



# tankdrive XXL

Multi purpose control for miniaturized track vehicle RC models

## Instructions for installation and operation

Please read carefully before use

Disclaimer: tankdrive comp disclaims all and any warranty in case of improper installation, inobservance of this manual or product modifications by the user.

This multi-purpose control can, in conjunction with a 4 to 8 channel proportional drive remote control, operate a full option RC model. Despite its compact size it can provide several time synchronized switching functions additionally. It is especially designed for large scale heavy weight models. It provides full power to the motors while still having reserves for harsh and rough terrain.

The driver PCB is capable of supplying 2000 Watt instant peak power 12V up to 40V motors.

### General Instructions

To ease power supply for control- and driver PCB we recommend to use a DC-Board – available in our shop TWM-Box.de

**This Tankdrive system is configured especially for controlling Benedini sound modules. If you prefer to use a different sound module please refer to section 7, „I/O-Ports for sound module“.**

**For installation and connection of the tankdrive PCB and its add-on modules basic skills in solder techniques are presumed.**

We strongly recommend use of the enclosed isolating plastic washers and mounting the PCB on standoff bolts, e.g. like used for PC motherboard.

For easy assembly/disassembly we also recommend to equip all wires with plug connectors. Be sure to work skillfully if soldering wired directly to connector pins. Always disconnect the battery! Flexible cables must be equipped with wire end ferrules.

Electronic devices must be protected from electrostatic discharges. Always touch a grounded metal part e. g. a water tap or a radiator, before touching the PCB.

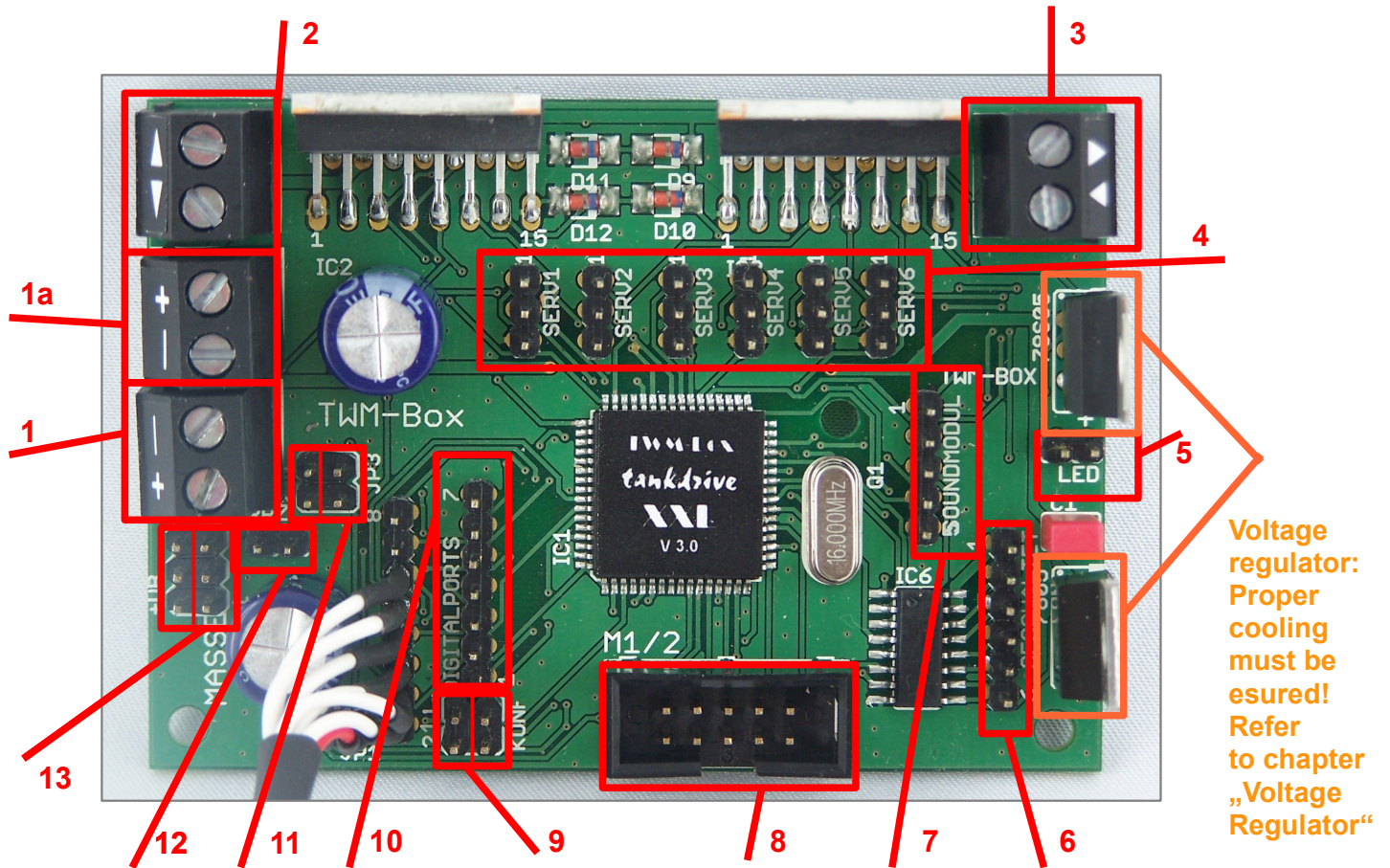
**For intermittend control of proper function refer to chapter „channel assignment“.**

