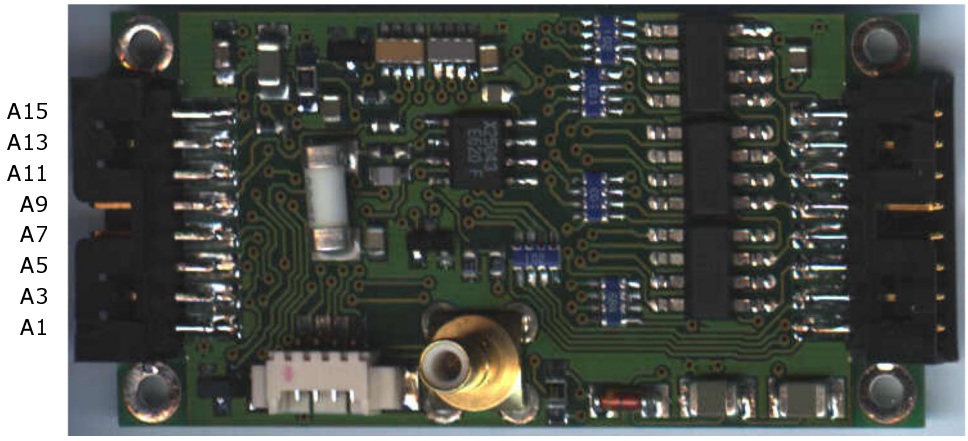
Guidelines for MultiClass version 2 timers.

F1A / F1C timer:



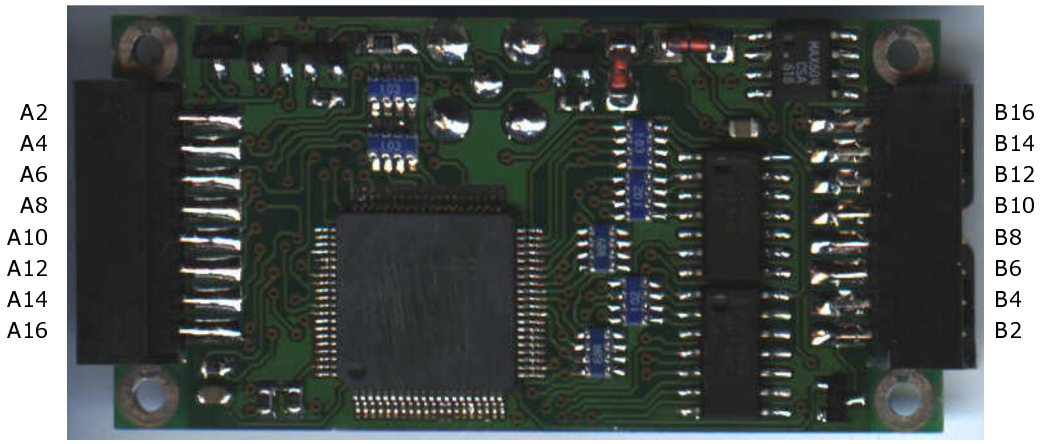


Table of connections for F1A/F1C version timer.

Servo wire colours refer to the special electronics less version of the Becker S100 Servo.

Position	Function	Colour	Connect to
A15	Speaker +	Yellow	Speaker + terminal
A13	Radio positive supply	Red	Radio red wire
A11	Radio data input	Yellow	Radio yellow wire
A9	Radio negative supply	Black	Radio black wire
A7	Aux digital or analogue input	Brown	See Alt. DT
A5	Battery +	Red	Battery +
A3	Battery -		
A1	Battery -	Black	Battery -

Position	Function	Colour	Connect to
A2	Switch / Hall ground	Black	Hall element 1 pin 2/Switch NC
A4	Switch / Hall power	Orange	Hall element 1 pin 1/Switch NO
A6	Switch / Hall signal 1	Green	Hall element 1 pin 3/Switch C
A8	Switch / Hall ground	Black	Hall element 2 pin 2/Switch NC
A10	Switch / Hall power	Orange	Hall element 2 pin 1/Switch NO
A12	Switch / Hall signal 2	Yellow	Hall element 2 pin 3/Switch C
A14	Aux digital input (Hg)		
A16	Speaker -	Blue	Speaker - terminal

Position	Function	Colour	Connect to
B1	Servo 3 motor -	Black	Servo 3 black wire
B3	Servo 3 motor +	Red	Servo 3 red wire
B5	Servo 2 motor -	Black	Servo 2 black wire
B7	Servo 2 motor +	Red	Servo 2 red wire
B9	Servo 1 motor -	Black	Servo 1 black wire
B11	Servo 1 motor +	Red	Servo 1 red wire
B13	Servo 3 potmeter signal	Yellow	Servo 3 yellow wire
B15	Aux analogue input		

