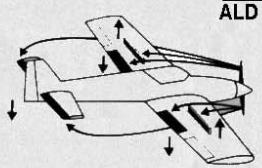


❻ MIX A11, B11, C11

Freely Programmable Mixer

Both the mixer program (servo functions 1 ... 8) and the mixer ratio (0 ... ±125%) can be selected individually.
The mixers can be set permanently "ON" or switched on and off via the associated external switch





Elevator Setting

CLEAR = "0"
"OF" if switch 5 is off

Flap Setting

CLEAR = "0"
"OF" if switch 5 is off

Spoiler active/ inactive setting

(receiver output 7)
CLEAR = "OF"

Setting the operating point:
Put throttle at the desired switching point and press INC or DEC.
CLEAR turns ALD off.

20

AUTOMATIC MANOEUVRE

Two Snap-Roll programs
(access via Set-Up Menu)

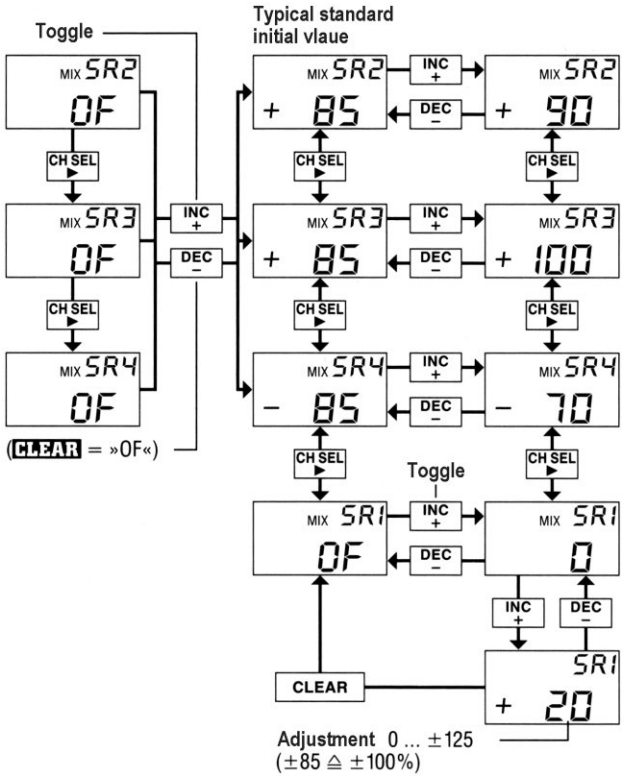
The switches to operate the Snap-Roll program must be connected to socket 6 and/or 7 of the transmitter board. This code allows the programming of aileron, elevator and rudder positions, plus the pre-setting of the throttle position. Two Snap-Roll programs are available, i.e. Snap-Roll to left and right. To control this function, momentary switches, part No. 4160.11, 4160.44 or kick-switch M4144, are needed to select the Snap-Roll program “SR…”, and to turn off the function immediately the switch is released.
The both programs differ as shown in the following tables, The final program to be activated is always indicated in the display.

Switch	Display	Function	Ch
Socket 6	SR1	Throttle	1
	SR2	Aileron	2
	SR3	Elevator	3
	SR4	Rudder	4
Socket 7	SRT	Throttle	1
	SRA	Aileron	2
	SRE	Elevator	3
	SRR	Rudder	4

Note:
If two separate momentary switches are used, and both are turned on together, the one connected to socket 7 has precedence. Simultaneous activation of the Automatic Landing (code 22) using switch 5, the Snap-Roll program will be inactive underneath the switch point of the Automatic Landing

Consecutive presses of the CH SEL button moves through the channels “SR2” through “SR4” and/or “SRA, “SRE”, and “SRR”. The three channels can be set independent of the position of switches 6 and 7, or turned off using the CLEAR button. The first of the codes “SR1” and/or “SRT” for the throttle control is actually the fourth code that appears. The function selection is changed by the CH SEL button, with the CLEAR button cancelling a setting.

