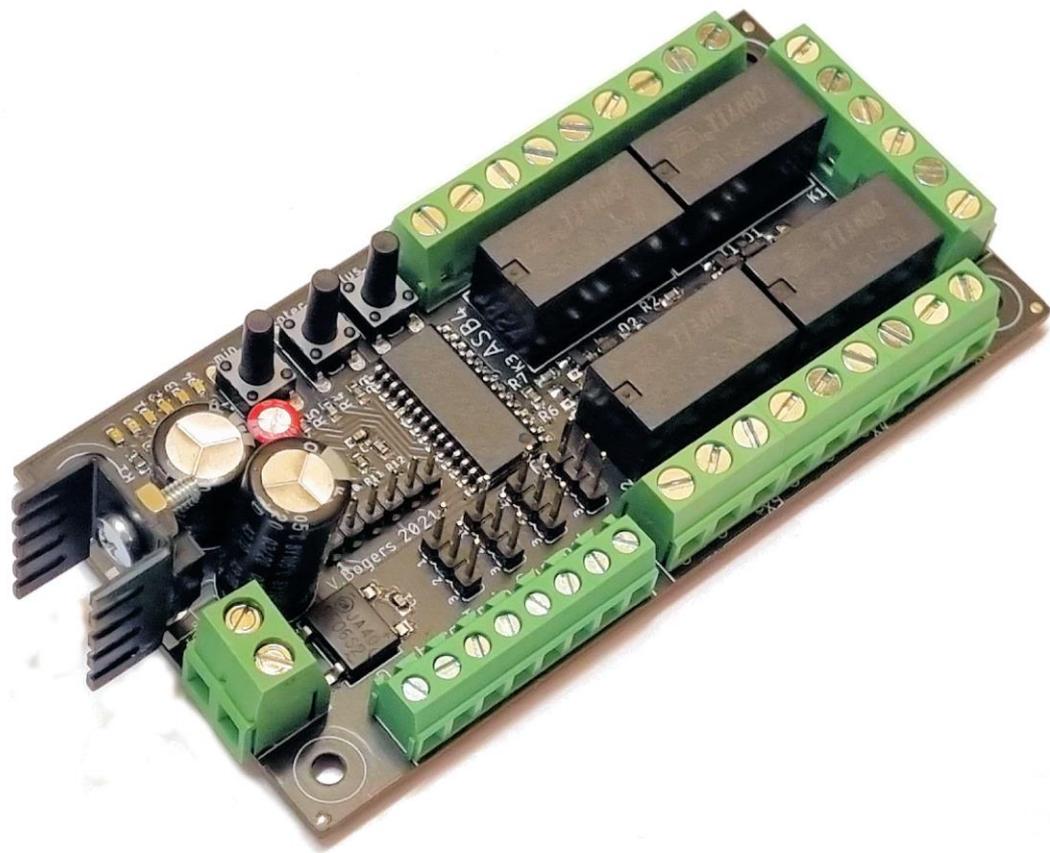


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DTS Manual: ASB4 Analogue Servo Controller

Version 1 - 2022



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Introduction

Thank you for purchasing the ASB4 Analogue Servo Controller. This article was developed especially for users who would like to control their turnouts and barriers beautifully and reliably by hand. A controller which is unique in its kind and which offers an answer to a much requested need. There are many users for whom digital control is still a bridge too far, or who simply do not find digital control of accessories interesting. This group of users controls their turnouts and scenery manually with switches on a control panel. A method known to every model railway user. These users often use magnetic controls for points, signals and barriers. A solution that has many disadvantages compared to servo control.

Servo control is not only cheaper to buy, but also much more economical, reliable and beautiful than the click-clack magnets. However, for servo control you usually need a hardware device with software to control the servos. There are some solutions for this via a handful of suppliers of small PCBs. However, these solutions lack the possibility to switch a relay with a servo. These relays have two switch contacts, which makes it possible to polarize hearts and create feedback for the position of the switch.

The ASB4 is the successor of the very successful ASB. Where the ASB was limited to control 2 servos in turn, the ASB4 is developed for 4 servos which can be controlled simultaneously. Also the way of programming is improved and simplified. Where with the ASB you still had to go through all the menus, with the ASB4 you can choose to program each servo individually.

