robbe
Futaba

Operating Instructions

FC- 16 Boat `n Truck

40 MHz 6/8/1 No. F4044

CONTENT

SAFETY ADVICE, PLEASE TAKE NOTE.

Before operating the equipment, please read these instructions paying special attention to the safety advice given here. If you are operating a radio-controlled model for the first time, we strongly recommend that you engage the help of an experienced modeller.
This radio control system has only been designed and approved for the operation of radio-controlled models. robbe Modellsport accepts no responsibility if used for other purposes.

SAFETY ADVICE
Radio controlled models are not toys in the normal sense and should not be operated by anyone under the age of 14 years old without the consent and supervision of a responsible adult.

Their construction and operation requires technical understanding, careful assembly and safety awareness in operation. Mistakes or carelessness in the build or operation can lead to serious damage to persons or property.

As the manufacturer and re-seller has no influence over the safe construction and operation of the model, this risk is advised to you and we absolve all responsibility for damage to persons or property, howsoever caused.

Mechanical or electrical technical defects, can lead to an unexpected starting of drive motors. This can in turn lead to parts being thrown from the drive train at high speed. Operation of the receiving system without the transmitter being switched on can lead to unexpected operation of motors and servos.

Therefore the possibility of serious wounding is always there. All such driven rotating parts, offer a permanent threat to subject damage to persons or property.

Avoid all personal contact with such parts of the model.

Never put your hands or body near the danger areas of electric motors whilst they are connected to their power batteries. Ensure that no other objects or clothing come into contact with rotating parts!

Protect your equipment from dust, dirt and dampness. Keep it away from excessive heat, cold and vibration. The equipment is designed to operate in an ambient temperature range from –15 to +55 Celsius.

Use only the recommended chargers and charge your batteries for the prescribed times. Take note of the advice given by the battery manufacturer. Incorrect and over charging can lead to explosion of the batteries. Ensure correct polarity is maintained.

Avoid shock or constant pressure loading on the electronic parts of the system. Check for damage to casings and cables after a crash. If a part becomes damaged or wet (even after drying out) do not re use! Either send to robbe service to check or replace the affected part yourself.

Hidden damage can occur through ingress of water or after a collision, this can lead to function failure after a short operation time. Only genuine robbe replacement parts or accessories may be used with this equipment.

Always use genuine robbe-Futaba connectors and crystals. No modifications may be made to the equipment.

Routine checks before use

If there is more than one modeller operating at your model site, please check that no one else is using your frequency before turning on your transmitter.

- Observe any frequency control procedures in operation at the site.
- The transmitter aerial must be fully extended and secure in its mounting
- Before switching on the receiver, ensure the throttle stick is at its lowest setting.
- Always turn the transmitter ON first, then switch the receiver on
- Always turn the receiver OFF first, then the transmitter off
- Make a range check with collapsed transmitter aerial
- Go through a control check, taking special note that servo direction and throw is correct for your model.
- Are mixers and switches in their correct positions?
- Is the battery condition sufficient for operation?
- Any doubts, don't operate the model!!

Model operation
- Don't put people or animals at risk
- Don't operate your model near locks, weirs or other water users
- Don't operate your model on public roads, motorways, footpaths or other public areas etc.

Don't operate your equipment in rain or stormy conditions.

For full control of your model, you must have the transmitter aerial fully extended. Don't point your aerial directly at the model as the signal strength will be at its lowest. It is always best to have your transmitter aerial acting parallel to the model axis.

When several transmitters are in operation and on neighbouring channels, it is recommended that you stand in a group to avoid unwanted interference from or to the other models.

Insurance
Ground-based models are usually insured by your own private liability insurance, check that your insurance includes models and has sufficient third party liability cover.

Liability exclusion:
robbe Modellsport are not in a position to influence the way you install, operate and maintain the radio control system components.
For this reason we are obliged to deny all liability for loss, damage or costs which are incurred due to the incompetent or incorrect use and operation of our products, or which are connected with such operation in any way.

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

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

1 .   CONTENTS

1 FC-16 Boat 'n Truck transmitter
1 R118F FM receiver
1 S3003 servo with accessory bag
2 Linear proportional potentiometer controls
1 Switch harness with charge cable
1 pair of crystals

1.1.   RECOMMENDED ACCESSORIES

• 9,6 V 1500 mAh transmitter battery	No. 4566
• 9,6 V 3500 mAh transmitter battery	No. 4569
• 4,8 V 2000 mAh receiver battery	No. 4551
• F series transmitter charge lead	No. 8262
• Transmitter charge lead	No. F1415
• Receiver charge lead	No. F1416
• Neckstrap	No. F1550
• Aluminium Tx case	No. F1556

2.   CONTROL LAYOUT

2.1   FC-16 BOAT 'N TRUCK TRANSMITTER

FC-16 Boat 'n Truck transmitter as supplied.

CAMPac memory module

Aerial socket

Neckstrap ring

Option well for Multi-Prop or Multi-Switch modules

Option well for Multi-Prop or Multi-Switch modules

Channel 3 trim

Linear proportional control well

Left hand stick unit

Right hand stick unit (throttle)

Channel 4 trim

Throttle trim

Channel 1 trim

Charge socket

On-/Off switch

LC- Display

Mode keys

Data "+"/"-" keys

Cursor keys
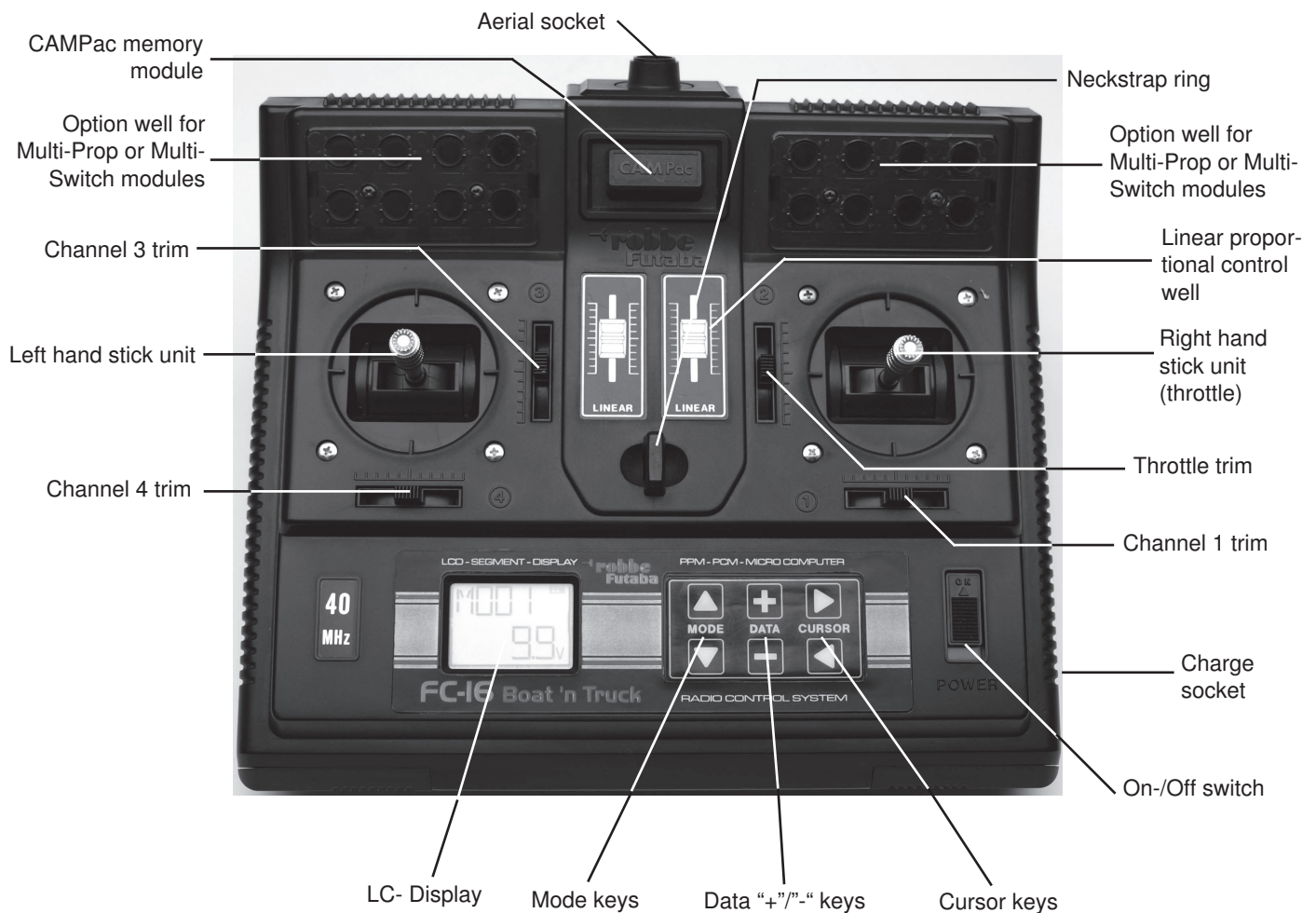
2.2   GENERAL DESCRIPTION FC-16 BOAT 'N TRUCK TRANSMITTER

The FC-16 Boat 'n Truck is a fully expanded 6 channel computer transmitter in an ergonomic hand held layout and has been specially designed for marine and truck modellers.

Expandable to 8 proportional channels, or by using the Multi-Switch/Multi-Prop modules, upto 6+32 switch functions or 6+16 proportional functions.

The transmitter includes all the important features that the advanced modeller might need.

Some key features of the system are:
*   The transmitter can be used in 1 of 2 modulation systems
1. Standard PPM (FM) modulation
2. 1024 bit Pulse Code Modulation (PCM-1024) modulation for fast and secure transmission
*   Clear 100 segment Liquid Crystal Display (LCD)
*   10 internal model memories, expandable using CAMPac modules
*   4 character memory name
*   Servo reverse (REVR) and exponential (EXP) available on all stick controls
*   Servo end point adjustment (EPA), for each direction of travel
*   Low voltage alarm
*   Trim memory
*   Easy installation of option modules
*   Easy installation of linear proportional controls

It is recommended to use only rechargeable batteries in a finished pack form. The transmitter is supplied with a suitable charge sokket to enable simple and safe charging of the battery pack.

