Programming

Code List (Types 1…5)

The codes for the various options were chosen as a result of in-house deliberations. The following programming instructions, are arranged in the sequential order of the individual programming steps. These are arranged to suit practical requirements, the code numbers are not arranged in numerical order.

When a new model is being programmed, be sure to follow the sequences detailed in the following pages. If you don't follow it, you may forget something or unintentionally change other, earlier made adjustments.

In subsequent descriptions functionally related options have been grouped together, so they will be comparatively easy to fund.

Code 56
Model Selection

Selection and Deletion of Models

s	e	l	e	c	t		M	O	D	E	L		
K	E	Y		1	-	7		O	R		+	/	-

The MC-18 transmitter permits the storing the data of seven models and 30 models[2], including all trim data. To this end, actual trim data have to be stored into the trim memory via code 59, so the trim sliders of control functions ailerons, elevator and rudder can be moved to the centre position. In this manner finding trim data required for a newly selected model (after a change of model) will be very much simplified, as all you've got to remember is that all trim levers will occupy the centre position.

After calling code 56, model selection is performed either directly by entering the model number under which the desired model has been stored, or by skimming through the index of stored models to and fro via keys INC and DEC. In either case the name of the currently selected model will appear in the lower line of the display. You still have the possibility to correct your selection by entering another model or by skimming the index once again.

The selected model will be activated by ENTER. If the CLEAR key is pressed instead of ENTER, complete deletion of the selected model data can be initiated. This process is be performed by the ENTER key, and aborted by any other key.

In case the model selected has been programmed for another kind of modulation than the preceding one, the display message "POWER OFF" indicates that you've got to turn the transmitter off and then on again so that the switch from PCM to PPM (or vice versa) can be made.

[2] Transmitters are configured for 30 models, starting with series '89

Code 95
Modulation

Selection of PPM or PCM Modulation

m	c	-	1	8	E		M	O	D	E	L	1	
M	O	D	U	L	A	T	I	O	N		P	P	M

The MC-18 transmitter permits operation on PPM (Pulse Position Modulation) or PCM (Pulse Code Modulation).

Switch over is provided by code 95, using the INC and DEC keys.

After a change of the modulation mode, the display text will indicate that the transmitter has to be turned off momentarily, so that it can swap over to the changed modulation.

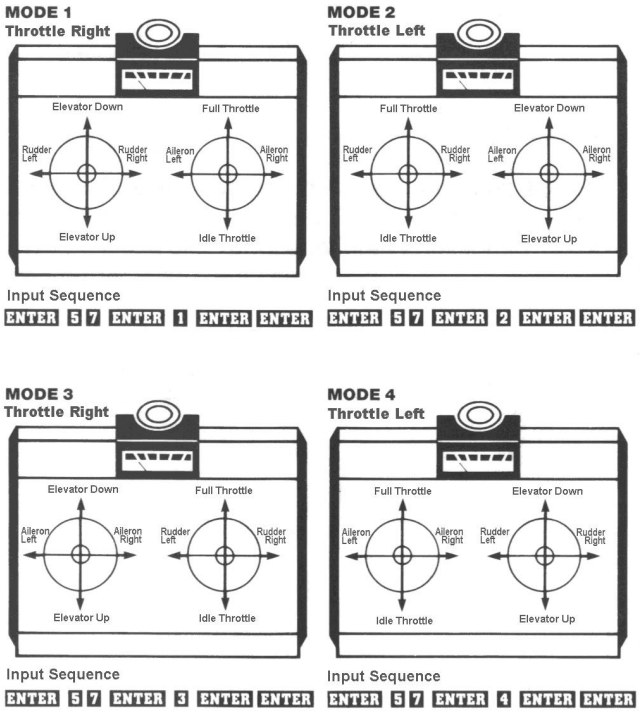
Code 57
Control Allocation

Allocation of Control Functions 1 – 4

m	c	-	1	8	E		M	O	D	E	L	1	
M	O	D	E		2								

Fundamentally there are four different modes for allocating the control functions ailerons, elevator, rudder and throttle to the two control sticks. Which of them is used depends on the individual preferences of the modeller.

The selection of the desired mode of operation is performed by selection of code 57 via keys 1…4. Changeover of the internal mechanical spring centring will be required when changing between even and odd mode numbers.



Code 58
Model Type

Selection of Model Type

m	c	-	1	8	E		M	O	D	E	L			1	
N	O	R	M	A	L	/	D	I	F	F					

The PROFI-ULTRASOFT-Module recognises a total of 9 different model types. The selection has to be performed when beginning to program a model, as it determines which codes may be called. A code number which is incompatible with the model type concerned, will be rejected by a message “INH (WRONG TYPE)”.

The following model types can be selected via buttons 1...9 on activation of code 58, with the selected type indicated in the lower line of the display.

Key	Display	Meaning
1	NORMAL	Conventional model
2	NORMAL/DIFF	Same as 1, but with 2 aileron servos and differential
3	DELTA/DIFF	Deltas and flying wings with aileron/elevator mix
4	UNIFLY/DIFF	Models with plain flaps operated by a single channel
5	QUADRO-FLAP	Same as 4, but flaps operated by 2 channels
6	F3B (3 wing sv)	F3B model with 3 wing-mounted servos (1 channel for flaps)
7	F3B (4 wing sv)	F3B model with 4 wing-mounted servos (2 channels for flaps)
8	Heli	Universal helicopter program including models with RPM control
9	Heli (sp.ctl)	Helicopter with RPM control only

When changing model type via code 58, you must be aware of the fact that some of the already programmed adjustments will be deleted and reset to their basic values, even if immediately switched back to the initial model type.

Code 32
Model Name

Entering Model Names

N	A	M	E	:										
D	I	S	C	U	S		3	3	0					

Due to the variety of model programs which can be stored in the transmitter at the same time, it will not be easy to remember the number of a model, the data of which have been stored in memory. For this reason the name of a model can be additionally stored. The relevant test, which must not exceed 11 symbols, is indicated in the multi-data terminals display.

