

1. Channel Allocation (Code 51)

To program a mixer first call code 51, via which the channels to be linked are determined.

On the display then appears "MIX ?", asking the operator to input the number of the mixer to be used. After the number has been input, the display changes to:

M	I	X	1														
I	N	H															

With INH meaning Inhibited.

This indicates that the mixer is not yet active, otherwise the numbers of the already allocated control channels will be displayed instead of INH.

Start by entering the control functions by keys **1...9**, which are to act as input signal of the mixer. If the dummy mixer indicated by "0" is to be used press **INC**, or if the preceding mixer is to be used as the input press the **DEC** key before the input function number, which will be indicated by an arrow in front of the input channel. Then input the control channel (=servo output) into which the signal will be mixed.

M	I	X	1														
	4	→	8		T	R	I	M		Q	F	F					

If, as in the example above, the input is one of the control functions 1 – 4, it can be decided whether trim is also to affect the mixer input or not. Pressing the **INC** or **DEC** key will enable the trim, whilst pressing the **CLEAR** key will disable it.

M	I	X	1														
	4	→	8		T	R	I	M		Q	N						

Channel allocation of the mixers is confirmed by the **ENTER** key. Programming can be continued by entering the next mixer number, or terminated by pressing the **ENTER** key again.

2. Allocation and Polarity Reversal of External Switches (Code 33)

A switch which allows the mixer to be turned on and off is allocated to the mixer by code 33.

M	I	X	E	R		1	2	3	4								
S	W	I	T	C	H	9	9	9	9								

The upper line indicates the mixer numbers, with the allocated switches shown on the bottom line. Switches are allocated by entering the number of the mixer, whereupon a "?" appears in the lower line, and then entering the desired switch number, the polarity of which can be reversed by pressing the **DEC** key first. The phantom switch "9" can be used, in which case the mixer remains permanently on (basic setting of all mixers). When in doubt, switch number and switch position can be established quickly and reliably using code 73.

3. Adjusting the Symmetrical Mix Quota (Code 61)

If a symmetrical (common) mixer (in relation to the neutral point) is required, the mix quota and direction is set using code 61.

M	I	X	1		C	O	M		4	→	8		w	/			
o	f	s			o		-	S		+	3	2	%				

Mix quota is adjusted using the **INC** and **DEC** keys, the process can be speeded up by pressing the **6** or **8** key, which increases or decreases the value in steps of 10 respectively. The direction of mixing is determined by the + or – prefix to the mix quota, and can be changed by pressing the **TURN** key.

To alter the neutral point of the mixer, shift the corresponding operating element (stick, etc.) into the required position and press the **STORE** key. The offset from the normal neutral point captured in this way is transferred to the display.

Adjustment is confirmed by pressing the **ENTER** key. Afterwards, further mixes can be adjusted by entering their number, or the adjustment process terminated by pressing the **ENTER** key again.

4. Adjusting the Symmetrical Mix Quota (Code 71)

Code 71 permits adjusting separate mix quota and mix directions for the two sides of the control function at the mixer inlet.

M	I	X	1		S	E	P		4	→	8		w	/			
o	f	s			o		-	S		+	2	8	%				

The setting of the mix quota is performed in the same way as for code 61 using the **6**, **8**, **INC** and **DEC** keys. In this case the operating element has to be set to the side requiring adjustment (displayed with the prefix + or – ahead of "s"). The direction of mixing can be adjusted separately for either side using the **TURN** key. Neutral point offset is achieved by moving the operating element of the control function to the required position and capturing the value using the **STORE** key.

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
+	2	2		-	0	2		+	0	2		-	1	5	
	↑			↑				↑				↑			
	Idle			Roll				Pitch				Tail Rotor			

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 trim 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** = Idle Trim
- 2** = Roll
- 3** = Pitch
- 4** = Tail Rotor

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 77

Copying

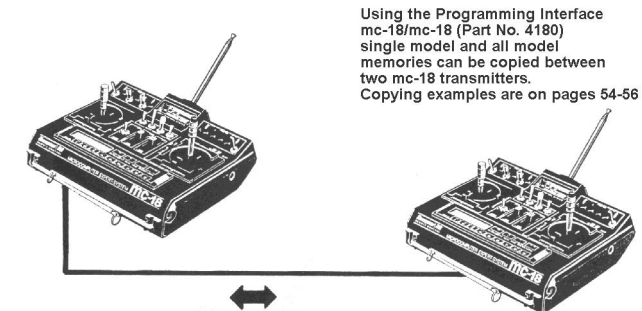
Model Copying Functions

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.



Code 74 Servo Position

Display of Servo Position

S	E	R	V	O		P	O	S	.						
p	u	s	h			c	h			k	e	y	1	-	10

The actual position of each servo can be shown exactly with the aid of code 74. In this manner, the interaction of different mixers on a specific servo can be determined with accuracy, and the operation of throw reduction can be controlled. Battery fail-safe (code 78) can also be checked.

For the simulation of battery fail-safe position relying on the menu. The operating element for channel 1 or channel 8 is adjusted to the percentage value set using code 78, and the control surface throw checked at the servo after calling code 74.

After calling the request for the selection of the control channel to be checked will appear in the display. To select the channel, use keys **1**...**9** and **INC** (for channel 10). After entering the channel number, the lower line of the display will indicate after the channel number, the exact servo position within a range of $\pm 150\%$ of the servo throw in either direction, with 0% corresponding to the neutral position. Using keys **1**...**9** and **INC**, other control channels can be displayed. To terminate the display of servo position, press the **ENTER** key.

Code 76 Servo Test

Testing Servos 1 – 9

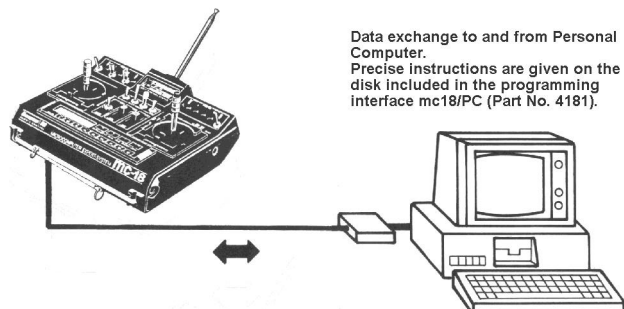
m	c	-	1	8	E		M	O	D	E	L			1
E	N	T	E	R	=	S	E	R	V	O	T	E	S	T

To check all servos for proper function, check them one after another by executing full deflections in both directions, starting from the neutral position. After calling code 76, the test program will be executed in an endless loop until interrupted by pressing the **ENTER** key. In this way, the receiver can be checked over a longer period.

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 reason, 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.

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.



Code 73

Switch Position

Display of Switch Positions

S	w	i	t	c	h		1	2	3	4	5	6	7	8	9
							⌵	⌵	⌵	⌵	⌵	⌵	⌵	⌵	⌵

For checking the installation of switches and their connections to plug stations 1...8, the switch positions of all external switched are indicated by code 73, with an automatic channel 1 switch, possibly programmed by code 63, being taken into account.

The display always refers to the actual mechanical switch position of the switch concerned, independent of its having possible been reversed by code 23, 33, or 34.

Please Note:

In the case of mixers a closed switch will normally turn off the mixer concerned, not on!

Code 77

FAIL SAFE

Programming the Fail Safe

m	c	-	1	8	E		M	O	D	E	L			1	
F	A	I	L		S	A	F	E		H	O	L	D		

This is possible only in PCM mode with mc-18 receivers.

The inherently higher operational reliability of Pulse Code Modulation (PCM) as compared to the simpler Pulse Position Modulation (PPM) results from the ability of the micro-processor installed in the receiver to recognise when a received signal has been corrupted or stopped by outside interference.

In such cases, the receiver automatically replaces the false signal with the last correctly received one stored in the receiver. In this manner interference of short duration will be eliminated.

In the case of longer lasting disturbance of the transmissions, the operator may choose between two options:

1. HOLD

The servos hold that position which corresponds to the last correctly received signal, until the receiver manages to receive a new intact signal again.

2. FAILSAFE

The servos move a pre-set position until an acceptable signal is again received by the receiver. The delay, determining the time from loss of signal to the triggering of the fail-safe program, can be adjusted in three steps (1.0s, 0.5s and 0.25s), to allow for different model speeds.

After calling code 77, switching can be performed by the **INC** key between HOLD, FS 1.0s, FS 0.5s and FS 0.25s. To record the positions for the servos the control functions have to be moved to the required positions at the transmitter, then press the **STORE** key. This step stores the current adjustments as the fail-safe settings, which are transferred at regular intervals to the receiver. The receiver stores these fail-safe values for use in the case of signal loss.

Fail-safe adjustments can be overwritten at any time, even in flight, by calling code 77 and changing the current transmitter fail-safe data by pressing the **STORE** key.

Code 78 FAIL SAFE Bat

Activating Battery Fail-Safe

m	c	-	1	8	E		M	O	D	E	L			1
B	A	T	T		F	.	S	.		O	F	F		

The automatic battery fail-safe serves to warn the pilot of dropping receiver battery voltage and to give him a chance to avoid an impending crash caused by depleted receiver batteries.

As soon as the voltage at the receiver battery drops below a predetermined value, a servo permanently allocated to the battery fail-safe function and acting as an indicator of the imminent depletion of the receiver power supply will be actuated. In the case of a fixed-wing model program, this will be the servo wired to channel 1 (throttle). For helicopter programs it will be channel 8, which could for example be used for switching on the lights, etc.

For the position, to which the servo will be shifted, three different values may be programmed:

- +75% Three-quarter deflection in one direction
- 0% Servo neutral position
- 75% Three-quarter deflection in the opposite direction

When checking adjustments, the servo position display (code 74) will prove helpful.

The fail-safe display can be cleared again by actuating the operating element concerned for a moment (e.g. throttle stick for fixed-wing) and the servo can then be controlled in the normal manner. A model should be landed straight away after the battery fail-safe has been indicated. After code 78 has been called the display will read "BATT F.S. OFF". Pressing the **INC** key activates the battery fail-safe and permits selecting the display position of the servo in sequential order -75%, 0%, +75%, OFF. Pressing clear will switch off the battery fail-safe immediately.

ALARM TIMER and Stopwatch

The PROFI-ULTRASOFT-Module offers two stopwatch functions.

3. Stopwatch with normal display (hours, minutes and seconds).
4. Timer alert, with seconds display.

One of these options can be selected for each model program.

A stopwatch, once programmed, will appear on the lower line of the display each time the transmitter is turned on, it does not need to be called over and over again. Once triggered the stopwatch will continue to run even when inputs are made during its operation via the keyboard.

Stopwatch with normal display.

The stopwatch with normal display may be programmed by allocating a switch to function "CLK" using code 23. A prerequisite is that the alarm timer (code 97) is not activated. The clock will then run as long as the allocated switch is closed. Using the **CLEAR** key it can be reset to 0.00.00 when not running (if running the transmitter switches to list of codes mode of operation). By this programmable switch allocation, the stopwatch function may be coupled with the tow hook, permitting the exact duration of flight (starting from release of the tow-line) to be recorded.

Code 97 Stopwatch

Stopwatch

T	I	M	E	R		6	0	0	s	e	c		←	
A	L	A	R	M		3	0	s	e	c				

After calling code 97, the message "TIMER OFF" will appear on the display. The timer is activated by the **INC** or **DEC** key, whereby the stopwatch, possibly programmed by code 23, will be turned off. The alarm timer can be deactivated by the **CLEAR** key. Timer run can be adjusted on the upper line of the display in 10 second increments using the **INC** and **DEC** keys. In the lower line a point of time can be set when, prior to the expiration of the return time, an acoustic signal alerts the flyer. The arrow at the right hand end of the display indicates which time can currently be adjusted, and is moved by pressing the **TURN** key.

After the set time has run down to 0, it is indicated by a longer acoustic signal. The timer continues to run, so that the time beyond 0 can be read.

Start/Stop instructions can be given by keys **2** and **3** respectively, or via an intermediate switch (order No. 4160/11) connected to plug station CLK, or a kick button (order No. 4144).

If a switch for the timer has been allocated by code 23, operation of the alarm timer will be performed exclusively by that switch.

Acoustic Signal Sequence:

- 100s before zero: every 5 seconds
- 20s before zero: every 2 seconds
- 10s before zero: every second
- 0s Extended Signal

A + symbol on the display indicates that the time shown is that beyond zero. The maximum timer capacity is 900 seconds beyond zero.

Code 98 Operating Timer

Transmitter Operating Timer

m	c	-	1	8	E	M	O	D	E	L			1	
I	N	T	E	G	.	T	4	:	2	7	:	5	4	

The operating timer displays the time the transmitter has been switched on and monitors the transmitter power supply.

After the batteries have been charged, code 98 should therefore be called and indicated time reset to 0 by pressing the **CLEAR** key.

The operating time is then measured whilst the transmitter power switch is on. This permits the cumulative operating time to be displayed at any moment by calling code 98.

Code 88 Input Lock

Code Lock for Keyboard Input

K	E	Y	B	O	A	R	D	L	O	C	K			
p	u	s	h		k	e	y	1	-	9				

The input lock prevents changes of transmitter settings by unauthorised persons or accidental pressing of the input keys. The lock does not prevent unimpaired use of the transmitter when flying models using the elements activated, but no inputs will be possible via the keyboard, hence a change of models is not possible.

Activation of the keyboard lock is performed using code 88 and entering an optional 3 figure combination using keys **1**..**9**, followed by the **ENTER** key.

The lock becomes effective by turning the transmitter off and on again. After pressing the **ENTER** key, the request "push key word" appears. Only after entering the correct combination of numbers will the lock be released. The lock remains released until the transmitter is turned off, after which it will be active and it has to be unlocked again.

The combination of numbers can be changed at any time, after releasing the lock, by calling code 88 again and entering the new combination.

To clear the input lock completely, the **CLEAR** key has to be pressed instead of entering a combination. The input has to be terminated by pressing the **ENTER** key.

Please ensure you remember the combination you set, or you will have to return the transmitter to Graupner Service for decoding.

Code 99 Transmitter Lock

Numerical Transmitter Lock

A	L	L		C	L	O	S	E						
p	u	s	h		k	e	y	1	-	9				

As a precaution against theft an electronic transmitter lock can be enabled using code 99. It prevents the putting the transmitter into operation unless the correct combination of figures is input after turning the transmitter on.

Activation of the transmitter lock is achieved by calling code 99 and entering an optional 3 figure combination using keys **1**..**9**, followed by the **ENTER** key.