2.3   TECHNICAL DATA FC-16 BOAT 'N TRUCK TRANSMITTER

Frequency	40 MHz
Channel spacing	10 kHz
Modulation	PPM (FM)/PCM 1024
Current consumption	30/200 mA
Voltage	9,6V NiMH
Dimensions	230 x 200 x 50 mm
Weight	1000g (with battery)

Crystal — Servo sockets — Aerial — Battery socket

3.   R118F RECEIVER

The receiver covers a wide spectrum of uses with 8 channels in FM operation. Compact in size by use of SMD technology. The high quality FET front end and the Anti-Blocking double superhet guarantee a secure signal reception. Highly integrated IC receiver with ceramic filters specially designed for 10 kHz separation is the new standard. Even on low operating voltages, the receiver maintains a reliable signal reception.

3.1   R118F RECEIVER TECHNICAL DATA

Functions/channels	8 servos
Operating frequency	40 MHz
Modulation	FM (PPM)
Channel separation	10 kHz
Operating voltage	4.8-6 V
Current drain	10 mA
Weight	35 g
Aerial length	100 cm
Dimensions	60 x 36,5 x 20,5

4.   SERVO S 3003

Compact and robust universal servo with high torque of 32 Ncm. Assembled using the latest wire-less technology, where high resistance to vibration and long life expectancy can be expected to be achieved. The feedback potentiometer is fitted with 6 wipers and is backlash free. High technology at an attractive price.

4.1   TECHNICAL DATA S3003 SERVO

|	
Operating voltage	4.8-6V
Torque (Ncm)	32 Ncm @ (4,8 V)
	41 Ncm @ (6 V)
Speed (sec/45 degree)	0,18 @ 4,8 V
	0,14 @ 6 V
Battery cells (NiCad/NiMH)	4-5
Weight	37,2 g
Dimensions (mm)	40,4 x 19,8 x 36

5.   BATTERY OPERATION

5.1   BATTERY INSTALLATION AND REPLACEMENT

The FC-16 Boat 'n Truck is supplied without a battery pack. The battery compartment will be found in the rear of the case. To install or replace the battery, release the latches shown at the point marked X below, slide and lift to open, more information in section 7.2.

Battery recommendation:
9.6 Volt (8cell) 1500 NiMH welded transmitter pack, no. 4566, will give an operating time of 8 to 9 hours.
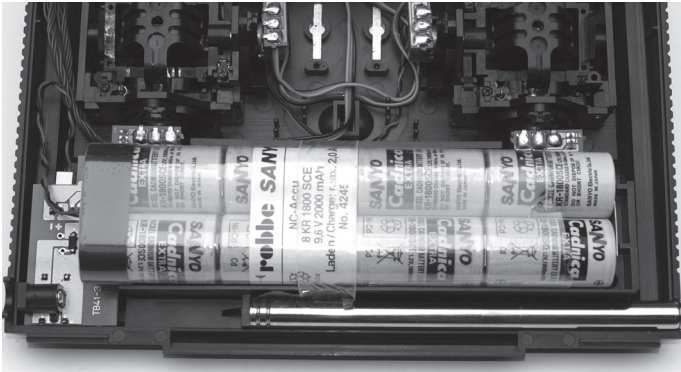
We recommend using only welded, factory made packs for the transmitter and the receiver in the model. Using single cells can result in loss of reliability due to breaks in the receiver power supply due to vibration/ loss of contact between individual cells.
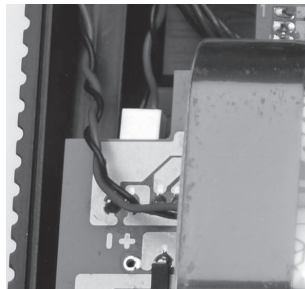
Installation of a factory made transmitter battery
•   Connect the battery plug to the transmitter socket ensuring correct polarity
•   Lay the battery into its compartment and close the lid.

When changing batteries, please check the charge state of the new pack. Switch the transmitter on and check the voltage on the voltmeter in the display (section 5.3). If the battery is not fully charged, then please recharge before further use. If the transmitter is not to be used for a while, we recommend removal of the battery pack and that it is stored indoors away from cold and damp over winter.

5.2   BATTERY CHARGING

On initial use, or after a long lay up, please trickle charge all the batteries at 1/10 the battery capacity. This will replace the lost charge and form all the cells to the same charge level. (E.g. 1500 mAh battery, charge at 150 mA)

Self-discharge rate of NiMH cells is approx 5-10% of rated capacity per month. That means after 10 months of inactivity, a fully charged battery will be flat, even if there is no load on it.

The transmitter battery can be charged without removal from the transmitter case by using the integrated charging socket located on the right hand side of the case.

For convenient charging, we recommend the robbe Unicharger no.8500.

To avoid a short circuit whilst charging, always connect the banana plug first to the charger. TAKE CARE NOT TO RE-VERSE POLARITY.

After the winter lay off, all batteries should be cycled at least once before use. Once this has been done, the full battery capacity and life can be expected.
To charge the transmitter or receiver batteries at a higher rate than 1/10 C, you must use a charger, which has a Delta-Peak Cut-off feature, (these batteries are sensitive to overcharging). In principle, you should be able to use almost any charger, which has "automatic cut-off", but do check the charger instructions.
The transmitter and receiver must be switched off whilst charging.

The transmitter battery should not be charged at a rate higher than 1 A. Otherwise, the charge socket and internal wiring will be overloaded and can be damaged.

Tip:
The transmitter is fitted with a diode for accidental reverse polarity protection.

If wishing to use a charger using the "Reflex Charge Method", please contact robbe service department for advice.

Reflex charging with the protection diode gives an incorrect Cut-Off and will overcharge the battery.

NiMH batteries are suitable for re-cycling; you have paid the fee in the purchase price. Please do not dispose in your normal household refuse! To protect the environment, please take your used battery to a local disposal point for recycling. All battery sellers will accept defective or used batteries at no charge. The cells will then be recycled thereby minimising environmental damage.

5.3   TRANSMITTER BATTERY VOLTAGE INDICATOR
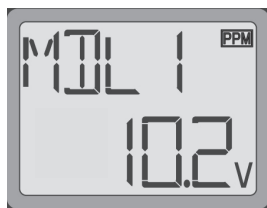
The battery voltage status is shown in the display. The voltage varies and dependent on charge condition between 10,8 V (full) and 9 V (nearly flat). If the indicated voltage reaches 9.4 V, then the battery needs recharging. If the condition is such that 8.9V is displayed, you must stop operation and recharge before continuing.
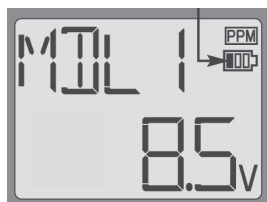
As soon as the voltage reaches 8.5 V, an acoustic and optical alarm will go off to draw your attention that the battery is flat and you must immediately turn off the transmitter and recharge.

5.4   OPERATION TIME

Using a 1500 mAh NiMH battery pack, the transmitter will have an operating time of between 8 and 9 hours.
The receiver operation time, on the other hand, is dependent upon the number of servos and friction in the control linkages as well as the frequency that they are moving. One servo typically draws between 150 and 600 mA in normal operation. Idle current is 5-8 mA.

Once the servo reaches its commanded point (neutral, end or in between position), the motor returns to an idle current, provided that the linkages have no friction, and that the servo is not reaching a mechanical limit. (A buzzing servo is drawing a heavy current and can drain a battery very quickly!)

6.   CRYSTAL CHANGE

Your transmitter and receiver may be operated on varying frequency channels within the 40 MHz band. Matching transmitter and receiver crystals must be fitted to their respective sockets in the transmitter and receiver cases. The channel number of both transmitter and receiver crystal must be the same for the system to work.
To change the transmitter crystal, you must open the transmitter case back; see section 7.2.

| **Transmitter crystals are marked with TX + channel number** | **Receiver crystals are marked with RX + channel number** | **Crystals for dual conversion superhets are marked with RX-DS + channel number** |

It is not possible use 35 MHz crystals in a 40 MHz receiver; the receiver will not work.

7.   TRANSMITTER ADJUSTMENTS

7.1   ADJUSTMENT OF STICK LENGTHS

The stick length may be adjusted in length to suit the best feeling for the driver.

Part A   Part B
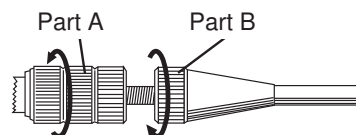
- **Loosen Part A and B**
- **Adjust stick length to suit by screwing in or out**
- **Lock part B against part A**

7.2   REMOVAL OF REAR COVER
The rear cover is held in place by two latches.

To Open
- Slide the two latches on case underside outwards and lift cover
- Remove/replace transmitter crystal

To close
- Carefully replace cover back into the case
- Close two latches to secure

7.3   CHANGING OF THROTTLE RATCHET
As delivered, the throttle stick is on the left hand side (Mode 2), if required, the throttle control may be moved to the right hand stick unit by the following means:

**Remove rear cover as described previously: (Looking from rear of case)**

1 Loosen return spring on right hand stick unit
2 Install spring on left hand stick
3 Locate the spring on the left hand neutralising gimbal using long nose pliers
4 Remove neutralising arm from left hand stick, This stick has now a ratchet friction on the vertical axis
5 Fit the neutralising arm to right hand stick unit. Locate spring with pliers on the hook. The right hand stick unit has now a self-centring vertical axis.
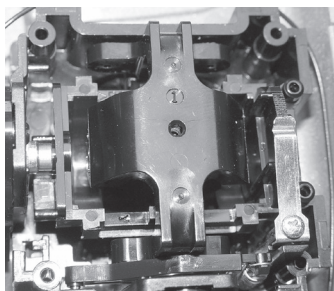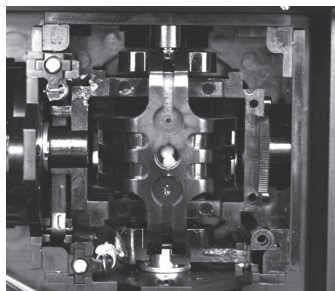
Position 1
loosen right hand throttle
spring
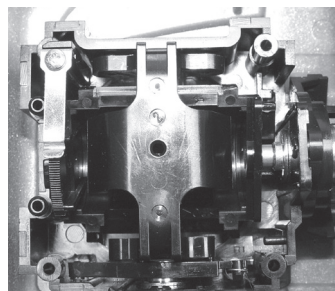
Position 2
Install spring on left stick
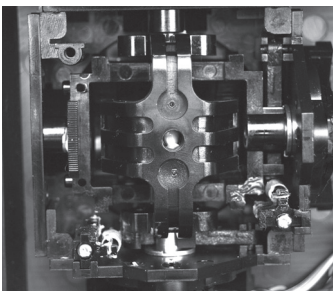
Position 3
Locate spring in left hand ver-
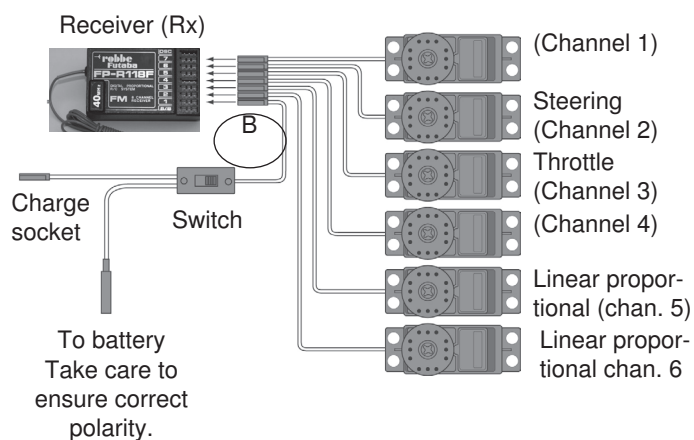tical neutralising gimbal and
remove gimbal.