On selecting code 32 the earlier input text will appear or, when programming for the first time, an empty line. Using the INC and DEC keys the letters of the alphabet and numbers 0 through 9 may be selected. Use of the TURN key permits switching from capital letters to lowercase. When the desired character appears it is accepted by pressing STORE and the next character can be selected. When finished, press the ENTER key.

Deletion of data input is performed by pressing the CLEAR key.

If analogue input is used, via a proportional rotary module connected to the AUX socket, for selection of the characters, special symbols will be available in additional to capital letters and numbers, for dressing up a names.

Code 18
Engine Idle Trim

Idle Trim Direction Forward/Backward/Off

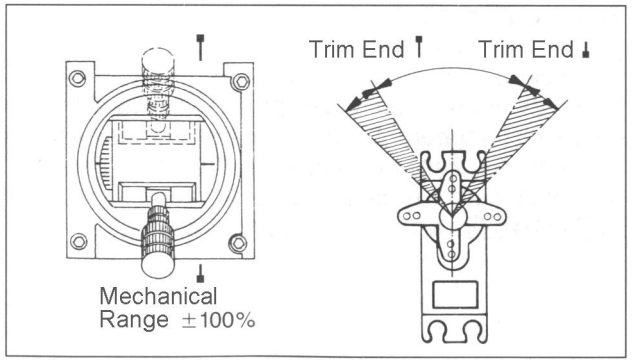
m	c	-	1	8	E		M	O	D	E	L		1	
I	D	L	E		R	.		T	R	I	M			

Idle trim is permanently allocated to control function 1 (throttle) and permits precision adjustments of idle RPM to be performed without affecting full throttle adjustments.

Code 18 enables the pilot to adapt idle trim to the direction of operation of the throttle stick he uses.

After calling the code, the direction of operation (push or pull) can be reversed by pressing the INC and DEC keys. The currently active adjustment is shown on the display in a stylised control stick which indicates idle stick position.

Idle trim can be switched to normal trim – bi-directional effect – by pressing the CLEAR key.



Code 23
Switch Function

Allocation of External Switches to Model Types 1 – 5

→	C	L	K		D	I	1		D	I	2		P	R	G
		N				9				9				N	

External switches installed and connected to plug stations 1 – 8 are allocated to specific functions via code 23. Some of these functions can be activated and de-activated in the process. Allocation can be performed either as per the mechanical mode of operation of the switch (open = OFF, closed = ON) or by pole reversal (open = ON, closed = OFF).

In addition to physically existing switches a logical “phantom switch” is available, designated numeral 9. By allocation of this switch one of the functions can be permanently switched on or off, respectively.

As any number of functions can be allocated to any of the switches, linkages can be realised. Without this mixers would have to be used, which remain available for other purposes.

Allocation and pole reversal of external switches

After calling code 23, the functions available for the active model will appear on the upper line of the display, with the allocated switches appearing on the line below. Numerals indicate the switches wired to the corresponding plug stations.

N means that the function in question is de-activated. Flashing numerals indicate that the switch concerned has been allocated with reverse polarity. The small arrow (upper line) indicates the function to which the switch can be allocated at the present time. It can be moved to the right or left by pressing the INC and DEC key, respectively.

As not all of the available functions can be shown at the same time on the display, the latter can be moved – window style – over the two lines, showing the allocations. When the arrow points to the outermost right function, the next function will appear in the display when the INC key is pressed. They can be scrolled left by pressing the DEC key. In this manner any of the functions can be displayed.

To allocate the selected functions press the CLEAR key. As a result a question mark symbol will appear on the lower line. To switch be may allocated by pressing keys 1…9. If the switch is to be reversed, the DEC key has to pressed first.

If a de-activatable, currently active function is selected, pressing the CLEAR key will first de-activate the function, pressing the CLEAR key a second time will display the question mark symbol.

The type and number of functions, to which switches can be allocated via code 23, depends on the activated model type (code 58).

Available functions for model types 1…5

CLK Stopwatch in standard mode, runs as long as switch is closed.

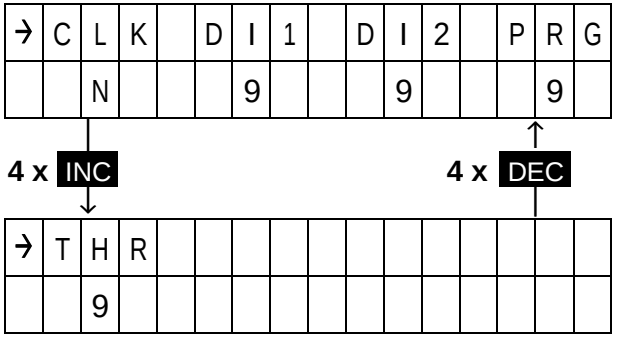
DI1 Differentiation switch 1 (see code 22)

DI2 Differentiation switch 2 (see code 22)

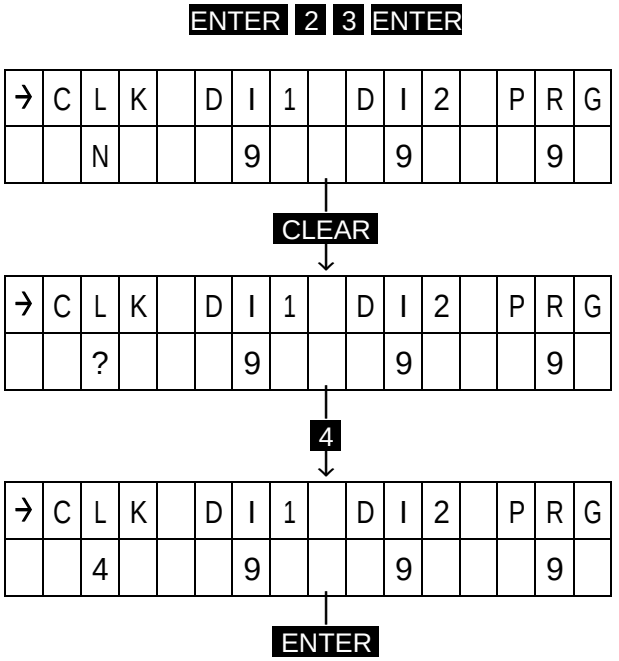
PRG Activation of automatic program (code 66)

THR Throttle reduction (code 17)

Using code 73 the switch position, number and direction of operation of the desired switch can be found quickly and reliably.