Now the servo setting for each sub-code “SR…” can be set using the INC and/or DEC buttons in the range 0 … ±125%



Momentary operation of switch 7 changes the display between "SRA", "SRE", "SRR", "SRT".

21

DUAL-RATE / EXPO- AUTO-COUPLING

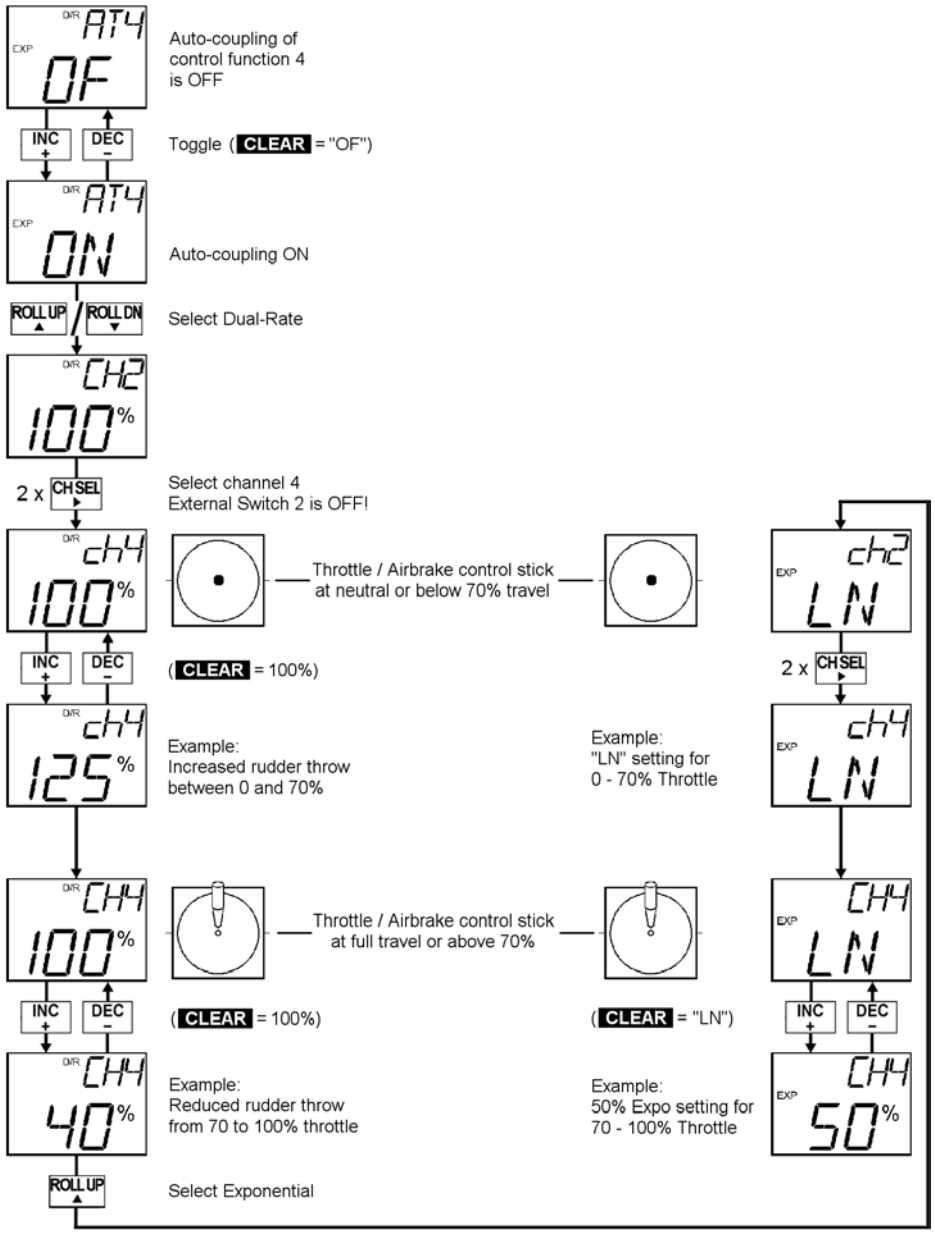
Automatic switching of control characteristics
(access via Set-Up Menu)

The normal Dual-Rate (D/R) and Exponential functions for channels channel 4 (rudder), see page 20, can be linked to the throttle control stick to automatically switch between the two settings at about 70% of full throttle.
Example:

0 … 70% throttle	Rudder travel increased to 125%, with linear motion (“LN”).
70% … 100% throttle	Rudder travel decreased to 40% and exponential set to 50%.