I wish you a lot of pleasure with the ASB4, should you have any suggestions for improvement of the product or a critical note. Please let me know by sending an email to info@domburgtrainsupport.nl.

Kind regards,

The operation of ASB4

The functionality of ASB4

The ASB4 works on the basis of a PIC interface provided with a code that allows it to function. In order for the board to work properly, the supply voltage on the board is reduced to 5VDC with which the PIC can control the servos and the relay.

Each servo is controlled with a switch. The most commonly used is the rocker switch, but any switch that maintains its position is suitable for this purpose. The centre position of a servo is linked to a relay in the internal code. As soon as the servo reaches its centre position it switches the relay on or off depending on the position taken.

To determine the servo positions and speed, there are three push buttons: Plus, Enter and Min. With these three buttons the internal code can be set.

As mentioned, the ASB4 can control four servos, unlike its predecessor, simultaneously.

Possibilities of control

The relay allows a number of functions to be performed by means of two changeover contacts per relay. Some of the most common ones:

- Point polarisation of a switch
- LED status signalling on control panel
- Activation of an ABC module at the position of the switch
- Switching a signal position to the position of the turnout
- Switching of blocks according to the position of the switch

This is just a few of the many possibilities. If you have applied a new possibility, please let me know. I can collect them and incorporate them into this manual.

Mounting

The ASB4 has 4 mounting points. We recommend using our mounting frame for mounting.



Mounting the ASB4 upside down or sideways is also possible if you take the cooling of the cooling element into account.

For the assembly, you can also use the PCB assembly set that you can find in the webshop.

Servo bracket

The MDF Servo Brackets consist of 3 separate parts. A foot plate, stand and partition.



You should glue the 3 parts together, preferably with wood glue. Hobby glue and hot glue are also good. Pay attention to the partition, it only fits one way really well. Then the sides are equal. The bracket can be

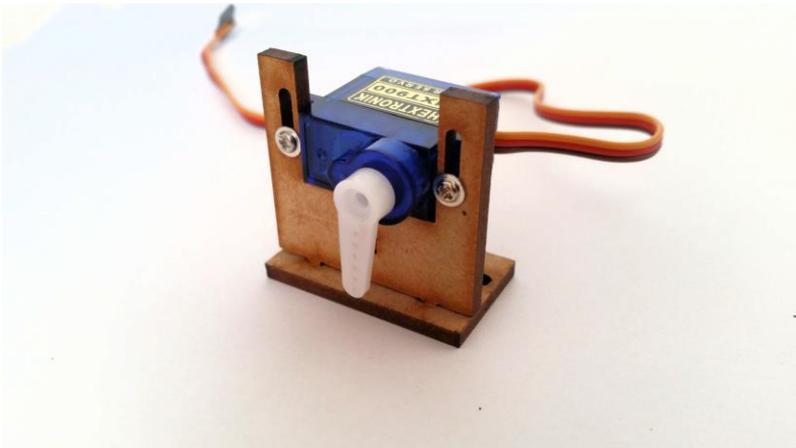
Mount on your model rail using the sheet metal screws provided.

Servo

The servo is equipped with a number of arms. Choose the arm you want to use and mount it on the servo. Make sure you use the small screw to attach the arm to the shaft of the servo.

Now position the servo in the bracket like this and screw it into the servo bracket with two sheet metal screws.

As servo we recommend the Hextronics HXT900, or the Turnigy TG9e as analogue servo. Or if you want to use a digital servo we recommend the Turnigy TG9d or the MX-95° .



Feather steel wire

You can use the spring steel wire to effect the transfer between the servo arm and the object to be moved. You do this as directly as possible. Every form of bending, Z-cutting and V-cuts are not necessary and actually counteract the movements.

The most common way of mounting is directly under the switch tongue, which makes the distance and movement of the servo as short as possible. The different holes in the arm can be used to play with the stroke of the servo. If the stroke is too short or too fast, you may prefer a hole closer to the axis. If you want a direct movement, then choose a hole as far away from the axis as possible.