Selection of individual functions - Stopwatch



Code 37
Signal Generator Allocation

Allocation of Operating Elements Channels 5 – 9

P	O	R	T					5	6	7	8	9		
I	N	P	U	T				5	6	7	8	9		

In some cases, for individual models, it may be desirable to have certain operating elements, such as slider-type potentiometers or channel switches affect other function outputs than those to which they have been allocated by the internal connection.
Code 37 permits free choice of allocation of the operating elements to the function outlets without changing the internal connections. In addition it is possible to have one operating element affect several function outputs.

After selecting, the function inputs (operating elements) appear in the upper line of the display identified by the socket 5…9, and the output to which they have been allocated appears in the lower line. Signal generator 7 is, for example, the slider-type potentiometer is connected to plug station 7.

To allocate one of the function inputs to another operating element, select the function concerned by one of the keys … 9, whereupon a question mark symbol appears in the lower line below the selected function. Pressing key 5 … 9 allocates this function to the desired operating element, which may have also been allocated to another function, affecting both functions in that case.
Normal allocation will be restored by pressing the CLEAR key.

In the case that a signal generator action should be undesirable, in special case such as a dummy mixer, the signal generator concerned can be turned off via code 72.

Code 43
V-Tail

V-Tail Mixer

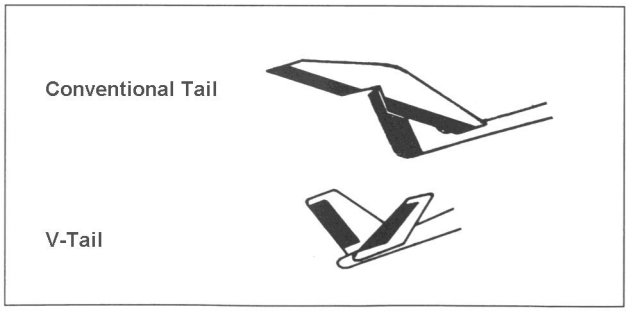
m	c	-	1	8	E		M	O	D	E	L			1
V	-	T	A	I	L		O	F	F					

With models fitted with a V-tail the functions of elevator and rudder are mixed in a such a manner that in the case of the elevator both control surfaces are moved up and down (in the same direction), but in opposite directions (one up, one down) the case of rudder. Unlike mechanical solutions where the elevator servo and the rudder servo actuate both surfaces via a suitable mechanical mixer, each control surface is operated by a separate servo. This solution provides the advantage that control of the V-tail is slop-free and accurate, and that in addition, higher control forces are available.

The V-tail mixer can be used for all types of models, naturally with the exception of helicopters (types 8 and 9) and Deltas and flying wing models (type 3) as in these case elevator function and aileron function are mixed anyway.

After calling code 43, the V-tail mixer can be turned on via the INC and DEC keys, and turned off by pressing CLEAR.

The elevator/rudder mix ration can be modified via the dual-rate adjustment, code 13.



Code 11
Servo Reverse

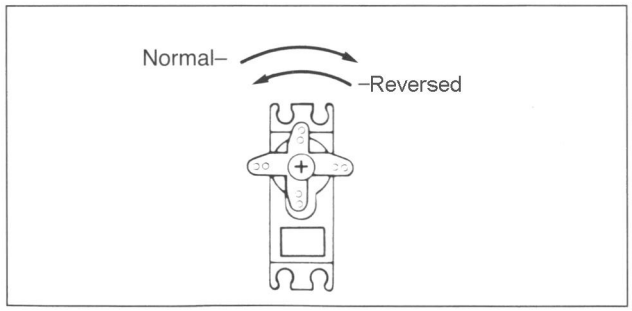
Reversing Direction of Servo Rotation

R	E	V	.	S	W			2	3		5			8	
		N	O	R	M		1			4		6	7		9

Code 11 permits changing the direction of rotation of servo to those required in a model, so the linkages etc., can be installed without paying attention to the initial direction of rotation of the servos in question.

After calling code 11, the direction of rotation of all servos will be simultaneously indicated on the display by their numbers 1…9 with the numbers appearing in the bottom line indicating normal rotation, and those appearing in the upper line indicating reversed rotation.

Important:
The numerals of the servo designation always refer to the receiver outlet to which the servo is connected. Any conformity with the numbering of the control function inputs of the transmitter would be purely coincidental. They won't occur normally because of the complex special programs of these hi-tech models. For that reason a change of allocation of control functions (code 57) won't affect the numbering and direction of rotation of the servos.



Code 15
Neutral Adjust

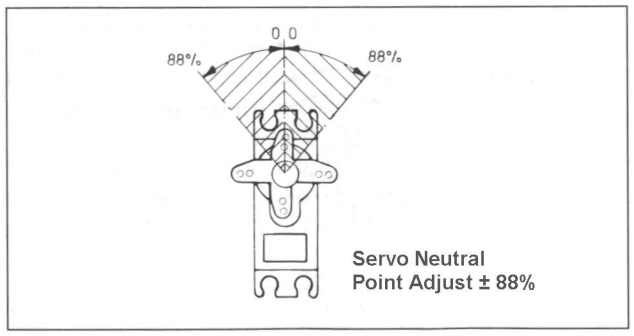
Adjusting the Servo Neutral Position

S	U	B		T	R	I	M								
p	u	s	h		c	h		k	e	y			1	-	9

For adjusting servos which do not comply to normal standards (servo neutral 1.5ms) and for extreme requirements, the neutral position can be adjusted within a range of ±88% of normal servo travel.

After calling the servo concerned via keys 1 …9, the servo neutral position can be adjusted with the INC and DEC keys; pressing CLEAR restores the initial normal neutral position.

This adjustment refers directly to the servo concerned and is independent of all other trim options.



