

Futaba

CAR SPEED CONTROL

1M23N14302



MC800C Ver.2 INSTRUCTION MANUAL

Before using your MC800C Ver.2, please read this manual thoroughly and use the MC800C Ver.2 properly and safely. After reading this manual, store it in a safe place.

- No part of this manual may be reproduced in any form without prior permission.
- The contents of this manual are subject to change without prior notice.
- This manual has been carefully written. Please write to Futaba if you feel that any corrections or clarifications should be made.

Thank you for purchasing an MC800C Ver.2. The MC800C Ver.2 is a high-frequency drive FET speed control developed for model electric cars. It is compact and light weight competition speed control, and uses a simple digital setting system.

Applicable motors (Number of turns is criteria.)

Use the MC800C Ver.2 with a motor with 5 turns or more.

*If a motor with a number of turns smaller than the above is used, the heat protector and overcurrent protection circuit may operate. The number of turns of the motor is a criteria only. Depending on the running conditions, the protection circuit may operate even if the condition above is satisfied.

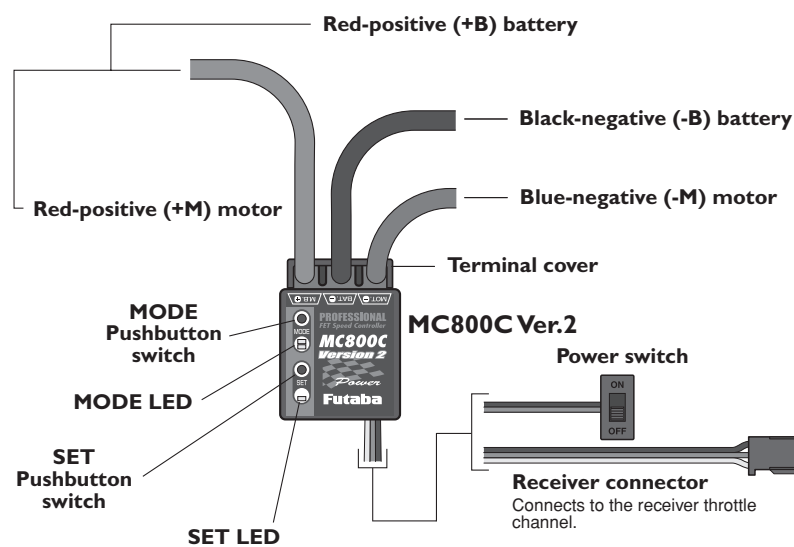
Power supply

Nicd, NiMH battery 4~7 cells (4.8~8.4V)

DESCRIPTION OF FEATURES

- SMD MOSFETs with smallest internal resistance for minimal losses and maximum power**
- Digital variable modes "Power Control 2", "Hyper Brake" and "Neutral Brake"**
MC800C Ver.2 features three different modes which enable you to adjust motor power and the driving "feel" to match your special requirements precisely. Power Control 2 is a revolutionary digital motor management system, which enables you to set the rate of acceleration to meet your specific preference. This system replaces simple technologies such as current limiting and variable frequencies. Hyper brake allows you to set a certain level of "hand-brake effect" in an emergency, i.e. you can vary the minimum brake effect when you apply the brake. Neutral brake allows you to set a slight braking action which is applied in the neutral range. This enables you to hold the throttle on longer when entering a turn. Your car also has greater front axle grip with this setting.
- External solder points with 12 AWG silicone flex wire**
- Start Acceleration function**
The start of a race is often crucial to the result. You can exploit the Start Acceleration system to give you the crucial advantage at start time, as the system shortens the speed control's response time at this critical moment, with the result that you have more acceleration available.
- 4-cell operation possible without receiver battery**

CONNECTION



Accessories:

- Miniature screwdriver (Use to press the pushbutton switch.)
- Schottky diode (for motor)
- Capacitors (for motor)
- Double sided tape
- Others

MOUNTING PRECAUTIONS

WARNING

- Install the receiver and receiver antenna away from the amp, motor cord, power cord, Nicd battery, and other parts that carry a high current.
 - Metal and carbon chassis and other conductive parts transfer switching noise. When mounting the receiver to such a chassis, use thick double-sided tape to mount the receiver as far away from the chassis as possible.
 - Always install a motor noise suppresser capacitor. Also, do not forget to service the brushes, and other parts.
- If noise causes the receiver to operate erroneously, control may be lost and an extremely dangerous situation may occur.
- Insert the connectors firmly.
- If vibrations while running cause the connectors to work loose, control may be lost and an extremely dangerous situation may occur.