**IMPORTANT: always turn on your remote sender prior to powering up the RC model.**

**If you use several batteries in series we recommend to disconnect each plus pole to reach full potential-free state!**

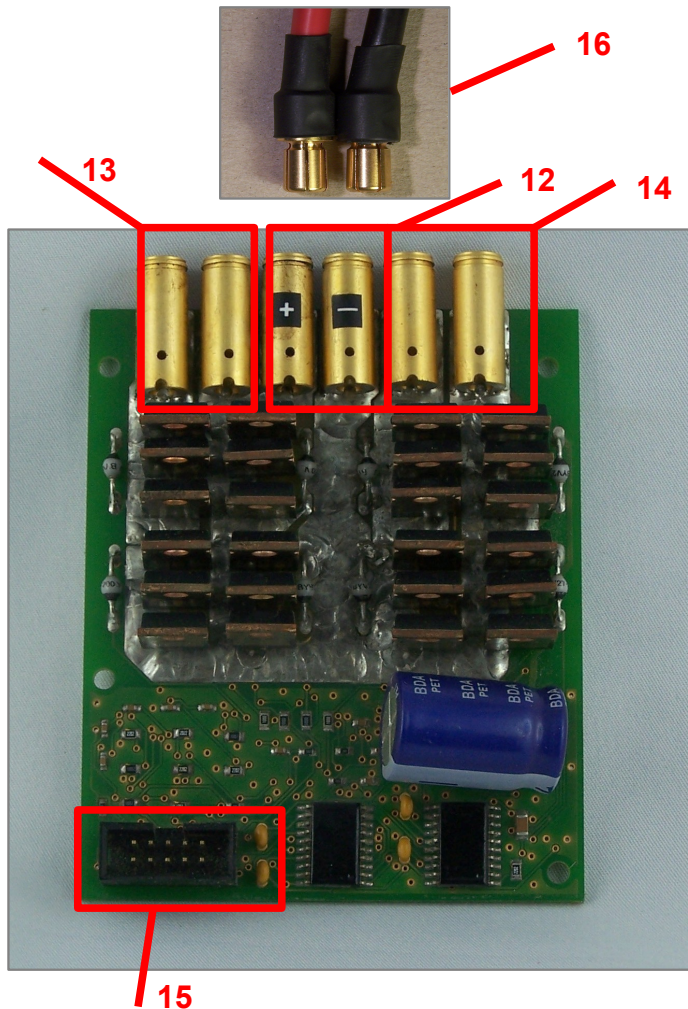
# Connector Assignment Overview

## Control PCB



- 1 Power supply connector for control PCB
- 1a Power supply for turret turn motor / cannon up/down motor
- 2 Turn turret
- 3 Cannon up/down
- 4 Servo control outputs
- 5 Power-LED
- 6 Pre-assigned ports: loads up to 500mA can be connected
- 7 I/O-Ports for sound module: can control up to 5 different sounds (tri-state/active low)
- 8 Plug for interconnection cable to Driver PCB
- 9 Motor test/vehicle type configuration
- 10 Digital ports
- 11 Direction control for cannon up/down and traversing servos
- 12 Revert rotation direction for gun coil-back servo
- 13 3 GND/supply power pairs at free disposal

## Driver PCB



- 12 Battery Plus and Minus
- 13 Power to right track motor
- 14 Power to left track motor
- 15 Plug for interconnection cable from Control PCB  
(Track motor connectors are made for up to 16 mm<sup>2</sup>, AWG 6  
- solder power supply cables to it and apply sufficient insulation)

### IMPORTANT!

**A 22.000µF/50V (at least) capacitor must be assembled inside the power supply section of the driver PCB. It is included in the set.**

**Please refer to section „wiring“**

## IMPORTANT

**If operating the system from more than 12V supply!**

**Control PCB:** Sufficient heat dissipation from the voltage regulators must be provided!

**Opportunity 1:** Operate Control PCB from separate battery (7,2V bis 12V).

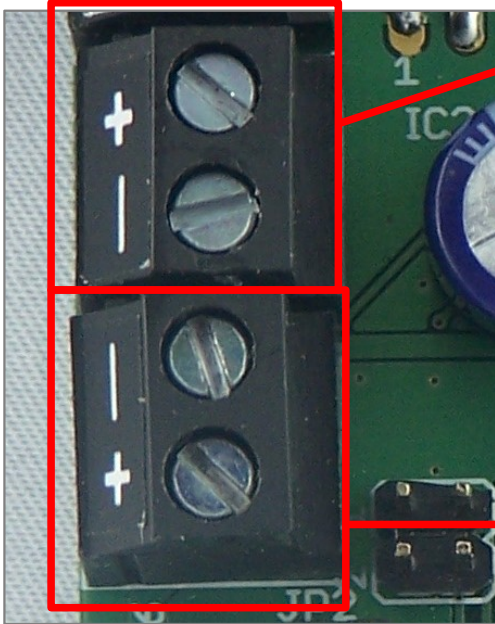
**Opportunity 2:** If using several 12V batteries in series operate Control PCB From one (the 1<sup>st</sup> seen from minus cable on connector 12) only.

**Opportunity 3:** If using one 24V battery screw attach the voltage regulators To large heat sink, e.g. the metal chassis of your vehicle.

**Opportunity 4:** use DC-Board (recommended!)

**The Driver PCB can be supplied from 40V directly without restrictions.**

## Connection Details – Control PCB



### 1a Power supply for turret turn motor / cannon up/down motor up to 40V

Important:

We recommend to apply a fuse between battery and plus port.

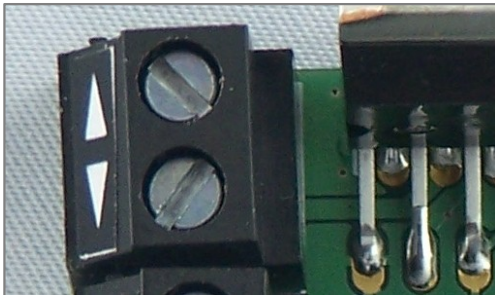
If the functions turn turret and lift/lower cannon are implemented using DC motors, the operating power supply for these motors must be connected here (plus and minus).

