DC SHUTTLE WITH STATION STOP AND ACCELERATION SAS2-BR

Operates DC Model Trains Automatically with Station Stop and Acceleration

- Runs a DC equipped loco back and forth along a single section of track
- Optional station stop function brings the train to rest at a station
- Realistic acceleration and deceleration
- Quick and easy to connect and set-up

For a long while simple shuttles have been available to model rail enthusiasts to operate DC locos back and forth along a single section of track. We had wanted to add further realism by controlling acceleration and deceleration, allowing the option of station stops and so on.

For the modeller looking for a quicker solution, we have designed the SAS2-BR. This module is a self-contained DC throttle, designed to operate a single loco along a section of track. Upon reaching the end of the track, the loco will decelerate to a standstill, wait for a period, then accelerate in reverse. It will run to the other end of the track and then decelerate to a standstill, wait again, and then accelerate off forwards.

This action would be appropriate to single line with one train and two terminus stations.

There is also the option to add one or more intermediate stations. In this case, as the train enters the vicinity of the station, it automatically slows to a standstill, waits a set time at the station and then sets off again. There can be any number of such stations on the single line.

Many programming options are catered for; to control the waiting times, speed, and randomness of stopping times.

Power Supply

The module is designed for a supply voltage of **12V DC.**

The module will not be damaged by reverse polarity, being connected to AC rather than DC, or input voltage up to 35V DC or 25V AC.

Normal traction current is below 0.2A for N gauge and 0.3A for OO and HO gauges for the speeds shuttle trains are normally operated at.

The module can provide up to 0.5A of traction current, and a power supply with a minimum output of 0.5A is recommended for Z and N gauges, 1A for OO and HO.

The output is protected against short-circuits.

Speed Setting & Waiting Time Adjustment

The locomotive top speed is set by the SPEED adjustment on the module.

Generally the midway position shown in the image below will be a suitable starting point.

The waiting times are programmed separately for the two ends and the station stop. These waiting times can only be adjusted by the TIME adjustment on the module if these individual settings for the waiting time are programmed to a value of 1 (see later).
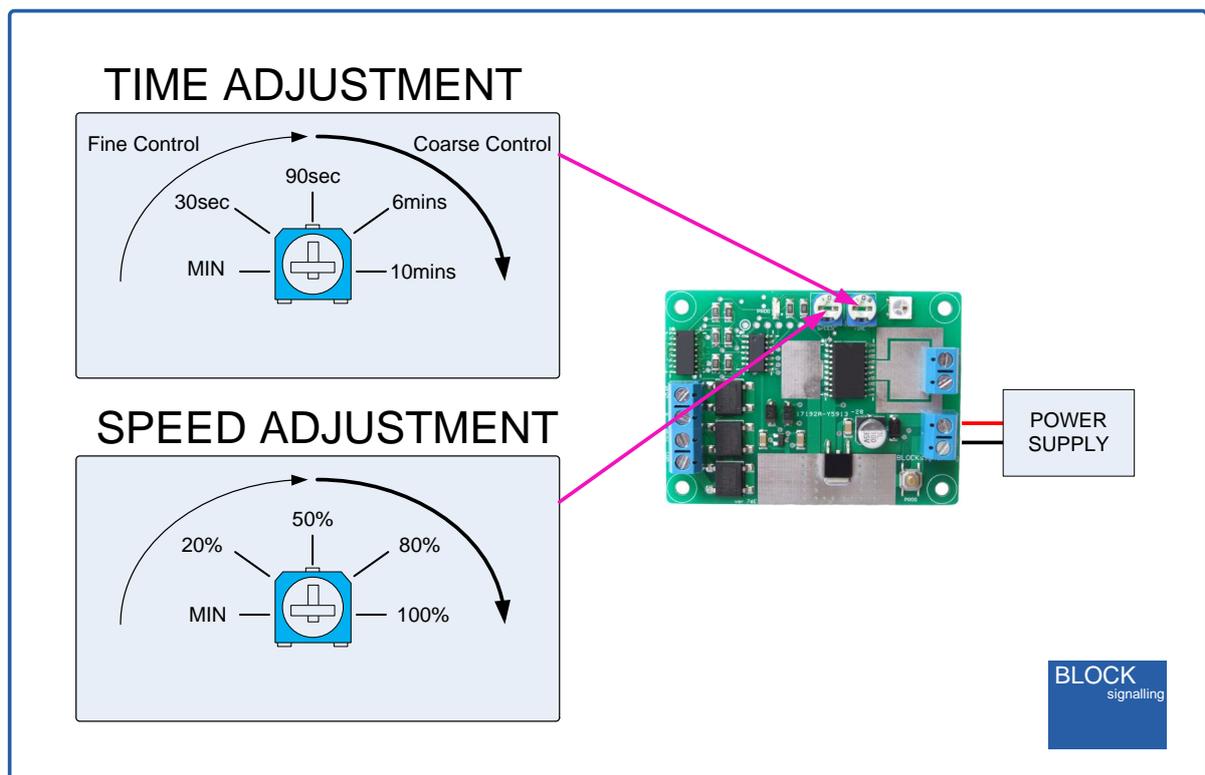
Emergency Stop