Code 12
Servo Travel Adjust

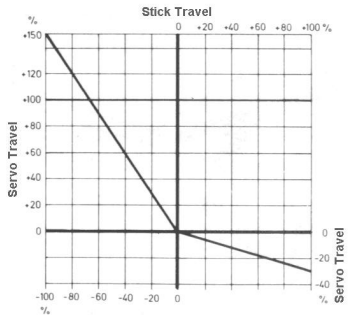
Adjusting Servo Travel

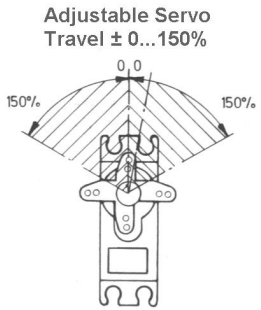
T	H	R	O	W		A	D	J	U	S	T				
p	u	s	h		c	h		k	e	y			1	-	9

Code 12 permits adjustment of servo travel for either side of motion independently. The range of adjustment is 0 – 150% of normal servo travel.

Important:
Unlike code 16, changing the signal generator, these adjustments refer directly to the servo concerned, independent of the source of the signal for the servo – be it control stick or any of the mixer functions.

After calling code 12 and input of the servo concerned using keys 1 …9, the travel of the selected servo will be indicated, with a prefix + or – indicating the side. For adjustment and display, the operating element (control stick, slider, rotary control or switch) has to be moved to the end station in question. The desired servo travel can then be adjusted with the INC and DEC keys, and may be reset to default travel (100%) by pressing CLEAR.





Code 19
Servo Travel Restrict

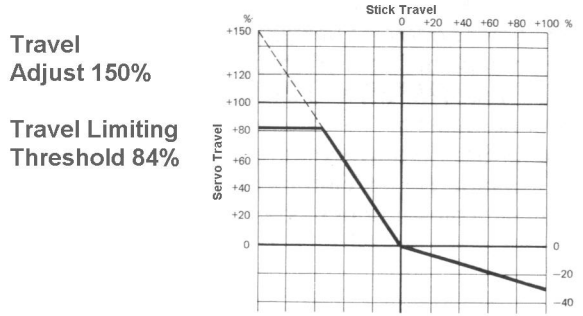
Limiting Servo Travel

T	H	R	O	W		L	I	M	I	T					
p	u	s	h		c	h		k	e	y			1	-	9

As a result of the cumulative action of mixers, the resulting deflection of servos may exceed the normal travel range. All Graupner servos feature a reserve of an additional 50% of the normal range. The transmitter restricts motion to 150% to prevent stalling the servos by mechanical constraints.

In certain cases it may prove advantageous to have servo travel limiting to become operative at a lesser servo travel, if for example, deflection is limited mechanically and the servo range normally used in flight must not be restricted unnecessarily, but unacceptably large travel might result from extreme combinations.

Code 19 permits adjusting the travel limiter threshold in 16 steps between 9 – 150% of normal control range, individually for each channel and each side of neutral. To this end, the desired channel has to be called first, by using keys 1 …9, followed by shifting the stick, slider, etc., to the desired end point. The travel limit can then be adjusted via the INC and DEC keys.



Code 79
Servo Slow Down
Slowing-Down Transit Time

S	L	O	W		D	O	W	N		O	F	F			
E	N	T	E	R		C	H		T	O		A	C	T	.

In some special cases, such as retracts, the normally fast transit time of a servo does not look right.

With code 79, the transit time of a servo connected to any of the channels may be slowed-down from 0.5s to 30s when moving from one end point to the opposite end point.

After activation of code 79, the desired channel has to be selected using keys 1 … 9.

Transit time is slowed down by the INC key, with steps being very small for short transit times and larger with longer ones. Below 1.5s the steps are so small that the display only changes after several steps. In all some 50 intermediate values are provided. Pressing the DEC key reduces the transit time and the CLEAR key cancels the deceleration completely.

This function is not compatible with retract servos such as G503 (order N° 3977) and C2003 (order N° 3890).

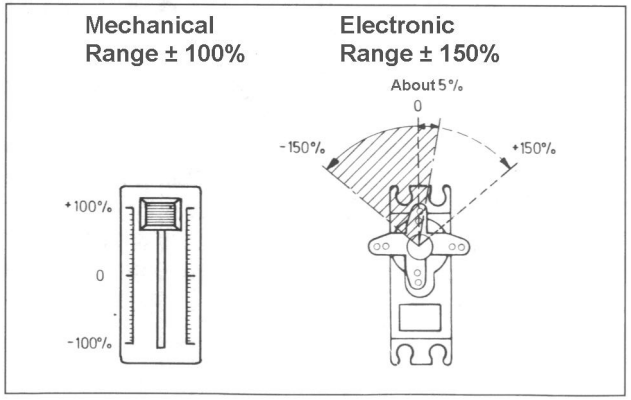
Code 16
Signal Generator Setting
Changing Control Travel

T	R	A	C	E		R	A	T	E					
p	u	s	h		c	h		k	e	y			6	-	8

Control travel resulting from actuating an operating element on function inputs 6 – 8 is adjusted by code 16.

The range of adjustments amounts to 0 – 150% of the normal range. Unlike code 12 (servo travel adjust), these adjustments refer to the operating element (slider, rotary control or switch) independent of the latter acting directly on a single servo or via a complex mixing and coupling function on several servos.

After calling code 16 and input of the function concerned via keys 6 … 8, the adjusted control range will be indicated with a prefix + or – indicating the side. For adjustment and display the operating element concerned has to be moved to the end point in question. The control range is then adjusted using the INC and DEC keys, or set to the normal (100%) via the CLEAR key.



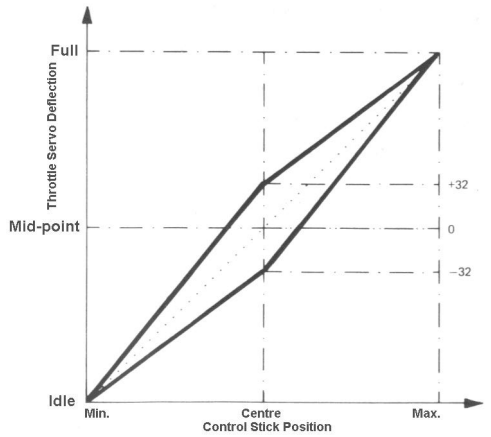
Code 31
Channel 1 Centre
Throttle/Spoiler Actuating Curve

T	H	R	/	B	R	K		M	I	D	P	N	T		
+		1	6	%											

Code 31 permits changing the characteristics of the servo connected to channel 1 (throttle/spoiler) at neutral position of the stick without affecting the end position.

