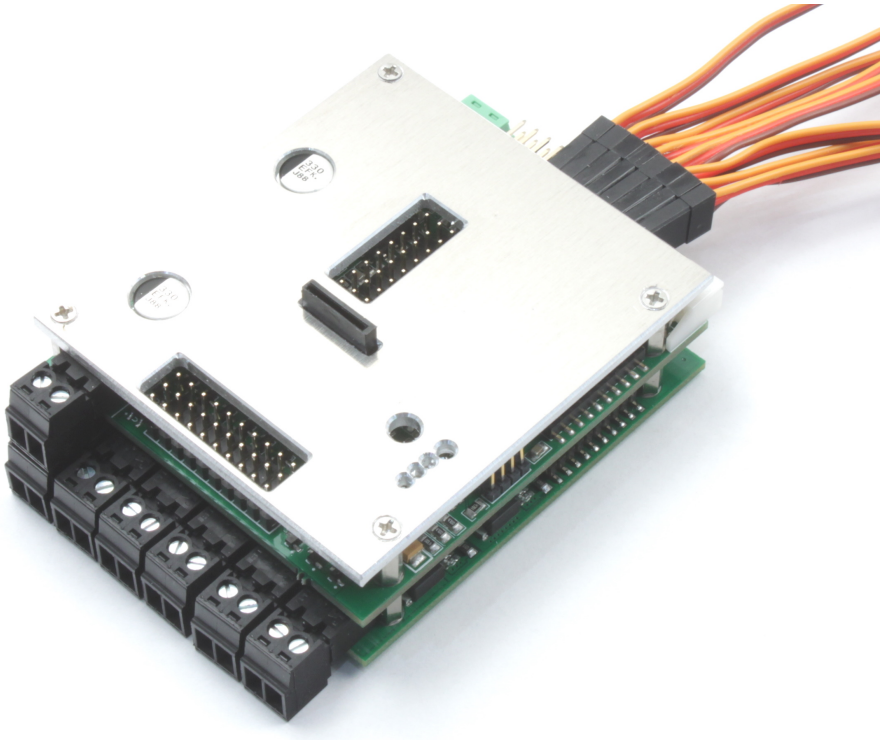
TVC-TRF-10-APC

Fulloption-Modul mit Sound für RC-Schützenpanzer im Maßstab 1:25 bis 1:16

Das Modul ist zur Steuerung eines Schützenpanzers mit Kettenlaufwerk entwickelt worden. Das besondere ist die Modusumschaltung die eine komplexe Steuerung mit nur min 5 Kanälem erlaubt. Für verschiedene Schützenpanzer existieren unterschiedliche Versionen, die sich durch den Sound unterscheiden.



1 Gebrauchshinweise

Zum Einbau des Moduls in ihr Modell braucht es gute Kenntnisse im Funktionsmodellbau. Die mitgelieferten Anschlusskabel müssen lastseitig gelötet oder angeklemmt werden.

Modellbau-Einsteiger und Jugendliche unter 16 Jahren sollten sich Rat von erfahrenen Modellbauern einholen.

Schalten Sie IMMER das Modell **vollständig** ab, wenn sie Änderungen an den elektrischen Anschlüssen machen. Prüfen Sie ihre Verdrahtung abschnittweise an einer strombegrenzten Spannungsquelle (Akku mit Feinsicherung oder strombegrenztes Labornetzteil)

Beachten Sie auch die Regel, dass in Funktionsmodellen nie mehrere Energiequellen den Empfänger speisen sollen.

Betreiben sie das Gerät nur in den zulässigen Betriebsbedingungen. Führen Sie keine Veränderungen an dem Regler durch. Das Gerät darf keinem Spritzwasser oder Regen ausgesetzt werden (Kurzschlussgefahr!)

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2 Introducing

This modul for recovery tanks is based on our 3th generation of the full option modul. This module comes with a wide range of in- and outputs and is therefore suitable for a wide varety of models. The user can switch the function between any of the model types just by loading the software provided on our website

- Trucks
  - trailer trucks
  - tank transporter trucks
  - spezial function trucks
- construction machines
  - dumper trucks
  - hydraulic excavators
  - rope excavators
  - dozers
- tanks
  - main battle tanks mbt/pso
  - recovery tanks
  - anti aircraft tanks
  - armored person carrier
  - excavator tanks
  - amphibious tanks
- snow forming tracked vehicles
- tugs

2.1 FO modul features

- 6 integrated ESC with a drive capability of 2x10A and 4x3A, clocked with 16kHz
- audio subsystem with 15W amplifier , volume can be controlled by a trimmer or a rc chanel
- 20 light output chanels
- 8 servo outputs

- 4 inputs for sensors (e.g. gepard radar parking pos sensor)
- maximum control chanel count is 16; PPM, S-Bus, I-Bus are supported
- sounds and firmware can be loaded using a uSD card to change the modules function to all kind of model software we provide

2.2 technology

The controller is rated for an input of 7.2V to 16V. A 10A fuse protects the module and the battery from over current. Integrated fail safe functions prevent unintended operation of the model.