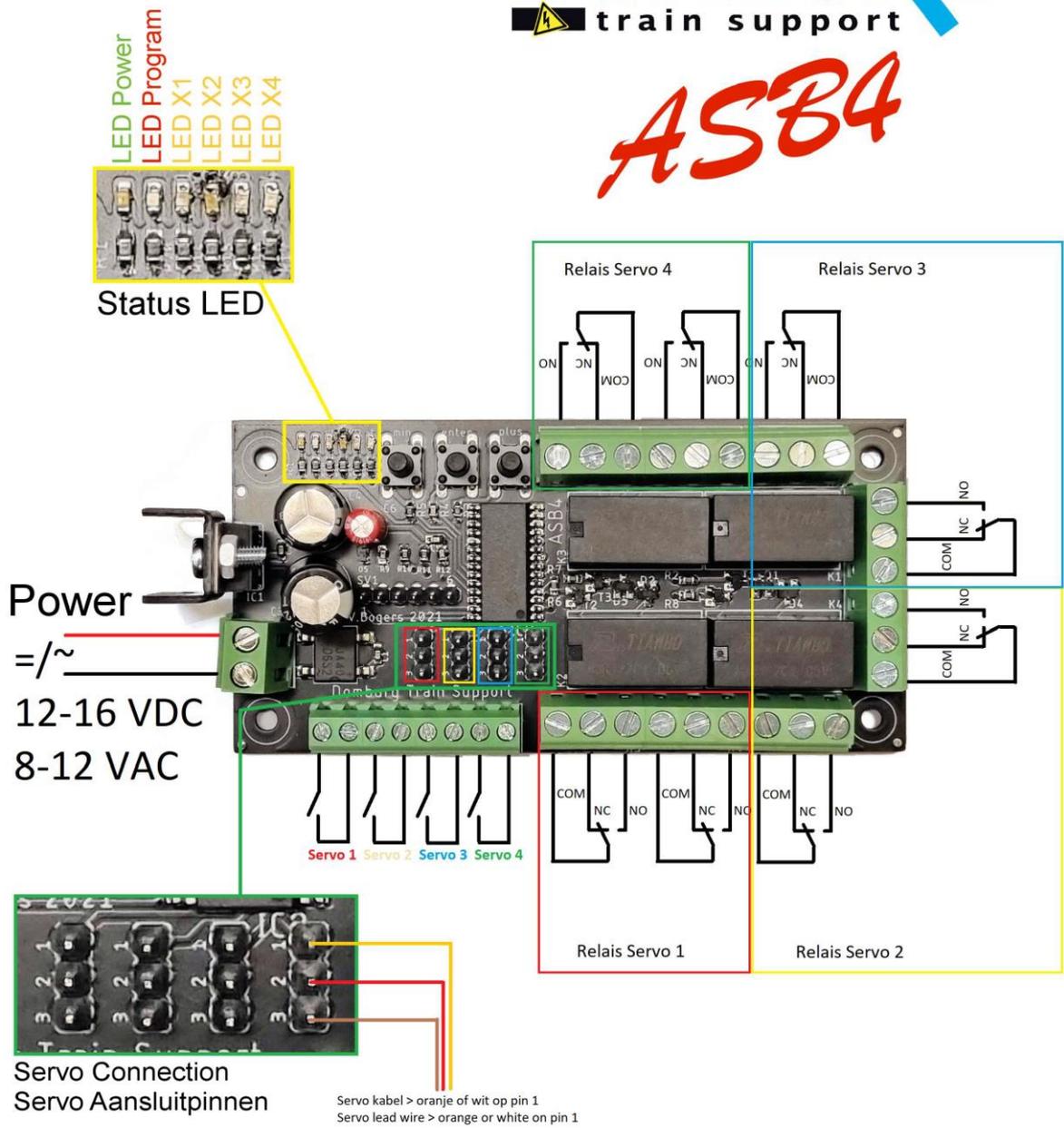
The distance from the arm to the servo is irrelevant. If you cover a distance of more than 5 cm at right angles to the arm and in line with the movement of the servo, you should use a tube to guide the spring steel.

Tip: use the sticks of a cotton bud. That will save you a lot of money.

Connect



ASB4



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Figure 1

Supply voltage

The power supply we recommend for powering the ASB4 is a stable DC source between 8 and 12 VDC.

The maximum voltage that can be connected to the ASB is 18VDC DC or 12VAC AC. It is therefore possible to supply the ASB with an AC voltage. Due to the presence of a bridge rectifier, the ASB is polarity insensitive. Therefore, it does not matter how you connect the power supply to the Power connection.

