Code 96
Teacher / Pupil
Setting-up the Teacher / Pupil Interface

This function provides the facility of allowing a student to have control of selected channels, with the teacher retain control of the remaining functions. Transfer of functions is activated with an external switch.

Student's Transmitter

It is important that all mixers, Dual-Rate / Exponential functions, etc., must be cancelled, since these are activated at the teachers transmitter. The modulation should be set to PPM, even where a PCM receiver is used (the teacher's transmitter can be set for PCM mode). It is important that the order of channels connected to the control board are the same as the instructor's transmitter.

You should therefore clear one memory (Code 56), set the modulation to PPM (Code 95) and enter the name (Code 32). It is then only necessary to select the desired control mode (Code 57) and, if required, activate the idle trim (Code 18).

Other transmitters equipped with the standard T/P interface can also be used as the student's transmitter.

Teacher's Transmitter

Requirements are an mc-20x transmitter, with fibre-optic interface with transmission through a 10-way plug.

Using Code 23, an external switch is allocated to the "T/P" function, which automatically controls the signal transmission.

Code 96 is used to select the functions that the student can use, with channels 1…8 being selectable individually by pressing the keys `1`…`8`. The chosen channels will be displayed in the lower left of the display.

Always check that the controls for these channels are connected in the same order in the student's transmitter, e.g. channel 1 operating the throttle / spoilers.

Channels chosen using Code 96 will not be stored just for one model, but will be available to all models. For models with no "T/P" switch allocated, Code 96 will display the caption "INACTIVE". When a switch has been allocated, but not operated, the caption "sw off" will be on the bottom right of the display.

When the switch has been operated and the selected channel numbers are flashing, no connection to the student's transmitter has been established, or the transmitter is turned off.

Safety Device

When no signal can be established with the student's transmitter, the control functions are automatically transferred back to the teacher's transmitter.

Code 64
Flight Timer
Additional Elapsed Flight Timer

This additional timing system has been designed for use where Total Flight Time and In-Flight Elapsed Time are required to be monitored simultaneously, e.g. in electric flight.

This new facility is an add-on to the existing mc-18 timer system and can not be operated separately. The new timer is activated by Code 64, Flight Timer.

To activate press the `INC` or `DEC` keys whilst in Code 64. To deactivate, press the `CLEAR` key. The status of the flight timer is displayed as "yes" or "no".

Once activated the timer remains available for the model until later deactivated by the user. The new timer appears beside the model name, above the original timer display, and therefore overwrites the model number when in use.

Note that the clock is not immediately displayed after switching on or after selecting a new model using Code 56. It will appear as soon as the clocks commence timing.

Assuming that a switch has been allocated to activate the standard clock, (Code 23, "CLK" function), both timers will start simultaneously when the switch is activated, and will run in parallel until the switch is turned off again.

At this point, this Flight Timer clock will continue to run, whilst the standard timer will stop.

The switch may be operated repeatedly causing one clock to measure the time the switch has been made, and the other the total time since the switch was first operated.

This feature is very useful if the timer is allocated to another switch, e.g. an electric motor on/off switch, in which case the pilot may record both motor on time and elapsed time.

Code 62
5-P Throttle
5 Point Throttle Curve

Codes 23 & 56
In-Flight Model Memory Swapping
F3B and Helicopter programs only

Note: the Flight Timer display can be frozen at any time the clocks are running by pressing the ENTER key. The clock will be still running and will resume displaying at it's correct value when the ENTER key is pressed again.

I reality, the Flight Timer can not be stopped once started except by resetting, which is achieved by stopping the standard clock and then pressing the CLEAR key. This resets both clocks to zero.

This code allows the user to influence the position of the throttle servo at the ¼ (-50%) and ¾ (+50%) collective pitch points. These settings are separate, and in addition, to the options for IdleUp, Idle Trim. This additional positioning is an option for those who want to take advantage of it, and should Code 62 not be used the original positions set will be retained.

Of course, one should initially trim the model using the existing functions before using Code 62. The values indicated are not absolute positions, but corrections to the curves already set-up. The throttle curve which results from idle-up and idle trim will be modified accordingly.

After choosing Code 62, the following indication appears in the display:

5	P	-	T	H	R		-	5	0	%				0	←
N	o	r	m	a	l		+	5	0	%				0	

The value to the right of the "-50%" indicates the value that has it's strongest influence in the –50% (or ¼) collective pitch / throttle stick position. The effect of this offset reduces linearly between the stick positions of –100% and 0% (minimum and neutral stick). The value behind the +50% equates to the ¾ stick position in a similar way.

The arrow indicates which setting is to be changed, and can be moved with the TURN key. The value can be adjusted by ±64 steps using the INC and DEC keys, allowing extremely unusual throttle curves to be created (±64 steps equates to about 50% servo travel).

The lower left of the display indicates the flight phase that the current adjustments will be active in, "Normal" of "FL2".

The active memory controlling a model may now be changed whilst in-flight. This greatly extends the "Flight Mode" switching capabilities of the mc18 transmitter.