An internal BEC generates 5V to supply the receiver. The receiver is supplied through the servo cables. The modul internally operates with 3.3V.

2.3 scope of delivery

Connecting cables and plugs are supplied with the module, which must be connected/soldered on the load side:

- servo leads for receiver connection
- green connector for power supply X60
- black connector for speaker X70
- black connectors for X01 to X04, X20 and X21

2.4 accessories

Connecting cables for outputs X08 to X17 (light, smoke generator, etc.) are NOT included in the delivery. These outputs can be used with standard three-pin servo leads. We offer different contacting options for this in the accessories.

- **FO-LS10** universal cable set with 8 servo leads, cable ties and 8 series resistors for LED
- **FO-AD13** universal adapter with contact spring force clamps
- **TVC-TRF-AD4** Adapter for connectors of the electrical system in Tamiya truck models

2.5 Funktionsübersicht

Das Modul steuert folgende Funktionen:

- Fahrmotoren (proportional mit Mischer)
- Turmdrehung (proportional mit Fahrtregler)
- Rohrwiege (proportional mit Servoausgang)
- Heckklappe (proportional mit Fahrtregler und Servoausgang)
- Mündungsfeuersimulation BK für Doppelschuss und Dauerfeuer
- Mündungsfeuersimulation Maschinengewehr
- polyphoner Sound zu allen Funktionen (Motor anlassen/abstellen, ”Standgas”, 14 Fahrstufen, Hauptwaffe, MG, Turmdrehung,Heckklappe)
- automatische Ansteuerung von Bremslicht, Rückfahrscheinwerfer, Blinklicht und Rundumlicht (Lauflicht)
- Servoausgang für externe Abschussvorrichtung
- Modellumschaltung von bis zu drei Modellen
- automatische, getrennte Ansteuerung von Abgassimulationspumpe und Heizelement

Zudem ist über den Scalebus alternativ eine Waffenstabilisierung, TVC-GSU12, anschließbar. Für endlose Turmdrehung kann der Scalebus mittels zweier Infrarotrepeater, GFMC-SBR10, entweder die Waffenstabilisierung TVC-GSU-12 oder die Turmsteuerung TVC-TC12 ansteuern.

3 Funktionsbeschreibung

3.1 Manuelle Steuerung

Zur Steuerung des Moduls wird eine Funkfernbedienung mit mindestens vier Proportionalkanälen benötigt. Die Funktionen des Moduls werden wie folgt auf vier bis acht Proportionalkanäle gelegt.

Wir benutzen hier die Bezeichnung Kanal, das bedeutet aber nicht, dass auch Kanal 1 des FO an Kanal1 des Empfängers gesteckt werden muss. Der Anschluss der Kanäle 5,6,7 und 8 ist optional.

3.1.1 Kanal 1 - Proportional links/rechts über integrierten V-Mischer.

Der integrierte Mischer verzögert beim Lenkungsausschlag die kurveninnenliegende Kette proportional bis zum Stillstand. Bei stehendem Fahrzeug bewirkt das Betätigen der Lenkung eine proportional steuerbare Drehung auf dem Teller (Tellerwende).

Desweiteren wird aus diesem Kanal die Ansteuerung der Blinker abgeleitet.

3.1.2 Kanal 2 - proportional vor/zurück

aus dem ”Gas”-Kanal wird auch Rückfahrscheinwerfer ein/aus, Bremslicht und Raucherzeugung abgeleitet

3.1.3 Kanal 3 - proportional Rohrwiege rauf/runter / Schußfunktion

Für die Steuerung der Rohrwiege kann man sich zwischen einem Servoausgang oder einem Fahrtreglerausgang entscheiden. Außerdem erfolgt über den Kanal das Auslösen der Bordkanone. Bei schneller Betätigung in die Maximalposition wird die Hauptwaffe mit Dauerfeuer ausgelöst. Bei schneller Betätigung in den anderen Anschlag wird ein Doppelschuss ausgelöst.

3.1.4 Kanal 4 - Turmdrehung links/rechts

Für die Steuerung der Turmdrehung kann man sich zwischen einem Servoausgang oder einem Fahrtreglerausgang entscheiden. Bei schneller Betätigung in die Maximalposition wird das MG ausgelöst.

3.1.5 Kanal 5 - Heckklappe auf/zu

Für die Steuerung der Heckklappe kann man sich zwischen einem Servoausgang oder einem Fahrtreglerausgang entscheiden.

3.1.6 Kanal 6 - Modusauswahl

Mit diesem optionalen Eingang kann einer der drei Betriebsmodi ausgewählt werden:

- Modus 1: Fahrbetrieb + Turmsteuerung
- Modus 2: Fahrbetrieb + Heckklappensteuerung
- Modus 3: Lauerstellung

Der normale Modus ist Modus 1 (Fahrbetrieb + Turmsteuerung).Im Modus 3 (Lauerstellung) ist der Hauptantriebsmotor, das Motorgeräusch und der Raucherzeuger abgeschaltet. Alle andere Funktionen arbeiten normal weiter. Der Modus 2 (Fahrbetrieb + Heckklappensteuerung) ist nur sinnvoll, wenn Kanal 5 nicht belegt es. In diesem Fall übernimmt Kanal 3 die Steuerung der Heckklappe. Die Modusumschaltung kann auch dazu genutzt werden, gezielt den Anlass- und Abstellsound zu spielen. Der Anschluss dieses Kanals ist optional. Wenn er nicht angeschlossen wird, ist das Modell immer im Modus 1 (Fahrbetrieb + Turmsteuerung) Typischerweise verwendet man senderseitig einen Kanal mit Dreistufenschalter.