Please note that the voltage AC is a factor of 1.4 higher than the voltage DC coming from the rectifier. In case of an AC power supply, do not use more than 12VAC, this gives a DC voltage of 15.6VDC. The present voltage regulator turns this into 5V. The difference in voltage is given off as energy to the heat sink (dissipation voltage).

Important:

The higher the voltage offered, the more heat is generated in the voltage regulator. The voltage regulator, to which the heat sink is attached, can become **hot**. This is not a problem, as the maximum temperature the voltage regulator can tolerate is 125 degrees Celsius. During regular and frequent use, the temperature can rise to 60-70 degrees Celsius. **Be careful, because it can lead to burns when touched.**

On the two-pole terminal of the ASB4, you can provide the direct voltage as shown in Figure 1. The polarity is not important here due to the rectifier. If you have connected the polarity correctly, the green POWER LED lights up.

Servos

Connect the servos to the four three-pole headers as shown in Figure 1. It is important that you connect the orange wire of the servo cable to the inside of the PCB, as indicated in the picture above. If you connect the connector the wrong way round, the servo will not respond.

You can extend the servo cable if required. You will find servo extension cables of 30, 50 and 100 centimetres long in the webshop.

Rocker switches

The switches are connected to the eight-pole terminal below the servo connection. The counting goes from left to right. The operation is quite simple:

Switch open: Servo goes to position A

closed: Servo goes to position B

By the way, it is not necessary to use a rocker switch. Any switch that switches between two contacts is sufficient to operate the servo. Just make sure that the switch or push-button monitors the position. A normal push button will only close the contact if you press it. When you release it, the contact will open again and the servo will return to position A.

Relay

Each servo has a relay that switches to the centre position of the servo. Each relay has two change-over contacts as shown in Figure 1. This means that each contact consists of a Common (COM), Normally Closed (NC) and Normally Open (NO). We have made this easier to understand by a number of letters per contact:

COM: Common

NC: Normally Closed

NO: Normally Open

In principle, you can forget the above. You connect the power supply wire of the thing you want to switch to COM, then the contact switches this voltage either to NC or NO. This depends on the position of the relay.

If you want to polarize a switch:

- Solder a wire to the centre piece of the turnout and connect it to terminal COM
- Solder a wire to the rail which is straight, this feeds the centre when bent. Connect this to terminal NO
- Solder a wire to the rail which is bent, this wire feeds the centre when straight. Connect this to terminal NC
- Measure with the multimeter after switching the servo whether the correct rail is led to the centre piece
- If this is not the case, swap NO and NC

If you want to create a status message with an LED:

- Connect the long leg of the LED (Cathode) to the V+ of the power supply.
- Connect the short leg of the LED (Anode) to the NC or NO terminal of a contact. Depending on the status message, determined by the position of the servo.
- Connect the GND of the power supply to terminal COM.

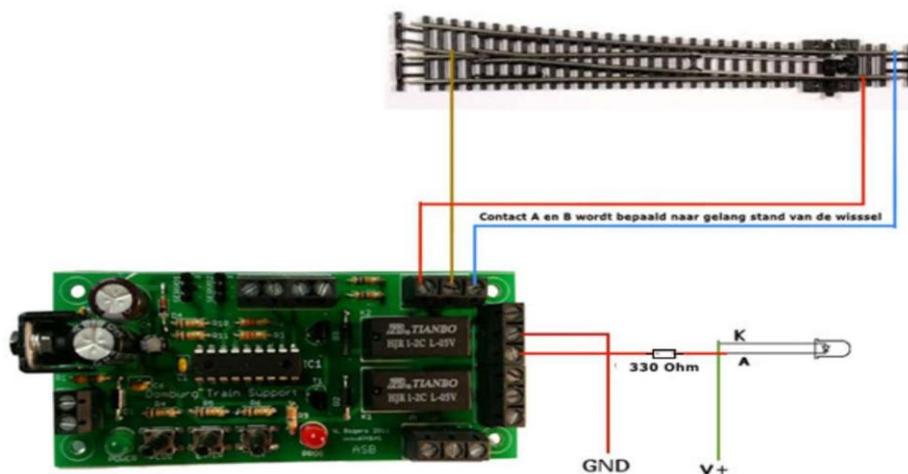


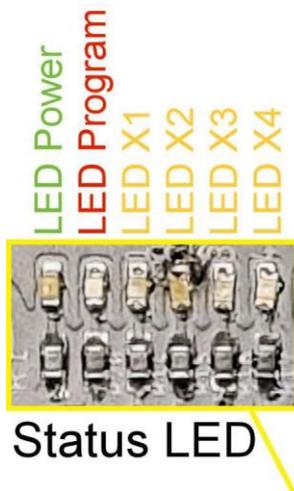
Figure 3

Adjustment

Setting the servos

The tuning of the servos on the ASB4 has been greatly improved over its predecessor, the ASB. You can now select the servo you want to program, you can skip steps if necessary and you can see which step you are working on by means of the LEDs.