If the motors use the same power supply as the Control PCB you can simply assert a bridge cable to the plus port of connector 1, the Control PCB power connector. The minus signal needs no separate connection in this case.

### 1 12V Power Supply to Control PCB

Important:

We recommend to apply a fuse between battery and plus port.

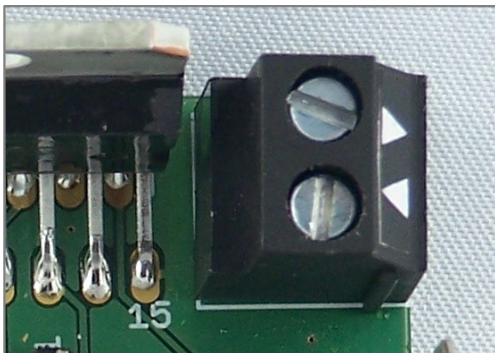


### 2 Turret turn motor

The original motor may be connected here. Servo 4 will be driven at the same time to enable e.g. horizontal adjustment of the cannon.

The motor connector can supply up to 4 amps, but if more than 2 amps is required it is strongly recommended to apply a heat sink to the driver IC.

If the motor turns into the wrong direction simply interchange the cables.



### 3 Cannon up/down motor

The original motor may be connected here.

At cannon up/down Servo 3 is driven simultaneously to e.g. perform the up/down action using a servo.

The motor connector can supply up to 4 amps, but if more than 2 amps is required it is strongly recommended to apply a heat sink to the driver IC.

If the motor turns into the wrong direction simply interchange the cables.



Row a: Signal  
 Row b: 5 Volts  
 Row c: GND

#### 4 Servo control outputs:

Serv1: group signal to sound module: speed of both track motors  
 (Prop 1 Benedini sound module)

Serv2: like Serv1

Serv3: cannon up/down Servo (optional instead of motor)

Serv4: cannon horizontal adjust Servo alternatively to turret turn motor on turretless tanks (StuG or similar)

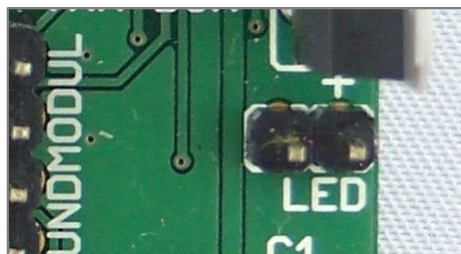
Serv 5: gun coil-back Servo

If recoil is done with a servo connect it here. The servo will move to the opposite end stop with full speed and return to start slowly once the cannon is triggered. The shooting sound is triggered simultaneously at pin3 of connector 7 and pulse signal is provided at pin 6 of the digital signal connector 6.

If your servo operates the wrong way you can assert a bridge jumper to header 12 for correction (see below).

Serv 6: supplemental servo (e.g. turning a periscope)

- controlled by channel 5 of the remote control.



#### 5 Power-LED

The enclosed LED may be connected here if desired. It displays operational system condition when the control is powered up.

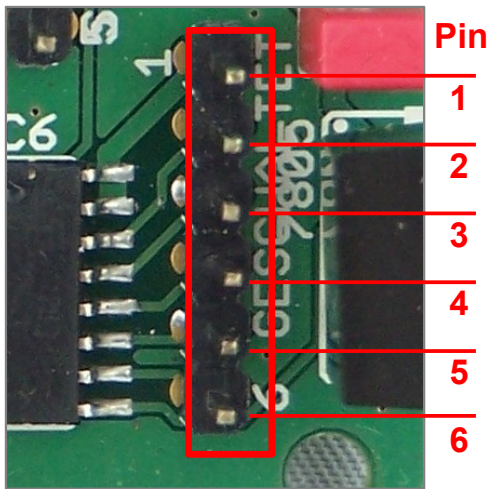
Led current consumption: 2mA. The shunt is built in already, no additional current limitation is needed.

Extend the connection cable if you want to mount the LED at a different location inside the vehicle.

For assistance in case of eventually appearing problems the Power-LED shows the following operation statuses:

During poer ON: temporary flashing indicates the remote control synchronization process. After completion the LED is lightning permanently.. Immediate permanent lightning indicates a missing signal from remote receiver.

During operation: permanent lightning indicates normal operation. Fast flashing indicates loss of remote receiver signal.



## 6 Pre-assigned ports (PCB printing: „geschaltet“)

Pin 1: connection for smoker

Pin 2: engine-idle-speed supply for smoker fan

Pin 3: vehicle-moving-speed supply for smoker fan

Pin 4: front/rear exterior lights (up to 25 standard LEDs)

Pin 5: connection for MG-LED

Pin 6: cannon coil-back (pulse signal)

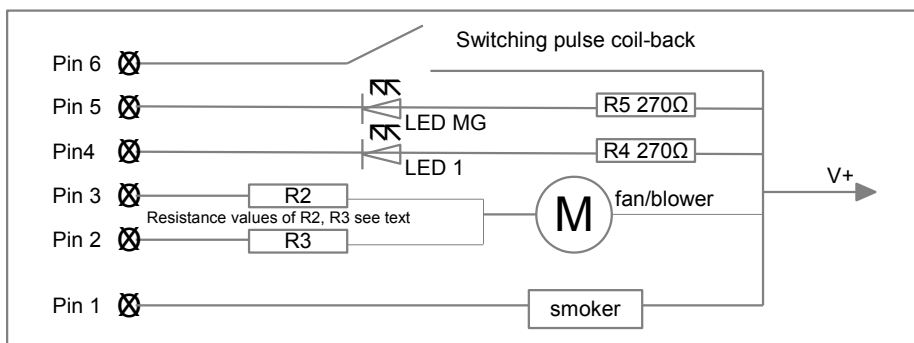
### Important:

All ports are switching low side, to GND! Connect plus terminal of the load to supply and the minus-terminal to the port.