3.1.7 Kanal 7 - Steuerung des Lichtmodus

Mit diesem Kanal kann das Rundumlicht und der Warnblinker geschaltet werden, sowie zwei frei belegbare Ausgänge.

Wird der Kanal nicht verwendet, ist das Rundumlicht permanent aktiv und die Warnblinker sind ausgeschaltet. Die beiden frei belegbaren Ausgänge

sind ebenfalls abgeschaltet.

3.1.8 Kanal 8 - Lautstärkeeinstellung

Wird an diesen Eingang ein Proportionalkanal angeschlossen, kann die Lautstärke hierüber eingestellt werden. Ist der Kanal offen, erfolgt die Lautstärkeeinstellung über das Potentiometer.

Kanal	Stecker	optional	function
1	X50	nein	Lenkung
2	X51	nein	Gas
3	X52	nein	Rohrwiege und Schussfunktion BK
4	X53	nein	Turmdrehung und Schussfunktion MG
5	X54	ja	Heckklappe
6	X55	ja	Modusauswahl
7	X56	ja	Lichtsteuerung
8	X57	ja	Lautstärkeeinstellung

Tabelle 1: Übersicht Servoeingänge

3.2 Function of the light mode control

There are two light modes light mode 1 and light mode 2. They are controlled indepentently with one RC chanel.

3.2.1 Lightmode 1

Lichtmode 1 for auxillary output 1 and 2. They can be used for combat light, beam light or any other consumer.

for auxillary output 1 and 2. They can be used for combat light, beam light or any other consumer. The mode is count up , (1 → 2 → 3 → 4 → 1 and so on). When keeping the stick for about 2 seconds, the lightmode is reset to 1(all off).

Zustand	1	2	3	4
auxlight 1	off	On	off	On
auxlight 2	off	off	On	On

Tabelle 2: Lightmode 1

3.2.2 Lightmode 2

The lightmode 2 controls the automatic functions of the warnblinker and the rotating flasher. The lamp function is given by the table below. The modes are called:

- road traffic 1
- road traffic 2
- road traffic 3
- combat 1

For example the turn flasher is not activated automaticly in combat mode, while it is activated in road traffic 1 and 2 when steering.

The lightmode 2 is changed by tipping the stick backwards.The mode is count up *road traffic 1 → road traffic 2 → road traffic 3 → combat → road traffic 1, and so on.* When keeping the stick for about 2 seconds, the lightmode 2 is reset to ”road traffic1”.

Zustand	road traffic 1	road traffic 2	road traffic 3	combat
brake light	auto	auto	auto	off
combat brake light	off	off	off	auto
blinker left and right	auto	auto	Warning flasher	off
rotating light 1,2,3,4	off	on (rotating)	on (rotating)	off

Tabelle 3: Lightmode 2

The light modes states are stored when changing the operation mode. When the model is switched off by the model selector channel, all light states are unchanged.

When the model is parked by turning of the transmitter, all light are turned off.

When using the battle-system, the four rotating lights are also activated in a random way for about three seconds when the tank is hit by the battlesystem.

3.2.3 Tip 2

Typically, a three-stage switch is used on the transmitter. Proportional channels with linear knops may complicate the selection of the light mode, because the indexing is done by briefly returning to the center position. This may be difficult with linear knops.

3.3 Automatic functions

3.3.1 Steuerung der 20mm-Kanonen

Wird die BK betätigt, flackert der LED Ausgang synchron zum Sound. Gleichzeitig spielt das Soundmodul das hinterlegte Geräusch einer 20mm Kanone ab. Ein Ausgang für eine superhelle Led wird synchron zum Schuss gesteuert. Während die Hauptwaffe feuert, wird ein weiterer Schaltausgang und ein Servoausgang gesteuert. Hiermit können z.B. pyrotechnische Effekte ausgelöst werden.

3.3.2 MG

The MG light flashes at approximately two times per second when shooting and the sound module plays the recorded MG sounds.

3.3.3 automatic engine stop

In case the radio is unoperated for about 2 minutes, the module turns off the engine and plays the engine stop sound. Additional the exhaust simulation is switched off. (parking mode)

To wake the module, just move the throttle stick, then the engine startup sound will be played and all functions are available again.

When the module is parking mode, random sounds are played. E.g. this can be sound from construction machines, music or walkie talky noise. These sounds, like all others on the module, can be changed.

You can also change to the parking mode by turning off the radio. When doing this, no random sound is played.

