

## MTC-2-BT mini tank controller with ACU auxiliary control unit, for Big Tank

MTC-2-BT is a modified version of MTC-2 for big tank. It has large connectors for battery and motors, and also FET with ultra low resistance. It can work alone as a twin motor ECS (electronic speed controller) for RC tanks. When the ACU (auxiliary control unit) is connected, it can also control turret rotation, gun elevation, gun firing, machine gun firing and engine sounds. When the GSU (gun stabilize unit) is connected, ACU can stabilize gun elevation and turret rotation. For GSU operation, see separate GSU manual.

### MTC-2-BT highlight features:

- MTC-2-BT can work alone as a twin motor ESC, with 20A continuous current for large motors.
- ECS with forward, reverse, left, right and pivot turn over all speed range.
- 5, 4 or 2 channel receiver options. When using 2 channel receivers, control can be switched between tank motion and turret / gun motion by trimmer action.
- Simple one button setup procedure.
- Input voltage 7.2V (6cell 1.2V NiMH battery) or 7.4V (2C Lipo battery).
- Auto shutdown at low battery.
- Dimension (PCB): 31 x 38 x 20mm (1.2" x 1.5" x 0.8")
- Dimension (with mounting plate): 45 x 38 x 26mm (1.8" x 1.5" x 1")

### ACU highlight features:

- Three servo ports for turret rotation, gun elevation and gun barrel recoil.
- Support optional GSU (gun stabilize unit). See separate GSU manual for details.
- Main gun led and machine gun led flashes.
- 22KHz high quality digital sound effects, including main gun sound, machine gun sound and engine sound.
- Engine sound includes engine start, stop, idle, and running. Engine sound changes according to speed. Engine sound can be turned off by jumper.
- Turret rotation can be replaced by gun left/right motion by jumper setting.
- Gun return to reload position after fire (can be disabled by jumper).
- ACU size 38 x 25 x 12mm (1.5"x1"x0.5")

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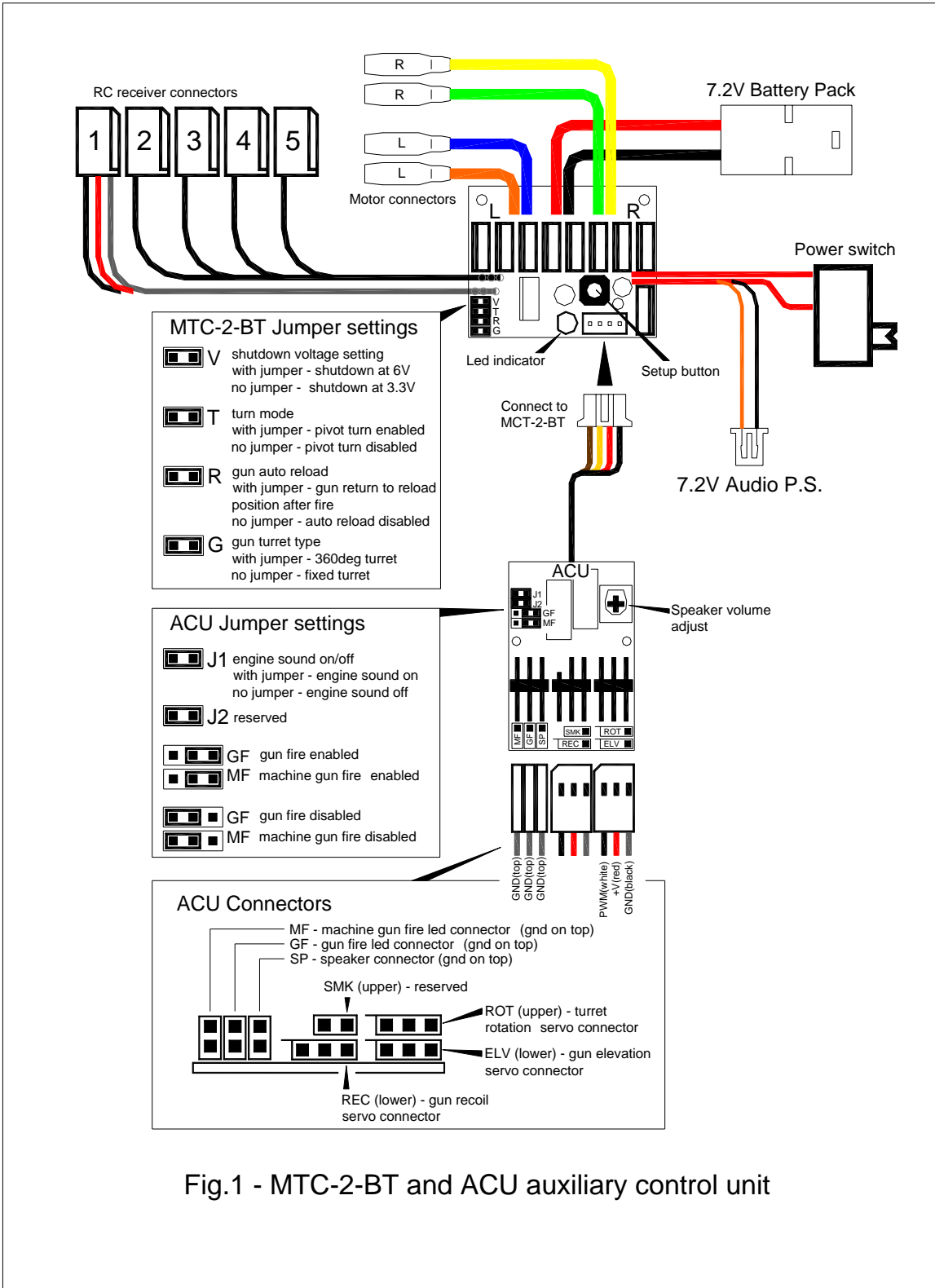