Position 5
Fit neutralising gimbal in right
hand stick. Hang spring on
the gimbal.
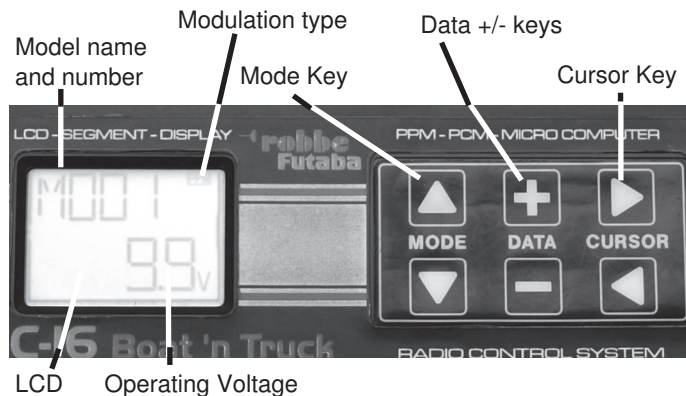
7.4   SERVO CONNECTION

The stick control functions for throttle, steering etc. are to be
found in channels 1-4. Channels 5 and 6 are linear proportional
channels with slider potentiometers.

**Channels 7 and 8 may be used either with switches or opera-
ted with Multi-Modules.**

The diagram illustrates the channel allocation on the Rx. Socket
"B" is used as an Rx battery connection or the battery may be
plugged into any of the other free channel outputs on the Rx.

Receiver (Rx)

B

Charge
socket

Switch

To battery
Take care to
ensure correct
polarity.

(Channel 1)

Steering
(Channel 2)

Throttle
(Channel 3)

(Channel 4)

Linear propor-
tional (chan. 5)

Linear propor-
tional chan. 6

8.   DISPLAY AND KEYPAD

Model name and number
Modulation type
Mode Key
Data +/- keys
Cursor Key
LCD
Operating Voltage

To program the transmitter and make adjustments to setting, there are a number of keys for data entry.

"MODE" Key:
The MODE key is used to choose the program mode and choice of menu. To enter programming mode, both the MODE keys should be pressed simultaneously and held for approximately 2 seconds. To enter the individual menus, "leaf" through them by pressing the UP or DOWN arrow keys individually. To exit, press and hold both MODE keys for a further 2 seconds.

"DATA +/-" Key:
The "DATA" keys are used to adjust the settings of a parameter (e.g. alter % values). The keys are split into "+" and "-", logically pressing the "+" key will increase the values and "-" will decrease them. By holding the respective key down, you will be able to alter values at a much higher rate (AUTOREPEAT) than with individual keystrokes.

"CURSOR" Key:
The "CURSOR" key is used to choose functions in the sub-menus.

9.   TRAINER OPERATION(BUDDY BOX)

When learning how to control models, it is safer to have an experienced driver at hand. The experienced teacher can control the model during critical operation phases and give control to the pupil when it is safe to do so.

This means that if a critical situation arises for the pupil, the teacher can "take-over" control of the model from the pupil. Using this system, it becomes simple for the pupil to learn the control inputs required without fear of damage, loss of the model or personal injury.

As standard, Tx is not fitted with a Trainer socket. The Trainer Module 4 No. F1374 can be connected to Tx PCB. See page 16 for the exact position of the socket.

NOTE:
To ensure correct hand-over of control from Teacher to Pupil Tx, the orange and red wires must be changed over on the Trainer Module, otherwise incorrect operation will ensue.
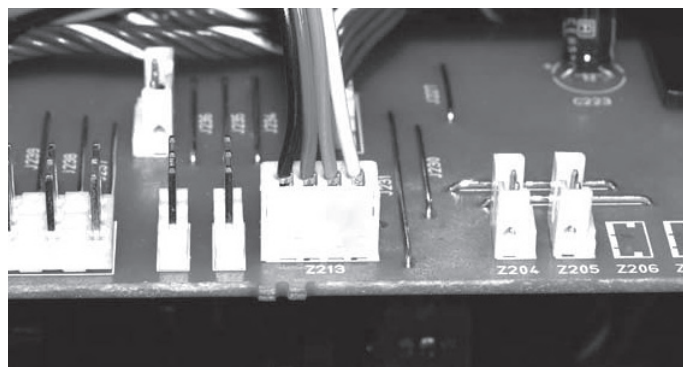
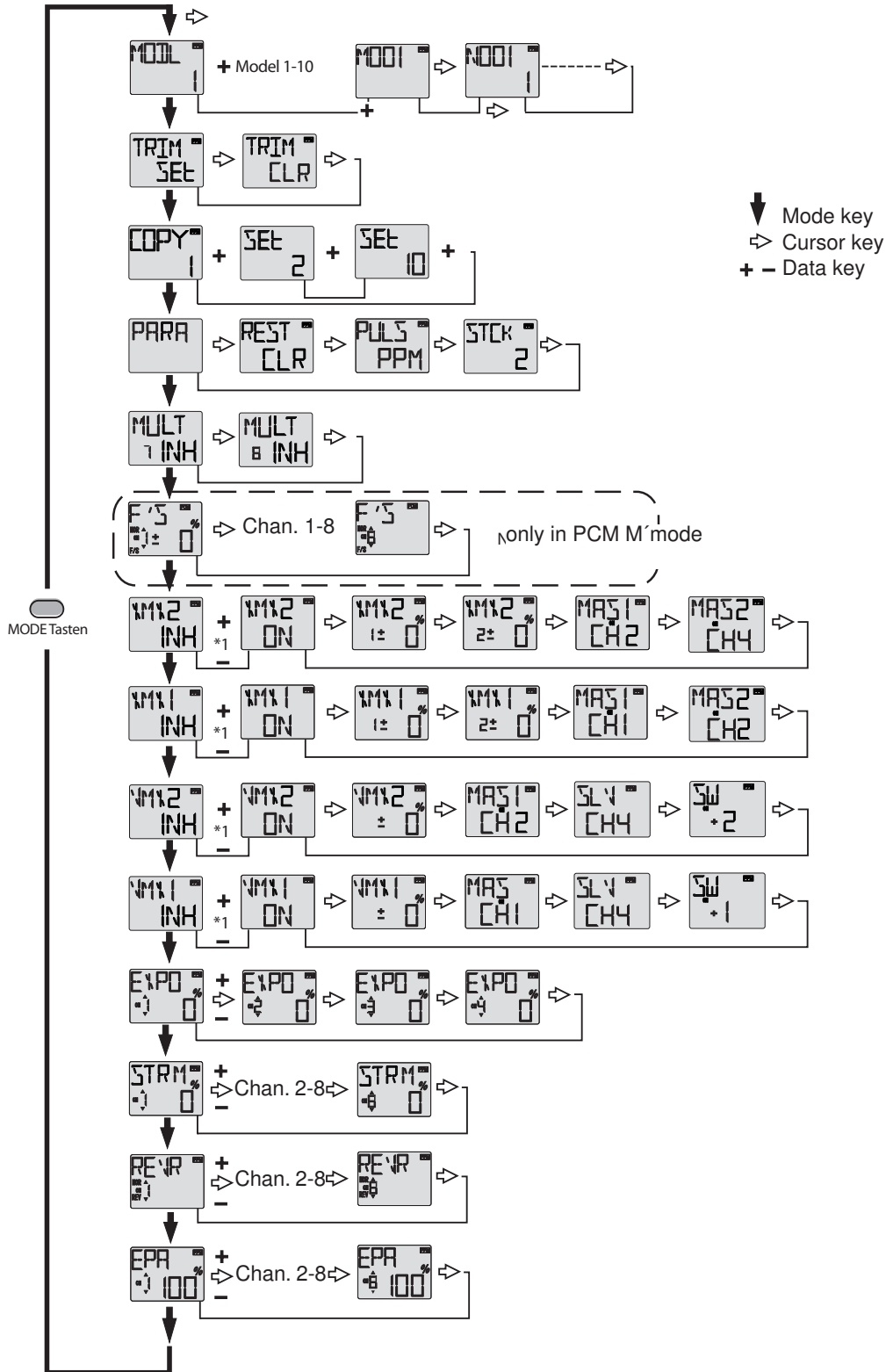

9.1   DIRECT SERVO CONTROL (DSC) OPERATION
A DSC cable can be connected to the Trainer socket; this allows operation of the receiver and servos without RF transmission from the Tx.
The robbe/Futaba DSC cable No. F1422 and the Trainer Module No. F1574 are needed for this.
The Trainer module 4 is connected to the Tx PCB (see page 16).

DSC operation can only be made with receivers fitted with a DSC socket (C), e.g. Rx R-118F.

Note: To avoid the transmitter radiating RF, the Tx crystal must be removed during DSC operation.