If using a 5V-blower as smoker fan we recommend  $36\Omega$  for engine-idle speed (R3) and  $12\Omega$  for vehicle-moving speed (R2) as shunts for supply from a 7.2V power pack.

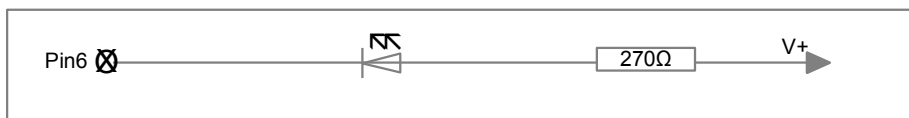
Always refer to the manual of your smoker unit for correct resistor selection.

See the schematic below for a typical pre-assigned port application:



### Note:

If cannon coil-back is done using a servo pin 6 may be used for muzzle flash emulation according to the schematic below. If you are using a super bright LED you may wish to adapt the shunt resistance accordingly. A set containing a super bright LED and fitting shunt resistor is available from the TWM-Box program.



## 7 I/O-Ports for sound module

A sound module providing low-active inputs may be connected directly.

Pin assignment:

1 Turret turn

2 engine crank

3 cannon shoot

4 cannon up/down

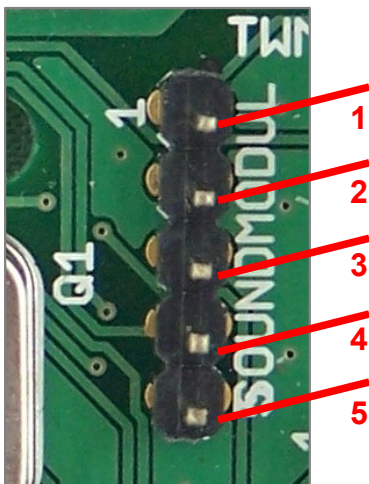
5 MG-shoot

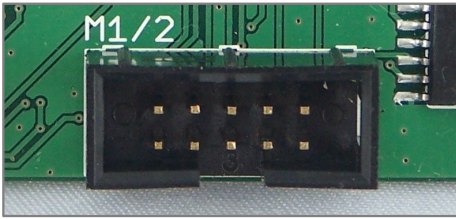
Signal output: tri-state/active low.

**If using sound modules of other vendors the switching logic must be adapted – please refer to the specifications of the sound module supplier or check for supplementary equipment probably offered by him, respectively.**

**IMPORTANT: do not connect anyother loads here. Damage to the device may be caused!**

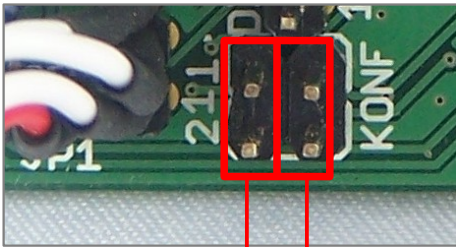
Left picture: plugged in Benedini adapter PCB with servo connector to the sound module





## 8 Plug for interconnection cable to Control PCB

Insert here the 10-wire flat cable interconnecting Control PCB and Driver PCB.



Konfig 1

Konfig 2

## 9 Motor test/Vehicle type configuration

For easier mock up the unit can be configured for track motor testing by bridging both config 1 and config 2 with jumpers. After you have connected the motors according to the manual (see chapter 7) apply power to the module. With correct motor polarity the left track should run forward and the right track backward. Else adjust the motor connections accordingly.

**IMPORTANT: Jack up the RC model for motor testing. It does not respond to remote control signals in this configuration**

After successful testing you may configure the size classification of your model. Classifications are light (e.g. infantry fighting vehicle), medium tank, heavy (main battle) tank (Jumpers remain mated).

Light tank:

No jumper applied – cannon reload time approx. 6 sec.

*After 1<sup>st</sup> hit: vehicle speed reduced to 1/2*

*After 2<sup>nd</sup> hit: cannon up/down out of order*

*After 3<sup>rd</sup> hit: total loss of function (out of battle) for approx. 15 sec*

Medium tank:

Jumper on Config 1 – cannon reload time approx. 9 sec

*After 2<sup>nd</sup> hit: vehicle speed reduced to 1/2*

*After 4<sup>th</sup> hit: cannon up/down out of order*

*After 6<sup>th</sup> hit: total loss of function (out of battle) for approx. 15 sec*

Main battle tank:

Jumper on Config 2 - cannon reload time approx. 12 sec

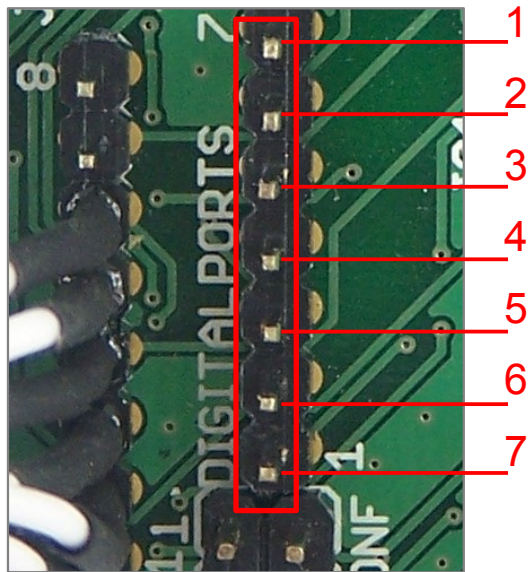
*After 3<sup>rd</sup> hit: vehicle speed reduced to 1/2*

*After 6<sup>th</sup> hit: cannon up/down out of order*

*After 9<sup>th</sup> hit: total loss of function (out of battle) for approx. 15 sec*

**Hit analysis can only be done with optional extension module TankBattle!**

**After configuration the complete system must perform a cold restart (Power down – Power up)**



### 10 Seven digital signal ports

These ports may be used to control additional optional accessory out of our TWM-Box-Program.