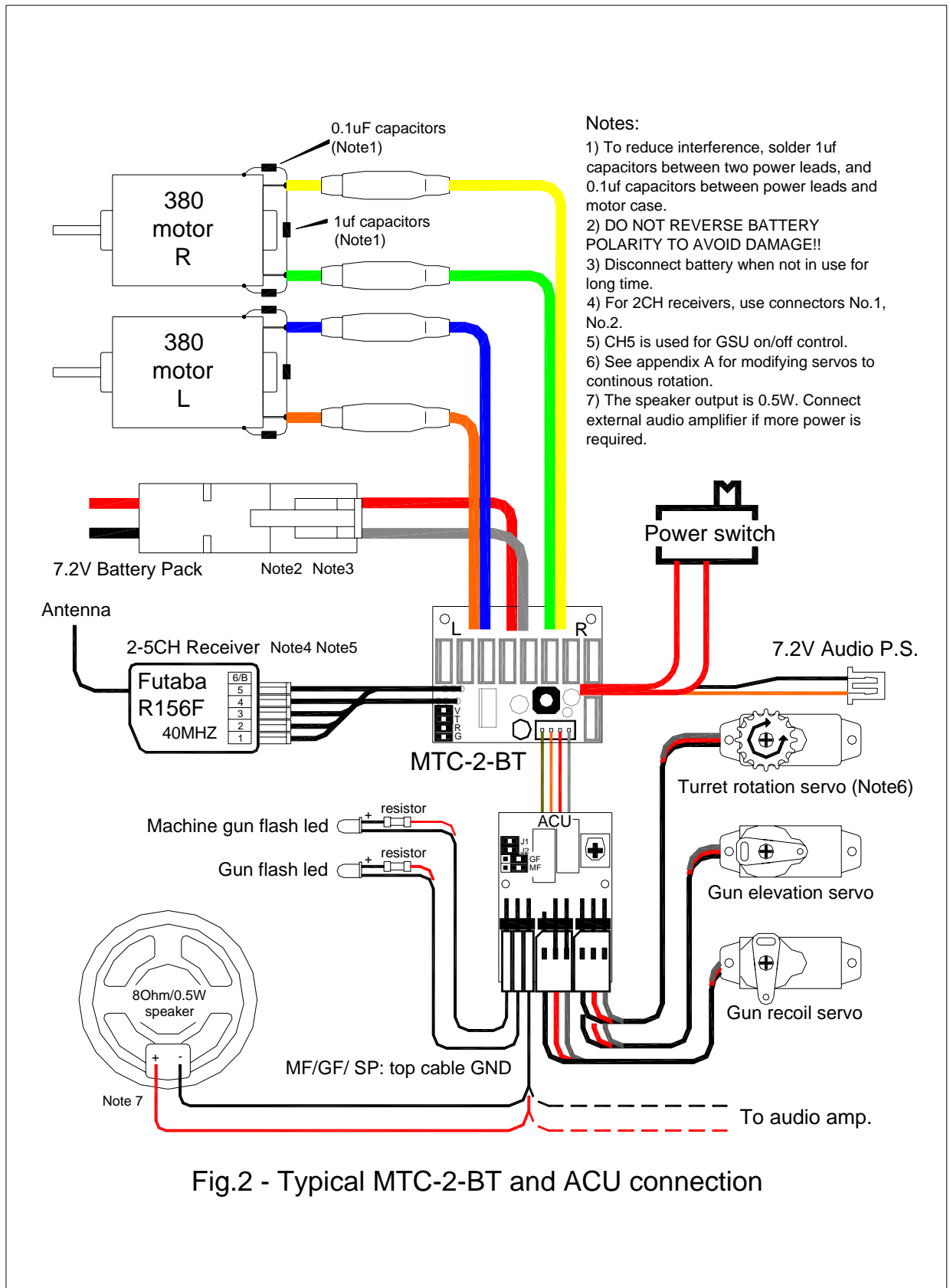
Fig.1 - MTC-2-BT and ACU auxiliary control unit