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10   MENU STRUCTURE

Press both mode keys for 2 seconds

MODL 1 + Model 1-10   **M001** ▷ **N001 1** ------▷

TRIM SEE ▷ **TRIM CLR** ▷

COPY 1 + **SEE 2** + **SEE 10** +

PARA ▷ **REST CLR** ▷ **PULS PPM** ▷ **STCK 2** ▷

MULT 7 INH ▷ **MULT 8 INH** ▷

F/S ±1 0% ▷ Chan. 1-8 **F/S** ▷   only in PCM M´mode

XMX2 INH + *1 − **XMX2 ON** ▷ **XMX2 1± 0%** ▷ **XMX2 2± 0%** ▷ **MAS1 CH2** ▷ **MAS2 CH4** ▷

XMX1 INH + *1 − **XMX1 ON** ▷ **XMX1 1± 0%** ▷ **XMX1 2± 0%** ▷ **MAS1 CH1** ▷ **MAS2 CH2** ▷

VMX2 INH + *1 − **VMX2 ON** ▷ **VMX2 ± 0%** ▷ **MAS1 CH2** ▷ **SLV CH4** ▷ **SW +2** ▷

VMX1 INH + *1 − **VMX1 ON** ▷ **VMX1 ± 0%** ▷ **MAS CH1** ▷ **SLV CH4** ▷ **SW +1** ▷

EXPO 1 0% + ▷ − **EXPO 2 0%** ▷ **EXPO 3 0%** ▷ **EXPO 4 0%** ▷

STRM 1 0% + ▷ Chan. 2-8 ▷ − **STRM 8 0%** ▷

REVR 1 + ▷ Chan. 2-8 ▷ − **REVR 8** ▷

EPA 1 100% + ▷ Chan. 2-8 ▷ − **EPA 8 100%** ▷

Mode key ▼
Cursor key ▷
Data key + −

MODE Tasten

10

11   MODEL FUNCTION (MODL)

Submenu model memory select
As standard, the Tx has 10 internal model memories; all model program changes and adjustments are stored here. Individual adjustments can be conveniently stored and if needed accessed quickly. The individual model memories are numbered for a clear overview.
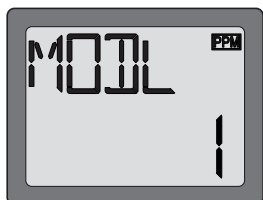
After simultaneous pressing of the "Mode"-keys for 1 second, programming mode will appear and the LCD will show as in the neighbouring illustration.

The number will flash of the active memory. To select a different model memory, press the "+ or –" keys until the chosen number appears. The next higher memory will be selected with the "+ " key, accordingly, the "–" key selects the next lower memory.
Once the chosen model number has been selected, simultaneous pressing of the "Mode" key will return to the start display.

NOTE:
The changes only become active after turning Tx off and turning on again.

Submenu model name (MDL)
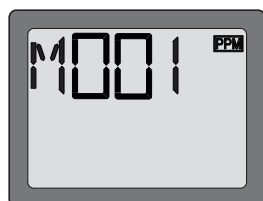
This function allows you to define an abbreviated model name for each memory number, thereby making subsequent model selection easier.

Using the "Cursor" key to select this submenu, the current model name will appear in the display. Unused model memories will have the name "MOO1" as default; this name represents the default model memory 1.

To change a model name, press the "Cursor" to move the cursor to the far right hand side until it flashes below the number "1". Other model memory numbers can be selected by pressing "+ or –" keys.

The model name can be abbreviated to a total of 4 characters, again using the "+ or –" keys, you can select alphanumeric, symbols, space and number characters.

NOTE:
The changes only become active after turning Tx off and turning on again.

12.   TRIM MEMORY (TRIM)
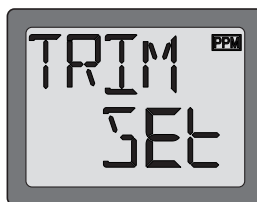
With the help of the "TRIM" function, the individual servo neutrals can be set after testing the model and the mechanical trims set to neutral.

Select "TRIM SET" function from the main menu to adjust the servo neutrals. The above display will be shown.
Now set the required Tx control trim to its chosen position. Simultaneously press the "+ or –" keys until a warn signal (beep) is heard to show the position has been stored. The new position is now stored in the memory and the set Tx trim should now be returned to its centre/neutral position. To make further changes to the neutral values, the original setting must be cleared/deleted. Use the "CURSOR" to select "TRIM CLR" function.
Press "+ or –" keys until you hear a beep. The previous stored values are now deleted.

13   MODEL MEMORY COPY (COPY)
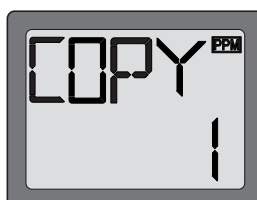
This function allows you to copy one model settings to another memory position. This can be used to make a "back-up" copy of model settings before you make further adjustments or to store a model memory in the CAMPac external memory. You are not able to copy an active memory to itself.

To Copy:
Choose the model memory that you wish to copy from using "MODL" (model select) function. Select "COPY". The model memory number will now flash.
Use the "+ or –" keys to select the memory number that you wish to copy to. Press "CURSOR" "right" key until the display flashes "SET".
Simultaneous pressing of the "DATA" keys will start the copy process and when complete the Tx will beep.

NOTE: apart from the model name, all other settings will be deleted.

14. SYSTEM ADJUSTMENTS (PARA)

14.1 SUBMENU MODULATION TYPE (PULS)

This function is used to select the chosen modulation, PCM-1024 or PPM. When using an FM Rx, then PPM must be selected, a PCM Rx will use PCM mode (PCM will need the appropriate PCM 1024 Rx).

Selecting the "PARA" menu by pressing the right cursor key twice to select "PULS" menu. Press "+ or –" keys for at least 1 second to change the modulation type.
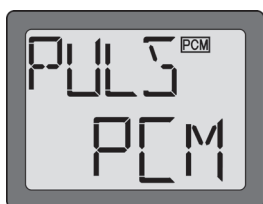
It is important to understand that the new modulation will not become active until the Tx is turned off and on again. You must check that the modulation required is shown correctly in the display and that is now active.

14.2 SUBMENU MODEL MEMORY RESET (REST)

All model details in a memory may be deleted and reset to the factory default condition. It is good practice, therefore before a new model is programmed to delete the previous settings using this function to reset to factory default condition.

The display will show.

Pressing both the "+ and –" keys for 2 seconds, the reset process will be initiated. The "CLR" will flash and then a beep will be heard to show the reset process has been successfully completed.

Pressing "MODE" key will return to main menu.

NOTE: Resetting a model memory will delete all adjustments back to factory default, There is no recovery of this data, so please be careful how and when you use the REST function.

14.3 SUBMENU STICK MODE (STCK)

This menu allows you to choose the stick control layout to suit you. The stick controls 1-4 must always remain in their factory position in the Tx controls sockets for this software to function correctly.
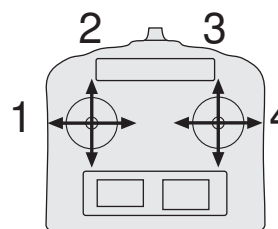
- Select "STCK" function in "PARA" menu.
- Select "MODE" 1 to 4.
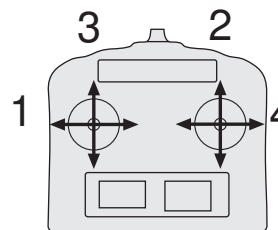- The changes become active after turning Tx off and turning on again.
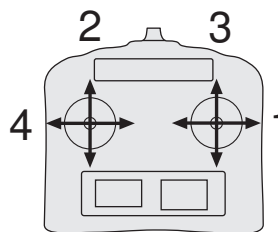
MODE 1:
Steering right 1
Control 3
Throttle left 2
Control 4
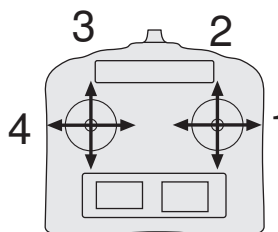
MODE 2:
Steering right 1
Control 2
Throttle left 3
Control 4

MODE 3
Steering left 1
Control 3
Throttle left 2
Control 4

MODE 4
Steering left 1
Control 3
Throttle right 2
Control 4

15. MULTI-SWITCH (NAUT)

For marine and truck models which require many switched and proportional controls. Using just two "normal" proportional channels (7-8), it is possible to cascade 2 x 16 switch, 2 x 12+2 multi or 2 x 8 proportional channels. Using these modules, the FC16 then can have 8 or 16 switch/proportional channels. This can control up to 32 separate functions. To do this, the Tx will need a Multi-Switch or Proportional module for every 8 channels required.

This module divides each proportional channel into 8 switch or proportional channels. For 16 switched or proportional channels, a second module is required.

- Using the "MODE" key, select NAUT function
- Using "CURSOR" key, select chosen channel (7 or 8)
- Press "+ or –" keys to activate the selected channel

NOTE: The connection to the Tx PCB is described in chapter 26 "connection of option modules"

16.   FAILSAFE ADJUSTMENT (F/S) (ONLY IN PCM)

In the case of a loss of signal in the Tx to Rx radio link, there are two alternative settings for the failsafe.

1 "NOR" (Normal) or hold mode

The Rx will hold the control setting from the last good transmission signal. All the servos will remain held in their last good position until reception of the Tx signal is re-established.

2 (F/S) Failsafe position

In this setting, the throttle servo will move to a pre-programmed position, which has been previously stored by the Rx. The factory pre-set position of 20% is active unless programmed differently.
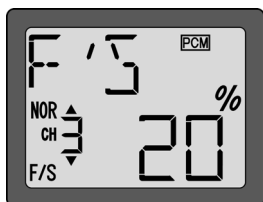
To navigate within the F/S menu.
The throttle channel will flash in the left hand side of the display. Using the "+ or –" keys you can select between Hold and Failsafe modes.

NOR- (Hold) mode   = press up (+)
F/S- mode   = press down (-)
An arrow highlights the chosen option.

If you would like to set a failsafe position for throttle channel (3), move the throttle stick to the desired position and press the (-) key for 2 seconds. A beep will signify that the new position has been stored and the percentage stored will now be shown in the display.

To test the setting, switch Tx off, the throttle servo (channel 3) will adopt the programmed failsafe position.
If using an i.c. motor; don't set the F/S throttle value too low, otherwise the motor may stop.

NOTE:

For certain slow moving models, using the Normal- (Hold) mode will be sufficient.

In addition, the "Battery Failsafe" function is available when the F/S mode is selected.
As soon as the Rx battery voltage falls below a value of 3,8V, the throttle servo will move to its pre-set position, indicating to the driver that the battery is nearly fully discharged.

Operation of the model must cease immediately this warning is given. If you need throttle to return the model to you, closing the throttle stick and re-opening will give throttle control to move it to a safe position for recharging. You now have 30 seconds to do this before the battery failsafe re-occurs if the voltage situation has not improved.
The function works also for speed controllers connected to channel 3.

17.   CROSS MIXER (XMX 1-2)
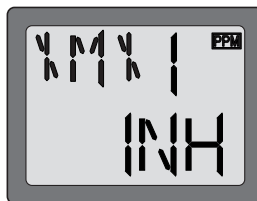
This mixer, known as a cross mixer (XMX1-2) couples two separate Rx output channels which need to be controlled by two individual Tx controls. (E.g. combined steering and throttle).