This setting can be used to compensate for non-linear throttle response, or to intentionally obtain a non-linear function of the spoilers, for example.

After calling code 31 adjustment of servo travel is performed using the INC and DEC keys, while directional changes can be made via the TURN key.



Code 34
DR/EX Switch

Dual Rate / Exponential Switch Allocation

→	D	R		2	3	4			E	X		2	3	4	
S	W	I		9	9	9						9	9	9	

The switches for the dual-rate and exponential functions are allocated using code 34. In doing so it is possible to trigger several control functions simultaneously without using multi-function switches.

Due to the possibility of reversing switch functions via the DEC key, dual-rate and exponential can be coupled with ant other function switch.

Allocation and reversing of external switches

After calling the designations of the control functions will appear in the upper line of the display for dual-rate and exponential, with the allocated switches concerned in the lower line. The small arrow in the upper line indicates whether the allocation for dual-rate or exponential is being performed, and it's position can be changed using the INC and DEC keys.

Allocation of the switches is performed by pressing the key for the input function (2…4) followed by the switch number, if necessary pressing DEC first to reverse the switch polarity.

After all allocations have been made, press ENTER to store the settings.

Using code 73, switch position, the number and orientation of the switches can be found quickly and reliably.

Code 13
DUAL RATE

Adjustable Servo Throw Reduction

D	U	A	L		R	A	T	E						
p	u	s	h		c	h		k	e	y			2	-	4

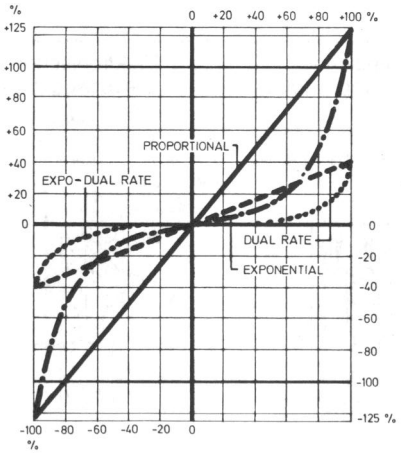
The dual-rate function permits in-flight switching of control characteristics, with the range of adjustment being variable between 0 – 125% of the normal range for each of the two switch positions. The switched must have been allocated beforehand using code 34.

Dual rate refers directly to the corresponding stick function, independent of whether it affects a single servo or, optionally via complex mixing and coupling functions, several ones.

After calling code 13 the desired control functions can be selected via keys 2…4:

- 2 = Ailerons
- 3 = Elevator
- 4 = Rudder

Adjustments of the control curve are performed using the INC and DEC keys after the switch has been moved to the appropriate position (P0/P1).



Code 14
EXPONENTIAL

Progressive Control Characteristics

E	X	P	O	N	E	N	T	I	A	L				
p	u	s	h		c	h		k	e	y			2	-	4

Exponential control permits obtaining sensitive control of a model near the neutral position of the function concerned, whilst maximum travel remains unaffected. The degree of progression can be adjusted from 0 to 100%, with 0 corresponding to normal linear travel.

The three control functions ailerons, elevator and rudder can be switched from linear to progressive control using switches, which have been allocated by code 34 beforehand, or from one progressive adjustment to another progressive one.

These adjustments refer directly to the corresponding stick function, no matter whether it affects a single servo or, optionally via complex mixing and coupling functions, several ones.

After calling code 14 the desired control functions can be selected via keys 2…4:

- 2 = Ailerons
- 3 = Elevator
- 4 = Rudder

Adjustments of the control curve are performed using the INC and DEC keys after the switch has been moved to the appropriate position. (P0/P1)

In some cases linking the two functions of dual-rate and exponential may make sense. This is achieved by using the same switch when allocating the dual-rate and exponential switches using code 34.

Code 35
Trim Reduction

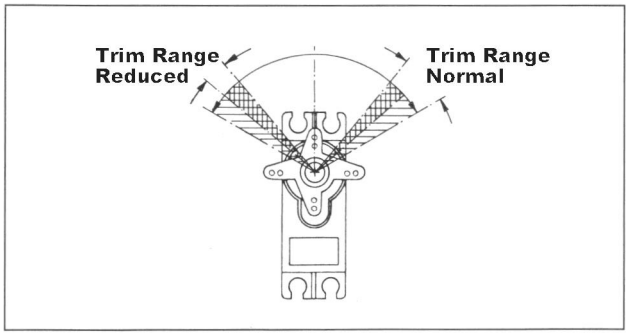
Reducing Trim Range

T	R	I	M		N	O	R	M	.		1			4	
T	R	I	M		R	E	D	.				2	3		

When using dual-ate and/or exponential, trim may in some cases, not appear sensitive enough because of the ratchet steps. Code 35 permits reducing the trim action tom 50% independently for each control function.

After calling code 35, the display will indicate the control functions using normal trim in the upper line, and reduced trim in the lower line. Using keys 1…4 permits switching the functions between the two options.

- 1 = Throttle
- 2 = Ailerons
- 3 = Elevator
- 4 = Rudder



Code 59
Trim Data Memory

Storing Trim Data

T	R	I	M		O	F	F	S	E	T				
S	T	O	R	E		o	r		C	L	E	A	R	

Code 59 is used for storing actual trim data. It can be used in addition to display trim data stored in the memory. After calling the display will show the following message.

T	R	I	M		O	F	F	S	E	T				
S	T	O	R	E		o	r		C	L	E	A	R	

From here, branching occurs to the functions of “Trim Storage” or “Display of Stored Trim Data”.

a) Trim Storage

To store actual trim data, press the STORE key. As a result, the display will show

S	E	T		T	R	I	M		&		E	N	T	E	R
+	1	6		-	0	7		+	0	9		-	1	3	

↑ Throttle ↑ Aileron ↑ Elevator ↑ Rudder

with the lower line indicating the positions of the trim levers as a deviation from the neutral position. With the aid of the display the trim levers are then shifted to the neutral position, a step which does not change the trim positions of the model. By pressing the ENTER trim data storage process is terminated and the previous in-flight established tri data now corresponds to the mechanical neutral setting of the trim levers.