The lock becomes effective after the transmitter has been turned off. On activation of the transmitter, the request "push key word" will be displayed and it is only after entering the correct combination of digits that the lock will be released, permitting the transmitter to be used. The keyboard, however, remains locked as in the case of code 88. After pressing the **ENTER** key, the request "push key word" appears again and the correct combination must be entered to obtain access to the settings.

The lock remains released until the transmitter is turned off, after which it will be active and it has to be unlocked again.

In the case where the combination entered for the input lock (code 88) differs from the combination of the transmitter lock (code 99), the combination of numbers for code 99 will also apply to the input lock and replace the figures previously entered into code 88.

Helicopters with Speed Control

(Model Type 9)

When the lock has been released the combination of digits can be changed at any time by calling code 99 and entering a new combination. To remove the lock completely instead of entering a new combination, the **CLEAR** key has to be pressed instead of entering a combination. The input has to be terminated by pressing the **ENTER** key.

For safety's sake the lock has to be removed prior to starting with flight operations! To this end, proceed as follows:

Turn on the transmitter

Input the correct combination of digits

Press the **ENTER** key

Input the correct combination of digits again

Call code 99

Press keys **ENTER** **CLEAR** **ENTER**

Please ensure you remember the combination you set, or you will have to return the transmitter to Graupner Service for decoding.

This program is suitable for model helicopters exclusively operated with speed control normally operated off an additional channel and which does not utilise any signal from the channel which in models without speed control operates the carburettor. As a result all compensatory functions affecting the engine are missing from this model type. Other control functions affect the channel which controls the regulator (autorotation switching) in a logical way.

When using RPM regulators which can be switched off or overridden by the normal throttle action, model type 9 should be used.

In model 9, all type 8 functions will be available except the following:

Code	Function
82	Dynamic Torque Compensation
84	Hover Throttle
85	Throttle Presets (Idle Up)
86	Mixer Swashplate → Throttle
87	Mixer Tail Rotor → Throttle

Code 23, allocation of external switches, differs accordingly.

Speed controls of this type are available in a variety of designs, but the majority of them are operated via an additional channel. That is to say, a channel that is not affected by the normal control functions and is actuated by a slider-type regulator. Using the latter the engine can be started and its idle adjusted (lower region of slider), the required value for the operating RPM adjusted and the engine cut-off (lower stop).

For this function, channel 1 is used, acted upon by a slider type regulator wired to connection "ch9". Unlike model type 8, this channel is not affected by the collective pitch control. Using a regulator of the type described above in conjunction with model type 9 results in improved operating comfort.

To start the engine, set the slider-type regulator against the lower stop and adjust the idle with the idle trim control. Using the idle trim, the engine can also be shut off. The slider-type regulator can be used to achieve the RPM required for flight, with the option that direct switching to a value set earlier with the slider is possible using a switch allocated with Code 23. Switching can be performed the hard way, or preferably using a time lag ranging from 0.5...30 seconds adjustable via Code 92.

Helicopter Programming Examples

In case you have become slightly confused by the unusually large number of functions offered in the preceding chapters of these instructions, the following are to show you by way of examples how a practical, usable, model set-up can be programmed in a minimum of time. In doing so the essential functions will be activated, while the “deluxe” options meant for competition pilots will not be considered initially. In the following chapters this basic program will then be expanded by additional options, followed by a few examples from the PROF1’s bag of tricks. Here the basic principles of computer RC will become clear:

From the extensive range of functions you select only those, which are actually required and forget the rest of them. If, in the course of time, you need more of them, all you have to do is activate additional functions.

Be sure to duplicate the following examples step by step, so you won’t forget or overlook anything. In this manner you’ll actually get automatically familiar with your R/C equipment and won’t consider it nearly as complicated as it may have appeared at first glance.

1.) Preparations

You have installed the module into the transmitter as per the instructions. Close the case of the transmitter again and turned the transmitter on. The display will read:

m	c	-	1	8	E		M	O	D	E	L			1	
	9	.	6	V			P	C	M						

Depending on what kind of module had been installed previously in your transmitter the display may show another model number or another modulation mode.

2.) Executing RESET (Important)

Call model memory 1 and clear it completely. To do this input:

ENTER 5 6 ENTER 1 CLEAR ENTER

If the transmitter had previously been switched to PCM you now have the basic position of the display again. If not, the request will appear to turn the transmitter off. This is because it has been switched to the default position of PCM modulation. Comply with the request and then turn it on again a moment later, thereafter you will be in the basic position.

For safety’s sake, so you won’t forget it later, execute a reset (right now) on all the remainder of the model memories. To do this, input:

ENTER 5 6 ENTER 2 CLEAR ENTER

ENTER 5 6 ENTER 3 CLEAR ENTER

...

ENTER 5 6 ENTER 7 CLEAR ENTER

...

(ENTER 5 6 ENTER 3 0 CLEAR ENTER)

This procedure needs only to be performed once in order to positively delete any programming parts and data which may have been stored in the transmitter memory by an earlier used module, and could still be stored. These program fragments may cause a malfunction if not deleted.

m	c	-	1	8	E	M	O	D	E	L		1
	9	.	6	V		P	C	M				

ENTER 5 6 ENTER

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

1

s	e	l	e	c	t	M	O	D	E	L		
N	O	N	A	M	E					:	1	

CLEAR

E	N	T	E	R	=	R	E	S	E	T	A	L	L
N	O	N	A	M	E					:	1		

ENTER

m	c	-	1	8	E	M	O	D	E	L		1
	9	.	6	V		P	C	M				

3.) Selection of Model Memory

In order to file the following adjustments under model No, 1, input the following

ENTER 5 6 ENTER 1 ENTER

4.) Entering Model Name

So you'll be able to locate it correctly later on, input the name of your model, by inputting:

ENTER 3 2 ENTER

The transmitter now asks for the name, with the cursor being located in the first position of the lower line. Using the **INC** and **DEC** keys you select the first letter of the name of the model. This is stored by pressing the **STORE** key, whereupon the cursor moves to the 2nd position. In this manner, store the complete name of the model (the length of the name must no exceed 11 characters). Using the **TURN** key changes between uppercase and lowercase letters. If you have entered an incorrect letter, you can backspace using the **CLEAR** key and the correct it. Having entered the complete name, input is terminated by a press of the **ENTER** key.

NOTE:

The transmitter is now back in the command mode, indicated on the lower line of the display by "FUNCTION ?", which is to say it is waiting for a code number to be input. During adjustment it will remain in this mode, which can be left by pressing the **ENTER** key. From normal mode you can switch to the command mode by the **ENTER** key.

For the ensuing inputs, it is assumed that the transmitter is in the command mode, that is "FUNCTION ?" will be showing on the lower line of the display.

In case you had switched off your transmitter or had accidentally switched to normal mode via the **ENTER** key, just press the **ENTER** key again to get back to command mode.

m	c	-	1	8	E	M	O	D	E	L		1
	9	.	6	V		P	C	M				

ENTER 3 2 ENTER

N	A	M	E	:								
_												

INC...DEC

N	A	M	E	:								
<u>L</u>												

STORE

N	A	M	E	:								
L	_											

INC...DEC...STORE...

N	A	M	E	:								
L	O	C	K	H	E	E	D	2	8	<u>6</u>		

ENTER

L	O	C	K	H	E	E	D	2	8	6	:	1
F	U	N	C	T	I	O	N	?	_			

Helicopter Programming Examples

5.) Defining Stick Allocation

Set the control stick allocation you are accustomed to by entering:

5 7 ENTER

Thereupon the lower line of the display will read:

MODE 1

Now press one of the keys **1...4**, to suit your normal control mode:

- 1** = Collective Pitch and Roll on the right
Pitch and Tail Rotor on the left
- 2** = Collective Pitch and Tail Rotor on the left
Roll and Pitch on the right
- 3** = Collective Pitch and Tail Rotor on the right
Roll and Pitch on the left
- 4** = Collective Pitch and Roll on the left
Pitch and Tail Rotor on the right

The figure on the display will change accordingly. Terminate the input by pressing the **ENTER** key and you are once again back in command mode.

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

5 7 ENTER

L	O	C	K	H	E	E	D	2	8	6	:	1		
M	O	D	E		1									

2

L	O	C	K	H	E	E	D	2	8	6	:	1		
M	O	D	E		2									

ENTER

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

6.) Defining the Model Type

The previous inputs were universally applicable to all types of

model. Now you select the type of model to which your actual model corresponds. For this example it is assumed that you own a perfectly normal power model, the ailerons of which as well as elevator and rudder are operated by a single servo each. Input:

5 8 ENTER

In the lower line of the display now appears the actual model type. At the moment it will read "NORMAL". To switch over to the Heli program, press key **8** and the display will change to "Heli". Leave type selection by pressing the **ENTER** key.

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

5 8 ENTER

L	O	C	K	H	E	E	D	2	8	6	:	1		
N	O	R	M	A	L									

8

L	O	C	K	H	E	E	D	2	8	6	:	1		
H	e	l	i											

ENTER

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

7.) Determining Collective Pitch / Throttle Stick Direction

Determination of the collective pitch / throttle control direction you are used to, e.g. pulling or pushing the throttle stick to increase collective pitch. To this end, input:

2 1 E ENTER

The display then reads: LOW PITCH ↓

Using the **INC** and **DEC** keys you may now switch to and fro between ↓ and ↑. ↓ means pushing for full throttle, and ↑ means pulling. Terminate the selection with the **ENTER** key.

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

2 1 E ENTER

L	O	C	K	H	E	E	D	2	8	6	:	1		
L	O	W	P	I	T	C	H					<u>↓</u>		

ENTER

L	O	C	K	H	E	E	D	2	8	6	:	1		
L	O	W	P	I	T	C	H					<u>↑</u>		

ENTER

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

Helicopter Programming Examples

8.) Allocation of Switches

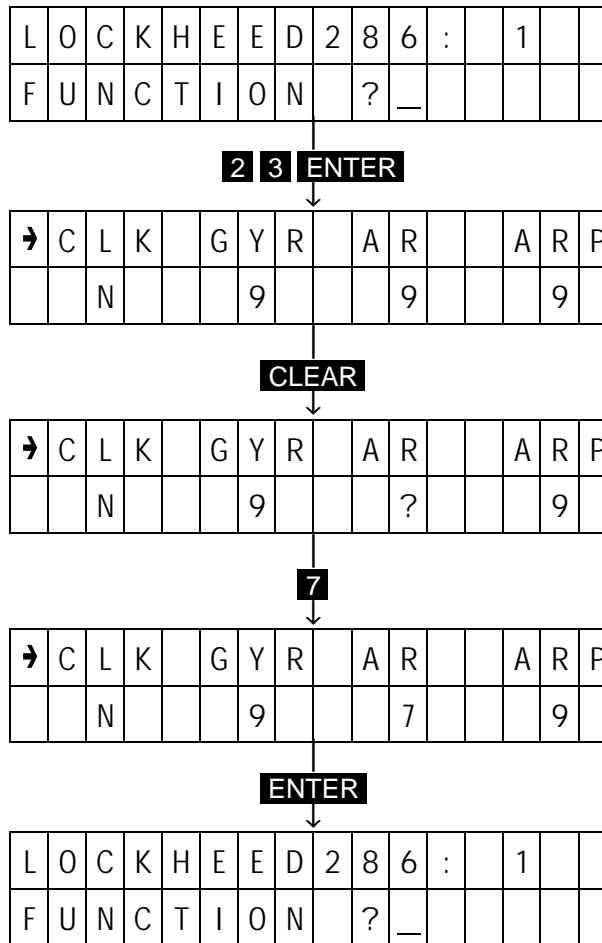
Now set-up the transmitter so that switch you want for autorotation is connected to socket "7". To allocate the switch, input:

2 3 ENTER

In the upper line of the display the various functions that can actuated by switches appear, with the switches allocated to them listed below the relevant function. A small arrow (upper line) indicates which function is about to be adjusted. This arrow is moved to the right or left using the **INC** and **DEC** keys. Press the **INC** key twice to shift the arrow to the "AR" setting as this is the function you wish to allocate the switch to. The press

CLEAR 7

Number 7 will now appear in the lower line below the "AR" caption. Terminate input by pressing the **ENTER** key.



9.) Copying Adjustments

All that's been input so far may be considered as "pilot specific" programming, as these inputs depend on the habits of the pilot and are alike for all models (excepting the name of the model). In order not to have to input these settings for each model memory, you can now copy them first into the other model memories. To this end input:

9 4 ENTER 1 ENTER 2 ENTER ENTER

You have now copied the essential settings of model 1 onto model 2. Repeat the same procedure for the remaining models by:

9 4 ENTER 1 ENTER 3 ENTER ENTER

9 4 ENTER 1 ENTER 4 E ENTER E ENTER

...

9 4 E ENTER 1 E ENTER 7 E ENTER E ENTER

...

(9 4 E ENTER 1 E ENTER 3 0 E ENTER E ENTER)

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

9 4 ENTER

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

1

C	O	P	Y	:	F	R	O	M	M	O	D	E	L	
L	O	C	K	H	E	E	D	2	8	6	:	1		

ENTER

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

2

C	O	P	Y	:	T	O	M	O	D	E	L			
N	O	N	A	M	E					:	2			

ENTER

C	O	P	Y	:	1	→		3						
E	N	T	E	R	K	E	Y	e	x	e	c			

ENTER

10.) Modulation Mode

If a PCM receiver has been installed in your model you may skip this step. In the case of a PPM receiver just input:

9 5 ENTER INC ENTER

Doing this you have switched to PPM mode, The transmitter now requests you to turn it off so it can change over to PPM.

A reversion to PCM mode is performed in the same way.