TIP

- If no warmstart sound can be found, the cold start sound will be played.
- If you use a failsafe receiver, the receiver delivers signal output when the radio is turned off. For that reason the module can not detect the unpowered radio. Please turn off failsafe function or use a normal receiver.

3.4 drive-dynamic functions

3.4.1 Exhaust simulation module

The module will control a liquid smoke heater and pump/fan. The smoke liquid heater is switched on when the model receives a valid radio signal. The outputs for the blowers and pump are operated as a function of acceleration and speed. At idle the smoke is inactive. As the model accelerates, smoke increases proportional to setting and duration of the throttle. During steady throttle travel the output is reduced by 50% (by means of PWM)

3.4.2 Reverse light

The reverse light output is linked to channel 2 and is automatic. As soon as the throttle lever (channel 2) is in neutral or forward position is, the reverse light is switched off.

3.4.3 Rotating flasher light

The flasher runs constantly with approx. 1.5 cycles per second. When signal faults occur or when the transmitter is switched off the flasher stops.

3.4.4 Turn signals

Starting from a minimum of 10% throttle the signal lights will flash left or right as required. Das Warnblinklicht kann durch den Lichtmodus 2 ein- oder ausgeschaltet werden.

3.4.5 Brake light

The brake light is automatic. Lights go out automatically with resumed throttle.

4 Connector overview

This section gives you an overview of the connectors. The exact function of each connector can be found below.

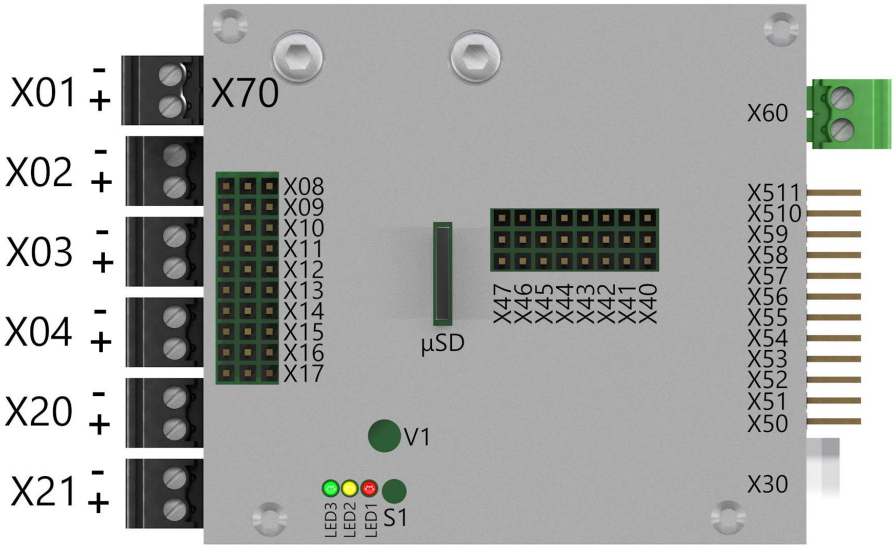


Abbildung 1: connector overview

4.1 Wichtig

Die Wirkrichtung der Kanäle in der Modusumschaltung ist im Modul festgeschrieben. Während Licht und Getriebemotoren sich leicht durch die Leitungszuordnung ändern lassen, ist das bei Servos i.d.R. nicht ganz so einfach. Zudem fahren die Servos in eine feste Parkposition, was ebenfalls die Wirkrichtung bestimmt. Legen sie daher alle Aktoren die von einem Senderkanal gesteuert werden auf den Schreibtisch und prüfen die Wirkrichtung. Für Kanal 1 (Lenkung) sind das z.B.:

- Antriebsmotoren (Drehrichtung)

- Blinker
- Turmdrehung

Für Kanal 2 (Gas):

- Antriebsmotoren (Vor-Zurück)
- Bremslicht und Rückfahrscheinwerfer
- Waffengondel (Parkposition beachten)

4.2 Connection of batteries cable (X60)

The connection is made with the green contact block. The connector is (X60). It is a good practice to install a switch between battery and the power connector.

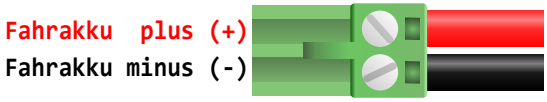


Abbildung 2: battery cable shown with polarity

4.3 Inputs

4.3.1 connection to the receiver (X50 to X57)

The connection to the receiver is made using jr patch cables. One side is plugged into the module and one side is connected to the receiver.

picture 4 shows how the connectors are plugged into the module. The ground (black or brown line of the servo cable) is closest to to the bottom of the module. Most receivers have no mechanical polarity protection, so double check polarity.

If the delivered cables does not match the length needed, they can simply be replaced by longer or shorter versions.