CAUTION

- Do not wrap your MC800C Ver.2 in foil. It is important to provide a free flow of cooling air over it.
- Do not remove the case of MC800C Ver.2. The MC800C Ver.2 may not be repairable.
- Never reverse the battery polarity. Reverse connection will immediately destroy the amp.
- Mount the MC800C Ver.2 so that conductive parts do not directly touch the solder parts of the input/output cord. A short circuit may occur.

OPERATING PRECAUTIONS

WARNING

- Do not run the vehicle in the rain or through puddles or on muddy or snowy roads. If moisture enters the amp, erroneous operation may cause loss of control and an extremely dangerous situation may occur. It may also cause amp trouble. Should moisture enter and cause erroneous operation, send the MC800C Ver.2 out for repair and inspection.
 - Always turn the power switches on and off in the following order:
ON: Transmitter -> receiver (amp switch)
OFF: Receiver (amp switch) -> transmitter
- If the power switches are operated in the opposite order, the vehicle may run unexpectedly and an extremely dangerous situation may occur.
- When going to and returning from the circuit, and when storing the model, always remove the Nicd battery.
- If the switch is turned on erroneously, control may be lost or a fire may start.
- Always perform a check of operation before running.
 - When making adjustments, remove the motor, or place the vehicle on a stand, so that it cannot run.
- When not set up correctly, the vehicle may run unexpectedly and an extremely dangerous situation may occur.

CAUTION

- If a peddle or other foreign object gets caught in the gears or the vehicle hits an obstruction, do not try to forcefully run vehicle. Forcefully running the vehicle will cause trouble.
- Do not touch the motor or MC800C Ver.2 immediately after running. Touching the motor or amp immediately after running may result in serious burns.
- If the motor is connected to the speed control, you must not run the motor by connecting a separate battery. This will wreck the unit.
- Turn the power switches on in the state where the vehicle is floated. When turning on, depending on the receiver used, a motor may rotate for a moment. Be careful not to injure a finger etc. by rotation of the wheels.

INSTALLATION TIPS

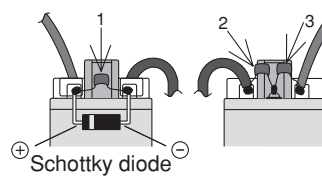
- Mount the speed control in the model using the double-sided foam tape supplied.
- Provide plenty of cooling openings in the bodywork; this increases the performance and extends the life of all electronic components.
- Install the speed control in a location where it is protected from crash damage.
- The speed control should be installed in such a way that you have easy access to all connectors and the set-up button.
- For extreme applications, use a special heat-sink sold separately. Note: not strictly essential. Naturally, MC800C Ver.2 also works perfectly without the heat-sink.

Important:

- Ensure that there is an adequate distance (approx. 3 cm) between the speed control and power cables and the receiver or receiver antenna. Avoid direct contact between all power system components and the receiver or antenna, as this can cause interference. If you encounter interference problems, re-position the components in the model.
- The antenna should be run vertically up and away from the receiver. Avoid contact with any parts made of carbon fibre or metal. See also the instructions supplied with your radio control system.

INSTALLATION

- Solder the suppressor capacitors and the Schottky diode to the motor.



Motors with no suppressor capacitors, or inadequate suppression, may cause the MC800C Ver.2 to malfunction. Always solder the capacitors supplied to your motor. The schottky diode improves the efficiency of the speed control / motor combination and provides extra protection to the brake FETs. The white ring must always face the positive side.

- Remove the motor pinion, or ensure in some other way that the wheels of the model can rotate freely.
- Install the MC800C Ver.2 in the model.
- Connect the MC800C Ver.2 to the receiver (throttle channel).
- Connect the MC800C Ver.2 to the motor: red wire to positive (+), blue wire to negative (-).
- Check all the wiring and connections before you connect the MC800C Ver.2 to a drive battery.

Caution: incorrect polarity will wreck your MC800C Ver.2.

The MC800C Ver.2 is now ready to be set-up (see back page).

[MC800C Ver.2 Technical Data]

(Specifications are subject to change without prior notice.)