Position	Function	Colour	Connect to
B16	Servo 2 potmeter signal	Yellow	Servo 2 yellow wire
B14	Servo 1 potmeter signal	Yellow	Servo 1 yellow wire
B12	Servo potmeter positive power	Brown	Servo 3 brown wire
B10	Servo potmeter positive power	Brown	Servo 2 brown wire
B8	Servo potmeter positive power	Brown	Servo 1 brown wire
B6	Servo potmeter negative power	Orange	Servo 3 orange wire
B4	Servo potmeter negative power	Orange	Servo 2 orange wire
B2	Servo potmeter negative power	Orange	Servo 1 orange wire

F1A/F1C Switch / Hall numbering:

Switch / Hall 1 is not used for F1C and is the "hook closed" switch for F1A. Switch / Hall 2 is the only one to be used in F1C mode and the "hook forward" switch in F1A mode.

Connection of switches:

When using micro switches instead of Hall elements, "Switch/Hall ground" should be connected to the NC (Normally Connected) terminal of the switch. "Switch/Hall power" should be connected to the NO (Normally Open) terminal of the switch and "Switch/Hall signal" should be connected to the C (Connect) terminal of the switch.

Use of alternative DT function (F1A/F1C timer only):

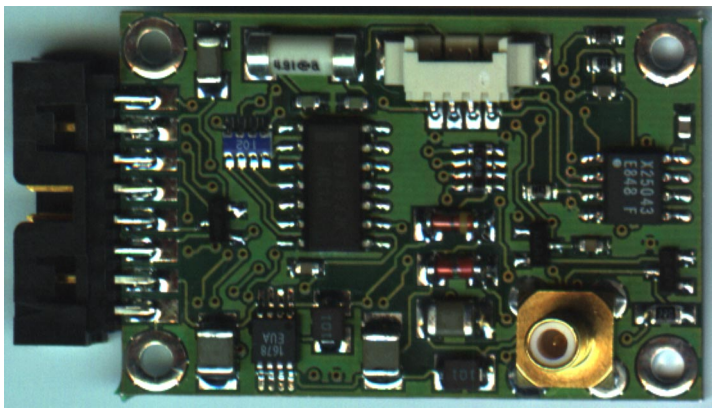
If terminal A7 is connected to terminal A13, the timer will DT at the alternative DT setting. If you connect a switch between A7 and A13, you can select either to use the primary DT or the alternative DT without using the Control Box.

This function is especially useful for trim flights.

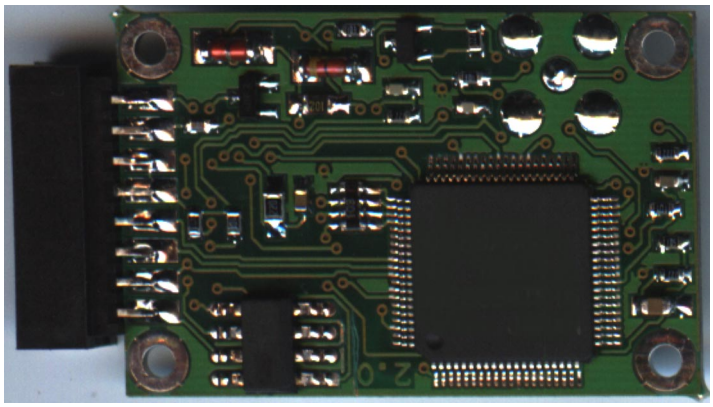
The connectors are not configured for use of alternative DT upon delivery. It is however supplied with extra wires with contact terminals, that should be mounted in the connector, if this function is required. If not, terminals without wires should be mounted to support the connector.

F1B timer:

C15
C13
C11
C9
C7
C5
C3
C1



C2
C4
C6
C8
C10
C12
C14
C16



Position	Function	Colour	Connect to
C15	Servo motor -	Black	Servo black wire
C13	Radio positive supply	Red	Radio red wire
C11	Radio data input	Yellow	Radio yellow wire
C9	Radio negative supply	Black	Radio black wire
C7	Speaker -	Blue	Speaker - terminal
C5	Speaker +	Red	Speaker + terminal
C3	Battery +	Red	Battery +
C1	Battery -	Black	Battery -

Position	Function	Colour	Connect to
C2	Servo potmeter negative power	Orange	Servo orange wire
C4	Servo potmeter signal	Yellow	Servo yellow wire
C6	Servo potmeter positive power	Brown	Servo brown wire
C8	Switch positive power	Orange	Switch NO
C10	Switch negative power	Black	Switch NC
C12	Switch signal	Green	Switch C
C14	Aux digital input (Hg)		
C16	Servo motor +	Red	Servo 1 red wire

Common for F1A/F1C and F1B timer:

Unused connector pins:

Unused connector positions should be filled with empty terminals to support the connector.