**MTC-2-BT parts:**

- 1) Battery connector – 3.6 - 9.0V battery input. **DO NOT REVERSE INPUT POLARITY TO AVOID DAMAGE!** Remove battery when not in use for long time.
- 2) Power switch – for switching on the control circuit and also the audio power supply.
- 3) Audio power supply – power supply for external audio amplifier, or other external components.
- 4) RC receiver connectors – for 4 CH receivers, connect all connectors No.1 – 4. For 2 CH receivers, connect connectors No.1 and 2 only.
- 5) Led indicator – multi-purpose indicator. When power on, it lights up 1 sec and then blinks slowly if it do not receive RC signal. It lights up continuously when signal is received from the RC connectors. It will also flash during the setup process. See setup procedures for details.
- 6) Setup button – setup MTC-2-BT for a particular transmitter. It also setup the gun reload position if R jumper is on. See setup procedures for details.
- 7) V jumper – shutdown voltage setting. With jumper installed, the shutdown voltage is set at 6V. When the jumper is removed, the shutdown voltage is set at 3.3V. See the input voltage section for more details.
- 8) T jumper – turn mode jumper. Remove this jumper to disable pivot turn.
- 9) R jumper – enable gun return to reload position after fire. Remove this jumper to disable this feature.
- 10) G jumper – gun motion select jumper. Install this jumper for turret with 360° rotation. In this mode, a servo modified for continuous rotation is connected to ROT port to control turret rotation speed. When the jumper is removed, a standard servo is connected to ROT port to control the left/right gun movement.

**ACU parts:**

- 11) ROT port – turret rotation servo port. A continuous rotation servo is connected here to control turret rotation. For tanks with fixed turret, remove the G-jumper to set this port to left / right gun movement by standard servo.
- 12) ELV port – gun elevation servo port.
- 13) REC port – gun recoil servo port.
- 14) Speaker volume adjust – trimmer to change speaker volume.
- 15) SP port – speaker port, for driving 8Ohm / 1W speaker.
- 16) GF port – gun flash led port.
- 17) MF port – machine gun flash led port.
- 18) J1 jumper – remove jumper to turn off engine sounds.
- 19) GF and MG jumpers – for enable/disable of gun fire and machine gun fire. See Fig.1 for jumper settings.



### Transmitter Stick Modes

The stick mode of MTC-2-BT is shown in Fig.3. If your transmitter has a different stick mode, change the connector numbers accordingly.