Important:
In normal cases the trim lever for idle trim should not be changed, as the indicated value does not represent a value which has been established in flight, but a random value for the idle trim position. If a larger deviation from normal value has been stored for function 1 (throttle), this will lead to malfunction of the idle trim. When in doubt the stored trim data for function 1 should be displayed and, if necessary, deleted as described below.

b) Display of trim data memory

If the CLEAR key is pressed instead of the ENTER key the stored trim data of each function can be displayed now using keys 1…4 and if necessary deleted (returned to 0) by pressing the CLEAR key. The trim values are:

- 1 = Throttle
- 2 = Ailerons
- 3 = Elevator
- 4 = Rudder

The deletion of trim memories should preferably be performed for all of the functions prior to entering the data for a new model, so the same range will be available for storing trim data in any direction when test-flying that model.

Code 94
Copying

Model Copying Functions

C	O	P	Y		:	F	R	O	M		M	O	D	E	L
K	E	Y		1	-	7		O	R		+	/	-		

Code 94 permits copying model data form one model to another one, and also via an external interface of a transmitter to another mc-18 transmitter.

With the aid of a separately available PC adapter, order N° 8181, it is also possible to transfer either individual model adjustments data or the complete contents of the memory of the transmitter (all models) into a personal computer compatible with industrial standards via the serial interface of the latter, saving it there on a disk for possible re-transfer to the transmitter (or some other transmitter).

A special cable, order N° 4180, will be required for the transfer to another mc-18 transmitter, which has to be plugged into the connection socket for the PROFITRIM module of both transmitters.

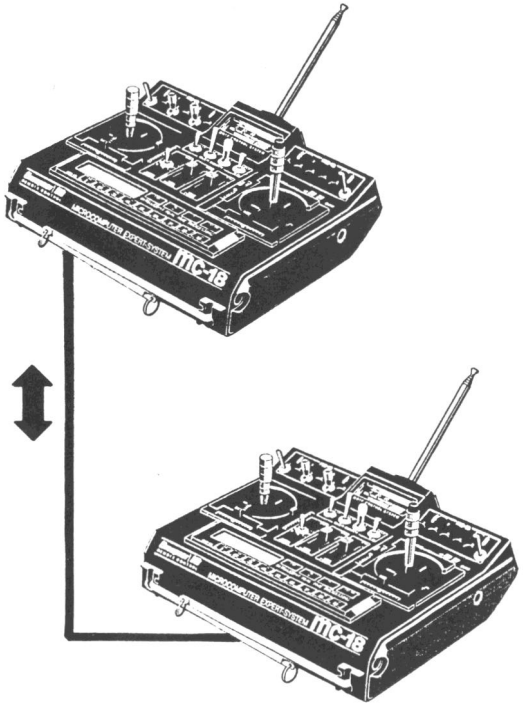
After activation of code 94, the transmitter expects the input of the model memory of which a copy is to be produced. This is achieved either by input of the model number or by skimming through the list of models using the INC and DEC keys. The selection is then made by pressing the ENTER key. Then the model memory, into which the copy is to be produced, is selected in the same manner. The copying process is triggered by pressing the ENTER key, with all previously stored data being transferred to the model memory, into which the data is copied. If the name of the model the data of which is being copied has been entered, this name will also be transferred to the copy, but with a + symbol added to the last letter of the name to distinguish it from the original.

For safety's sake, model memories that are active at the moment must not be copied!

When copying from one transmitter to another, or to a personal computer, selection is performed by keys INC and DEC, with "external interface" for source at the receiving transmitter, and as target for the sending transmitter. In addition, the "all-models memory" option is available, which permits transferring all model memories simultaneously. In that case, the options of both units have to be set accordingly. The transfer process should be initiated by the receiving unit via the ENTER key, followed by the sending one.

Copying between two mc-18 transmitters

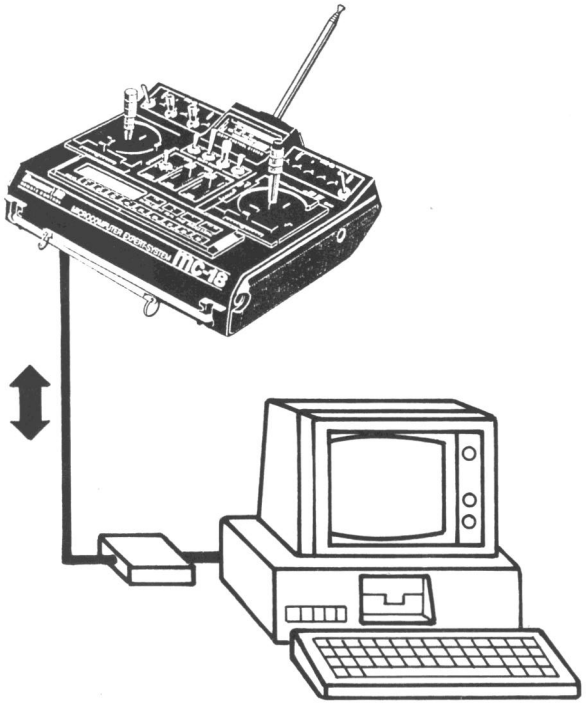
Using the programming interface mc-18/mc-18 (order N° 4180) single model and all models memories can be copied between two mc-18 transmitters. For example, please refer to pages 54/55.



In the case of transmitters with the extended memory (for 30 models), on deletion (code 56) and when copying (code 94) a back-up copy of that memory will be made onto which the copy is transferred or which is being deleted. This permits reversing accidental deletion or overwriting of model adjustments, this back-up copy being copied onto a normal memory station. Just call code 94 as usual and input "from model" memory station 31. For copying examples between two mc-18 transmitters refer to pages 54/55.