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

9 5 ENTER

L	O	C	K	H	E	E	D	2	8	6	:	1		
M	O	D	U	L	A	T	I	O	N	P	C	M		

INC

L	O	C	K	H	E	E	D	2	8	6	:	1		
M	O	D	U	L	A	T	I	O	N	P	P	M		

ENTER

L	O	C	K	H	E	E	D	2	8	6	:	1		
p	o	w	e	r	s	w	o	f	f					

Switch the power off, and then on again

L	O	C	K	H	E	E	D	2	8	6	:	1		
9	.	6	V		P	P	M							

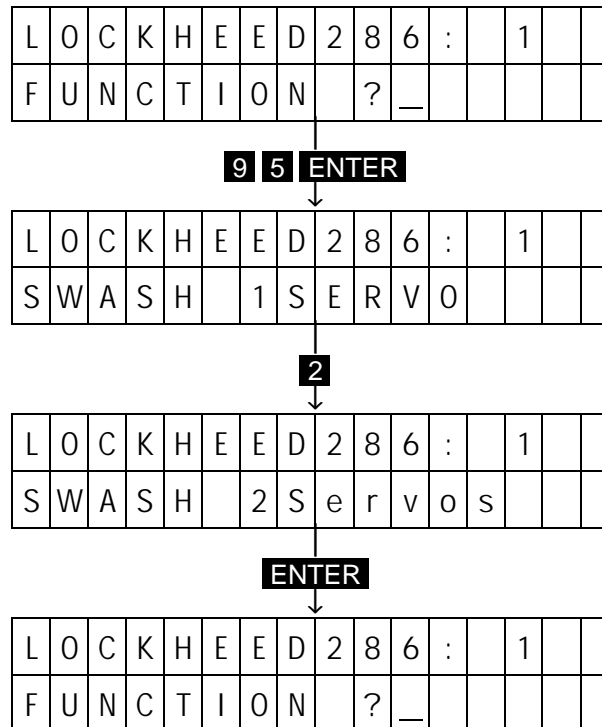
Helicopter Programming Examples

11.) Type of Swashplate Control

Depending on which type of pitch control your model helicopter has, the matching rotor head mixer has to be selected by:

6 8 ENTER

This is followed by the key **1...5** for the type concerned, and terminated by pressing the **ENTER** key.



12.) Direction of Torque Compensation

Next is the activation Torque Compensation. For a helicopter with clockwise rotating main rotor (viewed from above) input:

6 7 ENTER DEC

Or for anti-clockwise rotating rotors, input:

6 7 ENTER INC

Terminate the setting by pressing the **ENTER** key.

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

6 7 ENTER

L	O	C	K	H	E	E	D	2	8	6	:	1		
A	T	S		I	N	H								

INC

L	O	C	K	H	E	E	D	2	8	6	:	1		
A	T	S		L	E	F	T							

ENTER

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

13.) Activating the Autorotation Switch

Activate the autorotation switch to allow the engine to be shut-off by the autorotation switch. To achieve this, input:

2 4 ENTER INC

Terminate the input by pressing the **ENTER** key.

For the following adjustments the receiver must be turned on. The servos should be connected to the receiver outputs as per the instructions.

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

2 4 ENTER

A	U	T	O	R	O	T		I	N	H				

INC

A	U	T	O	R	O	T		p	o	s		4	0	←
O	F	F				S	T	I	C	K		5	0	

DEC ... DEC

A	U	T	O	R	O	T		p	o	s			0	←
O	F	F				S	T	I	C	K		5	0	

ENTER

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

Helicopter Programming Examples

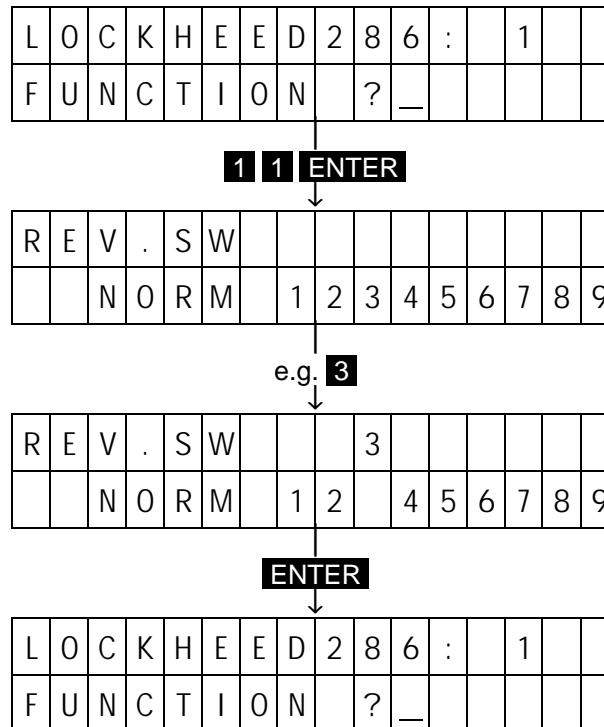
14.) Adjusting the Direction of Servo Rotation

Check the function of the control surfaces. Most likely one or other of the servos will be found to rotate in the wrong direction. To change the direction of rotation of a servo moving in the wrong direction, call servo reversing code 11:

1 1 ENTER

The display now indicates the direction of rotation of all servos. Correct the direction of rotation by entering the corresponding channel number so all control surfaces and the throttle move in the right direction.

When all the servos are rotating the correct way, terminate all input using the **ENTER** key.



IMPORTANT:

If you use a rotor head mixer (e.g. for HEIM heads) be sure to check each servo singly for its direction of rotation in roll, pitch and yaw. If a servos direction of rotation is incorrect for all of the functions you need only reverse the direction of rotation, as described above. If, however, the direction of rotation is correct for roll but wrong for pitch, you'll have to reverse these functions in the rotor head mixer. This is achieved by:

6 9 ENTER

You may then select the roll function by key **2** and the pitch function by key **6**, and depending on the type of swashplate, collective pitch by key **3**. By pressing the **TURN** key the direction of the individual function, represented by the prefix + or -, is reversed. For safety reasons, the collective pitch stick must be at the "full pitch" position to be able to do this. Terminate entry by pressing the **ENTER** key.

NOTE:

You may possibly have to execute alternating adjustments of Codes 69 and 11 until all the servos rotate the correct direction for all functions. It's a matter of practice how fast you finish the job. In any case, you may be sure that working adjustments can be achieved in this way.

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

6 9 ENTER

S	W	S	H	-	P		M	I	X			A	D	J	.
p	u	s	h		k	e	y		2	o	r	6			

2

S	W	S	H	-	P		M	I	X			A	D	J	.
					R	o	I	I				+	6	0	%

6

S	W	S	H	-	P		M	I	X			A	D	J	.
					P	i	t	c	h			+	6	0	%

Collective Pitch Stick to Full, **TURN**

S	W	S	H	-	P		M	I	X			A	D	J	.
					P	i	t	c	h			-	6	0	%

ENTER

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

15.) Adjusting the Pitch

After connecting a slider-type control to the connector socket for channel 6 (as supplied that will be the slider in the centre), move it to the neutral position. Now check whether the collective pitch control range corresponds approximately to the requirements for the helicopter by moving the collective pitch stick from the lower to the upper stop and observing how the blade setting of the model reacts. If the control range is too large or too small attach the links at the servo farther inboard or outboard respectively, or if necessary replace the servo arm with a different design. In any case, make sure that the control range is not smaller than required. It is possible to adjust the magnitude of the deflections over a wide range via the transmitter, but it will be advantageous to use deflections which are the right size mechanically. The following adjustments allow for the control range being a bit wider than required.

Adjust the maximum pitch by:

2 6 ENTER

The display will now read "Hi Pitch Curve" and below that the percentage of the normal servo throw value, here shown as 100%.

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

2 6 ENTER

H	i		P	i	t	c	h		C	u	r	v	e		
			N	o	r	m	a	I				1	0	0	%

INC DEC ENTER

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

Helicopter Programming Examples

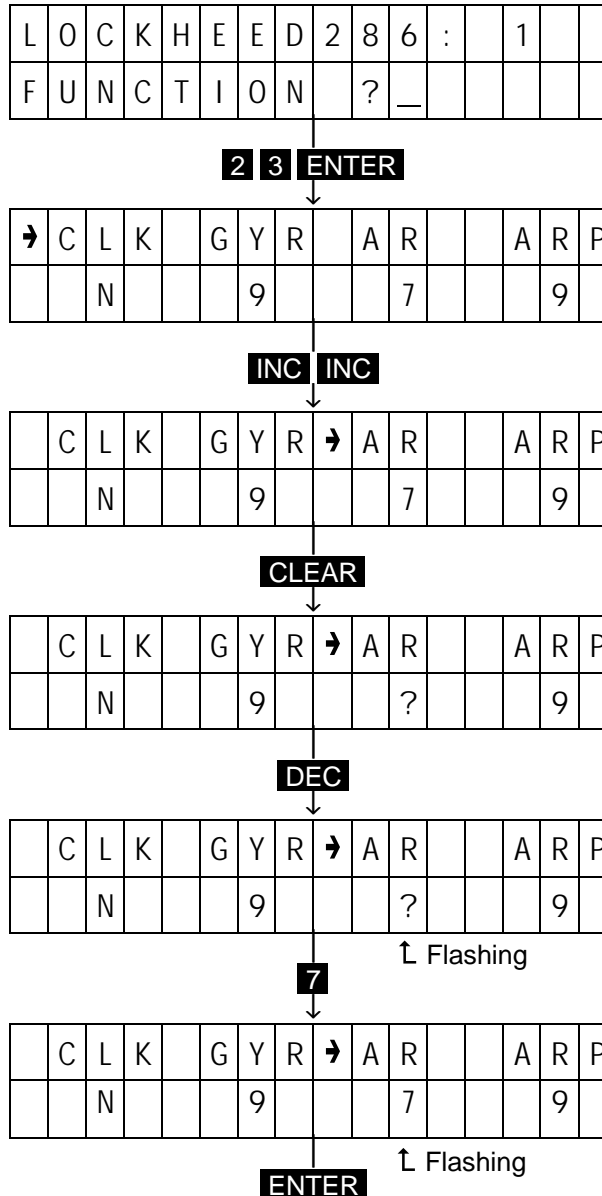
NOTE:

If ahead of the value the word “Normal” is not displayed, but “AT-rot” appears instead the autorotation switch is in the active position. Return the switch to OFF. If you are not familiar to this direction of actuation of the switch, you may invert it without making any mechanical changes. Simply use Code 23 (switch function), move to the “AR setting and, as described in chapter 8, input:

CLEAR DEC 7

The “7” below the “AR” will now be flashing indicating that the switch has been reversed (inverted). Terminate the input by pressing the **ENTER** key. The autorotation switch should now respond as required.

Adjust the maximum pitch value for normal flight by the **DEC** key to the desired value and terminate the input by pressing the **ENTER** key.



Set the value fro minimum pitch by entering:

2 7 ENTER

Reduce the value by the **DEC** key to the desired value and terminate the input by pressing the **ENTER** key.

Now check that the collective pitch for hover is achieved at approximately the neutral point of the collective pitch control stick. Correct any deviation by:

2 8 ENTER

Move the stick neutral position and adjust the hover pitch value using the **INC** and **DEC** keys. The range of adjustment is ±32 steps.

Terminate the input by pressing the **ENTER** key.

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

2 6 ENTER

L	o	P	i	t	c	H		C	u	r	v	e				
				N	o	r	M	a	I				1	0	0	%

DEC DEC ENTER

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

2 8 ENTER

H	O	V	.		P	I	T	C	H					
				N	o	r	m	a	I					0

ENTER

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

16.) torque Compensation

The static Torque Compensation can be adjusted separately for climb and for descent. In case correct values for torque compensation are on hand, from building instructions or based on experience, they may be input as follows:

8 1 ENTER

In the display the compensation values will appear for climb ("max") and descent ("min"). In each case the small arrow indicates the value to be adjusted. The arrow is moved using the **TURN** key. Perform adjustments by pressing the **INC** and **DEC** keys and terminate the changes by pressing the **ENTER** key.

NOTE:

In case accurate adjustment values are not available it is better to skip this point. The input values provide acceptable results in most cases.

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

2 6 ENTER

S	T	A	T	I	C			m	a	x		3	0	%	←
								m	i	n		3	0	%	

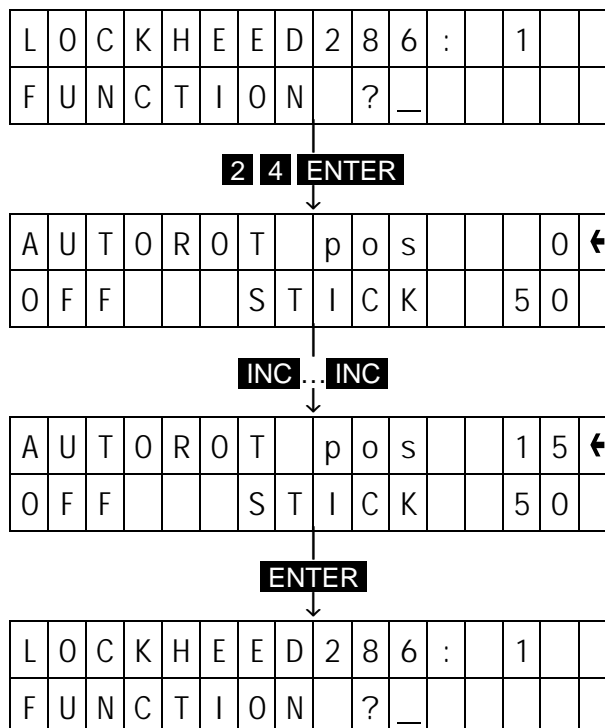
DEC DEC ENTER

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

Helicopter Programming Examples

17.) Operation of the Carburettor

Move the throttle / collective pitch lever to the full throttle position. The carburettor should open completely without binding of the throttle linkage; if necessary readjust the linkage. Now actuate the autorotation switch, the carburettor must fully close. If the linkage is restricted in this position, reduce the servo travel using Code 24, where you increase the "pos" value as necessary.



Reset the autorotation switch to the "normal flight" position again and collective pitch / throttle stick to the idle position. You should now be able to adjust the idle region of the carburettor using the trim lever. If the servo is too large or too small, it can be adjusted using Code 12. To do this input:

1 2 ENTER 1

Leave the collective pitch / throttle stick in the idle position and adjust the servo throw using the **INC** and **DEC** keys. Terminate input with the **ENTER** key.

The command mode is left by pressing the **ENTER** key again.

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

1 2 ENTER

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

1

T	H	R	O	W	A	D	J	U	S	T				
		1	c	h	-	E	N	D			1	0	0	%

DEC DEC ENTER

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

ENTER

L	O	C	K	H	E	E	D	2	8	6	:	1		
	9	.	7	V			P	P	M					

The basic adjustment of the mc-18 for helicopter operation is now complete. This adjustment encompasses all the required functions which the helicopter beginner and the less experienced helicopter pilot needs to control his model. Fine tuning of the various values can be performed in the course of flying operations, but all that is essential has been provided to permit performing these steps quickly and in an uncomplicated way. It is good practice to take along a small note which list only the code numbers of the options used for programming when flying the model with this adjustment. It should look like this:

Throttle

84 Hover
24 Autorotation

Pitch

26 Max.
27 Min.
28 Hover

Tail Rotor

81 Static Torque Compensation

Rotor Head

69 Mixer Adjustments

Miscellaneous

59 Trim Memory

In this way, you will have a complete list of adjust options on hand during flight operations, which have been used for programming.