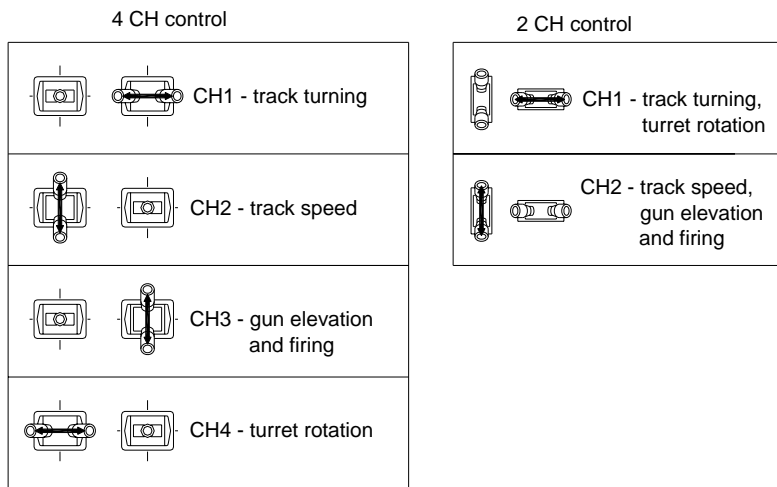
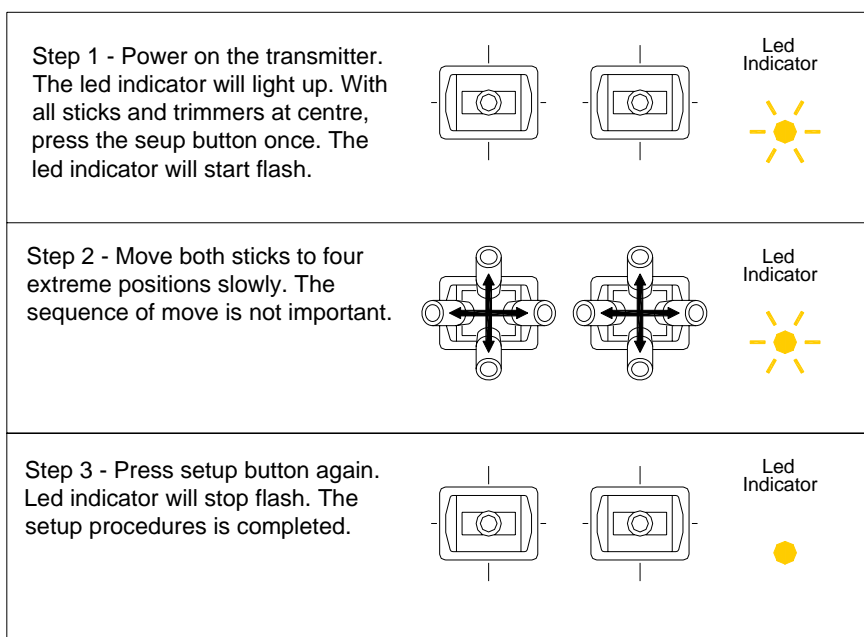


Fig.3 - Stick modes of MTC-2

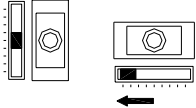

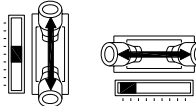

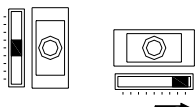

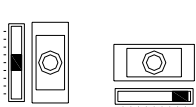

### Using MTC-2-BT for the First Time

When using MTC-2-BT for the first time, or when you change the transmitter, you must perform the setup procedures to store the transmitter characteristic in MTC-2-BT. To avoid unintended track motion, disconnected motors or remove tracks during setup.