The Tx software contains two freely programmable cross mixers (XMX1-2) for the user. Therefore, Tx inputs 1-8 can be used as controls of these mixers.
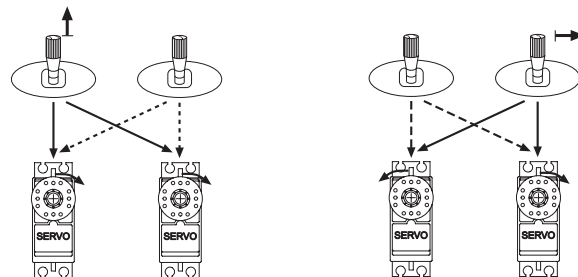
Sustained pressing of the "+" key switches the mixer (ON). (The % symbol will flash in the display, indicating that channel 1 can be adjusted).
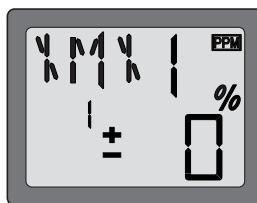
Page through with the cursor key until "XMX1" appears. The mix value (%) for control 1 can now be adjusted. Further pressing of the cursor will take you to control 2, where similarly, the mix % can be adjusted.


Continue pressing cursor until "MAS1" appears. The mix value for control "1" (%) can be set here for any of the channels (1-8). The same procedure is followed for "MAS2" values, which can be similarly adjusted in the menu.

In order to ensure that the servos move "together" or in "opposition" to achieve the desired control sense (and dependent on the installed position of the servos), it may be necessary to reverse their directions or change the mixer direction. Begin with reversing servo on the throttle function to get both servos working in the same sense.

This cross mixer is ideal for mixing throttle and steering functions required in tracked vehicles and twin engine marine craft. In these cases, it is usual to have throttle (3) and steering (1 or 4) mixed at 100 % for each channel.

18.   V MIXER (VMX 1-2)
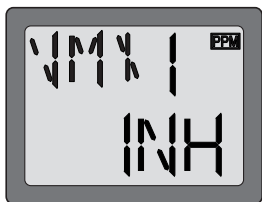
Moving a transmitter control will normally move only that servo connected to that channel number. If you want one Tx control to move another channel simultaneously, you must use a V mixer.

Some or all of the Tx controls may be mixed with another channel. The throw and direction of the mix can be adjusted individually.

The FC-16 software contains two V mixers with dummy functions. You are able to mix two free controls with each other. The mixer function can be switched on or off at any time by using an external mixer switch. The use of an external mixer switch can also vary the mix percentage varied with a mix controller. Furthermore, you are able to define the amount of trim used. The use and adjustment is the same for both V Mixers (VMX1-2). The mix switch and controller are simply plugged into a different position on the PCB sockets. (See chapter 25).

The mixing takes place with one control (Master) acting on another control (Slave).
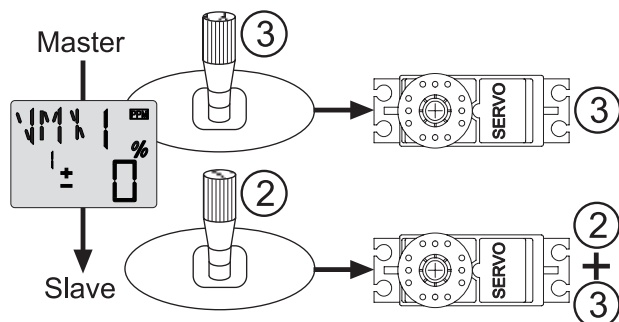
Finally, the mix switch number to control mix-on or mix-off must be selected.

## 19.   EXPONENTIAL FUNCTION (EXPO)
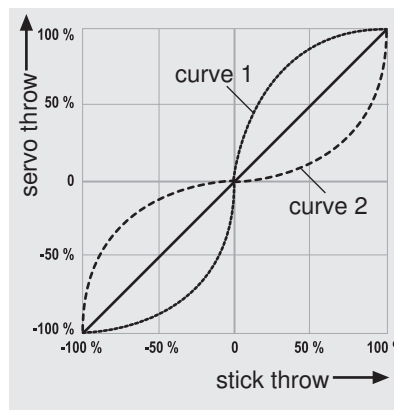
The "EXPO" function can be used to determine the amount of servo throw at a particular stick position. The linear action can be modified into a gradual exponential curve. This allows a softer control reaction around the stick and servo neutral position.
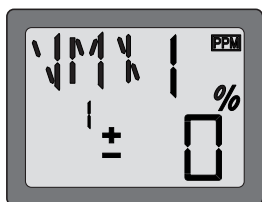
This option is available on all stick controls (1-4).
The exponential curve can be set both sides of control neutral:
• Positive curve-> exaggerated and sensitive control response around neutral position (curve 1).
• Negative curve-> reduced and softer control response around neutral position (curve 2).
• In both cases the servo end point throw remains unchanged.
• The straight line shows the normal, linear characteristic of the stick to servo throw (Expo set at 0%).
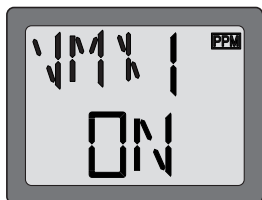
Navigate to the V-Mix 1 adjustment menu by continuous pressing of the "+" key (ON).
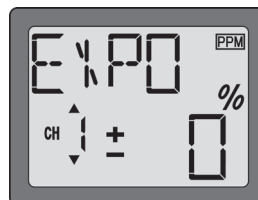
This function must be selected with the "MODE" key after activating the programming mode. Press the "CURSOR" key until "EXPO" menu appears in the display. Subsequently, the menu for adjusting Dual Rate appears as shown in the neighbouring display illustration.

Cursor through the menu until "VMX1" appears. Now the mix value (%) can be set for control 1.

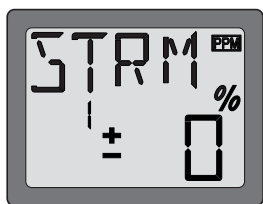The adjustment is made using an example for one of the stick controls:
By use of the "CURSOR" key, select a channel (1-4) that you would like to set the exponential throw. The particular channel number selected will now flash in the display.
Using the "+" or "-" keys, the "EXPO" adjustment can be set be a positive or negative % value. The selected % age will appear in the display.

The adjustment range of EXPO function lies between –100 and +100 %. The factory default is set to 0% for all controls.

Repeat pressing the cursor to select master channel "MAS". Channels 1-8 may be selected as master.

NOTE: Exponential also reduces the trim value by the corresponding amount; therefore a maximum of 50% EXPO should be used!

Further pressing the cursor will select slave "SLV". Channels 1-8 may be selected as slave.

20.   SUB TRIM (SUB-TRIM/STRM)

When installing the servos in your model, it always best to adjust linkages so that the servo arms and its control are in their neutral (centre) position when the Tx controls are neutral.

If you find that this is not possible or your servos have another neutral position, the Sub Trim function can be very useful. This allows all 8 servos to be adjusted to a new neutral position. This function is not designed to act as a replacement for trimming the model in the traditional sense.

• Select with "MODE" key
• Select which channel from 1-8 you wish to STRM with the CURSOR key
• Adjust the servo to its new neutral using "+" or "-" key.

21.   SERVO REVERSE (REVR)

This function will reverse the servo direction electronically. This means you can install the servos in your model to give the most direct linkage to the control without concern for servo sense of direction. The servo direction can be reversed afterwards if needed.
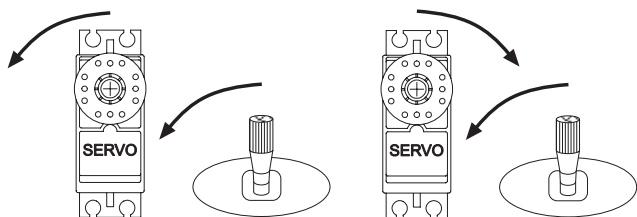
Before further programming of the model takes place, we recommend that you first correctly set the servo direction to suit your model.
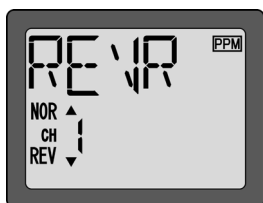
Select using "MODE" key after activating the programming mode.
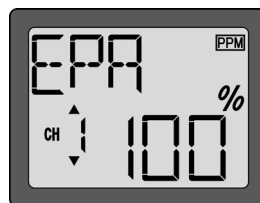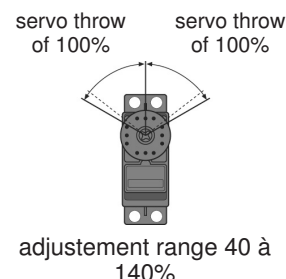The neighbouring display will be seen to allow servo reverse to be made.
Select the channel for reversing with the "CURSOR" key. Adjustments are made using the "+" or "-" key. If the (-) key is depressed for more than half a second, then the servo channel will be set to "REVERSE" (REV). Pressing the (+) key will change the setting to "NORMAL" (NOR) rotation. The arrow in the display indicates the current rotation direction.

22.   SERVO END POINT ADJUSTEMENT (EPA)

This function allows the end point to be set in each direction for all channels. This can be adjusted from 40-140% of the total servo travel including trim. This is to avoid stalling that servo against a mechanical limit before it has reached its electronic limit. This works on all servo channels and reduces all mixed functions. Please note the trim amount is also proportional to the total servo throw set.

The adjustment is made as a % age value. Channels 1-8 have a 100 % setting with approximately 40 degrees of servo rotation. With a servo EPA of 120%, 55 degrees of servo rotation will be available.

servo throw of 100%   servo throw of 100%

adjustement range 40 à 140%

Select using "MODE" key to activate EPA. The neighbouring display will be seen. In the left half of the display, you will see the channel number of the servo to be adjusted. The right hand side of the display has a flashing indication of the EPA value shown in %.

The relevant stick must be moved to select the direction for adjustment. Using the "+" or "-" keys, the EPA value can be set. (-) Reduces and (+) increases the value. Please note the servo throw must be adjusted for both sides of neutral.

The "CURSOR" key chooses the channel for adjusting the servo travel.

23.   CAMPAC MODEL MEMORY INITIALISE

The Tx has 10 internal model memories. A further 10 memories can be stored using a 16k CAMPac module. Remove the dust cover and plug the CAMPac into the socket on the Tx front face.
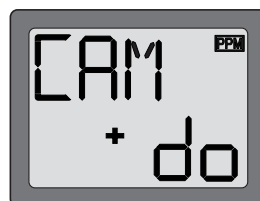
NOTE: Before plugging in or removing the module, the Tx must be turned off. When a new CAMPac module is fitted for the first time, it must be initialised before use. After switching on the Tx, "CAM "do" and CAM "-" no will alternate in the display. Press (+) key to start the automatic memory initialise.