- Operating system: Forward and brake
- Power requirement: Nicd, NiMH battery 4~7 cells (4.8~8.4V)
- PWM frequency: 3.1kHz (Especially Power Control level 4 is performed by load adaptive.)
- Setting: One-touch input by pushbutton switch.
- Current capacity (Momentary load): 235A (FET rating)
- Case size: 28.3x25.4x14.4mm (excluding protruding parts)
- Silicon cord gauge size: AWG12 equivalent
- Weight: 17.5g (excluding connector, cords and switch)
- BEC voltage: 5.8V (excluding at 4 cells)

SET UP

Neutral, high, and brake MAX points setting

In set-up mode MC800C Ver.2 stores every step when you press the Set-up button. All the settings are stored in the unit even when the speed control is subsequently disconnected from the battery. Set up the following basic functions on your transmitter (if present):

- High ATV, EPA (throttle travel) - maximum
- Low ATV, EPA, ATL (brake travel) - maximum
- EXP, EXPO (exponential) - start with 0
- SUB trim (neutral trim) - center
- TH trim - center
- Throttle reverse (servo reverse) - any setting; must not be changed after completion of set-up procedure.
- Asymmetrical stick travel is possible (2/3 throttle - 1/3 brake)

If your transmitter does not feature these set-up functions, it is already in "basic set-up" mode.

Remove the motor pinion, or ensure in some other way that the wheels of the model are free to rotate.

1 Turn on the power in following order.

- Switch the transmitter on.
- Set the transmitter throttle stick to neutral, and then switch the speed control on.

2 Hold the SET button pressed in for at least 3 seconds using the small screwdriver supplied.

- The SET LED flashes red, to indicate that the unit is in set-up mode. It continues flashing until the set-up procedure is completed.

	Transmitter throttle operation	SET button operation	MC800C Ver.2 MODE LED	SET LED
3 Neutral point setting	Neutral state	• Press SET button once.	• MODE LED flashes green and the motor beeps.	• SET LED flashes red.
4 High point setting	Full high state	• Press SET button once.	• MODE LED flashes red.	• SET LED flashes red.
5 Brake MAX point setting	Full brake state	• Press SET button once.	• MODE LED glows red.	• SET LED glows red.

- This completes the set-up procedure. Check the operation by the following "CHECKER LED DISPLAY." When throttle operation and the CHECKER LED DISPLAY are not correct, set up again from the first step.
- If you make a mistake during the set-up procedure, don't worry: switch MC800C off for about 10 seconds and start again from the first step.

DIGITAL VARIABLE MODES SETTING

Power Control 2, Hyper Brake, and Neutral Brake settings

You can change the Mode settings as described below.

1 Turn on the power in following order.

- Switch the transmitter on.
- At race events you usually do not have access to your transmitter. In this situation it is possible to adjust the speed control's settings without the transmitter signal. All you have to do is disconnect the receiver lead (attached to the speed control) from the receiver. (In this case, remove the motor pinion, or disconnect the motor.)
- Switch the speed control on.

2 Hold the MODE button pressed in for at least 3 seconds using the small screwdriver supplied.

- The Mode LED flashes green to indicate that you have selected 'Power Control' mode.

	MODE button operation	MODE LED	SET button operation	SET LED
3 Power Control 2 mode setting	• The MODE LED flashes green to indicate that you have selected 'Power Control' mode. • Press the Mode button again to move to the next mode.		• You can adjust the value by pressing the SET button.	• You can check the set value (1-5) by counting the flashes of the red SET LED (one flash equals value 1, two flashes value 2 etc.) Flash number: 1 2 3 4 5 Set value: 1 2 3 4 5 Power level: (Smooth) (Mega punch)
4 Hyper Brake mode setting	• The MODE LED flashes red to indicate that you have selected 'Hyper Brake' mode. • Press the Mode button again to move to the next mode.		• Press the SET button to change the value. (*1)	• The SET LED now shows the stored value again. Flash number: 0 1 2 3 4 5 Set value: 0 1 2 3 4 5 Brake: Linear (Progressive)
5 Neutral Brake mode setting	• The MODE LED flashes red/green to indicate that you have selected 'Neutral Brake' mode. • Press the MODE button again to complete the programming procedure and return to the normal mode of operation.		• Press the SET button to change the value.	• The SET LED shows the stored value again. Flash number: 0 1 2 3 4 5 Set value: 0 1 2 3 4 5 Brake: Off (Strong)

Power Control 2 set value:

- 1: for low grip
- 2: for off-road
- 3: for touring car
- 4: load adaptive mode
- 5: for stock racing

(*1) According to the setting of Neutral Brake, the range of Hyper Brake which can be set up changes. For example, when Neutral Brake is set as the level 2, the setting range of Hyper Brake serves as levels 2-5.

Default settings:

MC800C Ver.2 speed controls are supplied factory-adjusted.

The default setting is this:

- Power Control 2 = 2
- Hyper Brake = 2
- Neutral Brake = 0

If you lose track of the modes during the set-up procedure, you can reset the speed control to the default settings. With the transmitter switched on, hold the SET button pressed in while you switch on the speed control. This action returns the unit to the factory settings.