Helicopter beginner should be content with these adjustments for their first piloting exercises, until they master hovering flight, and refrain from activating more options which they are not yet capable of using.

This basic programming will be expanded upon now for the advanced helicopter pilot. We will:

1. Add a throttle preset
2. Supplement autorotation adjustments, and
3. Compensate for fluctuations by tail rotor control

In this context, it is assumed that the model already flies correctly on its basic programming.

Helicopter Programming Examples

1. Throttle Presets (Idle Up)

Three activation options exist for throttle presets; by slider-type control, by switch or by a combination of both.

a) Throttle Preset by Slider-type Control

As supplied, the mc-18 transmitter sports two slider-type controls in the central console. The right one adjusts gyro gain in the helicopter programs, and the other one (at the centre) may be used for trimming collective pitch. A third control may be installed for throttle preset (which in this case is connected to the socket marked "9ch"), alternatively the central slider can be used for this function as collective pitch trim is not required due to the numerous pitch adjustment options. In the latter case, one can simply unplug the connector from "6ch" and plug it into "9ch", but the software offers a much more elegant solution, programmed exchange of the two connecting sockets. If you decide to use this option, proceed as follows:

3 7 ENTER

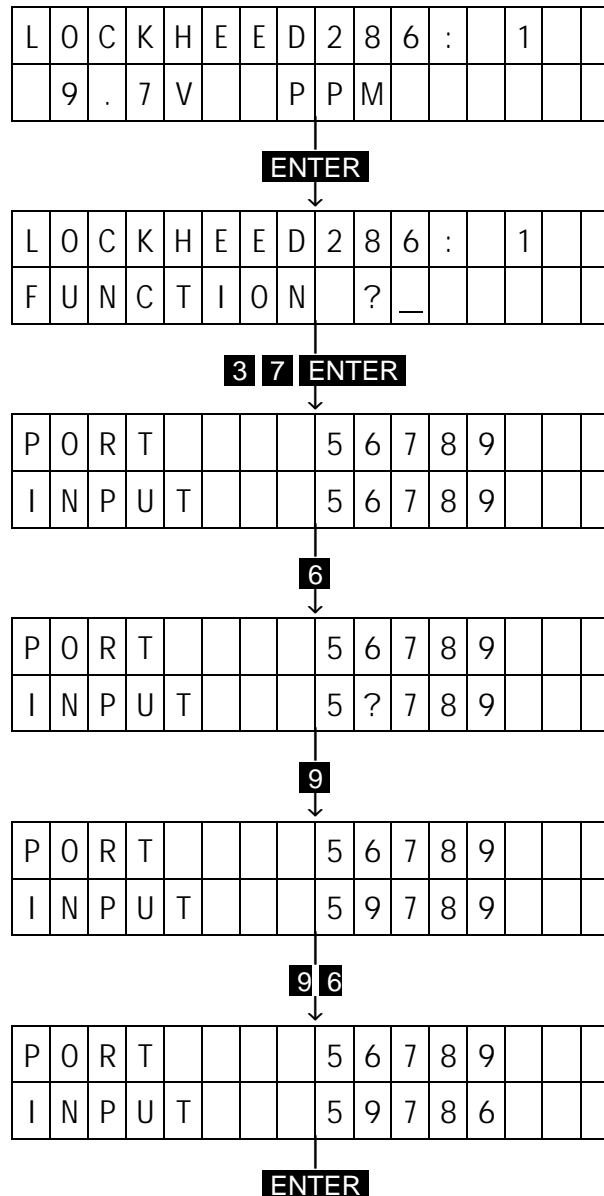
The display shows the numbers of the operating elements (switches, slider-type controls, rotary potentiometers, etc.) in the lower line, and the allocation of channels 5...9 in the upper line.

We are now going to exchange the operating elements for channels 6 and 9. To do this input:

6 9 9 6

Now operating element 9 is positioned below channel 6 on the display, while operating element 6 appears underneath channel 9 (which, in the helicopter programs adjusts throttle preset).

Terminate the input by pressing the **ENTER** key.



To now adjust the throttle preset, input:

8 5 ENTER

The upper line of the display now shows the percentage value of "G", and in the lower line the take-over point. The small arrow indicates which value can be adjusted. Leave the arrow behind the value of "G" in the upper line.

Shift the slider to the upper stop and set a value of 60% now via **INC** key. If you move the slider downward, the display now indicates that you can change the throttle preset value infinitely between 0 and the adjusted maximum value. As a result, you'll start the engine with throttle preset faded out (slider at the bottom stop) and increase RPM slowly prior to take-off using the slider, up to the preset value (at the upper stop). To establish the correct preset value flight, set the maximum value higher than required and adjust the throttle preset using the slider in the course of flying. After finishing the flight you can read the value of "G" from the display and set the maximum figure to match the displayed value.

Terminate input by pressing the **ENTER** key.

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

8 5 ENTER

I	d	I	e		u	p	(	1	)	G		0	%	←
					P	o	i	n	t			0		

INC...INC

I	D	I	e		u	p	(	1	)	G		6	0	%	←
					P	o	i	n	t			0			

ENTER

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

b) Throttle Preset using a Switch

In place of the slider you may use a switch for activating the throttle preset. Install the switch and connect it to socket 4, and input:

2 3 ENTER INC INC INC INC

The arrow points to "IU1" meaning throttle preset (Idle Up) 1. By entering :

CLEAR 4

You allocate the switch at socket 4 to throttle preset 1. Terminate input by pressing the **ENTER** key.

When adjusting the throttle preset values proceed as described above.

To avoid abrupt increases of RPM on actuation of the switch, the module provides Code 92 (slow-down of spin-up switches). Call this option by entering:

9 2 ENTER

and pressing the **INC** key, until the value to the right of IU1 reads approximately 3.0s. Terminate input with the **ENTER** key.

When you activate throttle preset using the switch, the carburettor will not be opened abruptly, and the RPM will increase slowly to the preset figure (in this example the spin-up phase will be 3 seconds).

c) Throttle Preset by Switch and Slider Control

The two methods can be combined so throttle preset can be activated by switch as well as effected using the slider.

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

2 3 ENTER 4 x INC

→	I	U	1		I	U	2		F	L	2		P	R	T
		9				9				9				9	

CLEAR 4

→	I	U	1		I	U	2		F	L	2		P	R	T
		4				9				9				9	

ENTER 9 2 ENTER

S	m	o	o	t	h		I	U	1	=	0	F	F	←	
							A	R	=	0	F	F			

INC...INC

S	m	o	o	t	h		I	U	1	=	3	.	0	s	←
							A	R	=	0	F	F			

ENTER

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

Helicopter Programming Examples

2. supplemental Autorotation Adjustments

Up to now, you have used the autorotation switch only to shut down the engine in an easy way without changing idle adjustments.

As an experienced helicopter pilots, you'll of course want to perform landings in autorotation mode, this being the only possibility for a helicopter surviving engine or tail rotor failure occurring at greater heights. With flight in autorotation differing so much from power-on flight the mc-18 offers a couple of alternative adjustment options, which in autorotation replace the power-on adjustments. They are activated by switching to autorotation (normally by the autorotation switch, but a 2nd automatic option exists, which will be described later).

Switching to autorotation triggers the following changes:

- The throttle servo is uncoupled from the pitch servo and it takes up the position set-up with Code 24.
- Values for maximum and minimum pitch are changed.
- All torque compensation mixers are turned off because engine induced torque is not generated during autorotation.
- The tail rotor moves to a fixed position, which is determined using Code 83. Tail rotor trim, including trim memory, are switch off.

The necessary adjustments will be performed as follows:

a.) Maximum Pitch Adjustment for Autorotation

During power-on flight, the maximum blade angle is limited by the available engine power output. In autorotation, however, it is limited only by the point of flow separation of the main rotor blades. For autorotation a higher maximum pitch value may therefore be set to make sure adequate lift will be generated on landing, even when the RPM decreases.

Call the maximum pitch adjustment by:

2 6 ENTER

The adjusted power-on (and in-flight verified) maximum pitch value can be read while "Normal" is showing in the lower line of the display. Actuate the autorotation switch, so that "AT-rot" is displayed in the lower line (instead of "Normal"). Using the **INC** and **DEC** keys, set an initial value that is 10 – 20% higher than the value of normal flight, which you have just read. Do not select a value considerably higher than the normal flight value, because in that case the pitch control will behave very differently from the control characteristic you are accustomed to. After switching over, this may lead to the pilot over controlling during the landing flare, causing the model to climb, and the rotor RPM to decrease, leading to the helicopter drop some distance to the ground. Later on, after a couple of autorotations have been practiced, this value can be further adjusted to suit.

Terminate input by pressing the **ENTER** key.

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

2 6 ENTER

H	i	P	i	t	c	h	C	u	r	v	e					
							N	o	r	M	a	l	1	0	0	%

Actuate the Autorotation Switch

H	i	P	i	t	c	H	C	u	r	v	e					
							A	T	-	R	o	t	1	0	0	%

INC...INC

H	i	P	i	t	c	H	C	u	r	v	e					
							A	T	-	R	o	t	1	1	0	%

ENTER

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

b.) Minimum Pitch Adjustment For Autorotation

The minimum pitch adjustment may, but need to not necessarily, be different from the Normal power-on adjustment. This depends of the pilots habits in normal flight. For flight in autorotation you must adjust the minimum pitch so that, under any circumstance, the model make the transition from forward flight at medium speed to a 60 – 70° descent at minimum pitch. If you, as the majority of helicopter pilots do, use this type of adjustments for power-on flying then you can simply transfer the power-on value. If, on the other hand, you are used to having a model descend at a flatter angle, you will have to set the minimum pitch value correspondingly higher for autorotation.

NOTE: It is often, erroneously, assumed that flight in autorotation should in principle be flown with the collective pitch stick at the lower stop. This is dangerous, however, because no reserve will be available to allow correction for pitch / roll changes or angle of approach via the pitch control stick without the rotor head RPM dropping unacceptably. The optimum position of the collective pitch stick for normal descent in autorotation is half way between the hover position (neutral stick position) and the lower stop. The length of the approach can then be reduced by pulling back on the pitch stick and simultaneously reducing the collective pitch. Also, the glide can be stretched by pushing the pitch stick slightly and increasing collective pitch very carefully, but this requires a lot of practice.

To set minimum pitch:

2 7 ENTER

Again, read the value for “Normal” flight and then switch to autorotation. Set the value as described above for maximum pitch and terminate input by pressing the **ENTER** key.

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

2 6 ENTER

L	O	P	i	t	c	h	C	u	r	v	e					
							N	o	r	m	a	l	1	0	0	%

Actuate the Autorotation Switch

L	o	P	i	t	c	h	C	u	r	v	e					
							A	T	-	R	o	t	1	0	0	%

INC...INC

L	o	P	i	t	c	h	C	u	r	v	e					
							A	T	-	R	o	t	1	2	0	%

ENTER

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	_					

Helicopter Programming Examples

c.) Tail Rotor Neutral Position

In normal flight, the tail rotor is adjusted so as to compensate for engine torque when the model is hovering, so even with this basic setting a certain amount of thrust will be generated. This thrust is the altered by the tail rotor control and the various mixers for torque compensation and re-adjusted by tail rotor trim to take care of the prevailing weather conditions, engine RPM in flight and other external factors.

In autorotation, the situation is completely different, with the rotor no longer driven by the engine no torque is generated and therefore no compensation will be required by the tail rotor. As a result, all mixers concerned with the tail rotor are switched off. Even the basic setting of the tail rotor has to be different for autorotation, as no thrust will be required due to the absence of torque, and the trim corrections required for power-on flight do not apply to the autorotation mode. As a result, the tail rotor neutral position in autorotation is only determined by Code 83. The tail rotor trim including stored values are switched off. For adjustment of neutral position, input:

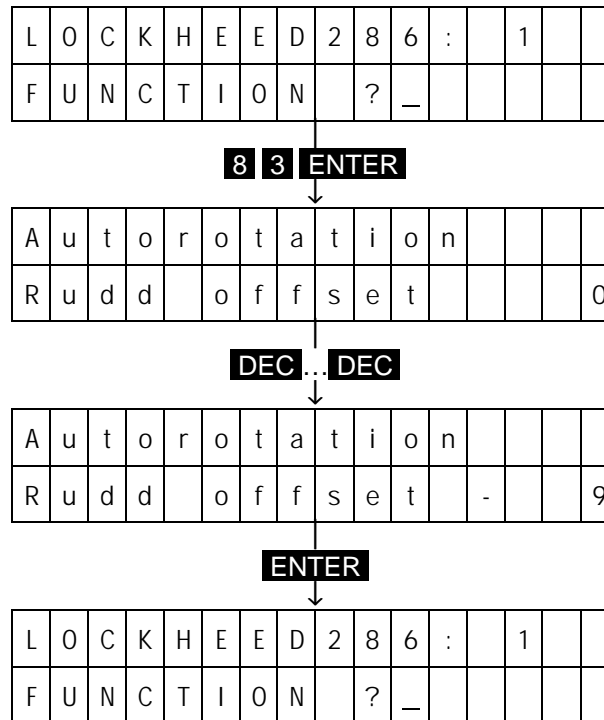
8 3 ENTER

Actuate the autorotation switch so that "Rudd offset" appears in the display. To perform adjustments the receiver of the model must be switched on. Position to tail rotor in the horizontal attitude, fold the two tail rotor blades downwards, thus making the blade pitch angle clearly visible. Now adjust the blade angle to 0° using the **INC** and **DEC** keys, which is easy to check as the two tail rotor blades when viewed from behind should be parallel to each other. This is approximately the correct adjustment. Depending on friction and gearbox induced resistance, the fuselage may rotate in the direction of the main rotor rotation. This friction can be compensated for by adjusting the tail rotor blade angle away from the neutral position to

some extent. Precision adjustments will have to be established in flight.

In any case, the value to be adjusted here will lie between 0° and some value opposite in direction to the value normal flight.

Terminate input by pressing the **ENTER** key.



3. Compensation of Load Fluctuations caused by Tail Rotor Control

When you increase tail rotor thrust using the tail rotor control stick, for HEIM helicopters in the left hand direction, the higher thrust requires more engine power too. If the carburettor opening is not adjusted to suit the higher power required by the tail rotor, the energy will be extracted from the main rotor, the RPM of which will be reduced. The effect of this can clearly be observed when executing manoeuvres and in other flight situations requiring large tail rotor deflection over a prolonged period of time, such as ascending pirouettes, steep nose-up circling, circling with the tail always facing the pilot (nose-out), etc, but also in a normal hover manoeuvre flown in strong crosswinds.