The LEDs have multiple functions:



LED Power: Supply voltage is OK
LED Program: ASB is in programming mode

Now the LEDs X1 to X4 have several functions. During active operation, i.e. not in program mode, they indicate the status of the relay. If the LED lights up, this means that the corresponding relay is also active. This way you can check the state of the circuit during operation.

In all cases: X1:
Servo 1
X2: Servo 2
X3: Servo 3
X4: Servo 4

To program, press the centre button marked "enter" for 3 seconds. To end the programming function, ensure that the LEDs X1 to X4 are extinguished to get to the "End" position and press the "enter" button again for 3 seconds. The red LED will then extinguish and the ASB is set to active mode.



If you are in the programming mode, the red LED is on, you can use the "plus" and "minus" buttons to choose between LED X1, X2, X3 or X4. You can select to edit Servo 1, 2, 3 or 4 respectively. As soon as you go in the right direction past X4, or in the left direction past X1 you will notice that all X LEDs are extinguished. This is the "End" position, with which you can leave the programming menu.

So there are 5 modes to choose from:

- X1 on: Servo 1
- X2 on: Servo 2
- X3 on: Servo 3
- X4 on: Servo 4
- X1 to X4 off: Quitting programming mode

If you wish to proceed to the next step, use the "Enter" key. To ensure that you do not confirm an action unintentionally, we have built in a delay of at least 1.5 seconds for the enter button to be pressed. Each subsequent step is visually confirmed by the brief extinction of the red and orange LEDs.

When you have made your choice of servo, press the enter button for 1.5 seconds. The red and orange LEDs will dim for a moment, and then light up again. This time you will also see LED X4 light up next to the chosen servo. This is the first step in setting the servo. Each step is confirmed again by pressing the enter button for 1.5 seconds, and this will be confirmed again by the LEDs going out briefly. Then the next step will be shown and the servo will move to the already set position.

The steps are as follows:

X4: Position of
position A X3:
Position in the
middle X2:
Position of
position B
X1: Speed of movement

Changing the positions is done with the "plus" and "minus" button. At step X1 the servo will move between position A and B and the operation of "plus" and "minus" will result in slower or faster movement of the servo.

Make sure that the position "centre" (X3) is always between position A and B. A position beyond position A and B will result in the servo not working properly. The centre position of the servo is very important for the ASB4 because the left and right deflection is measured with the centre position. If this position is not programmed between the two strokes, the servo will go into a "loop" where it travels a path and then returns to the beginning and repeats this. This is an indication that the centre position is not properly set.

Resetting the ASB4

It may happen that programming did not go well or that you are not satisfied with the settings and want to redo them. You can go through the steps again. However, you can also reset the entire ASB4.

This is done by pressing the PLUS and MINUS buttons simultaneously for 2 seconds in normal operation. You will see the LEDs X1 to X4 light up briefly and the ASB4 is reset.

By the way, this does not work in PROGRAM mode to protect your settings.

Frequently asked questions

The heat sink of the PCB is getting hot, is that bad?

No, this will not do any harm. It is also normal for it to heat up. The voltage regulator is responsible for this and switches itself off at 125 degrees Celsius. As an indication, at 45 degrees the average person thinks it is too hot to touch.

When I switch on the power supply, the servos twitch.

This is correct and is caused by the servos themselves. This can do no harm.

Afterword

I have written this manual for general use. You do not have to pay for this manual and it can be downloaded from our website free of charge. If you want to copy the text for your own or club use, please contact us.

I hope this manual will help you connect the ASB4. If you have any comments, please let me know. I will then be able to include them in a new version. You can report them by sending an email to info@domburgtrainsupport.nl.

Thank you for reading and using this manual.

Kind regards, Martin

Domburg

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