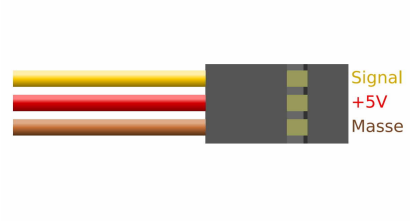


Abbildung 3: servo connector signals

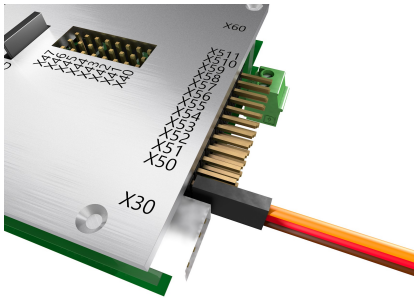


Abbildung 4: orientation servo input cables to the receiver

The module has an integrated BEC, so no additional BEC is needed. But if you want to use one, or you have an additional ESC that has one integrated, please do not operate your model with more than one BEC unit. This may lead into damage if one of the BEC units is a switching voltage regulator (SBEC). In this case pull the +5V (red(cable from all servo cables and isolate them with a tape or shrink wrap.

4.3.2 IBUS (X50)

If the module is operated on an IBUS receiver, this is connected to X50. Via the IBUS, a maximum of 14 channels can be used by the FO.

4.3.3 SBus (X50)

If the receiver has an SBus interface, it is connected to X50. If the receiver has a *in* and *out* signal, the *out* signal must be used. X51 is reserved for the *in* signal, but this is not supported yet. A maximum of 18 channels can be used via the SBUS.

4.3.4 SUMD sum signal (X50)

If the receiver has an SUMD interface, it is connected to X50. A maximum of 16 channels can be used via the SUMD

4.3.5 PPM (X50)

If the module is operated on a PPM output (also known as sum signal or teacher/student signal), this is connected to X50. PPM8 is supported, which means that a maximum of 8 channels can be used by the FO.

4.3.6 Multiswitch Module (X50 to X56 and X57)

The module can handle the multiswitch protocols of the old Graupner Nautic-Expert and Robbe multi-decoder on X57. These were used in FM systems to transmit up to 8 additional channels over one RC channel.

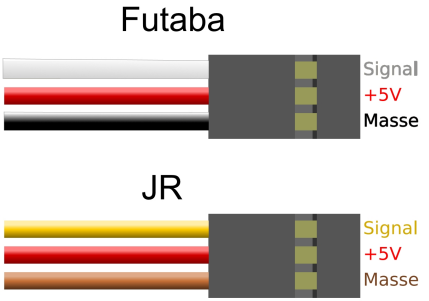
Unfortunately, this useful technology was not adopted by the manufacturers of 2.4GHz systems, but the 2.4GHz retrofit modules from Jeti support it.

There are also modules that combine channels for special receivers and output them as a multiswitch signal.

With the Multiswitch option, a maximum of 15 channels can be used by the FO.

4.4 connection of the servo outputs (X40 to X47)

The servos that are controlled by the module are connected to the connectors X40 to X47. Picture 6 shows the orientation of the connector. The ground (black or brown line of the servo cable) is closest to the center of the module.



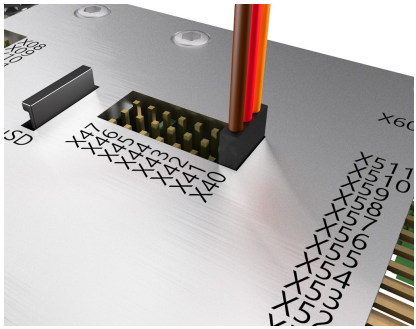


Abbildung 5: Futaba servos have a pla-stic nozzle that has to be removed

Abbildung 6: orientation servo output cables

The last servo position is stored with the module memory. Because of that you do not have to expect bis servo moves when powering the module. However, when powering the model, a short servo move may happen.

Make sure your servos can achieve the required position. When servo travel is blocked current flow can be 300-500 mA instead of the usual 40mA at rest. This can lead to hight temperatures of the module, because the BEC has to deliver high currents.

Servo outputs that operate in parallel to a motor output behave like a gear motor. Stick deflection results in rotation in proportion to motion. Release the stick and the servo stops without returning to zero position. For that reason only servos must be plugged in to this chanels. ESCs plugges to this channels will not stop when returning to neutral, as most one would expect.

4.4.1 Anschluss der Servos zur Turmmsteuerung

Der Servoausgang für die Rohrwiege ist (X41), der für die Turmdrehung (X42). Diese Funktion ist immer parallel zu den Motorausgängen aktiv, man kann diese Funktion beliebig kombinieren, z.B. einen Getriebemotor für die Turmdrehung und einen Servo für die Rohrwiege verwenden. Die Servofunktionen sind gedämpft, so dass sich eine realistische Bewegung ergibt.

4.4.2 Anschluss des Servo für die Heckklappe

Der Servo für den Heckklappe wird an X40 angeschlossen.

4.5 connection of the motors (X01 - X04 & X20 - X21)

motors are connected with blach, plugabble connectors.