The auto-coupling function will only operate if the external switch at connection 2 is turned off.
In the D/R / Exponential setting, the selection for rudder (channel 4) below 70% throttle travel is indicated by “ch4”, with above 70% being shown by “CH4”.
With the auto-coupling disabled, i.e. AT4 = "OF", the D/R and Exponential for the rudder uses the normal switching, as described on page 20
or
With the "AT4" function activated, the external D/R / Exponential switch (connection 2) must be in the off position for the auto-coupling to function. The desired values are set using INC & DEC.

Note:
The auto-coupling affects control function 4 in accordance with the block diagram on page 52. Thus to the left of the output point for mixers, it can operate other control paths using the freely programmable mixers A, B and C, and the same from the right of the input point for mixers. For example mix "A47" and a setting of 100% would give similar auto-coupling effect to control paths 4 and 7.



22

AUTO-LANDING

Automatic Landing Assistance
(access via Set-Up Menu)

Around the landing approach, in particular to reduce the speed of very fast F3A models, this code offers the possibility, when falling below a certain pre-selectable engine speed, of putting the elevator and flaps into a defined position. Both functions, however, remain separately controllable. Optionally an airbrake / spoiler can also be driven out. This landing aid can be switched off during the flight using an external switch attached to socket 5 of the main board.

After selection of this code, four different subroutines are available in the information display, successively selected using the CH SEL button:

In the program "LDE" the elevator adjustment can be set using the INC and/or DEC buttons over a range of ±125 steps. The setting for the flaps takes place in the same way using the program "LDF". If the CH SEL button is pressed again, it can be decided whether the airbrake is to be driven out on activation of the automatic landing aid.

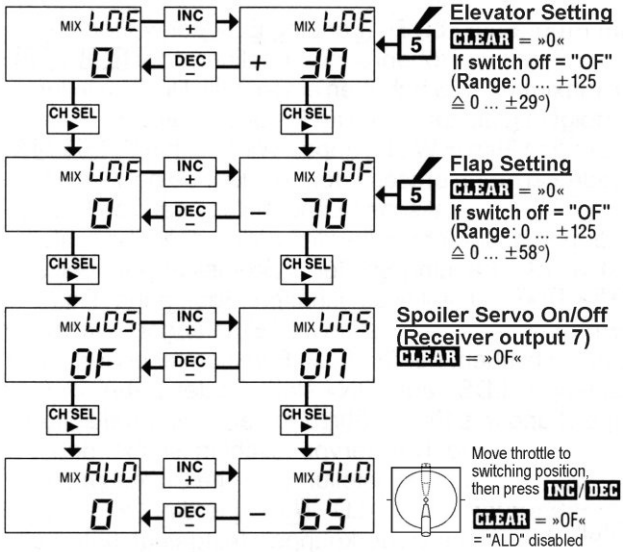
If required "LDS" is toggled between "ON" and “OF” by pressing the INC or DEC button: The airbrake servo is to be attached to the receiver output 7, which is reserved for this function. As long as "LDS" remains on "ON", the output 7 is closed and the servo drives from its neutral point to the end position. The servo excursion is over the code "servo way attitude", page 21, to specify.

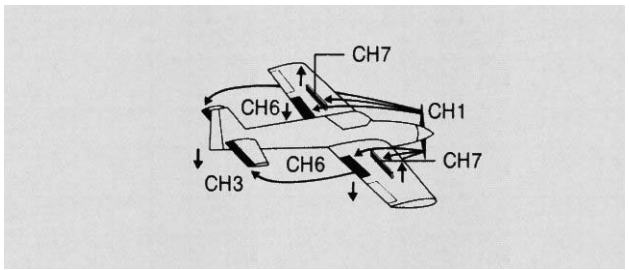
The subroutine "ALD" is used to specify the position of the throttle stick, below which the automatic landing aid is to be activated. The throttle stick is moved to the required operating position and the INC or DEC buttons is pressed to store the position. The current value is indicated in the display. If the throttle stick is above this position, or if the entire program is switched off using external switch 5, the message "OF" will appear in the display for the codes "LDE" and "LDF".