This process takes 2 minutes and will appear in the display. Pressing the "-" key will revert to the "normal" display and no further keystrokes are necessary.

24.   LAYOUT OF TX PCB SOCKETS
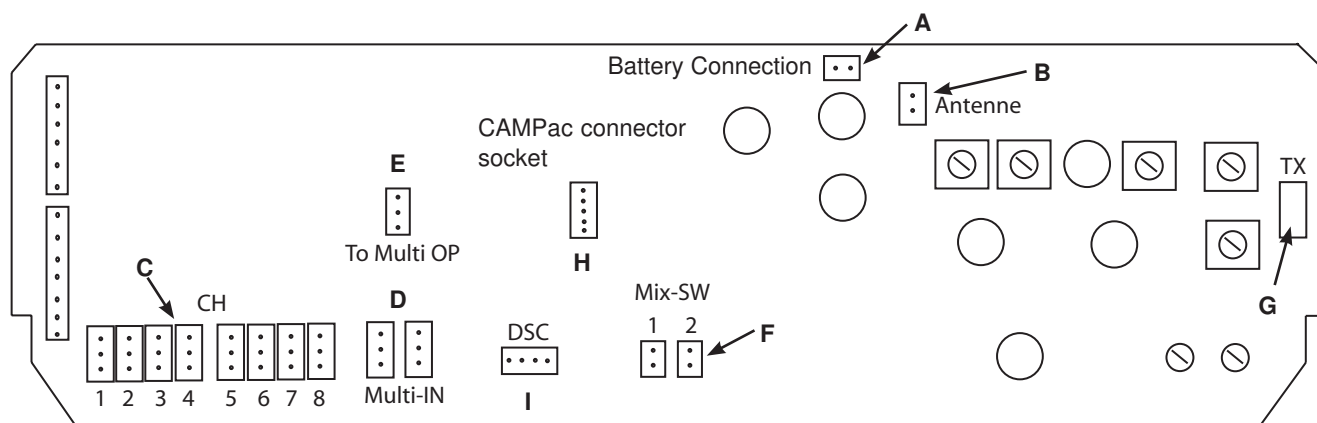
A) Battery Connection
B) Aerial
C) Sockets for controls 1-8 (CH)
D) Sockets for Multi-Switch/ Prop modules (Multi In)
E) Socket for Multi-Switch/ Prop power supply (To Multi OP)
F) Mix switch sockets 1-2 (Mix SW)
G) Crystal socket
H) CAMPac connector socket
I) DSC connector socket for Trainer Module No. F1574

25.   OPTION MODULE CONNECTION

Linear proportional slider:
To install the linear slide controls, the aluminium cover must be removed from the slider well on the centre front of the Tx case. Use a sharp knife to lift and remove the cover plates. Fit the slider from the rear and fix using the supplied screws. Install the new surround, remove protective film and attach the control knob.
Connection:
The linear proportional slider expands the Tx by one fully proportional control channel. The connection is made in any of the bank of sockets 1-8 (CH); the servo direction is defined in "REVR" or by rotating the plug by 180 degrees in the socket.
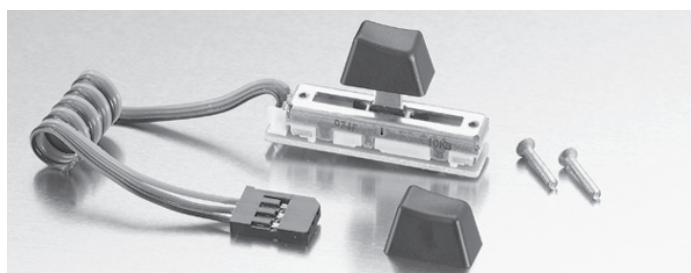

3-position switch channel:
Remove the blind cover to install a switch in any of the two option wells on the Tx front upper face. Simply prise the blind cover out with a suitable object. Remove retainer nut from switch, feed switch into your preferred position from the rear. Fit the retaining nut. Break out the corresponding blank switch position from the cover using pointed pliers or tweezers. Switch labels can be fitted to the recess in the rear of the cover, the cover is then snapped back into position in Tx case.
Connection:
This switch unit expands one channel to be a 3-position switch channel with low, middle and high positions. The connection is made to your choice of channel in the control sockets 1-8, the servo direction will be adjusted by "REVR" function or simply rotating the plug 180 degrees in the socket.

External Mix Switch:
Mix switches switch mixers on and off. Installation is made in option wells 1 or 2 in the same manner as switch channel switches. Connection is made to Tx PCB in the MIX-SW (1-2) sockets.
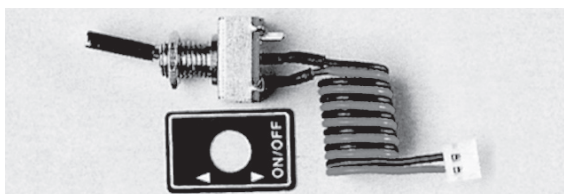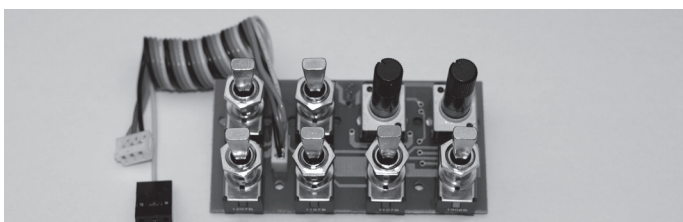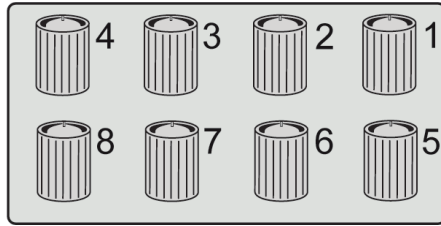

Multi-Switch, Multi-Prop-Module
These modules split one proportional channel into 8 proportional and/or switched functions. The Multi-Prop-8, Multi-Switch-16 or a Multi-Switch-Prop-12+2 module can be installed. The resulting transmitter is ideal for controlling models fitted with many complex auxiliary working systems and features.
Connection:
The module is installed in the Tx with the 3-pin socket on the solder side of the module facing the inside of the Tx (not the outside edge). The black plug on the single-core lead from the Multi-Module is connected to the socket marked "Multi In 1.2) on the main PCB. The white plug (twin core cable) from the Multi-Module is connected to the socket marked "To MULTI OP". The Multi-system will not work until you have programmed channels 7 or 8 (CH 7/8) as a MULTI channel within the MULTI program menu.

Caution: if you install and connect a Multi-Module you MUST NOT connect any other Tx control to channels 7 or 8 (sockets CH7 + 8).
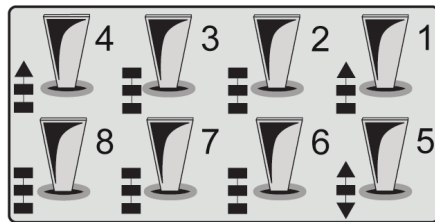
Multi-Prop Module   No. F1512

This module is designed for controlling auxiliary functions, and expands one proportional channel on the transmitter to provide 8 proportional functions. It provides accurate, simultaneous control of 8 channels.

Multi-Prop 8 Decoder   No 8042

Multi-Decoder for proportional channel expansion. Occupies only 1 servo channel but can control 8 servos or speed controllers independently of each other.

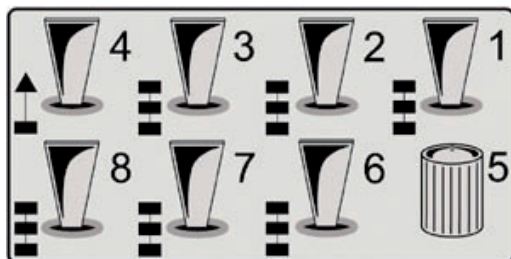## Multi-Switch-16 Module   No. 8084

This module is designed for controlling auxiliary functions, and expands one proportional channel on the transmitter to provide 16-switched functions.
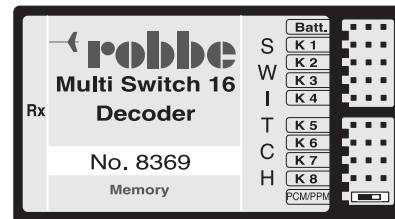
Multi-Switch 16 Decoder Memory   No 8369

For each Multi-Switch module in the transmitter you need one decoder at the receiver end. This takes up only one servo channel, and can switch 16 channels directly. Operating voltage 4.8 - 24 Volts, up to 1.8 A per output.

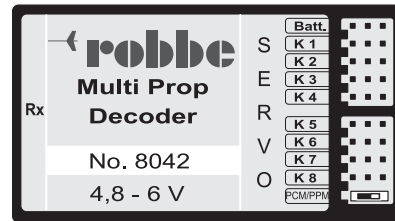## Multi-Switch-Prop 12+2 Module   No 8101

Optional module for controlling auxiliary functions; expands one proportional channel on the transmitter to provide 12-switched functions and 2 proportional servo channels. This is a combination module, which covers most requirements.

Multi-Switch-Prop 12+2 Decoder Memory   No 8370

For each Multi-Switch module in the transmitter you need one decoder at the receiver end. This takes up only one servo channel, and can switch 12 channels directly as well as providing 2-servo channels. Operating voltage 4.8 - 24 Volts, up to 2.7 A per output.

Multi-Switch Prop Module Light Set   No 8413
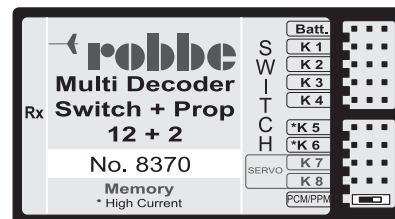
Optional transmitter module for controlling auxiliary functions; expands one proportional channel on the transmitter to provide 14 switched functions and 1 servo channel. Designed specifically for use with the Truck super lighting set, but can also be used in conjunction with any other Multi decoder.

Light Set for Trucks   No 8411

Microprocessor controlled decoder module, providing full control of scale lighting systems in model vehicles such as trucks etc., plus proportional control of auxiliary functions. This module can control the entire usual standard and flashing light functions; the unit monitors the RC system's throttle channel constantly, and uses that data to control the brake lights and reversing lights automatically.

In addition, there are 2 proportional servo channels controlled by switches.