Data Exchange to and from Personal Computers

Precise instructions are given in the disk included in the programming interface mc-18/PC (order N° 4181).



Code 22
Differential

Aileron Differential in Type 2 – 7 Models

m	c	-	1	8	E		M	O	D	E	L			1	
A	I	L	E		D	I	F		0			N	O	R	M

Differentiation of ailerons serves to correct an undesirable effect called “adverse yaw”. With equal throws on ailerons the drag of the lowered aileron is higher than the drag created by the raised one. The resulting moment about the vertical axis acts in opposite direction to the planned direction of flight. If a model tries to turn to starboard (right) under the action of the ailerons, higher drag is generated on the port (left) side, causing the model to bank to starboard, yet yawing left about the vertical axis at the same time. This effect which us much more apparent with sailplanes, with their high aspect ratio wings and resulting longer lever arms as compare to power models, normally has to be compensated for by simultaneous deflection of rudder, which increases drag still more and impairs flight performance.

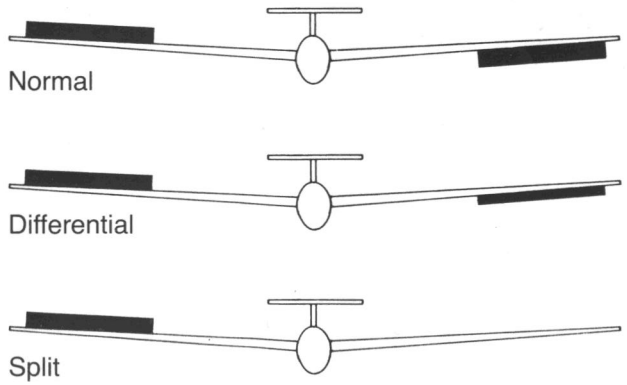
In the case of differential ailerons the downward movement of an aileron is less than the upward movement of the opposing aileron. This results in the drag being equal on both sides and in the cancellation of the negative jawing moment.

Mechanical solutions usually require permanent adjustments to be made during the assembly of the model, and in the case of high differential ratios may well introduce slop into the control system.. Electronic differential offers great advantages; each of the ailerons is operated by a separate servo, permitting the ailerons servo to be installed in the wing, ensuring slop free and reproducible adjustments even with 2 piece wings.

The ratio of differential can be adjusted as required via the downward deflection without affecting upward deflection permitting complete suppression of downward motion (Split) in extreme cases. In this manner, one can not only cancel the negative yawing motion moment, but even generate a positive one. In this latter case, operation of the ailerons will make the model yaw towards the direction of turn, permitting even large sailplanes to perform smooth turns on ailerons alone, which would not be possible otherwise.

The PROFI-ULTRASOFT-Module permits storing three different differential ratios which can be called up via allocated switches via code 23. Use of a external differential switch, order N° 4160/22, with three positions is recommended. This permits switching between the three differential values, e.g. switch position 0 = 20% differential used for aerobatics to allow precision rolls, switch position 1 = 50% for assisting the model during thermalling, and finally switch position 2 = 100% (split) for performing turns on ailerons alone at the slope.

After input of code 22, the number of the differential memory (0 – 2) and the stored value in % will appear in the lower line of the display, with 0% representing the standard installation (no differential) and 100% the split function. After changing the switch position into the required position, the desired value can be set via the INC and DEC keys. Resetting to the normal setting (0%) is performed by pressing the CLEAR key.



Code 17
Throttle Reduction

Switchable, Single-Sided Throttle Throw Reduction

R	E	D	U	C	E	D		T	H	R	O	T	T	L	E
F	U	L	L	⏚		V	A	L	U	E		1	0	0	%

Code 17 permits programming a reduction of the carburettor control range, switchable by an external switch allocated by code 23. The effects corresponds to a dual rate function for channel 1, the neutral point of which is not located at the stick neutral, but at one of the end points. This options permits the avoidance of exceeding a critical carburettor opening when the throttle stick is in the full throttle position or falling below a set carburettor opening, although the stick is on the lower stop.

After calling code 17, the lower line of the display will either show the word OFF, indicating that the switch allocated by code 23 is in the OFF position, or if the switch is in the ON position, it will show the adjusted value. The stylised stick right of “FULL” indicates that position of the throttle stick, where throttle reduction is to become effective. It can be reversed by pressing the TURN key. Servo throw can be adjusted in that direction via the INC and DEC keys, in % of normal throw. The end position of the throttle servo at the opposite end remains unchanged.

Code 66
Automatic Program

Automatic Flight Manoeuvre for Type 1 – 5 Models

P	R	O	G	R	A	M		-		A	U	T	O	M	.
P	R	O	G	R	A	M		3		O	F	F			

Prior to programming a switch has to be allocated by code 23. After its activation, channel 1 – 4 data for four different aerobatic manoeuvres (frequently Barrel Rolls, Snap Rolls) can be programmed and called via button while the letter is pressed down and hold. Programmed mix functions, if any, having their inlets at one of channels 1 – 4 will react as if the stick concerned had been moved to the programmed position. Channel trim remains effective in the normal manner, even when activated programmed position.

Selection of stored manoeuvres is performed via two switches wired to connections A and B as follows:

Switch A	Switch B	Manoeuvre
ON	ON	0
OFF	ON	1
ON	OFF	2
OFF	OFF	3

Activation of a selected manoeuvre is performed by an intermediate switch (order No. 4160/11) wired to connection C, or via a momentary button.

As a precaution against accidental activation of a manoeuvre, a switch can be allocated by code 23, preferably a locking safety switch (order No. 4147/1). This safeguarding measure can be dispensed with though if this function remains permanently activated by the setting in code 23.

On calling code 66, “INH” will appear on the lower line of the display if no switch has been allocated by code 23, or the allocated switch has not been turned on.

If the button at position C has not been pressed, the display will read:

P	R	O	G	R	A	M		-		A	U	T	O	M	.
P	R	O	G	R	A	M		N		O	F	F			

Symbol ‘n’ indicates manoeuvre 0 – 3, which has been selected by switches A + B.