If the "ALD" subroutine were previously switched off by pressing CLEAR, can move the elevators, flaps and airbrake to their pre-determined auto-landing positions by operating external switch 5.

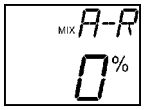
The settings for the control surfaces must be determined experimentally during flight and then adapted to the requirements.

Warning:
If the automatic manoeuvre, see page 56 is simultaneously switched on, it will be inactive when control function 1 is below the switching point for auto-landing!



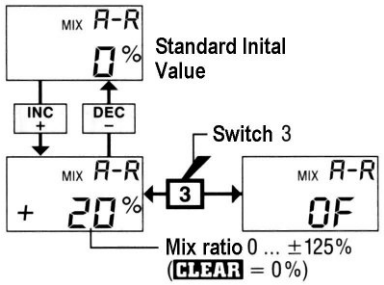


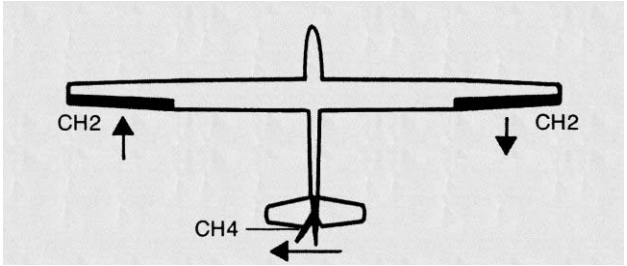
⑨ COMBI-MIX



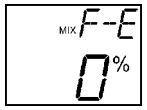
Aileron ➡ Rudder Mixer
(access via Set-Up Menu)

In the case of operating the ailerons, the rudder is deflected by a programmable mix proportion. The rudder can, however, be steered separately at any time with priority.
After call of the code "A-R", the mix proportion is adjusted using the INC/DEC buttons and is stopped to automatically at the maximum value of ±125%.
The combi mixer can also be disabled by an external switch attached to socket 3 on the transmitter board.



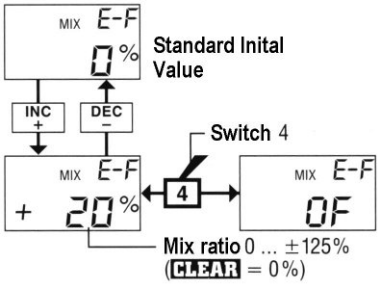


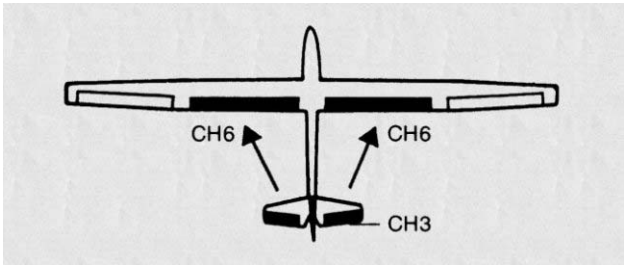
⑩ FLAP ➡ ELEVATOR MIXER



Flap ➡ Elevator Mixer
(access via Set-Up Menu)

To assist the elevator with close turning flight and aerobatics, the flaps can be linked to the elevator and are driven out proportionally to the increase the wing lift. The value in the code "E-F" can be varied using, the INC and DEC buttons between 0 and ±125%. The mixer can be also switched off with an external switch connected to socket 4.





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WING TYPE PROGRAMS

Wing Mixer for Delta and Flaperon models
(access via Set-Up Menu)

After calling this program "WNG OF" appears in the Info-Display . Two special mixers are available with this code, which can be selected using INC/DEC.