The system includes zero-contact control signal transfer to the Trailer lighting set by means of a pulse-modulated infrared signal.
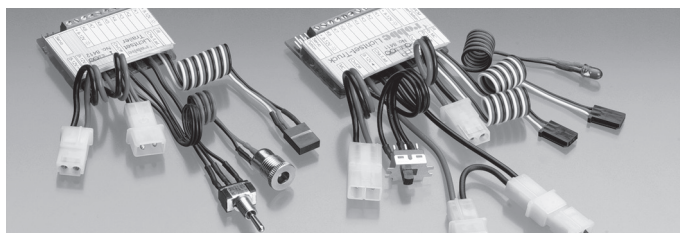
Super Light Set Trailer   **No 8412**
Used to extend the Truck Light Set when operating a Trailer with lights.

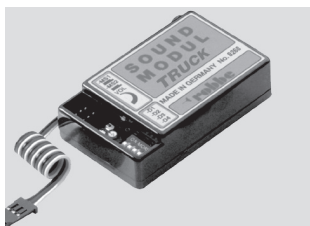**Sound Module Truck**   **No 8268**
Similar to Navy Sound Module, in addition to the Diesel motor sound it has:
- Compressed air release
- Martins Horn
- Normal Horn
- Air Horns

Operating voltage: 6-12 Volt, Power output: approx. 6 W into 8 Ohms at 12 V.


**Sound Module Navy**   **No.8270**
A sound module for model boats, containing six digitally stored original sounds. At any time a signal can be superimposed on the engine noise simultaneously, such as the Martins horn, foghorn, ship's bell, typhoon or destroyer siren, without interrupting the sound of the diesel engine. The diesel engine sound varies according to the speed of the drive motor, and features start-up and run-down sound phases. The sound module features an integral 8-channel multi-switch decoder, which is used to switch the individual sounds on and off.

26.   RECEIVER AERIAL
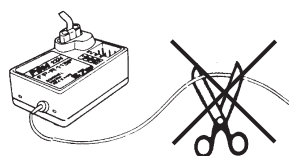
The receiver aerial is connected directly to the Rx PCB. The aerial length MUST NOT be shortened or lengthened.
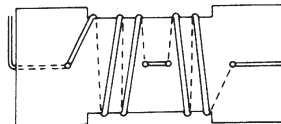
If it is not possible to accommodate your aerial in your model, place it in an S-shape near to the receiver. Best solution is to coil it around cardboard, ply or plastic plate as in the schematic diagram. This will not reduce the range.

Protect the aerial from tension, shock or bending. Where it exits the model feed it through a length of silicon fuel tube to protect the aerial. The aerial must be kept well clear of any rotating parts of the drivetrain.

26.1   SWITCH HARNESS
The Rx switch harness must be operable in both directions with no mechanical limits. The opening in the model must be large enough to allow full action of the slide switch. With IC powered models the switch should be placed on the opposite side of the model to the exhaust, so that no oil and dirt can contaminate the switch contacts. If using many, powerful digital servos, we recommend the use of a double battery system.

26.2   SERVO CABLES
Take care when installing the servo cabling that they are not subject to tension or shock loads and are not bent in a tight radius or broken. Make sure that they do not rub against sharp edges, which might damage the insulation. When unplugging, do not pull on the cables directly, instead pull on the plug housing.

Do not lay cables in an untidy manner, it is better to group and retain them with tape or tie-wrap to the hull sidewall or vehicle chassis. No modifications should be made, avoid short circuits and check polarity. The associated servos and other electronic devices are not protected against such abuse.
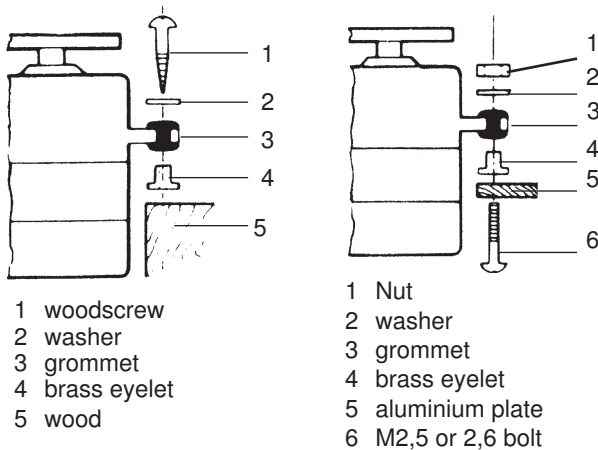
26.3   SERVO SUPPRESSION FILTERS
When using long servo cables or extension leads, the cables can act as an aerial and introduce unwanted interference into the receiver. Therefore if there is a straight run of more than 50 cm, we recommend you use twisted servo leads (F1452)

Even better is the use of additional servo suppression filters (No. F1413).

26.4 SERVO MOUNTING AND INSTALLATION
Use the supplied rubber grommets and brass eyelet to mount the servos in your model. Take care that the screws are only tightened enough to contact the grommet and not squash the brass ferrules, otherwise the vibration damping of the grommets will be compromised.

The following illustration shows the correct servo installation. In example "A" is fixing to a wood plate, example "B" is fixing to a plastic, glass fibre or aluminium plate.

1 woodscrew
2 washer
3 grommet
4 brass eyelet
5 wood

1 Nut
2 washer
3 grommet
4 brass eyelet
5 aluminium plate
6 M2,5 or 2,6 bolt

In RC car/truck models, the servo is usually mounted into pre-prepared servo mounts in the vehicle. For marine models we recommend the use of the robbe servo trays. Pay attention to the servo installation, as servos are sensitive to excessive vibration.

26.5 SERVO THROW/ SERVO HORNS
Every servo must be able to work throughout its whole range without stalling against a mechanical limit caused by the linkage. This is particularly relevant on the throttle linkage. The servo must be able to move between idle and full-throttle without being limited by the throttle stops on the carburettor. Otherwise the servo will be permanently stalled and under load; the servo life will be shortened and it will have a high current drain on the receiver battery.
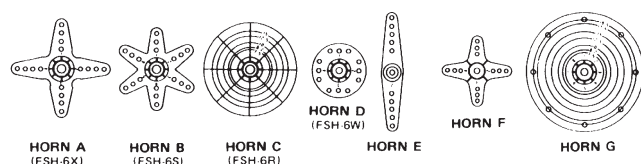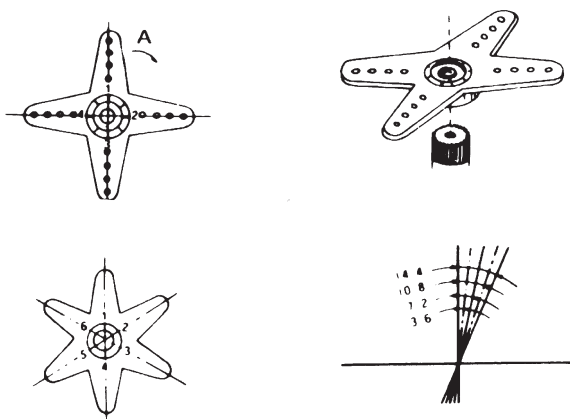
Robbe servos have a wide variety of servo horns and discs available to suit most applications. (See illustration on other side of the page). The splined servo output and horns provide an easy means of adjusting the neutral position. The illustration below shows a typical pushrod mounted to a servo.

26.6 INSTALLATION OF SERVO LINKAGES
The linkage must be very low friction and non-binding. Otherwise the current drain on the receiver battery pack will be high; this will significantly reduce the operating time. Friction in the linkage also leads to poor centring of the servo, which has a negative effect on the control accuracy and "feel".

Linkage

Servo Horn fixing screw
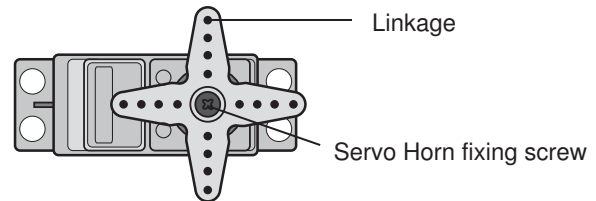
26.7 CAPACITY/ OPERATING TIME OF RX BATTERY
Applicable for all rechargeable batteries: Low ambient temperatures will significantly reduce the capacity of the battery, please note that in cold temperatures, the safe operating time will be dramatically reduced.

The safe operating time is strongly influenced by the number and type of servos, free linkages as well as the frequency of control movements. A standard servo when operating draws between 150 and 600 mA, idle current is approximately 8 mA. Super servos and digital servos can draw up to 1300 mA peak current at maximum torque.

Choose your battery with sufficient capacity to supply the current drain for the number and type of servos used in your model. A permanent mechanical limit (stalled servo) on the servo throw draws the highest current, will reduce the servo life and cause permanent damage.

Pay attention that the linkages are free and that the linkage to the device does not stall the servo.

In the receiver system, you will notice a discharged battery when the servo speed becomes noticeably slower than normal. It is time to stop running the model and recharge the batteries.
We recommend the use of a robbe battery controller/ monitor, which will indicate the voltage condition/ charge condition of the batteries in operation.

HORN A
(FSH-6X)

HORN B
(FSH-6S)

HORN C
(FSH-6R)

HORN D
(FSH-6W)

HORN E

HORN F

HORN G

27.   OPERATING ADVICE

All robbe-Futaba receivers will continue to operate with the same range even when the power supply drops to 3 Volts. This is an advantage when even one cell in the pack ceases to function (short circuit), you will retain full control of your model. Although the servos, which require 3.6 V, will operate at a lower speed and torque. This is very important in low winter temperatures to avoid a break in control, which might occur and caused by reduced voltage due to the cold temperature.

However, this can be a disadvantage inasmuch that you might not notice that a cell has ceased functioning. Therefore, the receiver battery should be checked periodically.

It is recommended that you use the robbe battery monitor No.8409, which can show you the current receiver battery voltage by means of a LED display.

27.1   TX/RX SWITCH ON/OFF SEQUENCE

Always turn the Tx on first, followed by the receiver. To switch off, always turn the Rx off first.

If there is a Tx signal, the Rx commands the servos to go safely and under full control to their neutral position. Before driving the model, you should check all functions by moving all the controls on the Tx. Also check that the servos are moving in the correct direction or "sense" in relation to the Tx control. If this does not occurs, then reverse the direction of throw using the REVR function described in chapter 22.