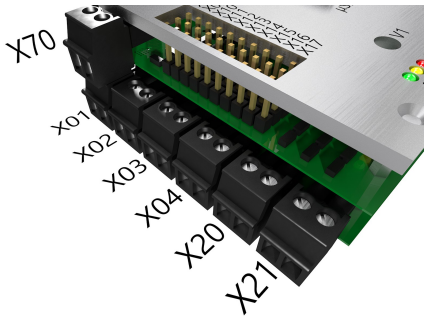


Abbildung 7: motor connectors

4.5.1 Anschluss der Motoren zur Turmsteuerung

Der Turmdrehmotor wird an X21 angeschlossen.
Ein Motor für die Rohrwiege kann an X20 angeschlossen werden.

4.5.2 Anschluss des Getriebemotor für die Heckklappe

Der Getriebebotor für die Heckklappe wird an X04 angeschlossen.

4.6 connection of the switch outputs (X08 to X17)

The switch outputs are used for light- and simple motor functions. Each connector has two outputs (blue and grey) and one common connection (red).

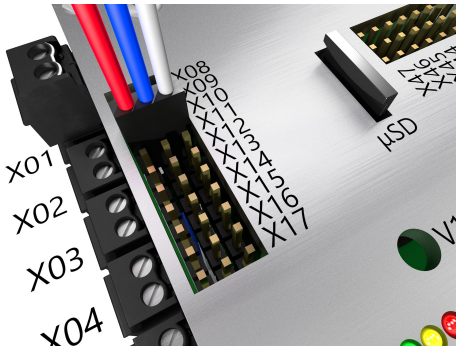


Abbildung 8: switch outputs

The switch outputs **X08 and X09** switch to battery + . The common connector is connected to ground.

The switch outputs **X10 to X17** are switched to ground. The common connector is connected to battery +.

Tip The left connection (permanent +) is the same for all eight connectors. To reduce lead count, you can use one + for several loads.

4.6.1 Connection of lighting and exhaust systems

This outputs switch the battery voltage, so the connected load must be able to stand the voltage. Example: If the model is operated with a 12V battery, the connected load should be rated for 12Volt. LEDs must be equipped with suitable resistors.

The heater from the exhaust system can be connected to X04,too. This output is able to drive up to 5A.

connector	Right post	Middle post	Right post
X10	(+) MG LED	(-) Masse Fahrakku	(-) MG LED
X11	(+) rotating flasher 1+2	(-) rotating flasher 1	(-) rotating flasher 2
X12	(+) rotating flasher 3+4	(-) rotating flasher 3	(-) rotating flasher 4
X13	(+) cannon	(-) cannon recoil	(-) cannon LED
X14	(+) aux 1 and aux 2	(-) aux 1	(-) aux 2
X15	(+) reverse light and brake light	(-) combat brake light	(-) combat reverse light
X16	(+) signal	(-) signal left	(-) signal right
X17	(+) Exhaust system	(-) Exhaust system heater	(-) Exhaust system motor

Tabelle 4: Allocation of terminal posts for the lights, exhaust fan, and heater

4.7 Connecting the speaker (X70)

The speaker connects at the black 2 pole connector (X70). We recommend a 4 ohm speaker. An 8 or 16 ohm speaker may be used but this will result in reduced sound volume. The volume may be adjusted by a RC channel or the potentiometer **(V1)**. Use a 2mm screw driver to operate the volume control. When the volume is controlled by a rc channel, the potentiometer **(V1)** has no function.

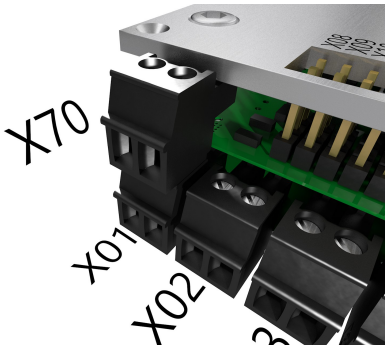


Abbildung 9: speaker connector

Tip 1 The speaker needs to be installed in a box to prevent a feedback loop. The presence of a box also improves bass response and sound volume. The box should have as much volume as practical and should not hinder airflow from the face of the speaker.

Tip 2 In case you want to connect an external audio amplifier, you need an amplifier with an speaker input, or you have to connect an audio transformer.

5 Initialization

5.1 turn on sequence

1. connect the battery
2. turn on the transmitter
3. all control sticks and trims must be centered
4. turn on the receiver. The LED lights for approximately 1 second.
5. the speed controls sense center point of the channels and the LED on the board flashes. If the operation is not successful the LED does not light. To repeat the operation turn the receiver off and on again
6. if the LED shines the model is ready for operation

This process is repeated at **every** start. The start position of the controls are set as center . This applies to all channels.

When doing the calibration, the optional channels can be left unconnected. In this case the module detects the channels to be unused. You can not connect an optional channel after the calibration finished.

Case one of the not optional channels leaves unconnected, the calibration will not end and the LED keeps on flashing.

5.2 operation modes

The green LED 3 on the module shows the active operation mode. The LED flashes like this.

1 flash normal drive mode

2 flashes parking mode

3 flashes model unselected (passive)

4 flashes destroyed (battle unit)

5 flashes damaged (battle unit)

6 flashes invulnerable (battle unit)

6 changing sound and software

The module is delivered with sound and software. So changing sound and software is optional.