1. For Delta models, "DLT" combines the functions of Ailerons and Elevators, where the servos are connected to receiver outputs 2 and 3 (Throttle to 1, Rudder to 4). The mix ratio is adjusted using the code "Dual-Rate" (Control function 2 for Ailerons and 3 for Elevator, see page 20).

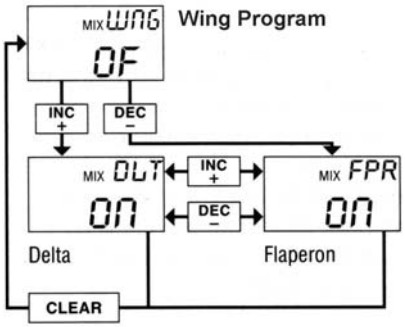
   Note:
   Depending on the installation of the servos, the direction of rotation and neutral position may be adjusted using the appropriate codes on page 21.
   Servo travel adjustment:
   Ch 2 affects the servo travel for servo 2.
   Ch 3 affects the servo travel for servo 2 during aileron control, but it affects both Servos 2 + 3 together during elevator travel. For safety reasons, the servo travel must amount to at least 50%!

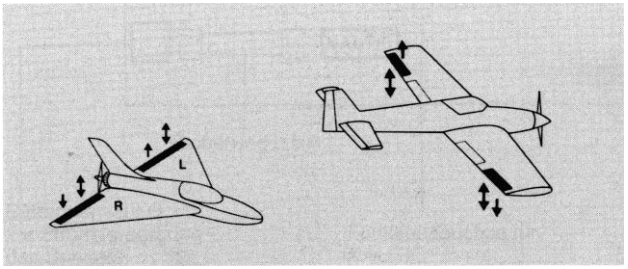
2. Aileron / Flap mixer: "FPR" stands for Flaperon and affects two servos attached to receiver output 2 and 6 as follows:

   ● Aileron, if the control stick for control function 2 is moved.

   ● Flap, if the control element for function 6 is moved.

   Note:
   Depending on the installation of the servos, the direction of rotation and neutral position may be adjusted using the appropriate codes on page 21.
   Servo travel adjustment:
   Servo 2 can be altered using the code servo travel adjustment for "CH2". The setting for "CH6" affects both exits when control function 6 is used for the flap position.
   The mix portion of the aileron control, function 2. can be changed using the Dual-Rate and Exponential settings. The setting doe CH2 affects both outputs 2 and 6 together.





HELICOPTER MODELS – General Information

With these helicopter programs the mc-16/20 transmitter provides all the options for the controlling a modern model helicopter.

To facilitate programming the following helicopter specific functions are available:

- Idle Up
- Throttle curve
- Pitch curve
- Autorotation
- Static
- Dynamic
- Mixer
- Gyro control

Additionally the functions previously described in the Fixed Wing section can be used:

- Dual-Rate
- Exponential
- Servo reverse
- Servo neutral point
- Servo travel adjust
- Free mixers
- Stopwatch and alarm timer
- Fail safe memory & battery fail safe

Warning

RC Helicopters are complicated aircraft which can not the mastered simply. They are aerodynamically unstable and can fly in any direction if control is lost. There is a constant danger of injury when operating them.

Beginners are strongly recommended to find an experienced modeller, club or model flying school. Further advice is available from model shops and modelling publications.

Preparations

Before reviewing the setting of the model into the transmitter, the model should be set accurately using the mechanical adjustments.

That is:

- All controls are set in accordance with the respective helicopter instructions.
- All controls are assembled so that with the control linkages at the middle position, and the trim neutral, the servo arm is at a right angle to the control rod.
- With the control sticks centred, the main rotor head is horizontal, and the tail rotor blades are at the required pitch angle.
- The size of the servo arm was chosen such that the throttle control rod movement matches the carburettor movement required between idle and full throttle, and that the motor will idle with the joystick fully back and the trim appropriately set. The servo movement is unrestricted and does not foul by appropriate mechanical or electronic limits.

The user should familiarise himself with the individual programs starting on page 66.