The mc-18 transmitter permits compensating for the increased power required by the tail rotor by opening the throttle a little wider using a mixer (Code 87), when tail rotor thrust is increased by the tail rotor control. One might arrive at the conclusion that engine output would need to be reduced when steering in the opposite direction to prevent an increase in RPM. This, however, is impractical for, with current helicopters, tail rotor thrust is not only reduced and rotation is executed with engine-induced torque, but additionally tail rotor control is even reversed up to an angle of attack region which corresponds to the angle of attack in hovering flight on the opposite side, thus requiring the same power again. For that reason, compensation takes place to that side requiring higher power only.

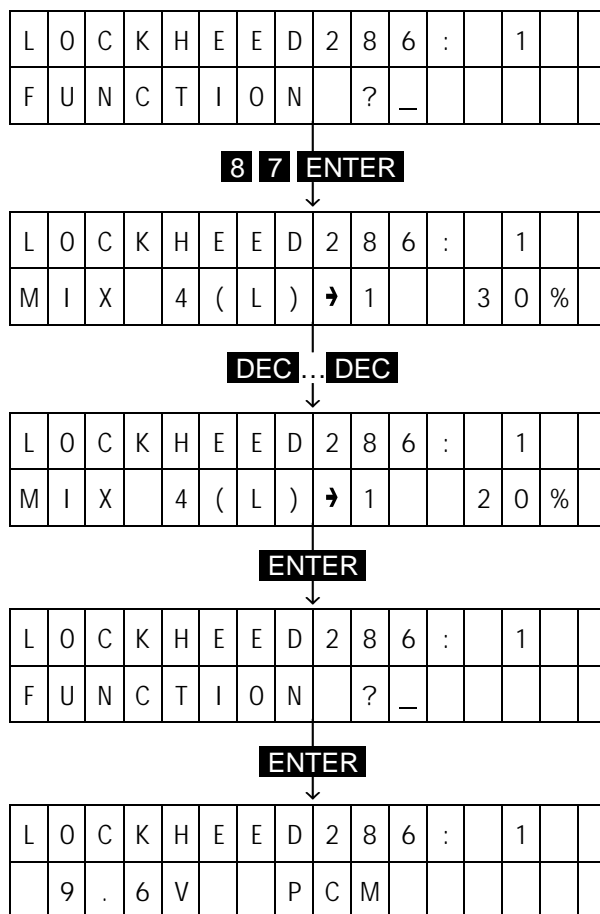
So input:

8 7 ENTER

Using the **INC** and **DEC** keys, respectively, adjust the value to approximately 20%. The exact value must be established in flight by performing pirouettes and left-hand circles with the nose facing the pilot (HEIM helicopters) and then readjusting the value with Code 87 so that the RPM doesn't drop or increase.

Terminate input by pressing the **ENTER** key.

By pressing the **ENTER** key again, you leave the command mode.



III. Additional Expansion Options for the Expert

Once you have programmed your model as in the first two examples, and as a pilot have learned to fully exploit their inherent possibilities, you can now make use of further options offered by the PROFI-ULTRASOFT-Module. The examples for the use of the options described below are no longer arranged in logical order, they should be considered and applied singly if required, and modified to suit the application.

Be sure to heed the following advice, it is in your interest:

Activation of additional options will make little sense if you have not learned to master your model using the adjustments described for normal flight, performing aerobatics and landing in autorotation. This is because a prerequisite for the intelligent use and adjustment of these options is a high degree of pilot skill. In some cases, the effect of imperfect adjustments may prove worse than omitting that option altogether!

Helicopter Programming Examples

1. PROFITRIM-Module

The PROFITRIM-Module can be installed into the transmitter as an option. In the helicopter programs the module permits adjusting up to eight parameters directly from the external controls without having to call up the options concerned in the program. Use of the PROFITRIM-Module has two aspects: firstly, there is the possibility of changing the main adjustments of the helicopter in one single operation, and secondly is the inherent feature of rotary controls in that they can't be incorporated into the storage, their adjustments having been performed mechanically by the pilot and as a result they are not subject to control by the electronics. In order to permit the user to take advantage of the benefits it offers without having to accept any disadvantages, the PROFITRIM-Module has been made so that items can be deactivated in a number of ways.

The essential idea behind the PROFITRIM-Module concept is to provide the possibility of setting up a new model in a short time by providing immediate access to the primary adjustments (even in flight under some circumstances) and to adjust them so the in-flight established values can be subsequently transferred in to the program, followed by turning off the PROFITRIM-Module. It also gives the competition pilot the chance to change adjustments, made necessary by varying external conditions, without permanently changing the basic set-up of the model. Both application options are supported by the PROFITRIM-Module as it offers two different options for switching the module on and off, which can be used singly or in combination.

Let's start by using the PROFITRIM-Module from trimming and test flying a new model. Afterwards we shall prepare it as a corrective option for the contest flyer.

a.) Test Flying a New Model with PROFITRIM

The PROFITRIM-Module features four trimmers for maximum pitch, minimum pitch, hover pitch and hover throttle.

Program your model as before in the first examples. Input the values of those options as correctly as possible for which you now have additional trimmers.

Reset them to the neutral positions so you'll be able to use them, then activate them using Code 91:

ENTER 9 1 ENTER

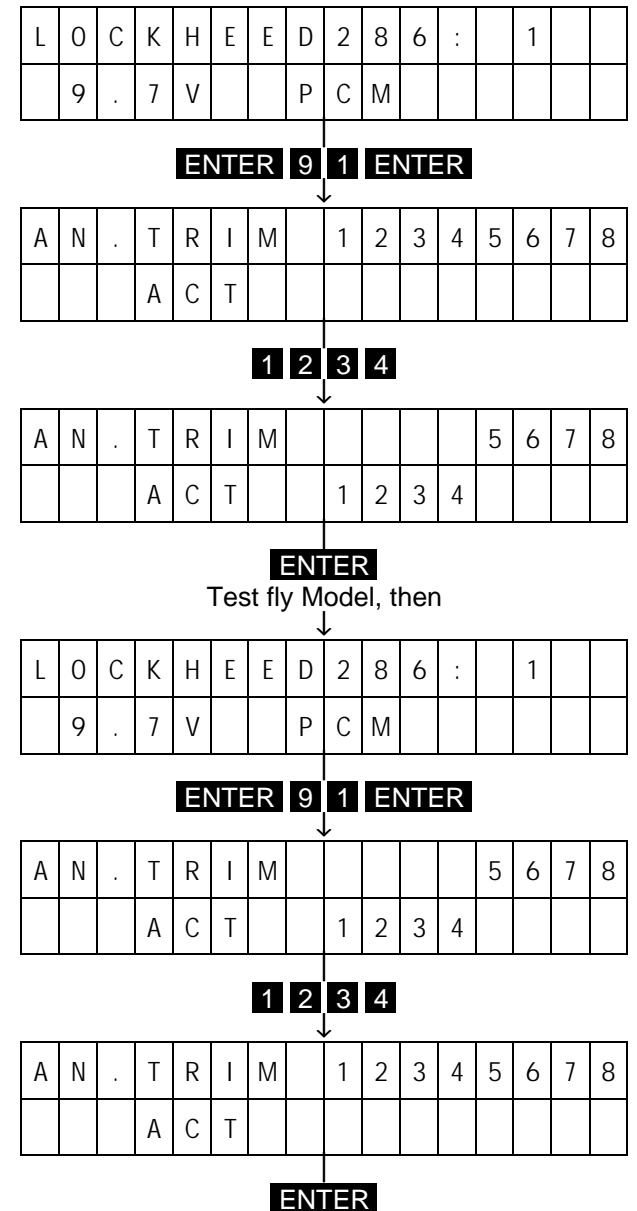
The display now indicates the inactive trimmers in the upper line and the active ones on the lower line. As only the four trimmers of the basic unit are at your disposal you may now activate these four trimmers. This is performed by pressing the associated buttons **1...4**. To active all of the trimmers, input:

1 2 3 4

The figures concerned will move from the upper line to the lower line. Terminate input by pressing the **ENTER** key and test fly your mode, adjusting the pitch and throttle values via the corresponding trimmers in the process. When satisfied with the adjustments, transfer the established adjustments into the program so they'll be available unchanged when changing models. On deactivation of a trimmer, using Code 91, the value adjusted will be automatically transferred into the program. So input:

ENTER 9 1 ENTER 1 2 3 4 ENTER

The in-flight established values are now retained under the corresponding Code number and the trimmers are switched off again.



b.) Switchable PROFITRIM-Module for Contest Flying

Let's assume your model has been set-up perfectly in the course of test flying and it's program has been completed. In course of a contest or some other event, you may observe the model behaving in an unusual manner. Possible causes are changing weather conditions, engine not running as usual, flying site at a higher altitude (different atmospheric pressure), leaking silencer or something else. In short something that should not occur, yet do (and this may include a pilot's shaky nerves).

Whatever the reason may be, you won't be able to find the cause right away, but you must get your model into the air. On the other hand you do not want to destroy your laboriously reached, otherwise optimal adjustment, because at home later you will naturally find the leaky muffler and will seal, replace the chafed through pressure oil hose or simply fit the cover cap, so that your engine runs as previously with the old adjustment. But you must now fly only once and need to modify some adjustment. As an experienced helicopter pilot you foresaw, fortunately, such situations and took appropriate precautions:

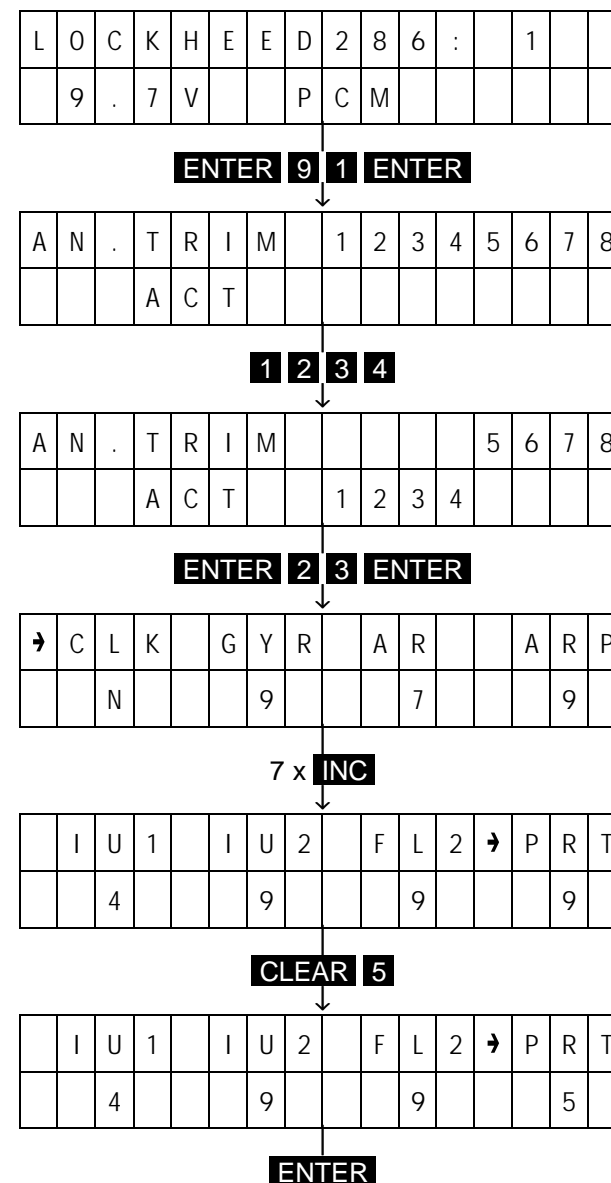
After your model had finished flown, and all automatic trim control systems in central position, the trimmers is activated using code 91:

ENTER 9 1 ENTER 1 2 3 4 ENTER

You have already mounted the locking external safety switch (Part No. 4147/1) and connected it to socket 5. Using Code 23 it is assigned to the PROFITRIM-Module ("PRT"), so that you can switch the module off at any time if necessary with this switch, and afterwards switch it on again without there being any changes to your programming. In addition you input:

ENTER 2 3 ENTER 7x INC CLEAR 5 CLEAR

Due to this precaution you can now switch on the PROFITRIM-Module and modify the adjustments in such a way that you can thereby fly. Later you simply switch it off again.



Helicopter Programming Examples

2. Switching between two adjustments: (Hover or Aerobic)

The next example is interesting for the FAI competition flier, those flying a program consecutively of both accurate hovering flight figures and dynamic, spaciouly flown aerobatics figures. Naturally one can fly the same adjustment for the model, but in the competition with generally high skill level often small advantages or handicaps, which can separate one from the many.

Thus it has proved favourable, for the hovering flight figures, if the wind permits it, to fly with low main rotor RPM, and this RPM should already be stable before taking off. However, for aerobatics a relatively high main rotor RPM, in order to have sufficient control effect in the fast forward flight and avoid flow separation at the backward-moving rotor blade.

Since during the competition no possibility exists to trim-up again for the other operating speed, and which would in all other respects be also very difficult. Both adjustments are to be achieved and stored beforehand with plenty of time, so that later you can switch back and forward between both adjustments. The one adjustment is the Normal adjustment, the other one the Alternative adjustment. Whether one has the aerobatics or the hovering flight adjustment as standard mode must be decided upon for yourself. In our example we want to use the aerobatics adjustment as standard, and the hovering flight adjustment as alternative adjustment capable of being activated by operating the switch.