### 4CH Setup Procedures

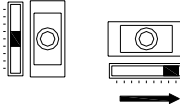
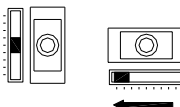


## 2CH Setup Procedures with Turret Control

<p>Step 1- Power on the transmitter. The led indicator will light up. Move both sticks to centre. Move left trimmer to middle. Move right trimmer to leftmost position. Press the setup button once. The led indicator starts flash.</p>		<p>Led Indicator</p> 
<p>Step 2 - Move both sticks to extreme positions slowly. The sequence of move is not important.</p>		<p>Led Indicator</p> 
<p>Step 3 - With both sticks back to centre, move right trimmer to rightmost position.</p>		<p>Led Indicator</p> 
<p>Step 4 - Press the setup button again. Led indicator stop flashes. The setup procedures is completed. After setup, control will go to turret and gun motions. See following section for control mode switching.</p>		<p>Led Indicator</p> 

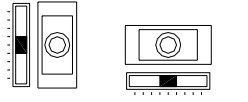

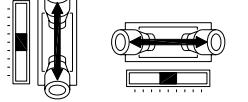

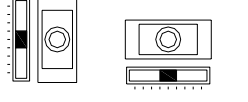

## 2CH Control Mode Switching

When using 2CH transmitters, you can either control track or turret motions. You can switch between the two modes as follows:

<p>Switch control to turret - With both sticks at centre, move right trimmer quickly to rightmost position.</p>	
<p>Switch control to track motion - With both sticks at centre, move right trimmer quickly to leftmost position.</p>	
<p>Notes</p> <ul style="list-style-type: none"> <li>- Speed is critical in mode switching. The trimmer must be moved quickly.</li> <li>- If switching failed, you can either repeat the process, or you can power off and on the transmitter. MTC-2 will determine the control mode when transmitter is power on.</li> </ul>	

## 2CH Setup Procedures without Turret Control

MTC-2-BT can be setup to control track motion only. All turret motions and sound effects will be disabled.

<p>Step 1 - Power on the transmitter. The led indicator will light up. Move both sticks and trimmers to centre. Press the setup button once. The led indicator starts flash.</p>		<p>Led Indicator</p> 
<p>Step 2 - Move both sticks to extreme positions slowly. The sequence of move is not important.</p>		<p>Led Indicator</p> 
<p>Step 3 - Press the setup button again. Led indicator stops flash. The setup procedures is completed.</p>		<p>Led Indicator</p> 

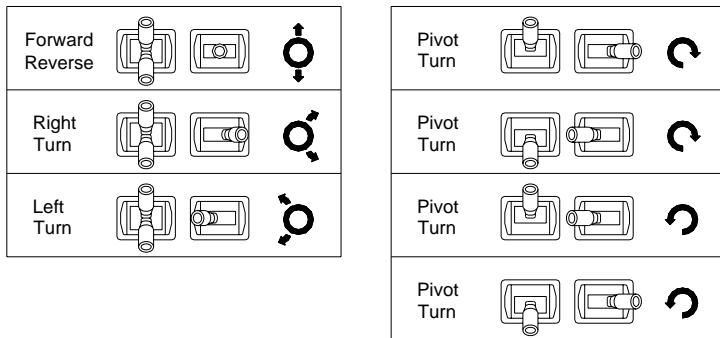
## Setup Gun Reload Position

When R jumper is on, gun will return to reload position after gun fire. To setup the gun reload position, move gun to the desired reload position and then press the setup button. You can go through the setup process as usual, or you can press the setup button at once to end setup.

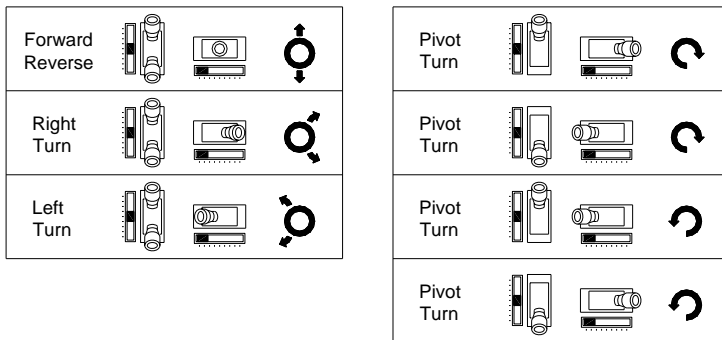
## Reset to Factory Settings

MTC-2-BT is factory set to 4CH control. To reset to factory settings, press and hold the setup button until it stop flash. MTC-2-BT is then reset.