**These ports may only be used for supplementary equipment from the TWM-Program (e. g. Tankflash)**

**Do not connect any power loads here. This will cause damage to the device.**

Pin 1, 2: optional extension TankBattle

Connect pin 1 to pin 1 on TankBattle PCB

Connect pin 2 to pin 2 on TankBattle PCB

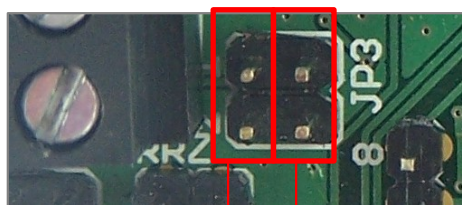
Pin 3: optional extension TankFlash for muzzle flash emulation (simultaneously with cannon coil-back)

Pin 4: digital control signal optional MG – control signal only - Additional switching device is required (e.g TankFlash) – usable with remote controls providing more than 4 channels only

Pin 5: supplemental switched signal (e.g. **Notek**) -control signal only - Additional hardware is required (e.g. TankFlash) usable with remote controls providing more than 4 channels only

Pin 6: Control signal for optional anti aircraft gun module

Pin 7: unused – individual functions can be implemented on request



**Cannon Up/Down**  
**Traversing**

### 11 direction control for cannon up/down and traversing servos

If lifting/lowering of the cannon is implemented using a servo, its sense of rotation can be reverted by plugging one of the set-included bridge jumpers here if the servo responds falsely to remote commands..

If traversing of the cannon (turretless tanks, e. g. Jagdpanther) is implemented using a servo, its sense of rotation can be reverted by plugging one of the set-included bridge jumpers here if the servo responds falsely to remote commands..

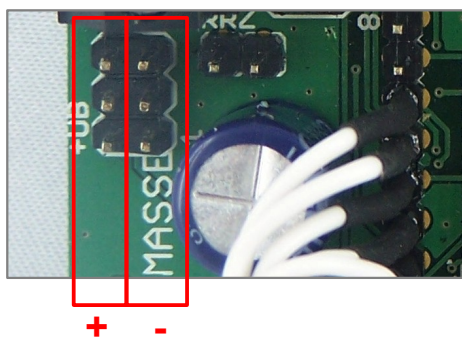
It is recommended to check the correct rotation direction of the servos before connecting the cannon to it.



### 12 Revert rotation direction for gun coil-back servo

If cannon coil-back is implemented using servo 5, its sense of rotation can be reverted by plugging one of the set-included bridge jumpers here if necessary

It is recommended to check the correct rotation direction of the servos before connecting the cannon to it.



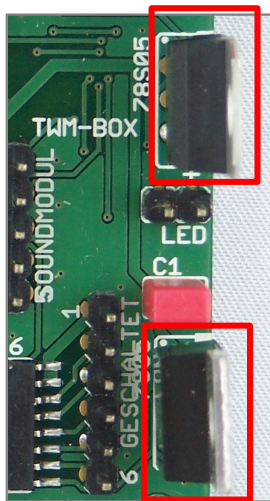
### 13 GND/power

3 Pins – all GND (-)

3 Pins – all supply power from battery pack (+)

Regard to PCB printing!





### Voltage Regulator

If using 12V power packs proper cooling must be provided for the voltage regulator ICs!

Mounting heat sinks to both regulator ICs is mandatory in this case. Fastening both regulator ICs directly to the metal chassis of the vehicle is also a possible opportunity)

**If supplying the Control PCB with more than 12 Volts please refer to the instructions in section „Connector Assignment Overview“**

## Connection Details – Driver PCB



### 14 Battery Plus and Minus

#### Achtung:

We recommend to place a fuse between battery and plus port. Select fuse rating according to total current consumption of both track motors.

Refer to the data sheet of your motors for proper value.

**Also please follow the instructions in section „Wiring“.**



Left track

Right track

### 15 Track motor connectors

**16** The track motor connectors are made for up to 16 mm<sup>2</sup>, AWG 6.

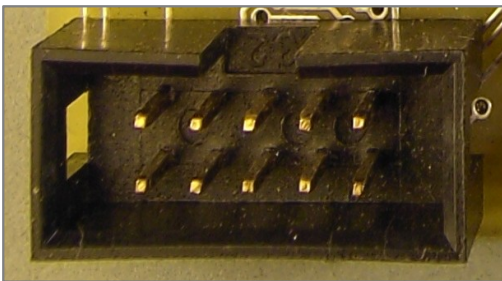
If the motor turns into the wrong direction simply interchange the cables.