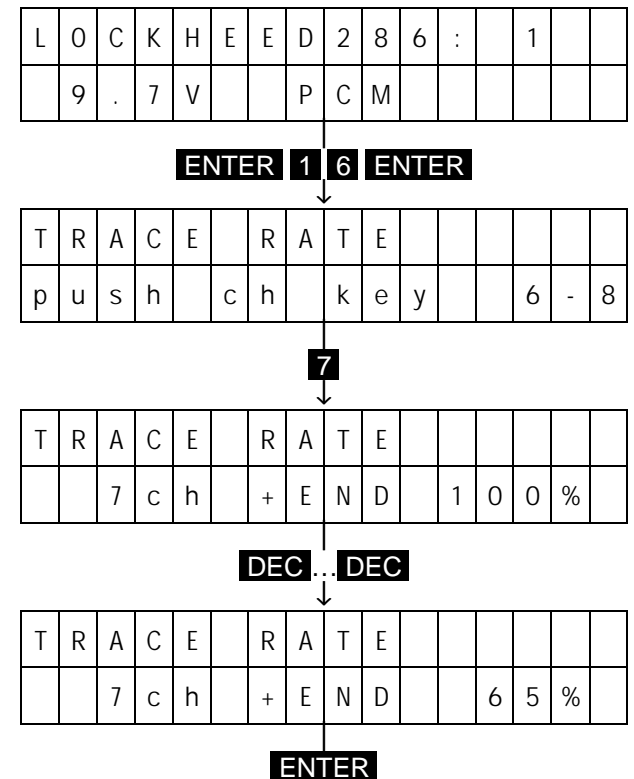
a.) Normal adjustment (Aerobatics)

Set-up your model, in the way the preceding section described, whereby you perhaps now select a somewhat higher main rotor RPM than before when set-up for hovering flight. Set-up the throttle and pitch adjustment, so that the model hovers again with the collective pitch stick in the central position. Likewise, reduce the pitch maximum accordingly, so that the main rotor RPM does not drop if one gives full pitch, and adjust the remaining settings to the higher RPM. We then estimate the gyroscope effect and set the adjustment with sliding control (CH 7). Shift this up to the upper limit (for max. gyroscope effect) and reduce the effect of this sliding control with Code 16 (Operating Element Adjustment). Input:

ENTER 1 6 ENTER 7

Reduce the displayed value of 100% using the **DEC** key to approximately 60 – 70% and accept the input with the **ENTER** key. You must now adjust the settings for the gyroscope further, with minimal gyroscope effect required, in order to achieve the same effect as beforehand. Then fly extensively with this adjustment, in order to optimise it, i.e. the tail of the model must not begin to oscillate in any flight situation, because of over-regulation by the gyroscope.

With everything adjusted, you can now make the adjustments for the alternative flight mode.



b.) Alternative Adjustment (Hovering flight)

First you must determine a switch (and have naturally installed and attach it) with which you will switch between aerobatics (Normal) adjustment and the alternative adjustment. In this example that is to be switch 8. You assign now this switch using Code 23 accordingly:

ENTER 2 3 ENTER

With the **INC** key, you move the arrow so it is before the "FL2" caption, and assign it to switch 8:

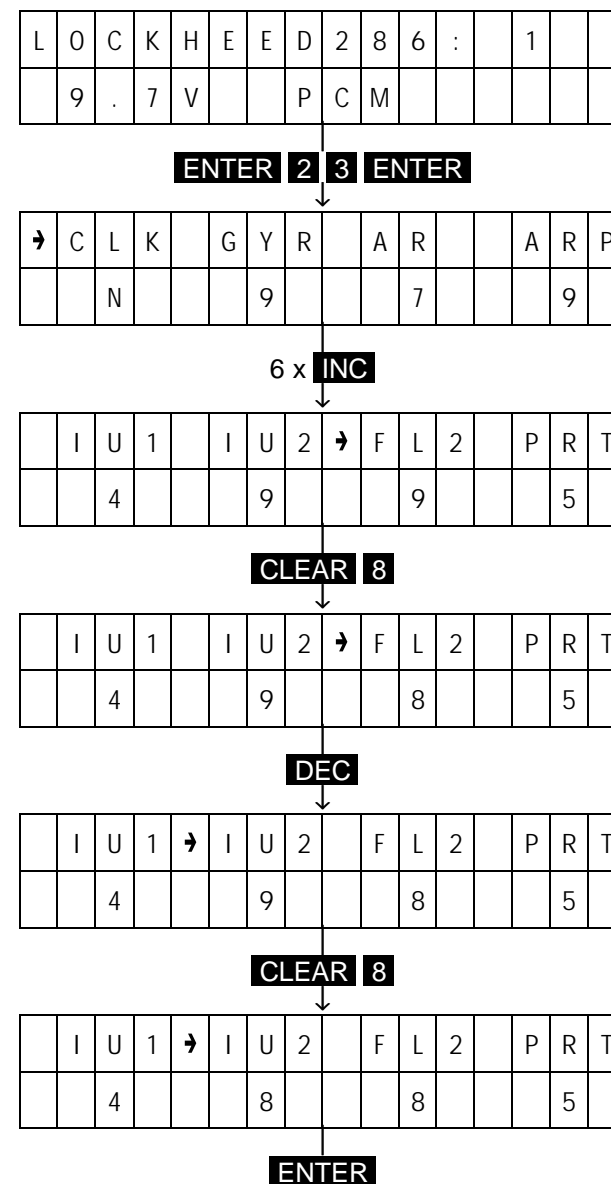
CLEAR 8

With this switch it is now possible to swap to collective pitch and gas settings for hovering flight as well as for maximum and minimum pitch in the appropriate menus, in each case set for the second flight mode. Additionally we wanted to activate another type of gas pre-selection (idle-up) for the hovering flight figures. Remember: for normal flying operation the gas pre-selection was set-up in such a way that in steep descending flight the main rotor RPM does not rise nor drop. The result is a model which is on the ground with an increased idling speed from this adjustment, but which does not achieve the hovering flight with the collective pitch fully back. This is also correct only for the moderate competition hovering flight figures, with which take-off is evaluated, for it does not handle descending flights from larger heights. With model the at the full hovering flight RPM which is attained on the ground, so that when taking off stable conditions prevail. For such purposes the PROFITRIM module possesses a second gas pre-selection, to which a switch can be connected, and then gas pre-selection 1 overridden. We will use this second gas pre-selection now for the hovering flight adjustment. It is activated, for good reason, with the same switch that switches between aerobatics and hovering flight adjustment, here that is

switch 8. Since you are still in the adjusting menu for the switch allocations (code 23), move you the arrow with back a step **DEC** to before "IU2", and assign switch 8:

CLEAR 8

Conclude the input with **ENTER**.



Helicopter Programming Examples

Now you input the values for the alternative adjustment. Those are, first hovering flight pitch (code 28), hovering flight throttle (code 84), maximum pitch (code 26) and minimum pitch (code 27). These values can now be pre-set only approximately, with final tuning taking place again in flight. Input thus:

2 8 ENTER

Read the adjusted value for the aerobatics adjustment (display "Normal"), then operate switch 8, so that in the display appears "FL2", and adjust the value here as appropriate, approximately 20% higher than the aerobatic figure. Conclude the input with **ENTER**.

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N		?	-				

2 8 ENTER

H	O	V	.		P	I	T	C	H					
					N	o	r	m	a	l				0

Operate switch 8

H	O	V	.		P	I	T	C	H					
					F	I	2							0

INC...INC

H	O	V	.		P	I	T	C	H					
					F	I	2						+ 2 2	

(Switch 8 to Normal flight)

ENTER

Place set the hovering flight throttle with:

8 4 ENTER

Again with the switch in the aerobatics position (display "Normal"), read the value then to switch to "FL2". Input here a value that is approximately 20% lower than the read from the aerobatic setting. Conclude also this input with **ENTER**.

Proceed forwards with the alternative adjustment for maximum pitch (code 26) and likewise place here a value approximately 20% higher than in the aerobatics adjustment. Finally with code 28 (minimum pitch) you set an appropriate value, which is approximately 20% lower than the value of the aerobatics adjustment. Now test this adjustment practically, and amend so that you achieve the point of hovering flight with the collective pitch stick in the central position at the desired, low number RPM (tuning Hover Throttle/pitch). Adapt the pitch maximum value in such a way that this RPM also remains constant with fully pitch. Proceed here very carefully, since these adjustments must correct be for the next steps. At the end you would have to be able switch between both adjustments during the hovering flight, with switch 8, whereby only the RPM changes, the model however with the same stick position remains in the hover.

L	O	C	K	H	E	E	D	2	8	6	:		1		
F	U	N	C	T	I	O	N		?	-					

8 4 ENTER

H	O	V	.				T	H	R	O	T	T	L	E	
				N	o	r	m	a	l		+				8

Operate switch 8
DEC...DEC

H	O	V	.				T	H	R	O	T	T	L	E	
				N	o	r	m	a	l		-				1 2

ENTER 2 6 ENTER

...

ENTER 2 7 ENTER

ENTER

If functioning perfectly you can program the gas pre-selection for the hovering flight adjustment:

8 5 ENTER

Operate switch 8 so that gas pre-selection 2 is displayed. Input 100% for G, then move the arrow with **TURN** to the point adjustment, and you input a value here of approximately 10. With this adjustment you obtain a so-called idle-up effect, i.e., if you move the collective pitch stick from the hovering flight position downward, the gas servo stops closely just below the carburettor opening for the hovering flight, so that after the landing with fully taken back pitch the full RPM is almost preserved. If, however, the RPM on the ground should increase during this adjustment, then you need to reduce the value for G accordingly, until this effect disappears.

L	O	C	K	H	E	E	D	2	8	6	:		1		
F	U	N	C	T	I	O	N		?	-					

8 4 ENTER

I	d	l	e			u	p	(	2	)	G			0	%	←
				P	o	i	n	t						0		

INC...INC TURN

I	d	l	e			u	p	(	2	)	G	1	0	0	%	
				P	o	i	n	t						0		←

DEC...DEC

I	d	l	e			u	p	(	2	)	G	1	0	0	%	
				P	o	i	n	t			-			9		←

ENTER

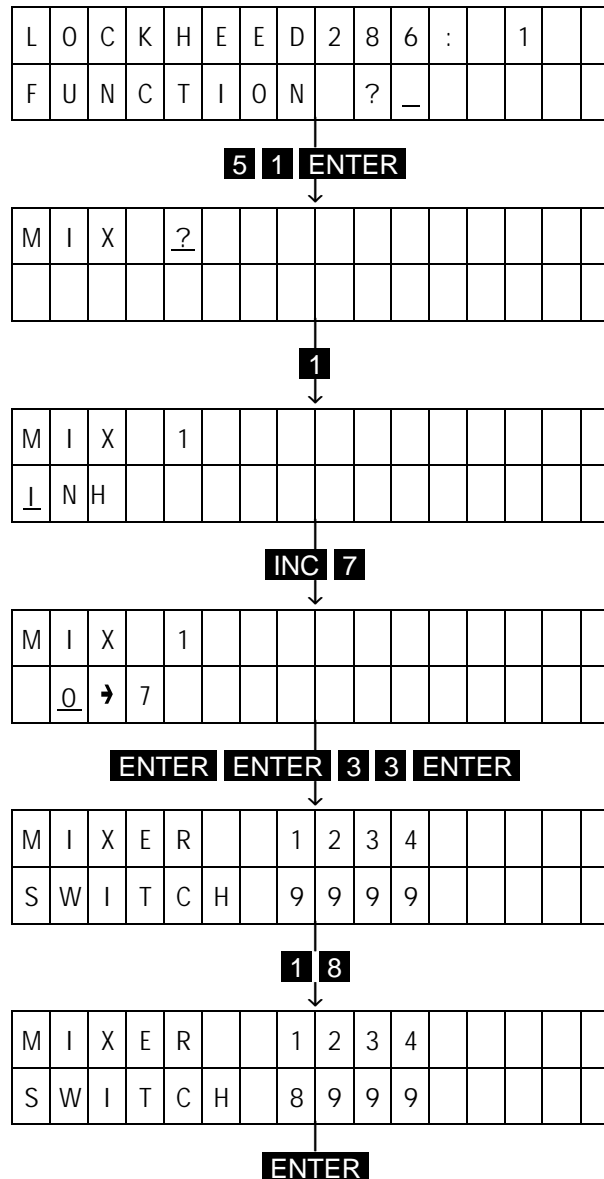
Helicopter Programming Examples

If the hover RPM you have selected is much lower than the one chosen for the aerobatic adjustments, chances that the gyro effectiveness which you had adjusted for the high aerobatics RPM will be a bit low because the tail rotor power had decreased with the lower RPM. This, however, can be expected and therefore you have provided for some reserve for the aerobatic adjustments with Code 16 (adapting the signal generator), which we will now make use of. Of course you could have reduced gyro effectiveness using the slider, and after switching you'd be able to use the same slider increase the gyro effectiveness again, but this would neither be convenient or reproducible. We therefore let this change be performed automatically and to do this we use one of the freely programmable mixers. This mixer will be programmed so that it adds a constant value to the one adjusted by slider 7 when it is turned on, using switch 8 again. The slider may now occupy a position at the upper stop as it's adjustment range has already been reduced using Code 16, so as to permit increasing gyro effectiveness with the mixer even in that case. To activate mixer 1:

5 1 ENTER 1 INC 7 ENTER ENTER

In this way, you have allocated the mixer inlet to a dummy mixer (phantom channel), which generates a constant value and switches the outlet of the mixer to channel 7, influencing the gyro. Allocate switch 8 to the mixer by:

3 3 ENTER 1 8 ENTER



The only thing left to be done now is to input the amount by which the gyro effectiveness is to be increased when the mixer is turned on. This is performed with Code 71 (asymmetrical mix), because the mixer, when turned on, is to increase gyro effectiveness but must not decrease it when turned off. So move switch 8 to the hover position and input:

7 1 ENTER 1

Start by setting a value of approximately 30% using the **INC** key and conclude the input by pressing the **ENTER** key. That's now set the difference in gyro effectiveness between hover and aerobatic modes. This value can also only be established correctly in flight so that helicopter doesn't oscillate about the vertical axis even in the hover, when the slider is positioned at the upper stop (maximum gyro effectiveness).

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	-					

7 1 ENTER

M	I	X	?											

1

M	I	X	1	S	E	P		0	→	7				
O	f	S		0	+	S	+				0	%		

INC... INC

M	I	X	1	S	E	P		0	→	7				
O	f	S		0	+	S	+			3	4	%		

ENTER

If you have made all the adjustments correctly up to now, you should be able to switch back and forward between the two adjustments when in the hover, with only the RPM changing, while the model with the same stick position keeps hovering with optimum stabilisation from the gyro. Depending on the type of helicopter, it may be necessary to alter the tail rotor trim when switching over. The model when travelling forward at high speed may be over compensated, which in turn has to be corrected by trimming to starboard. After switching to hover adjustments the model will then try and rotate clockwise about the vertical axis. This trim deviation can also be corrected automatically using one of the freely programmable mixers (3 of them are still available in this example). So program mixer 2 so that it will be active with the "hover" switch on and affect the tail rotor trim, but won't do so when the switch is in the "aerobatics" position. To achieve this, input:

5 1 ENTER 2 INC 4 ENTER ENTER

Mix a constant value into the tail rotor channel.

3 3 ENTER 2 8 ENTER

Allocate switch 8 again:

7 1 ENTER 2

You can now adjust the required trim change using the **INC** and **DEC** keys, and if necessary the **TURN** key to reverse the mix direction. Conclude the input by pressing the **ENTER** key.