START ACCELERATION FUNCTION

Start Acceleration function setting

- Activate Start Acceleration by holding transmitter at full brake for 5 sec before start.

This system shortens the speed control's response time at start time, with the result that you have more acceleration available.

CHECKER LED DISPLAY

Relationship between amp operation and checker LED display

The MC800C Ver.2 operating state can be checked with the checker LED as shown below.

Operation	Checker LED display
High point Forward	MODE: On (green) SET: On (red)
	MODE: On (green) *Becomes brighter nearer the high point. SET: Off
Neutral point	MODE: Off SET: On (red) — at Normal Brake SET: Off — at Neutral Brake
Brake Brake MAX point	MODE: On (red) *Becomes brighter nearer the MAX point. SET: Off
	MODE: On (red) SET: On (red)

TROUBLE-SHOOTING GUIDE

Symptom	Cause	Remedy
Steering servo works, but no motor function.	Set-up/basic settings problem	Repeat basic speed control set-up procedure from start; to store the function correctly you must hold stick in full-throttle position while you press the set-up button. Note also that all transmitter functions must be set as described in the instructions.
	Speed control connected to wrong receiver channel	Speed control must be connected to Ch.2; check polarity of receiver lead.
	Motor defective	Fit new motor.
	Motor brushes stuck	Check that carbon brushes are free to move.
	Wiring problem	Check cables and connectors.
No steering servo function or motor function	Receiver plug incorrectly wired	Check polarity of receiver plug.
	Crystal faulty	Replace components one by one to locate fault.
	Receiver faulty	Replace components one by one to locate fault.
Motor does not run when throttle is advanced; motor runs when braking	Transmitter throttle polarity (direction) has been changed	Simply repeat speed control set-up procedure. Leave transmitter stick direction unchanged.
	Speed control damp, protective circuit tripped	Switch off immediately, allow speed control to dry out.
No brake function	Receiver power supply circuit faulty	Check BEC output voltage, or send unit in for repair.
	Set-up/basic settings problem	Repeat basic speed control set-up procedure from start; see also "Motor does not run" point.
Poor braking effect	Speed control faulty	Send unit in for repair.
	Set-up/basic settings problem	Repeat basic speed control set-up (see above), or reset Low ATV, EPA, ATL on transmitter to maximum.
Insufficient top speed	Motor pinion/reduction ratio too large	Fit smaller motor pinion.
	Problem with set-up/basic settings	Repeat basic speed control set-up procedure from start; see also "Motor does not run" point.
Poor acceleration	Transmitter has been changed after speed control set-up, or has changed its own settings.	Repeat basic speed control set-up procedure from start; see also "Motor does not run" point.
	Motor faulty, brushes sticking	Try different motor, free up brushes
Speed control overheats	Inadequate cooling	Cut cooling openings in bodywork.
	Motor too powerful, or input voltage too high	Use less powerful motor, or battery with lower voltage/fewer cells.
	Motor pinion/reduction ratio too large	Fit smaller motor pinion.
Motor does not stop; continues running slowly.	Car drive/bearing system problem	Check or replace components.
	Motor run too often without cooling period.	Allow speed control to cool off after each full run.
Motor does not stop; continues running slowly.	Damp in speed control	Disconnect battery immediately, dry speed control with heat-gun (hot air).
	Set-up/basic settings problem	Repeat basic speed control set-up procedure.
Radio interference	Speed control faulty	Send unit in for repair.
	Motor inadequately suppressed	Solder capacitors to motor.
Imprecise, non-linear control characteristics	Receiver or antenna too close to power cables, motor, battery or speed control;	See "Installation".
	Receiver antenna too short, or coiled up.	
	Receiver fault	Replace components one by one to locate fault.
	Transmitter or transmitter module fault	Use original crystals only.
	Servo fault	
	Crystal fault, or crystal not correct type	
	Power cables too long, red power cable connected incorrectly.	See "Wiring" and "General installation notes".
	Connector contact problem.	Check connectors.
	Transmitter battery/cells flat	Replace dry cells, recharge NC pack.
	Transmitter antenna too short	Extend transmitter antenna fully.

Special Markings

Pay special attention to the safety at the parts of this manual that are indicated by the following marks.

- Symbol: ; Prohibited
 ; Mandatory

Mark	Meaning
	Procedures which may lead to a dangerous condition and cause death or serious injury to the user if not carried out properly.
	Procedures which may lead to a dangerous condition or cause death or serious injury to the user if not carried out properly, or procedures where the probability of superficial injury or physical damage is high.
	Procedures where the possibility of serious injury to the user is small, but there is a danger of injury, or physical damage, if not carried out properly.