### 17 Plug for interconnection cable to Driver PCB

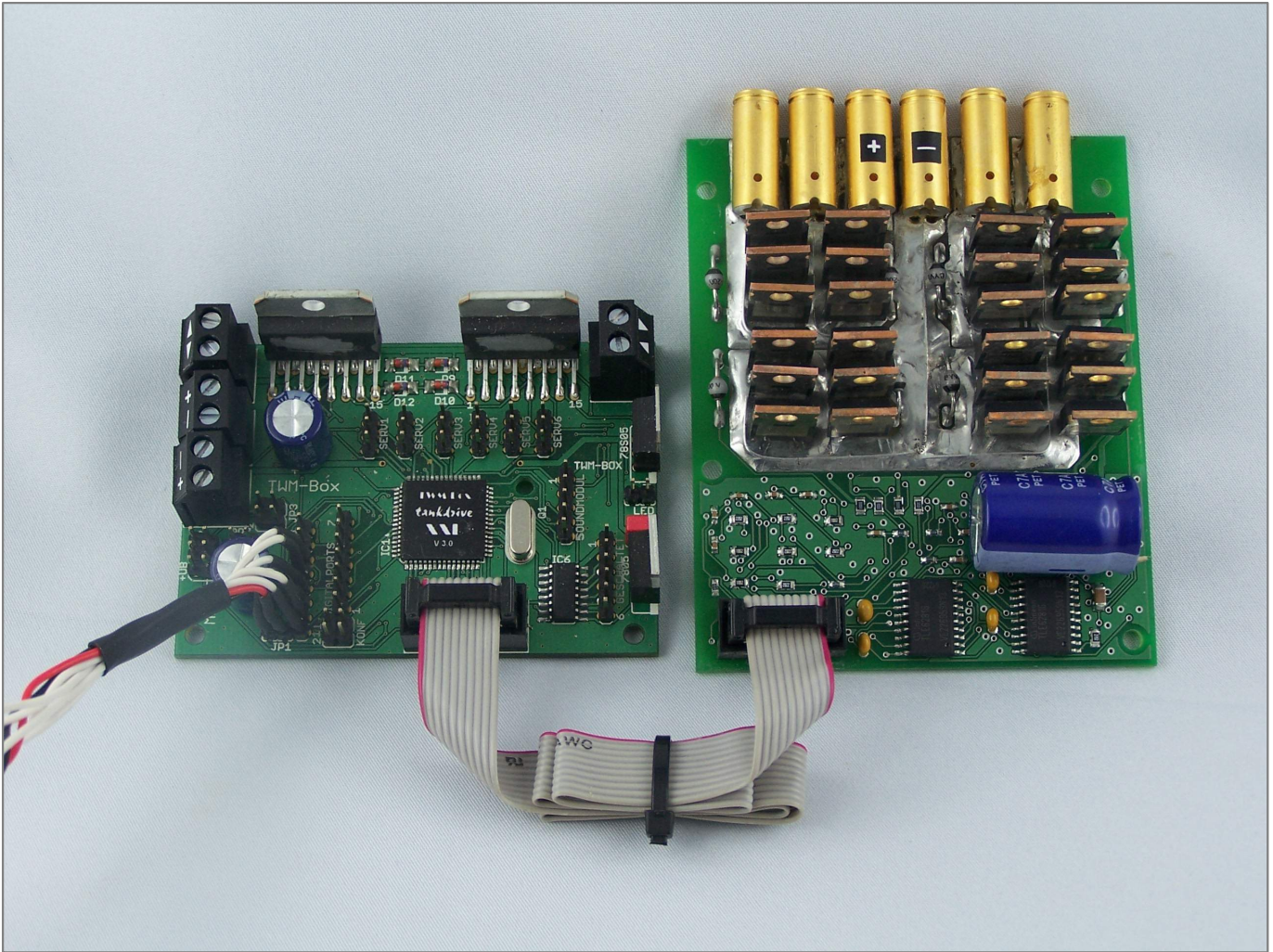
Insert here the 10-wire flat cable interconnecting Control PCB and Driver PCB.

Please use the set-included 10 wire flat cable only.