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N	?	-					

5 1 ENTER 2

M	I	X	2											
L	N	H												

INC 4

M	I	X	1											

ENTER ENTER 3 3 ENTER 2 8

M	I	X	E	R			1	2	3	4				
S	W	I	T	C	H		8	8	9	9				

7 1 ENTER 2

M	I	X	2	S	E	P		0	→	4				
O	f	S		0	+	S	+				0	%		

Set with **TURN, INC, DEC**

M	I	X	2	S	E	P		0	→	4				
O	f	S		0	+	S	+			2	0	%		

ENTER ENTER ENTER

Helicopter Programming Examples

3. Automatic Autorotation Changeover

During competitions landings in autorotation are normally performed with the model flying downwind, approaches at a greater height and transitions into a moderately steep descent. The engine is the cut off, with the model continuing to descend in a normal manner. A 180° turn is performed, with the model finally settling down gently , in autorotation, on the intended landing spot (if done correctly).

With initiation of autorotation on the one hand require increased attention by the pilot for correct timing as well as precision control of his model, and on the other hand any correction of the direction of flight and the angle of approach impairing the score at contests. Shutting-off the engine manually will always pose a problem with the necessity to swap controls, which even with a control stick mounted kick button tends to divert the attention of the pilot.

For that reason, the PROFI-ULTRASOFT-Module provides automatic changeover in addition to the normal, manual, autorotation switch. On approach, at normal pitch, the autorotation pre-select switch is operated. Descent is the initiated by reducing pitch, whereby changeover (engine cut-off, activation of autorotation adjustments) occurs automatically on dropping below a preset pitch value, permitting the pilot to concentrate fully on controlling the model. Activation of the automatic mode by a separate switch offers the advantage that in an emergency the engine can be shutdown using the normal autorotation switch at any time, e.g. in the case of tail rotor failure.

To permit the use of an automatic mode, a switch has to be installed and connected, in this example to socket 3. The autorotation switch is determined by Code 23:

ENTER 2 3 ENTER INC INC INC

The arrow is now positioned to the left of the “ARP” caption, and switch 3 will be allocated by:

CLEAR 3 ENTER

You must now adjust the threshold point on the collective pitch control stick that you want autorotation changeover:

2 4 ENTER TURN

Move the collective pitch control stick to the full pitch position and actuate the autorotation preset (ARP) switch (3). The lower line of the display changes from “OFF” to “stdby”. When you now move the collective pitch control stick slowly in the direction of minimum pitch the display will change from “stdby” to “activ”, indicating that autorotation changeover has been actuated. This point is adjusted by the value to the right of “Pitch”, with 50 indicating a point right near the lower stop of the stick, while 100 refers to a point right below the hover point. Adjust to a value that suits your requirements and terminate input with the **ENTER** key.

L	O	C	K	H	E	E	D	2	8	6	:	1		
9	.	7	V				P	C	M					

ENTER 2 3 ENTER

→	C	L	K		G	Y	R		A	R			A	R	P
		N				9				7					9

3 x **INC CLEAR 3**

	C	L	K		G	Y	R		A	R		→	A	R	P
		N				9				7					3

ENTER 2 4 ENTER TURN

A	U	T	O	R	O	T		p	o	s			1	5	
O	F	F				S	T	I	C	K			5	0	←

INC ... INC

A	U	T	O	R	O	T		p	o	s			1	5	
O	F	F				S	T	I	C	K			7	5	←

ENTER ENTER

4. Flare Compensation

It is a unique feature of the HEIM mechanics that the swashplate will tilt forward slightly on reduction of pitch below the hover point. It is caused by the design of the compensating see-saw controlling pitching about the transverse axis and executing an arc shaped movement when doing so. Some helicopter pilots believe this forward tilt of the swashplate is meant to dampen a pitching up tendency of the model when in a fast descent, with the collective pitch markedly. This is a debatable assumption which is not positively supported in practice. The majority of pilots flying the HEIM helicopters believe the tilting of the swashplate to be a undesirable technical deficiency which has to be removed, and to achieve in some cases considerable mechanical efforts have been taken.

This effect is a feature of standard HEIM mechanics only. With swashplates with 3 or 4-point linkage hook-up the swashplate will move in a linear manner, without tilting.

To resolve this phenomenon the PROFI-ULTRASOFT-Module provides several solutions for a variety of goals:

- 1) Elimination of undesirable swashplate tilt on activation of collective pitch control in the case of standard HEIM mechanics.
- 2) Amplification and adjustment of the tilting movement of the standard HEIM mechanics.
- 3) Generation of swashplate tilt in models featuring symmetric 3 or 4-point swashplate connection.

The solution is practically the same for cases 1 and 2 where one of the freely programmable mixers is used. In this example it will be mixer No 4. As no reason exists why this mixer should be turned off once it has been adjusted correctly, no external switch will be allocated to the mixer. The mixer will remain permanently turned on. Call Code 33 (mixer switch):

ENTER 3 3 ENTER

To turn mixer 4 on permanently, allocate the phantom switch "9" to it, where this has not already been achieved during a reset:

4 9 ENTER

Now determine the functions to be linked by the mixer using Code 51. In the example function 1 (throttle / collective pitch) is to affect channel 3 (pitch):

5 1 ENTER 4 1 3 ENTER ENTER

Mix quota and direction are adjusted via Code 71 (asymmetric mix):

7 1 ENTER 4

Program the mixer offset onto the neutral position of the collective pitch stick (hover position) by moving the stick to the corresponding station and pressing the **STORE** key.

Now shift the stick to the minimum pitch position and adjust the mix quota and direction using the **TURN** key so that the swashplate tilt can be compensated for, amplified or reduced, as desired. Terminate input by pressing **ENTER ENTER ENTER**.

L	O	C	K	H	E	E	D	2	8	6	:	1		
	9	.	7	V			P	C	M					

ENTER 3 3 ENTER

M	I	X	E	R			1	2	3	4				
S	W	I	T	C	H		8	8	9	9				

ENTER 5 1 ENTER 4 1 3

M	I	X		4										
	1	→	3		T	R	I	M		0	F	F		

ENTER ENTER

L	O	C	K	H	E	E	D	2	8	6	:	1		
F	U	N	C	T	I	O	N		?	-				

7 1 ENTER 4

M	I	X	4		S	E	P		1	→	3			
O	f	s			0		+	s		+			0	%

(Collective Pitch stick to Minimum Pitch)

INC (TURN)

M	I	X	4		S	E	P		1	→	3			
O	f	s			0		-	s		-		3	0	%

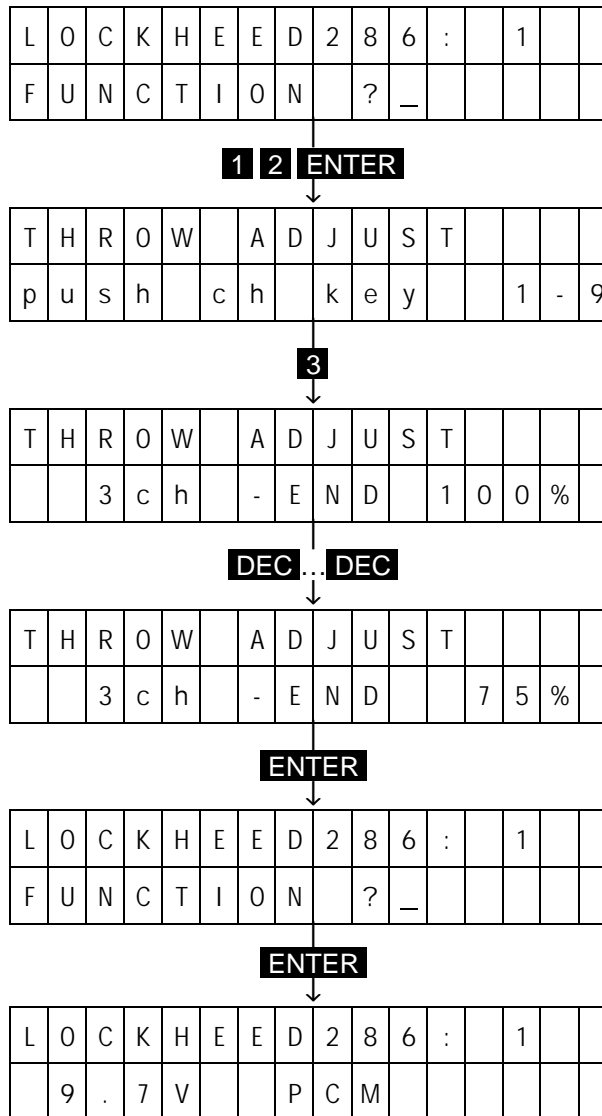
ENTER ENTER ENTER

Helicopter Programming Examples

Several options for providing swashplate tilt exist in the case of symmetrical 3-point (120°) hook-up. One may, as described overleaf, use a mixer and control the aft servo as required, this type of set-up corresponds exactly to one described there. A simpler method though is reduce the throw of the aft servo from below the centre position. This produces the same effect, therefore call Code 12:

1 2 ENTER 3

Now move the collective pitch stick to the minimum position and reduce the indicated value using the **DEC** key until the desired swashplate tilt is obtained on operation of the collective pitch control. Terminate input by pressing the **ENTER** key.



General Changes compared to the MULTISOFT-Module 128K

Model selection and Trim Storage

Trim data storage is no longer performed automatically on changing from one model to another (Code 56), it must now be performed using Code 59 by the operator.

Calling a certain model with Code 56 can either be performed directly by entering the model number concerned as before, or by stepping through the list of models using the **INC** and **DEC** keys. In both cases the name of the model that has been called appears in the lower line of the display. The relevant model program can then be activated by pressing **ENTER**, or another model chosen by entering the number or stepping through the list once more. Alternatively, it can be deleted by pressing the **CLEAR** key.

Analogue Data Adjustment

The function of the **INC** and **DEC** keys can be taken over by a proportional rotary module (Part No. 4111) wired to connection "AUX", or by a proportional module (Part No. 4152).

Calling functions is performed as before, with one exception: at stations where adjustments are to be made using the **INC** and **DEC** keys, the control has to be activated with key **9**. Adjustments can then be made using the proportional control with the indicated value corresponding to the current position of the control. In the case where adjustment range of the proportional control proves inadequate to obtain the desired value, turn to control off with the **INC** or **DEC** key on reaching the end point, reset it to a new position, and turn it on again with key **9**. This procedure can be repeated as necessary.

With the PROFITRIM-Module installed the lower right trimmer assumes the function described above. It's normal function is automatically interrupted in this case.

Overview of Function Codes Mode

This mode of operation allows an overview of the function codes by pressing the **LIST-DM** key, then forwards with the **INC** key and backward with the **DEC** key. Once the desired code number has been found, it is selected by pressing the **ENTER** key. Adjustments can then be made using the **INC** and **DEC**, **CLEAR** and the **1...9** keys.

The overview is left by pressing the **CLEAR** key, whilst a new code is displayed, with code number and title of that code in the lower line of the display.

Operating Elements

The operating elements (e.g. slider-type control, channel switch) which are plugged into connections "5ch"... "7ch" may be allocated to other functions and reversed without having to change their connections. Furthermore, one operating element can be used to simultaneously affect several function inputs.

External Switches

External switches are no longer determined by their plug connections, but are allocated by programming. To achieve this Code 23 (function switch), Code 33 (mixer switch) and Code 34 (dual rate / exponential switch) are available. The only switches excluded are those for the automatic manoeuvre and the switch for the countdown timer, which still have dedicated permanent plug connections.

External switches may be allocated to any desired number of functions. For helicopter programs, they can also be programmed for use as the operating elements for channels 7, 8 and 9. In this role, they are processed the same as a two position channel switch module without neutral position.

Changeover of MULTISOFT / PROFI-HELISOFT / SUPERSOFT

Adjustments established with the MULTISOFT-Module can also be operated under a PROFI-ULTRASOFT-Module and, if desired, supplemented by new functions as the relevant changes are made automatically. Only the switch allocation (Codes 23, 33 and 34) if used and the model name (Code 32) will have to be entered from new. Model types which are no longer contained, such as the older Helicopter types, will continue functioning nevertheless.

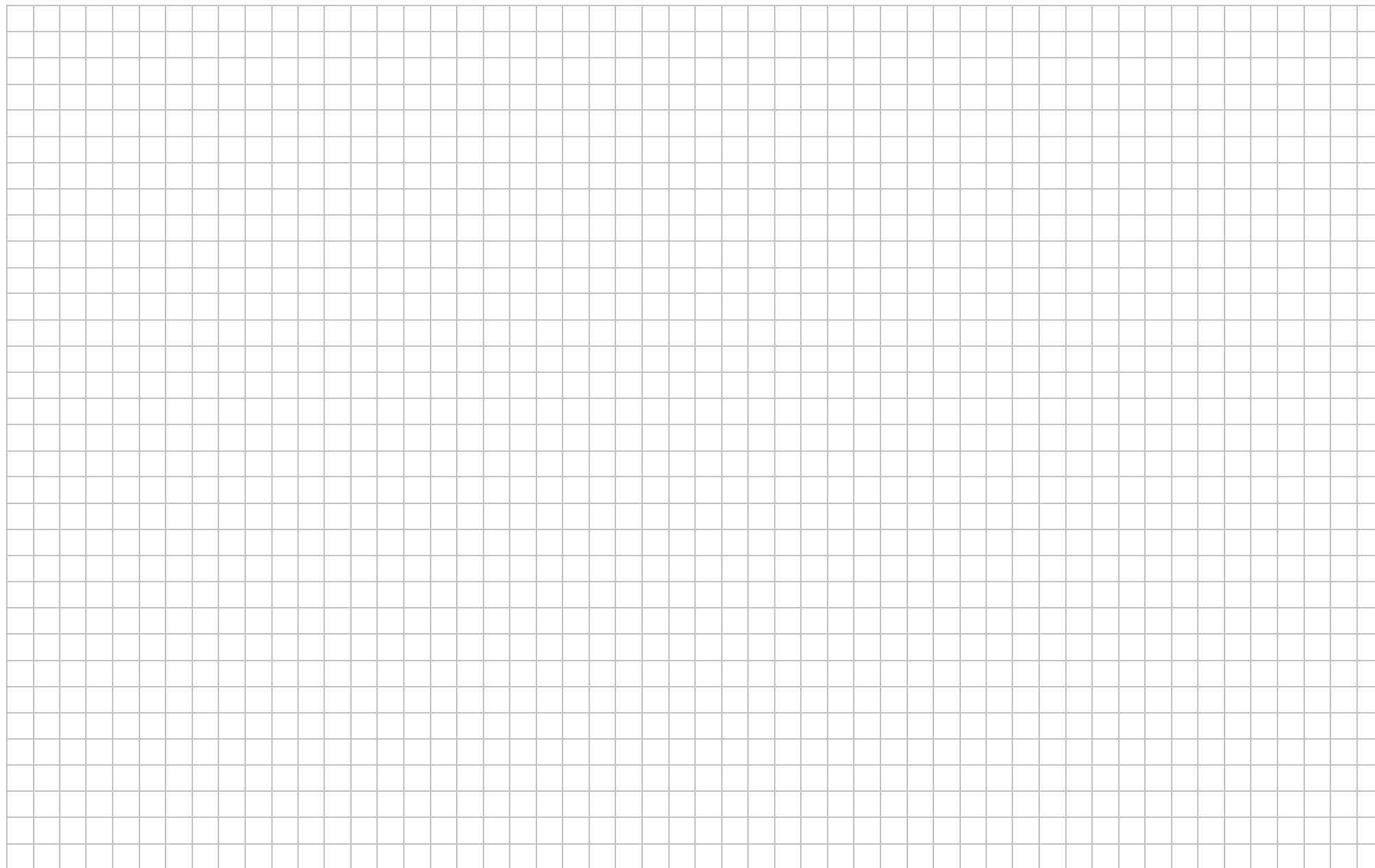
Model adjustments performed with the PROFI-HELISOFT-Module or the SUPERSOFT-Module have to be deleted using Code 56 in all circumstances and the re-entered afterwards.