27.2   ELECTRICAL NOISE

For reliable, interference-free operation of your model, "metal-to-metal" electrical interference must be avoided. This can occur when individual metal parts of the model are allowed to contact against each other under vibration. The throttle linkage of an i.c. motor is a common source of this. Therefore, you should always use a plastic quicklink for the throttle arm connection to the motor. If a metal-to-metal linkage is inevitable, both parts should be electrically earthed together by soldering a flexible wire to both metal components.

27.3   ELECTRIC MOTOR SUPPRESSION

All on-board brushed electric motors MUST be suppressed; otherwise the arcing or "brushfire" that exists between the brushes and commutator will cause constant interference and loss of control.

We recommend using the robbe suppresion filter kit No.8306 or the capacitor kit No.4008. Every brushed motor must be individually suppressed as in the illustration.
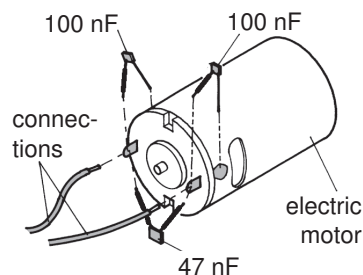
27.4   BATTERY ELECTRONIC IGNITION

The increase in popularity of spark ignition motors has meant that the ignition system can be a source of interference on your radio. Always power the ignition from a separate battery. Use resistor suppressed spark plugs and shielded plug leads. Locate the receiver system in your model as far away from the ignition and its battery/switch as possible.

28.   GUARANTEE/WARRANTY

Our products are, of course, offered with a 24-month statutory guarantee period. If you feel you have a valid guarantee claim, please contact your dealer or re-seller in the first instance, as they are responsible for this.

During the guarantee period, if possible functional, material or workmanship issues arise; robbe will rectify these free of charge. Consequential loss or damage claims are excluded from this.

The items must be returned to us in their original packing at your cost, they will be returned to you at robbe' cost. We will not accept unpaid post shipments.

For loss or damage to your shipment, robbe absolves all responsibility. In this instance, we recommend that you insure the shipment with your carrier.

Return you item to the service address in your own country.

To make a guarantee claim, the following conditions apply:
*   Please include your purchase receipt for the goods
*   The goods have been operated in accordance with the robbe instructions.
*   Only recommended power sources and genuine robbe accessories have been used in and during operation.
*   The system has not been subjected to water or damp damage, modification by third parties, reverse polarity, overload or other mechanical damage.
*   Please include a detailed and objective summary of the problem or defect that you have experienced.

29.   LIABILITY EXCLUSION:

robbe Modellsport are not in a position to influence the way you install, operate and maintain the radio control system components.

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

30   POST OFFICE REGULATIONS

The R&TTE (Radio Equipment & Telecommunications Terminal Equipment) directive is the new European regulation which applies to radio systems and telecommunications equipment, and is applicable to all such equipment which has general conformity approval in the EC.
Part of the R&TTE directive regulates the setting up and operation of radio systems in the European Community.

An important change compared with earlier regulations is the abolition of approval procedures. The manufacturer or importer must submit the radio system to a conformity assessment procedure before marketing the equipment, and is obliged to notify the appropriate authority when the process is completed.

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

This symbol is used in all the countries of the European Union. Other nations such as Switzerland, Norway, Estonia and Sweden have also adopted this directive. Your radio control system is registered (i.e. approved) in all these countries, and can legally be sold and operated there.

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

We are obliged to point out that the responsibility for this, and also for operating a radio system which fulfils the requirements of the directives, rests with you, the user. In Germany radio control systems for models operating in the frequency bands of 27 MHz, 35 MHz and 40 MHz do not need to be registered or licensed, and no fee is payable, but this may not apply in the country in which you live. In Germany a 'General Licence' to use these frequencies is granted by right. A copy of this General Licence is supplied with your system.

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

31.   CONFORMITY DECLARATION (CE MARK)

Robbe Modellsport GmbH & Co. KG declares that this device is made in accordance with the fundamental requirements and other relevant regulations of the appropriate CE directives. The original certificate of conformity may be viewed at www.robbe.com under the particular device description by pressing the Logo button "conform".
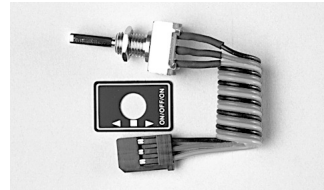
32.   ACCESSORIES
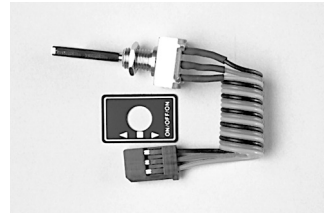
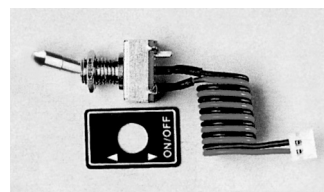**3-position proportional channel switch, long**

No F1588

Expands Tx with a 3-position switch channel, also used as switch channel in Multi-Module.

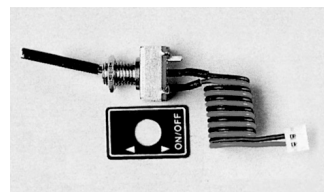**3-position proportional channel switch, short**

No 1500

Expands Tx with a 3-position switch channel, also used as switch channel in Multi-Module.

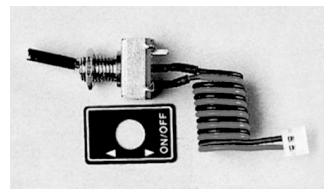**Latching Mix-switch, 2-position, short**

No F1523

For switching mixers on and off

Biased Mix-switch, 2-position, long
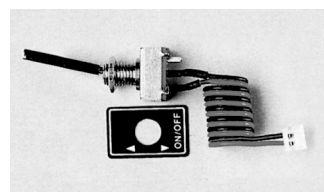
No F1504

For momentary switching mixers on and off

Mix-switch, 2-position, short
No F1502
For switching mixers on and off

Mix-switch, 2-position, long
No F1521
For switching mixers on and off

Mix-switch, 3-position, long
No F1522
For switching mixers on and off

Mix-switch, 3-position, short
No F1503
For switching mixers on and off

Single point neckstrap
No 1550:
Soft, variable-length neckstrap, with spring hooks and swivels.

CAMPac-Model data memory module:
No battery required. For permanent storage of model data, and for copying or transferring data between transmitters.

4K	No F1508	4 models
16K	No F1509	16 models
64 K	No F1566	65 models

Power Peak Compact 6S EQ
Compact, low-cost 230 / 12 V charge / discharge station with battery management for NC / NiMH batteries consisting of 1 ... 14 cells, LiIo, LiPo and LiFe packs consisting of 1 ... 6 cells, and 2 ... 12 V Lead-Acid batteries. With integral Equalizer and BID system.

Unicharger   No 8500
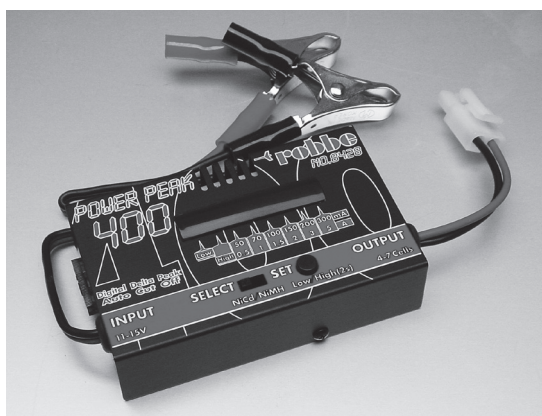High-performance 230 V home universal battery charger for Tx and Rx batteries

Tx tray   No.F1518
High-quality transmitter tray, in a moulded plastic design. Suitable for the F-14, FC-16 and FC-18 Tx. Fitted with a generous hand rest and compartment for small parts. Complete set with soft neckstrap.

Power Peak 400   No 8428
A high quality, reasonably priced 12 V fast charger in a metal case, for charging 4 - 7 cell NC and NIMH batteries as used in model aircraft, boats and cars.

Duo-Power 8S EQ-BID   No.8504
A good-looking high-performance computer charging / discharging station with battery management for all current battery types. With integral Equalizer for eight-cell Lithium-Ion, LiPo and LiFe batteries. Maximum charge current 6.5 A, optionally from a 12 Volt car battery or the 230 Volt mains using the integral switch-mode PSU.

1-24 NC/NiMH
1-8 LiIo (3,6 V), LiPo (3,7 V) or LiFe (3.3 V)
1-6 cells (2…12V) PB/Lead acid

34.   DISPOSAL

This symbol means that the electrical and electronic parts must be disposed of at their end of life separately from the normal household refuse.

Please take the parts to your local authority-recycling centre. This applies to all EU member states and other countries with a separate recycling system.

35.   SERVICE CENTRE ADDRESSES

Country	Company	Street	Town	Telephone	Fax
Andorra	SORTENY	130 LES ESCALDES		0037-6-82 0827	0037-6-82 5476
Denmark	MAAETOFT DMI		8900 RANDERS	0045-86-43 6100	0045-86-43 7744
Germany	robbe-Service	Metzloser Str. 36	D-36355 Grebenhain	0049-6644-87-777	0049-6644-87-779
United Kingdom	robbe-Schlüter UK	LE10-1UB	Leicestershire	0044-1455-63 7151	0044-1455-63 5151
France	S.A.V Messe	BP 12	F-57730 Folschviller	0033-387-94 6258	0033-387-94 6258
Greece	TAG Models Hellas		143 41 Nea Philadelfia	0030-1-25 84 380	0030-1-25 33 533
Italy	MC-Electronic	Via del Progresso 25	I-36010 Cavazeale (Vi)	00390-0444-94 5992	00390-0444-94 5991
Netherlands/Belgium	Jan van Mouwerik	Slot de Houvelaan 30	NL-3155 Maasland	0031-1059-13 594	0031-1059-13 594
Norway	Norwegian Modellers		3101 TØNSBERG	0047-333-78-000	0047-333-78-001
Austria	Robbe Service	Puchgasse 1	A-1220 Wien	0043-01259-66 59	0043-01258-1179
Sweden	Minicars Hobby A.B.		75323 Uppsala	0046-18-71 2015	0046-18-10 8545
Switzerland	Spahr Elektronik	Gotthelfstrasse 12	CH-2543 Legnau	0041-032-65 22 3 68	0041-032-65 37 364
Slowak Rep.	Fly Fan		91105 Trencin	0042-1831-74 442 03	0042-1831-74 447 15
Czech Rep.	robbe-Service Ivo Marhoun	Horova 9	CZD-35201 As	00420-351 120 162	
Turkey	Formula Modelsports		35060 Pinarbasi-Izmir	0090-232-47 912 58	0900-232-47 917 14