**If making your own cable it is essential to regard correct polarity.**

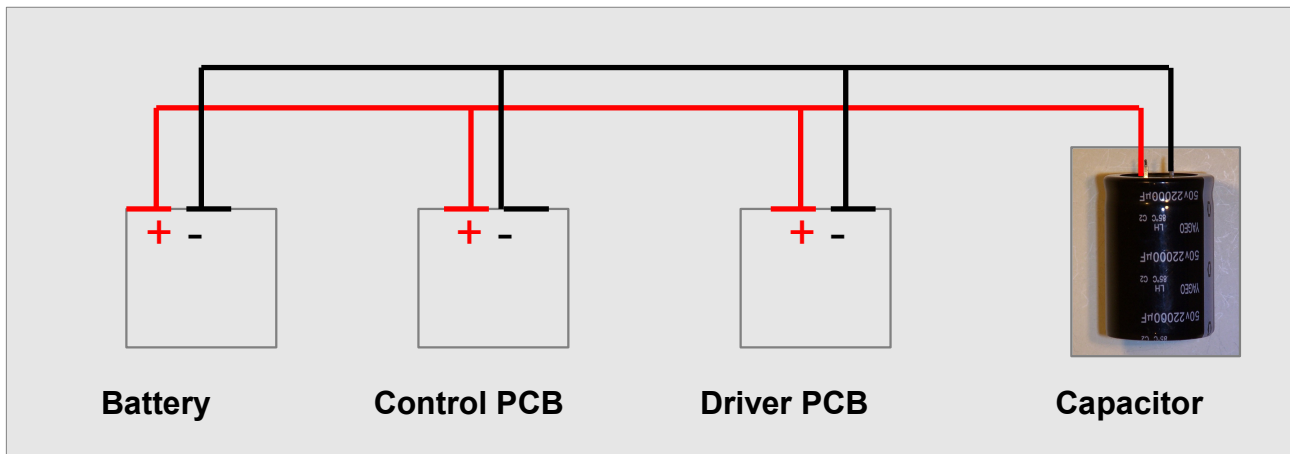


Picture: Driver PCB and Control PCB connected



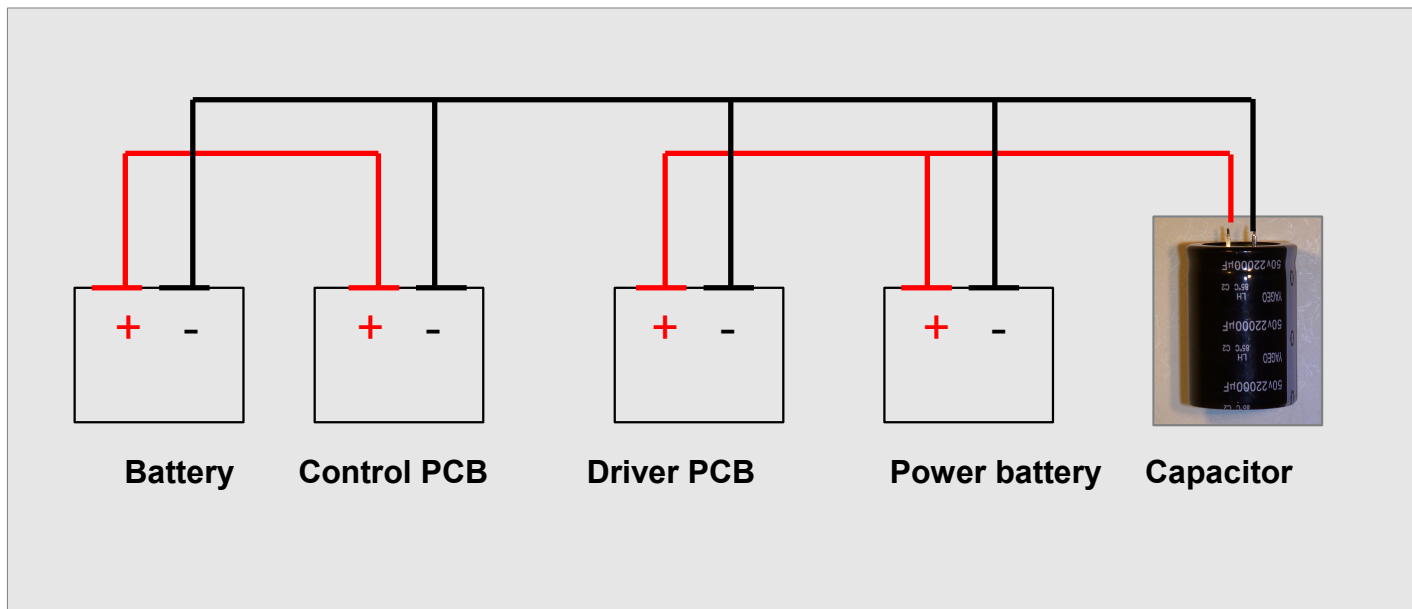
## Wiring

Example schematic: Supply of Driver PCB and Control PCB from one battery.  
Important: the battery must be rated 12V to 40V and sufficient heat sinking for the voltage regulators on the Control PCB must be provided.



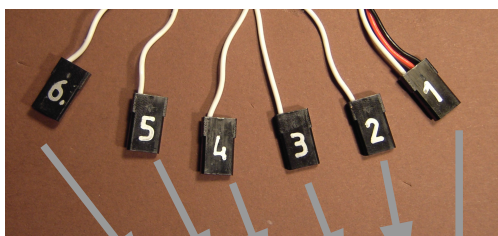
Example schematic for separate power supplies for Control PCB and Driver PCB (this is the recommended setup).  
 The Control PCB can be supplied from 7.2V to 12V. If using 7.2V no heat sink is needed for the voltage regulators.  
 The power battery must provide 12V to 40V. Operation from 7.2V supply is not possible.

It is essential that the negative poles (GND, minus, -) of the two batteries are connected.  
 The set-included capacitor must be connected in parallel to the Driver PCB supply!



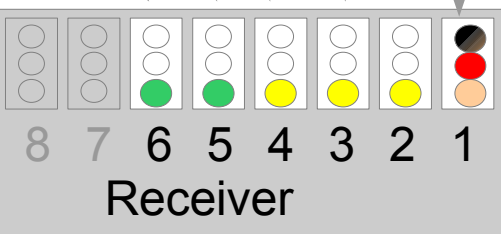
**Always disconnect/unplug all battery plus cables to reach fully potential-free conditions when intending to unsupply the system or parts of it!**

### Receiver Connection



Refer to the specification of your remote receiver for channel assignment. Connections must be established in the following way:

Pin column No.	Channel assignment at receiver:
1	Right stick left/right
2	Right stick forward/backward
3	Left stick left/right
4	Left stick forward/backward
5	Supplemental servo (e.g. turning a periscope) – usable with remote controls providing more than 4 channels only
6	Supplemental switching channel, e. g. For additional MG. Please refer to section „seven digital ports“



If necessary evaluate by connecting a servo to the receiver at which pins which stick action is signaled.  
 (Please note: the plugs with one cable only attached must be plugged in so that these wires connect to the same row as the signal cable (white) of the three wire equipped plug. Refer to the manual of your receiver to find out which wire carries the signal.

**IMPORTANT: channels 1 through 4 must be connected - channels 5 through 8 are optional**

To pin column 6:

If your remote control comes with a 3-position (ON-OFF-ON) switch feeding channel 6, then one direction can trigger the additional MG, while momentary switching once in the other direction invokes a supplemental control signal while a second switching disables it (e. g. for control of Notek headlights)..