As a result of the combination of the MULTISOFT-Module, SUPERSOFT-Module and PROFI-HELISOFT-Module some changes to the code numbers of the SUPERSOFT and PROFI-HELISOFT had to be made.

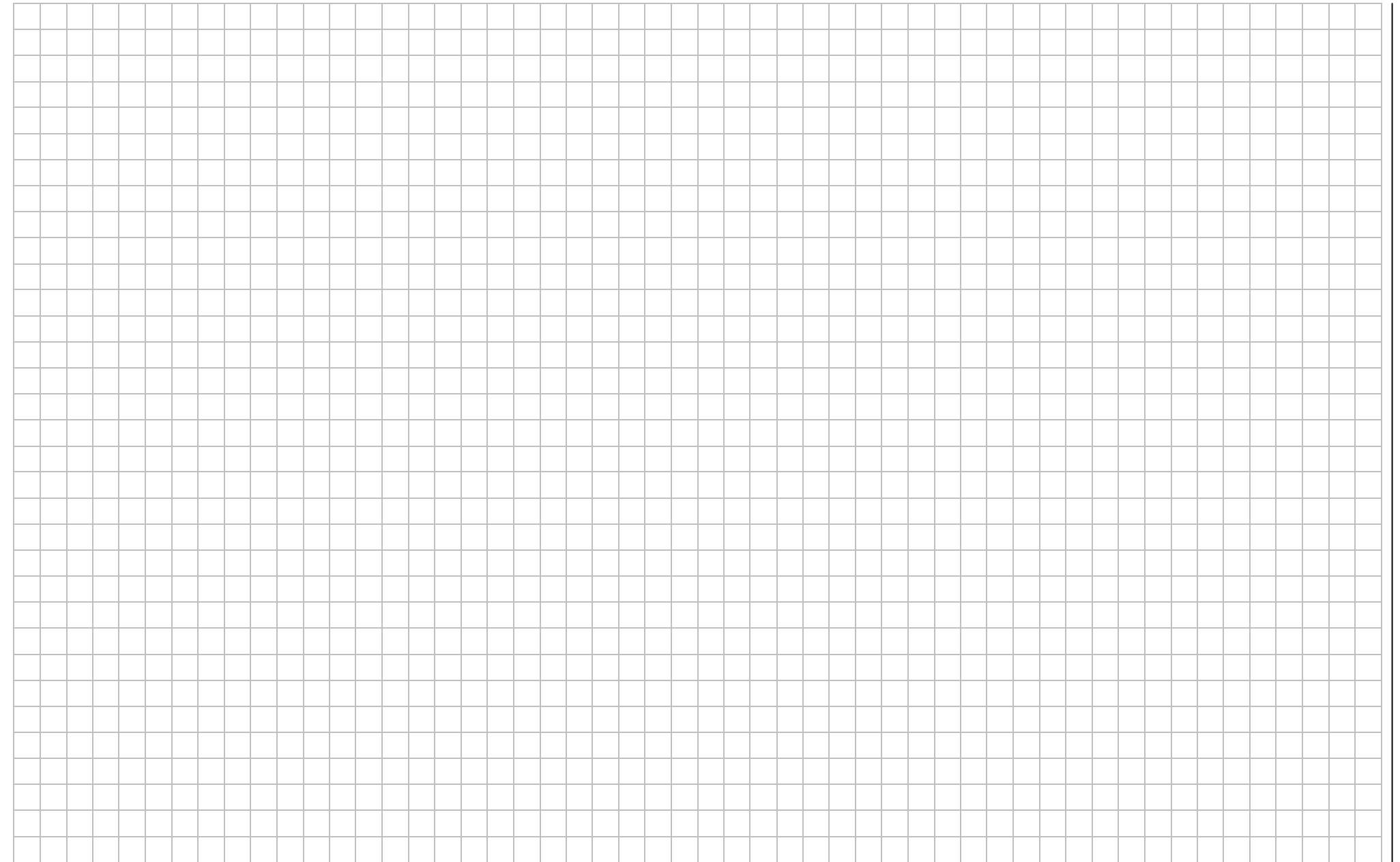
The table below compares the old and the new input codes of the Helicopter section and includes new options.

Code PROFI- ULTRASOFT	Subject	Code PROFI- HELISOFT
67	Rotor Rotation Clockwise / Anticlockwise	45
68	Swashplate Type	58
69	Swashplate Mixer	62
21	Collective Pitch Stick Direction	21
24	Autorotation Switch-over	26
25	Set-up for Inverted Flight	65
26	Maximum Pitch Set-up	68
27	Minimum Pitch Set-up	69
28	Hover Pitch Set-up	67
29	Throttle Trim Allocation	-
75	Swashplate → Tail Rotor Mix	-
81	Static Torque Compensation	46
82	Dynamic Torque Compensation	47
83	Positions Tail Rotor in Autorotation	42
84	Set-up for Hover Throttle	27
85	Set-up Throttle Presets	28
86	Swashplate → Throttle Mix	31
87	Tail Rotor → Throttle Mix	41
89	Set-up Gyro	74
91	PROFITRIM On / Off	81
92	Switch Slow-Down on Start-Up	-
93	Virtual Swashplate Rotation	-

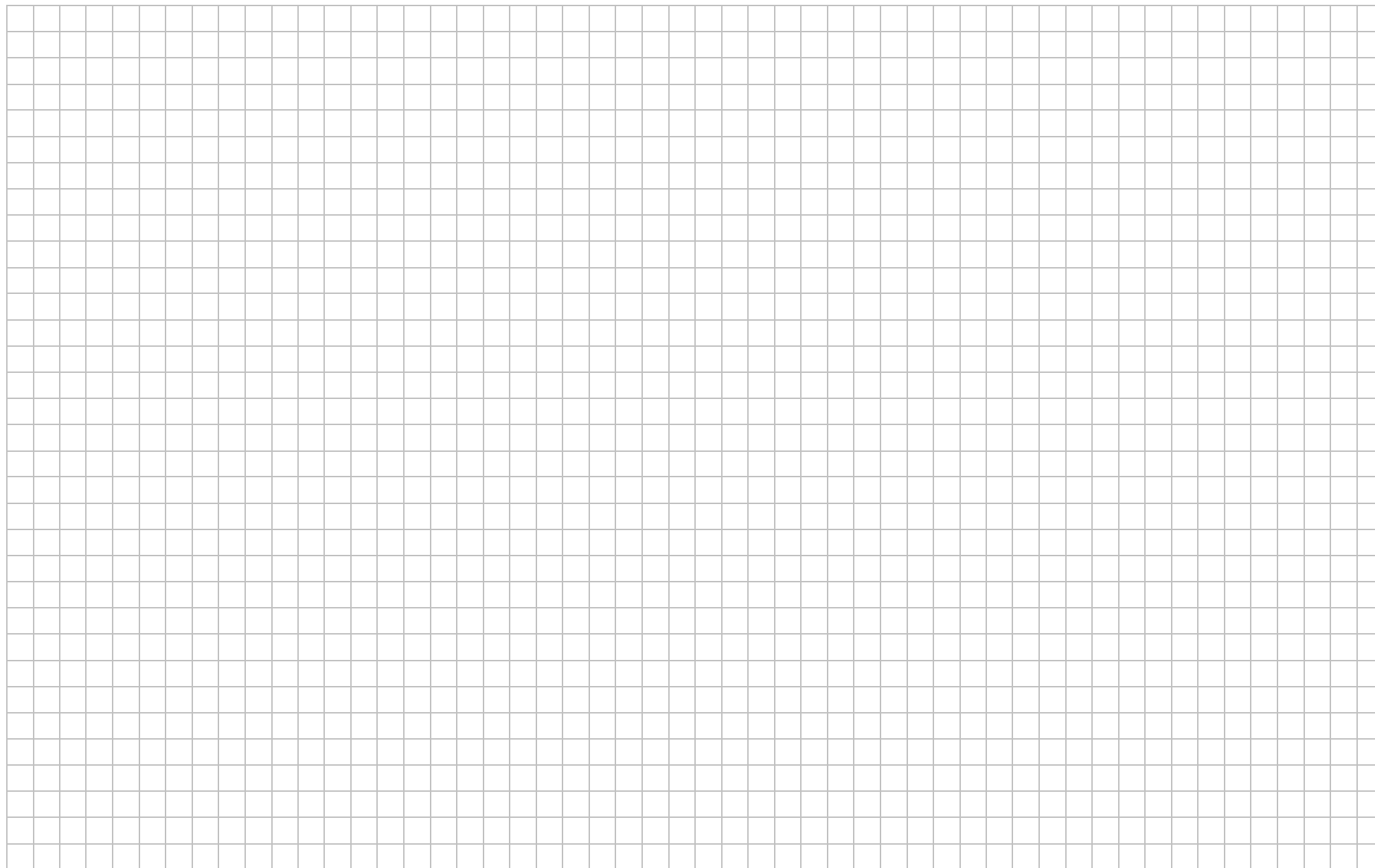
For Your Notes



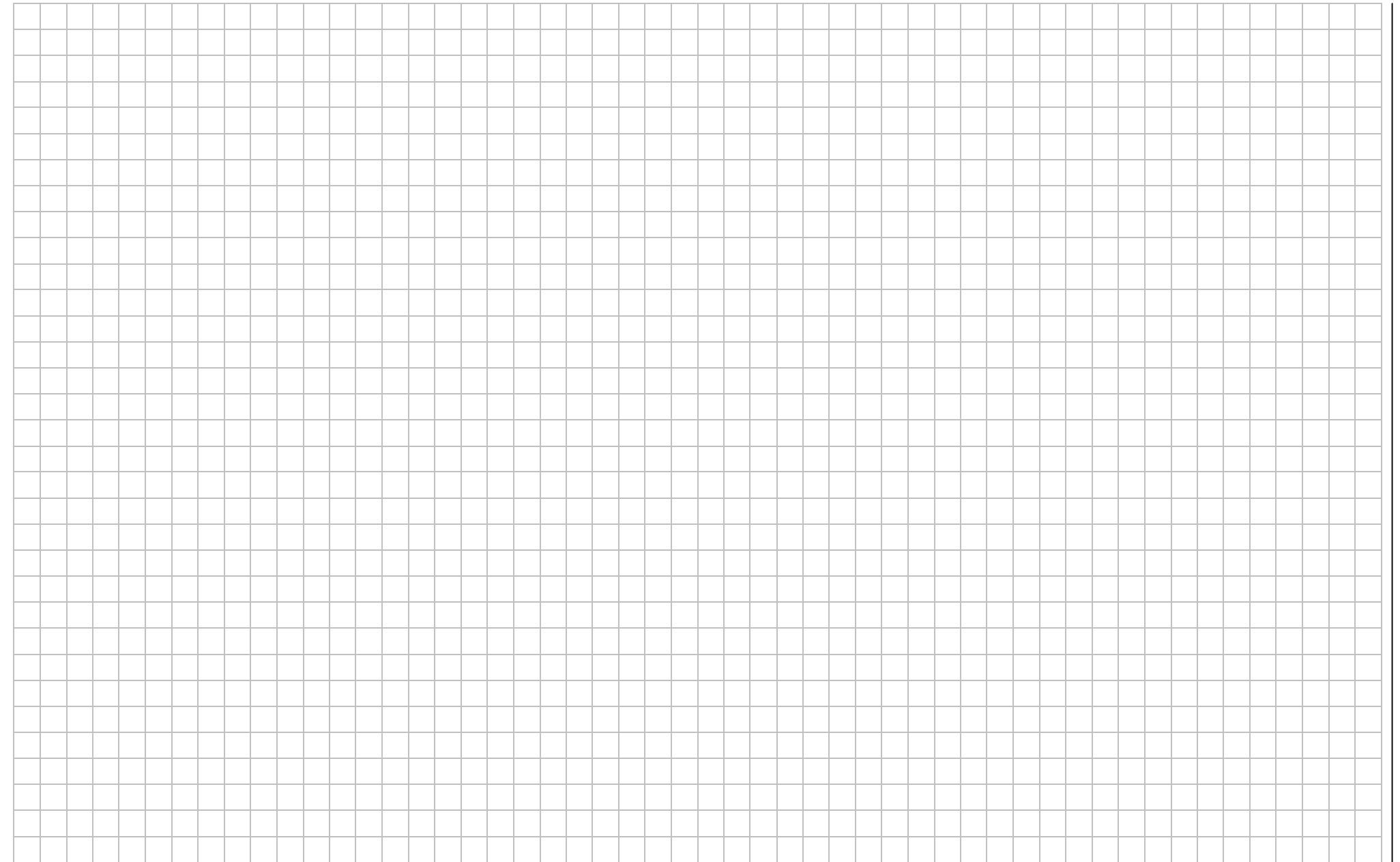
For Your Notes



For Your Notes



For Your Notes



JOHANNES GRAUPNER
POSTFACH 1242
D-7312 KIRKCHHEIM-TECK
GERMANY

Modifications as well as delivery opportunities are reserved.
Supply only by the specialized trade.
Sources of supply can be proven.
No responsibility is accepted for mistakes.