### Track Motion Control



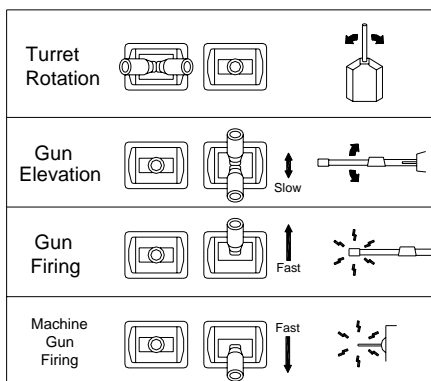
4CH Transmitter



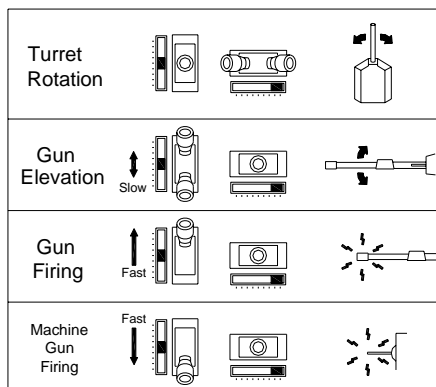
2CH Transmitter

- Pivot turn begins when right stick move halfway left or right
- Pivot turn is disabled when T-jumper is removed (Fig.1).

### Turret Motion Control



4 CH Transmitter



2 CH Transmitter

- To trigger gun firing, move right stick (left stick for 2CH transmitter) quickly from middle to top. Tank will recoil during gun fire. After gun fire, move stick back to middle to resume operation.
- To trigger machine gun firing, move right stick (left stick for 2CH transmitter) quickly from middle to bottom. Machine gun sound continuous when stick keep at bottom. Move stick back to middle to resume operation.
- Both sound effects can be disabled by jumper settings (Fig.1).



## Control of Engine Sound

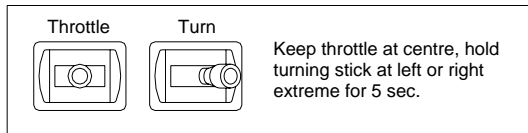
Engine sound will be generated when ACU is connected and J1 installed:

Engine start – trigger by first throttle

Engine idle and running – engine sound changes according to speed

Engine stop – with throttle at center, hold turning stick at left or right extreme position for 5 sec.

Alternatively, engine will stop in 5 sec after transmitter is turned off.



### Engine stop by stick motion

## Input Voltage

- MTC-2-BT is designed to work at 4.8 - 7.4V (4 - 6 cell 1.2V NiMH, or 2 cell Lipo battery). To avoid over discharge of Lipo battery, it will shutdown automatically when input voltage is too low. After shutdown, the motors will stop and led indicator flashes slowly. Also, the ACU beeps if connected.
- The V jumper determines the shutdown voltage. When installed, the shutdown voltage is set at 6V. It is suitable for 2 cell Lipo. When the V jumper is removed, the shutdown voltage is set at 3.3V. It is suitable for NiMH and 1C Lipo.
- When using 4 cell NiMH or 1C Lipo, operation becomes unstable when input voltage drops below 4V. This may happens before auto shutdown and you should replace the battery.
- When using Lipo battery, follow all safety precautions for Lipo battery. Always disconnect battery after use.

## Troubleshooting

Symptom	Cause	Resolution
Led blinks when tank moves Tank out of control	Motor interference Low battery	- Add noise filtering capacitors (Fig.2) - Keep antenna away from motors cables - Prevent loose metal contacts - Motor fault, replace motor - Replace or recharge battery
Led indicator not stable, or turns off	Antenna problems	- Check antenna length - Keep antenna in vertical position - Keep antenna away from motors cables
Led indicator dims when tank moves	Low battery	- Replace or recharge battery
Cannot trigger main gun / machine gun	Improper setup	- Do setup again
	Wrong jumper setting	- Check GF, MF jumpers