You can find the files at this location on our website:
https://www.sgs-electronic.de/downloads/Full+Option+Modul/TVC-TRF

To change sound or software, you need a µSD card and basic knowledge how to copy files with your pc.

6.1 Changing the sound

You can use the sound files provides on our web site. If you want to change the sound or create your own sound files, you need our FMC software. It is provided for free, on our website.

After powering the module, it detects the µSD card and copies the sound data into the internal sound memory. This is indicated by the green and yellow LED. This sequence takes roughly 30 to 60 seconds. After powering down the module, the µSD card can be removed. It is not needed for operation.

Always power off the module before the µSD Card is removed .

6.2 Changing the software

The module is equipped with a so called bootloader. After powering the module it checks if a µSD card is plugged and a valid software is stored on the card.

To update or change the kind of model (Battletank, Recoverytank, Anti Aircraft Tank, Armored person carrier), two files have to be copied to the µSD card. When changing the model type, you have to change the sound files, too.

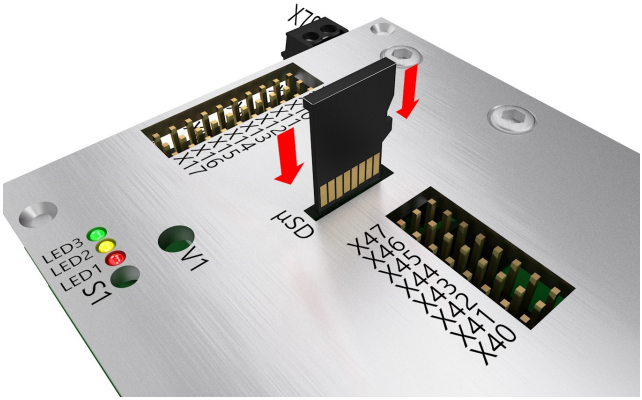


Abbildung 10: position and orientation of the µSD card slot

2 flashes	config file not found	starts previous image (if loaded)
3 flashes	no program in memory	endless loop
4 flashes	program file not on card	starts previous image (if loaded)
5 flashes	program file not valid for this module	starts previous image (if loaded)
6 flashes	program file crc error	starts previous image (if loaded)

Tabelle 5: boot-loader error codes

7 Practical tips

7.1 Neutral position

Please use a self centering type joystick or a three stage switch for mode selection. Use of a non self centering stick will result in problems with mode selection due to imprecise neutral position selection.

We suggest using mode channel with

- three stage switch
- self centering sticks, or
- potentiometer with mechanical center indicator

7.2 Failsafe receiver

The module calibrates the neutral position of the channels every time you turn on power. If you use a failsafe receiver, please adjust it to deliver the same signals that are delivered when the sticks are in neutral position. Or turn off the failsafe function. Otherwise, the module calibrates the wrong neutral positions.

7.3 Do not use provisionally methods of connectivity

Solder or screw all the electrical connections. Provisionally connections can cause high contact resistance, which can lead to problems especially with the battery connection. Isolate open connections using shrink hose or tape.

7.4 Work on the wiring

turn off your model **completely** when working at the wiring. Do not plug connectors while the model is powered.

7.5 Rotating flasher

The module controls a rotating flasher with four lamps. The lamps are switched in sequence, so no additional electronic is required. Two lamps are connected to X11 and two lamps are connected to X12. Remember that the lighting outputs are at battery voltage. So when the module is powered with 12V the lamps must be rated for 12V. 6V Lamps can be connected using resistors or 5,6V Zener diodes to operate them at 12V supply.
If you want to connect your own electronic, this can be done by connecting all minus outputs and use them as minus for your flasher.

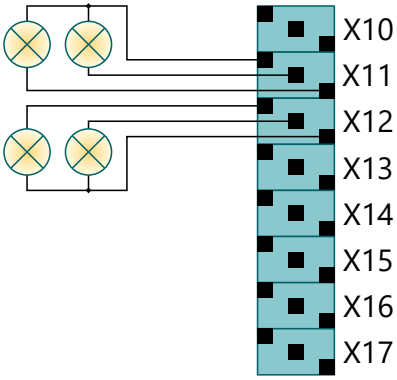


Abbildung 11: rotating flasher wiring

7.6 Connecting LED

When connecting LED, please use suitable resistors. On page 30 correct way to calculate the resistor value is show.
Common resistors are within the scope of delivery .

Note Please never connect LED without resistor to the module. This will destroy the LED and/or the module.