The model memories for this function must be numerically consecutive in the memory.

The primary memory, that selected using Code 56, must be the lowest number in sequence.

One or two alternative model memories are activated by mixer switch(es) as determined with Code 23 in the primary memory. With the primary model selected, simply enter the switch numbers that will select the alternate memories under the "MO2" and "MO3" captions.

"MO2" is the next highest memory to the primary, with "MO3" being one higher memory number than that.

Normally a three-position mixer switch (Part No. 4160/22 – differential switch) would be used for this purpose. This ensures that "MO1", "MO2" and "MO3" can only be selected independently.

Switching between memories is not possible whilst in programming mode.

Example:
Set-up memory 4 as the Primary F3B model, allow memory 5 to be "MO2" (Speed Trim) using mixer switch 3, and memory 6 to be "MO3" (Distance Trim) using mixer switch 7.

Code	Primary "MO1"	"MO2"	"MO3"
56 - Model Select	4		
Perform program set-up			
94 - Copy Model	4 →	5 →	6
Ensure you are in memory 4			
23 - Switch Allocation		MO2=SW3	MO3=SW7

This example procedure:

- Initialises memory 4 as Primary memory (Code 56).
- Allows programming of memory 4 using the codes required.
- Copying of memory 4 to memories 5 and 6 (Code 94).
- From memory 4, shows that memory 5 is "MO2", accessed via switch 3, and that memory 6 is "MO3" and accessed with switch 7 (Code 23).

It is worth naming the models to reflect their relation to the other models in the set. For example, "Ellipse PRI", "Ellipse MO2" and "Ellipse MO3" for memories 4, 5 and 6 respectively.

When you have finished programming and are in memory 4, you should see "Ellipse PRI" as the model name. On setting switch 3 you should see "Ellipse MO2", and on operating switch 7, "Ellipse MO3".

NOTE: If you try to enter program mode whilst switched into a secondary model, the following options will be blocked and "INH (WRONG TYPE)" will be displayed.

- 77 – FAIL SAFE MEM
- 78 – FAIL SAFE BAT
- 95 – MODULATION
- 97 – ALARM TIMER

During use, these values are taken from the primary model.

If two separate mixer switches are used for "MO2" and "MO3", and they simultaneously switched on then "MO3" has priority. It is safer to avoid this problem by using switch Part No. 4160/22 for model selection.

Finally, if a primary memory is copied to another memory, the "MO2" and "MO3" switch settings both revert to "N" during the copying procedure.

Caution
Clearly the mc-20 must be organised around the model group logic. It is perhaps best to think of primary and secondary models as a fixed group.

From the preceding, it is possible to enter programming mode whilst switched to "MO2" or "MO3" to effect program changes without using Code 56 and directly entering the model number.

Once you have established "MO2" and "MO3", we suggest all further programming of these memories be done from the primary memory after operating the appropriate mixer switch, and NOT directly using Code 56. In this way, the system provides the maximum assurance that errors and conflicts between models are avoided during further programming of secondary models.

If a 10 channel receiver is used with the mc-20, 10 servos can be operated.

Movement of the tenth servo can only be achieved using the free mixers, programmed using Codes 51, 61 and 71.

These mixers allow control of the servo direction and travel volume.

Channel 10 can only be used as a "Slave" to other channels. That is, there is no other way of inputting movement to a servo connected to channel 10.

If a dummy-mixer is used, a two position switch can be used to drive channel 10 between two positions set by the mixer adjustments (with Code 61 or 71).

To select channel 10 in Code 51, press the **INC** key.

Compression of the data transmission by the transmitter may cause the servo connected to channel 10 to operate unevenly or in spurts.

This is similar to the problem to channel 9 with the mc-18.

Further, channel 10 can not be programmed in failsafe. In a failsafe condition, the servo connected to channel 10 will adopt a neutral (centred) position.

Code 55
Tachometer
Built-in Optical Tachometer

It is now possible to connect tachometer hardware to the mc-20 to allow RPM measurement of a propeller or helicopter rotor blade.

The mc-20 allows for the rotating objects having between 1 and 8 blades.

To enable this facility use:

5 **5** **ENTER**

On entering the subroutine, the number of blades to be counted will be displayed, if previously set. After about a one second delay, display of the measured RPM commences:

	R	P	M					2	-	B	l	a	d	e
				0		R	/	M	I	N				

If you wish to change the number of blades, press the **CLEAR** key at any time and the revised number of blades may be entered, using keys **1**…**8**, before continuing measurement.

You can also freeze the displayed RPM by pressing the **STORE** key whilst the value is displayed on the screen.

Code 76
Servo Test

For safety reasons, the servo test is no longer activated immediately on entering Code 76.

The message "ENTER=SERVOTEST" is displayed. You may proceed by pressing the **ENTER** key, or abort by pressing any other key.

Codes 51, 61 and 71
Programmable Mixers

The range of values for the freely programmable mixers (Codes 51, 61 and 71) have been extended to allow 150% (instead of the original 100%).