Using other servos than the Becker S100:

Connect the red motor wire to the + terminal of the motor and the black wire to the - terminal.

The orange wire and the brown wire should be connected to each end of the servo potentiometer, whereas the yellow wire should be connected to the servo output (the center terminal in most cases).

The phasing between potentiometer and motor is important. When you have connected the servo and the switches, you should power the timer up shortly and press switch 2. If the servo seeks a stable position, it is connected correctly. If it seeks the endpoint of the servo, that is the mechanical stop or simply the end of the potentiometer and it never reaches a stable position, the phasing is incorrect. If so, you should swap either the red/black wires or the orange/brown wires. Swapping both pairs will cause the servo to be stable and rotate the opposite way.

If you notice that the phasing is incorrect, the timer power should be removed immediately (within 1-2 seconds) or there is a risk of damaging the servo or the timer.

This is how it looks inside a Becker servo:

The motor is at the top of the picture, the potentiometer at the bottom. All wires a secured with hot-melt glue and the empty space inside the servo is filled with foam rubber to protect the wires from vibrations and to secure the potentiometer so that it does not drop out.

DON'T EVER USE ORDINARY GLUE TO SECURE THE WIRES. It will flow through the small openings in the motor and potentiometer and is very likely to block either or both. The result is a damaged servo.
You should preferably use hot melt, and if that is not possible, the glue should be under the servo while curing, it should be fast curing and have high viscosity.

Please note that the F1B timer requires 2V servo motors.

Setting the servo parameters:

First from the menus, select "info and config" and set the number of servos you want to use. Default setting is 3 servos and that will appear to work wit 1, 2 or 3 servos. IT DOESN'T. The thing is that if only servo 1 is connected, 2 and 3 will never reach their desired position and therefore the servo drive circuitry and the timer will never enter low power mode. That will cause the timer to drain the battery within a few hours.

Having set the number of servos, choose "Setup" and set the servo parameters. Pos000 is one end of the servo stroke, Pos250 is the other. The figure you set for Pos000 and Pos250 is the corresponding potentiometer position as a percentage of full stroke. You should never get too close to 0% and 100%, there should bee some room for servo overshoot. 10% and 90% is recommended for a start. NOTE: With the Becker linear movement servos S80, the range should be set to 40% to 60% for a start, and can be increased to something like 30% to 70%.

The last servo parameter to set is the servo gain. The higher the gain, the faser the servo reaches the desired position. If it gets too high, the servo becomes unstable or overshoots, so find a good compromise. For the F1B version of the timer, the value should probably be around 150, whereas 42 will be a good place to start for F1C. Software versions before 2.02 has different internal scaling and a value of 130 is recommended.

Determining the quality of the servo:

Having the servo up and running, you should check that it reaches a point where the servo does not drive the servo motor. If there is too much friction in the servo, it will often not reach the stable point and the timer will therefore constantly drive the motor. This will drain the battery quite fast. If so, get rid of the servo. Some servos are simply not suited for free-flight.

You can determine if the servo has reached the correct position by feeling if the disc is beating. The reason for the beat is that the drive current to the servo motor is pulsed and it is easy to feel the pulses on the disc. To get familiar with the feeling, rotate the servo disc carefully with your fingers and feel the reaction of the timer.

Securing the connector and the wires:

The timer is delivered with a syringe filled with silicone grease. Use it to fill up the connector completely. It will keep moisture and water from entering and it will reduce terminal vibrations.

All wires should be carefully strain relieved. Secure the wires for at least each cm. Wire breaks is the number 1 enemy of an electronic timer. For soldered wires, the first 2mm of wire is the most sensitive to vibrations. The reason is that soldering anneals the copper near the joint.

Special precautions for F1C:

Be very careful about the strain relief. If you are fond of your model, solder the battery connection (thick red/black) directly to the timer until someone volunteers to test the reliability of the connector in a live test….. He may loose his model, but the connector, filled with silicone grease, will probably bee sufficiently reliable.

Apply heat shrink tube to support the connectors, if possible.

Never use microswitches for F1C, they are simply not good enough. Use Hall elements instead.

Special precautions for carbon fibre:

Please note that carbon fibre is conductive! It is very likely to destroy the timer if it touches some conductive part of the timer. Use some kind of insulation if the space is limited.

Protecting the timer:

The timer is covered with a thin solderable protective layer. It should be protected from getting in contact with fuel or water. If you can't protect the timer sufficiently, you should consider covering it with an extra layer of polyurethane. Be careful about the connectors, they should have no lacquer at the contact surfaces whatsoever.

A hint for shrinking the flat heat shrink tube:

By some reason, it tends to crack if shrinked at too high temperatures. Shrink at 2-300 degrees centigrade.