If you want to stop the train, either in an emergency, or perhaps to re-rail or change a loco, press the button on the PCB. Track power will be removed and the train will immediately come to a standstill.
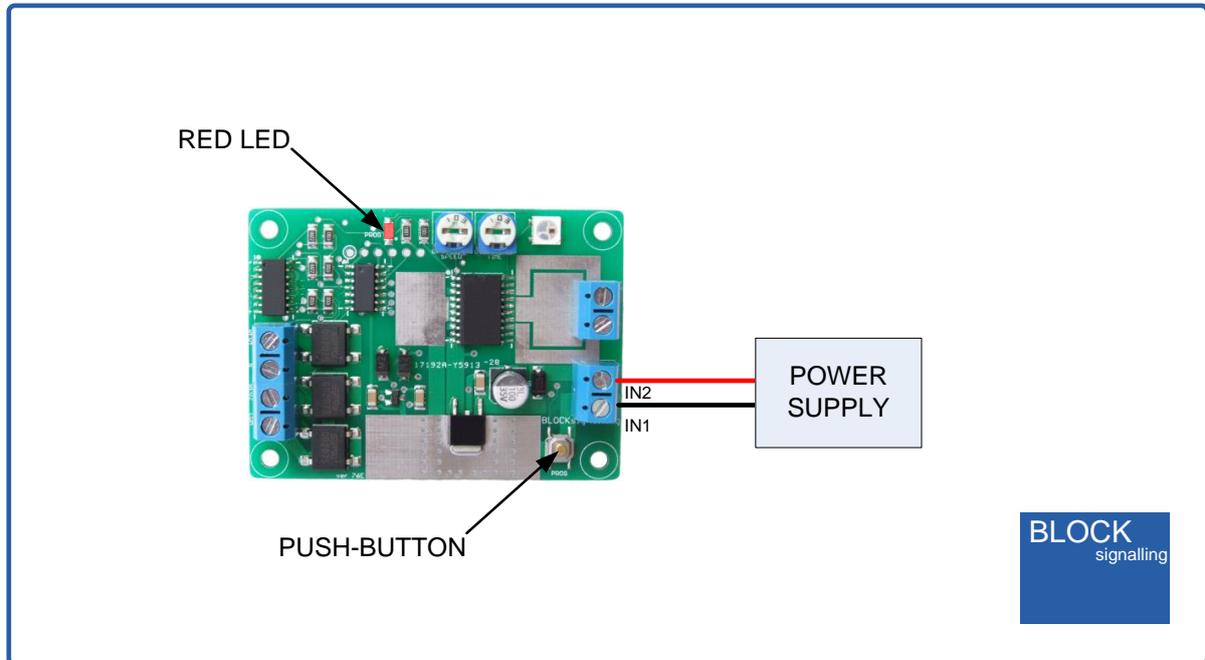
The led on the PCB will flash 0.5seconds on/ 0.5seconds off.