If your remote control provides a ON/OFF switch only, the actual switch position during power up will be learned as center position and one function, MG or supplemental control, can be used.

## Channel Assignment



### Left Joystick:

- forward: cannon down
- backward: cannon up
- left: turret turn left (ccw)
- right: turret turn right (clockwise)
- lower left: exterior lights
- upper left: MG-fire
- upper right: cannon coil-back
- **lower right: engine start/stop**

### Right Joystick:

- Both track motors (via V-mixer)
  
- left or right only: vehicle spin turn ccw/cw

Note: spin turn is performed only if the joystick was moved to center position before

All functions of the left stick are performed only with the stick fully excursed.

## Connecting the tankdrive PCB in lack of the remote receiver manual

The joysticks of the remote control are assigned to the first 4 channels of the remote receiver. The easiest way to evaluate which stick action is to which output is to use a servo.

Example:

Connect the receiver connection cable 1 of the Tankdrive control unit to your remote receiver, e.g. to terminal 1). First turn on your RC handheld and then power up the Tankdrive unit. Now connect a servo to the receiver, e.g. at terminal 2. Try all joystick movement opportunities to test out on which movement the servo acts. Repeat this procedure until every connection is assigned to a joystick action. The last remaining unassigned action then belongs to terminal 1.

## Installation and start-up

**To ensure proper operation it is mandatory that all programmings of your radio set (mixer function, exponential drive etc.) are deleted prior to starting up the tankfire unit.**

Connect the tankfire unit to the RC receiver unit as described in chapter „Receiver Connection“.

Then connect the motors and finally the power pack.

**The following tests should be performed with the vehicle jacked up:**

Ensure that all control sticks and trimmers of your radio set are in center position.

Power up first the handheld and then the RC model.

Move the left stick to lower right end position to activate the motors. If you now move the right stick forward or backward the track motors should run.

Checking the fail safe function:

Let the track motors run using the right stick. While keeping the stick in forward or backward position turn off the handheld. The motors should stop immediately. Turn on the handheld again and perform a stop engine / start engine sequence by moving the left stick to the lower right end position twice. The tankfire unit should now operate normally again.

If some functions act mirror-inverted you may need to invoke the reverse function of the according channel at your radio set.

Once the above basic functions work as intended you may continue by connecting all other loads and units (turret motor, cannon lift, etc.)

## Miscellaneous Informations

If any motor acts mirror-inverted to your intentions, simply reverse the connection polarity by flipping the plug.

If your RC model is an assault cannon (StuG) and you want to do the cannon sideward movement using a servo we recommend to check it for correct moving direction before you mount it into the vehicle. The same applies to the cannon up/down servo.

## Problems during Operation

At every power up the tankdrive unit learns the actual stick positions as center position. If during operation some functions are no longer triggerable please check first if all trimmers are still in center position.

If the tankdrive unit performs an engine stop once you hit the gas (right stick forward/backward) your power pack is empty. Replace or recharge it.

If the tankdrive unit recognizes that the radio contact got lost during operation it automatically stops the track motors.

CAUTION: we have seen that some digital receivers store the last received command and continue to output it to the control unit. In this case the RC model DOES NOT STOP!

Always check the fail safe behavior with your own radio set!

## Technical Specifications:

Useable with 4 to 8 channel proportional radio sets

Dimensions Control PCB: 80 mm x 57 mm x 25mm (LxWxH) (without heat sink)

Dimensions Driver PCB: 76 mm x 92 mm x 25 mm (LxWxH)

Power Supply: Driver PCB: 12 V .. 40 V DC / Control PCB 7.2V .. 12 V DC

### **Important! If using 12V power packs the voltage regulators must be equipped with heat sinks**

2 track motors up to 80 A each (peak 120 A)

7 switching functions up to 500 mA

2 supplementary motors up to 4A /max.40 V each

5 outputs for proportional control of a sound module (tri-state/active low)

Fail-Safe-Function: If the radio contact is interrupted the track motors are stopped automatically, the MG muzzle flash LED flashes and „MG-Sound“ is invoked

Other individual functions can be implemented on request

This product complies to the applicable EU-directives.



## Safety Instructions

Ensure that your model is unpowered completely before you do any installation, retrofitting or maintenance!

All working should be done in a clean and dry room providing sufficient ease of movement to you.

If moving the model from a warm to a cold environment ensure to wait sufficiently long to let the model acclimate in order to avoid damage due to condensed water.

The tankdrive unit must not be operated outside its technical specifications, in particular not in terms of supply voltage.

Keep conductive parts away from the tankdrive PCB. Always check that no metal parts lie on or underneath the PCB prior to apply power (danger of short circuits).

The tankdrive construction kit contains small parts that may be harmful if inhaled or swallowed. Keep it away from children. Never leave it unsupervised in range of children.

Children younger than 14 years may install or operate the tankdrive kit under supervision of adults only.

Defective components may be replaced by parts that are same type as the original equipment.

## Terms of Warranty

Every product has left our house 100% tested and inspected.

We have no control over all uses of our modules, and for this reason no liability is assumed or implied for any harmful or malicious use of these products either by designed intent or random consequence.

We explicitly accept no liability for any damage to any Electrical Module if it is determined that the damage has been caused by either misuse or improper set up. These are electrical devices, and must be installed as per the instructions to avoid damage. Also excluded are defects caused by application of accessory which is not compliant to our specifications. Our warranty expires as soon as any modifications are done to our product, e.g. replacement of components by non-original types.

## Disposal

This product and its accessory should not be disposed in general household disposal but should be fed to proper recycling. Waste is resource!

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