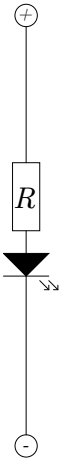


Abbildung 12: LED resistor

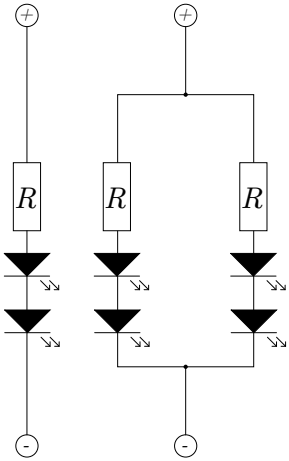


Abbildung 13: resistor for LED groups

one LED (diagram 12)

$$resistor = \frac{batterievoltage - LEDforwardvoltage}{LEDcurrent}$$

example for red LED and 7,2V batterie:

$$R = \frac{7,2V - 1,2V}{0,02A}$$
$$= 300\Omega$$

multiple LEDs (diagram 13)

$$resistor = \frac{Akkuspannung - (LEDforwardvoltage \times LED\ count)}{LEDcurrent}$$

example for two red LEDs and 7,2V batterie:

$$R = \frac{7,2V - 1,2V \times 2}{0,02A}$$
$$= 240\Omega$$

The Summe of the Forward voltages should be min. 2V under the battery voltage. If more LEDs are needed, just switch groups in parallel.

8 Glossary of terms

BEC **B**attery **E**liminator **C**ircuit
This circuit replaces a extra Battery needed for the receiver and connected servos, by generating a fixed voltage from the drive battery.

ESC **E**lectronic **S**peed **C**ontroller
This is a unit to control the speed and direction of a DC motor.

LED **L**ight **E**mmitting **D**iode
A light-emitting diode (LED) is a semiconductor device that emits visible light when an electric current passes through it. Benefits of LEDs are low power requirement and long life. Disadvantages is the more complicated wiring, compared to a classic bulb, it has a polarity and a resistor is needed to limit the current.

Scalebus The Scalebus is a development of **SGS electronic** to connect controllers and modules to compose solutions for complex RC models.

SBus The Sbus has been introduced by **Futaba** to simplify the wiring between RC Receivers and servos / esc.

SBus The SBus was introduced by the company **Futaba** to simplify the wiring between receiver and servos/controllers. This is especially useful for models with many controllers.

IBus The IBus was introduced by the company **Flysky** to simplify the wiring between receiver and servos/controllers. This is especially useful for models with many controllers.

SUMD The SUMD sum signal has been introduced by the company **Graupner** to simplify the wiring between receiver and servos/controllers. This is especially useful for models with many controllers.

Abbre-vation	meaning	explanation
Stick	**S**tick	Stick not self centering
StickS	**S**tick **S**elfcentering	self centering Stick
TSMS	**T**hree **S**tage **M**omentary **S**witch	self centering momentary switch with three stages
TSS	**T**hree **S**tage **S**witch	switch with three stages
Pot	**Pot**entiometer	linear- or rotary knob
PotC	**Pot**entiometer with **C**enter key	linear- or rotary knob with a center key

Tabelle 6: Abbrevation for the manipulators in the transmitter housing

9 Technical data

rated motor current X01 and X02	10 amp per motor
rated motor current X03, X04, X20 and X21	3 amp per motor
PWM frequency motor outputs	16kHz
rated voltage drop in motor stage	0,3 Volt
rated current X08 to X17	0,4 amp per chanel
rated power audio amplifier	8W/7V; 14W/12V
supply voltage	7,2V bis 16V (equals 12V pb battery / max 11 pb cells / max 12 NiCd/NiMh cells / max 4S Lipo)
rated current BEC servo outputs	1000mA
rated current BEC receiver output	800mA
maximum power disapation	5 Watt
maximum operation temperature	75°C
diemnsions without connectors	65x75x34mm

10 Important

This equipment described above has been tested and inspected for quality and function. And it is intended for installation and use only as described above. This equipment does not contain any user serviceable parts. The supplier accepts no responsibility, financially or otherwise, for damages caused by use or misuse of the equipment described above. The equipment must be protected from exposure to water to prevent short circuit. Do not open the equipment or attempt to change function, wiring, or documentation in any way. Do not connect to incorrect voltage or reverse the battery polarity. Do not use in a careless or abusive fashion around persons or property. Do not attempt to repair. Any legitimate use, e.g. Installation in a model makes the user responsible to ensure that the operating instructions and non-liability agreement are provided to the purchaser of the module described above.

Do operate the device only in the permissible operating conditions. Do not make any changes to the controller through. The device shall not be exposed to splashing water or rain (causing a short circuit).

10.1 Warning

Due to choking hazard caused by small parts that may be swallowed, this product is not suitable for children under 6 years of age.

10.2 Environmental protection

For defective devices, repair is possible in many cases. Please contact us. If you do decide to dispose of the device, you will be making a contribution to environmental protection if you return the device to a municipal collection point for recycling. Electronic devices do not belong in household waste.

10.3 Address

SGS electronic
Zeppelinstraße 36
47638 Straelen
Germany / Europe

10.4 Contact

Web	www.sgs-electronic.de
Email	info@sgs-electronic.de

Ust-IdNr.:	DE 249033623
WEEE-Reg.-Nr.:	DE 90290947

10.5 Document date

This document was created on 17.02.2024, 12:24:40 MEZ

10.6 Documentation

We reserve the right to make updates, changes or additions to the information and data provided.

The documentation that accompanies your product applies.

Please note that documents obtained later via download may not correspond to the status of your module.