If button C is pressed, the display will read

→	1	:	+			0	%		2	:	+			0	%
	3	:	+			0	%		4	:	+			0	%

In each case the arrow indicates that control function the setting of which can be changed. The selection is performed with keys 1…4. Keys INC and DEC permit adjustment of the magnitude of control surface deflection, while key 7 reverses the direction of deflection. Using key 8 the selected control can be set to follow the relevant control stick, while the other servos occupy their programmed positions. In this case the display will read “VAR” instead of a percentage value.

Code 63
Channel 1 Switch

Automatic Channel 1 Dependent Switch (Throttle/Spoiler)

C	H	1	-	S	W	I	T	C	H	=	?			

For special functions it is desirable not to perform switching by an external switch, but automatically via the channel 1 stick (throttle and spoiler), whereby exceeding a critical stick position provides switch position ON, while falling below provides switch position 0, or vice versa.

The threshold point can be placed anywhere along the stick travel and the modeller can decide whether the upper or lower portion is to activate switch position to the ON state. The automatic switch is allocated to one of the external switch connectors (1…8) whereby it is unrestrictedly included into the free programmability of the external switches via codes 23, 33 and 34.

If a normal switch is also wired to this connection, the two switches (e.g. the external switch and the automatic one) will be wired in parallel. With reversal of polarity being possible with either type of switch, logical links between the two of them can be realised.

“AND“ Link
Both switches must be closed so the connected function(s) can be performed.

“OR” Link
The connected function(s) is (are) performed when either switch is closed.

As a result the external switch may be used to perform automatic switch over by the stick. By including the automatic switch into a free allocation of external switch any combination of functions can be switched in dependency of the control stick position. So, by turning on the correspondingly programmed misers, flaps can be lowered when throttling the engine and the elevator re-trimmed (Auto-Landing), or dual-rates may be switched to increase control surface throw in the landing approach at reduced speed. Pilots of electric flight models can turn the timer on and off via the automatic switch for checking motor run synchronously with the main drive motor.

Programming:

After calling, via code 63, the transmitter, as in the above display, indicates it is waiting for the input of the external switch connection (1…8), to which the automatic switch is to be allocated. After the connection number (e.g. “6”) has been input the display will read like:

C	H	1	-	S	W	I	T	C	H	=	6				
	=			C	H	1	S	=			P	6	=		

Here the interaction of the automatic switch and a possibly connected external switch is shown. The stylised control stick at the left of the lower line indicates the direction of deflection of the throttle/spoiler stick with the switch in the open position. Direction can be reversed by hitting the TURN key.

The switch state (open or closed) of the channel 1 switch is indicated in the centre of the lower line. By moving the stick the function can be checked and the threshold point be adjusted. To do this the stick is moved to the position at which switching is to occur, then press the STORE key.

The right end of the lower line displays the switch state of a switch wired to its allocated external switch connection.

The interaction of the external switch and automatic channel 1 switch is displayed at the right end of the upper line of the display.

The allocation of the channel 1 switch is cancelled by pressing the CLEAR key.

Code 51, 33, 61 and 71
Free Program Mixer

Programming Mixers and Dummy Mixers

In addition to the available mix and coupling functions, all model programs provide a number of freely programmable mixers. In the case of type 1 - 3 models nine mixers are at the disposal of the user, types 4 and 5 have four mixers available, for F3B types 6 and 7 a total of seven, and for the helicopter types 8 and 9 there are four mixers available.

The mixers link an input signal to an outlet signal, with allocation performed by code 51. As any optional control function can be fed as an inlet signal, the outlet signal affects any desired control channel, not a control function. Distinguishing between these two terms is of utmost importance. Control function refers to the outlet signal of an operating element, that is a stick with or without trim, slider, rotary control or a channel switch, which in the course of the ensuing action passes through all the mix and coupling functions of the model program. A control channel is the outlet signal for a specific receiver connection, which until it arrives at the servo can only be affected by throw adjust, neutral point adjust, throw reduction or control surface reversing.

Mixers may also be switched in series for special applications, which is say that in addition to the control function proper all other preceding mixers can also be used as inlet functions. All F3B mixers (see F3B programs) and all freely programmable mixers with a lower number are considered as preceding mixers.

To give you an idea, imagine that instead of a control function (see above) the outlet signal of a control channel is used as the input function of the mixer before it passes through throw adjust, neutral point adjust, throw reduction or servo reversing.

Each of the freely programmable mixers can be turned on and off by one of the switches allocated using code 33.

Vital parameters of the mixers are the mix quotas which determine how strongly the inlet signal affects the control channel wired to the outlet of the mixer. They also set the direction of the mixed signal and the neutral point of the mixer, that is the point on the control characteristic curve of the inlet signal where the mixer does not affect the control channel wired to the outlet (normally this will be the neutral point of the control stick).

In the case of freely programmable mixers, these parameters can be adjusted over a wide range. The neutral point can be shifted to any desired point of the control throw of the operating element wired to the inlet (the distance from neutral point is called the OFFSET). The mixing ratios can also be adjusted in both directions above and below the neutral point, either in symmetrical (code 61) or asymmetrical (code 71) fashion. The mix direction can also be set for both sides using codes 61 and 71 by setting the values as + or -.

As a single control function can serve as inlet for an optional number of mixers, and any number of mixers may affect a control channel, the freely programmable mixers permit achievement of special, highly complex, applications.

DUMMY Mixer:
A so called dummy function may also be allocated as an inlet signal, that is a control function that is not available as a true operating element, but provides a consistent control signal. In this manner it is possible to make use of a control channel as an operating element by allocating a dummy mixer and having the outlet of the mixer affect the channel concerned. Throw of the switch is then adjusted by the mix quota and mix direction of the dummy mixer. A dummy mixer also permits mixing an additional constant trim signal dependent on a switch allocated by code 33.

Practical Example of a Dummy Mixer

An external switch is wired to socket 1, switches a servo connected to receiver output 8,for example operating a glider tug release device.

Programming Sequence:

1. Reset mixer from 0 to 8 via code 51. Inlet function 0 is obtained by pressing the INC key.
2. Input mix quota and direction via codes 61 and 71.
3. Allocate external switch to socket 1 via code 33.