To re-power the train, press and hold the PCB button for 1 second and then release.

Programming Procedure

The module is programmable, and many of the settings can be adjusted to suit.

Programming is performed holding down the Push Button on the module when switching on the power.

When programming, there are two values to be entered.

The red led on the PCB flashes at 1 second intervals. When the required number of flashes is seen (see later for the list of possible choices) the button is released to store the first value. At this point the led comes on for five seconds to confirm the first value is stored.

The led then starts flashing again, and this time the button needs to be pressed to store the second value.

Now the two values to be stored have been entered, the led flashes 10 times rapidly, and the module starts operating.

Each value entered can range between 1 and 255. If more flashes are seen, or the programming is aborted by switching off, then the programming must be repeated.

Connecting the Unit

REV1 — S — REV2 — COM

OUT2 — OUT1

IN2 — IN1

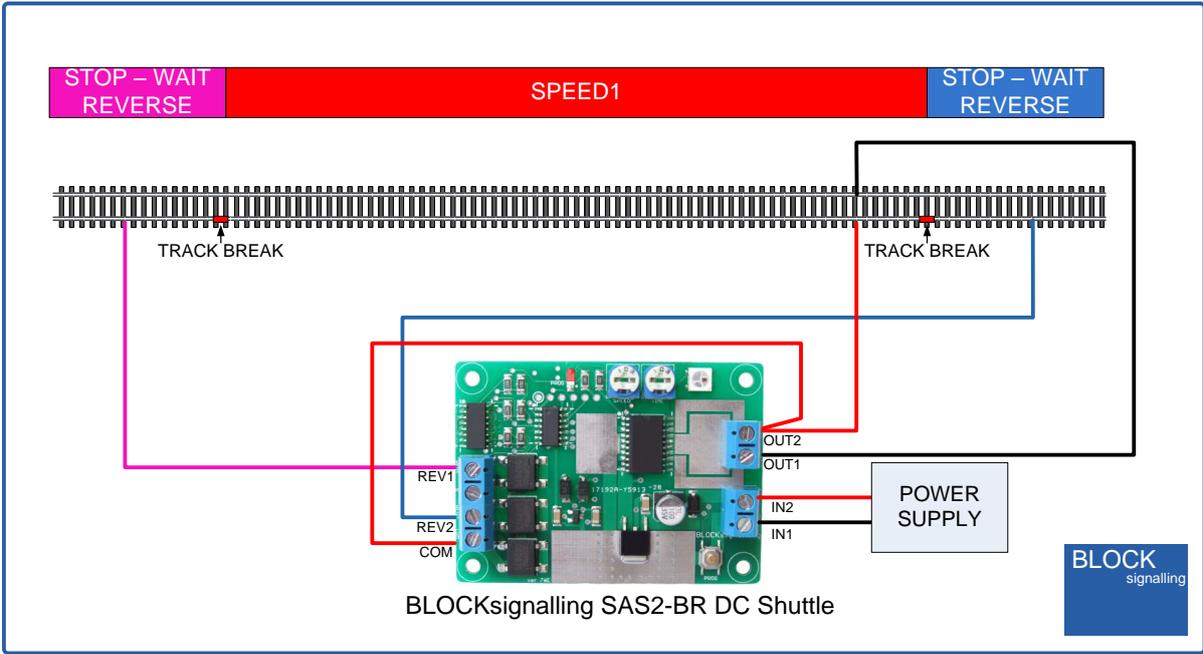BLOCKsignalling SAS2-BR
Terminal Arrangement

BLOCK
signalling

The track is divided up into a minimum of three sections, the main section and two ends.

The ends are formed by isolating the right-hand rail by using an insulated rail joiner, or by cutting the rail with a dremel or hacksaw. Fill any remaining gaps caused by cutting with epoxy glue to ensure smooth running. This is not necessary at the testing stage, but will ensure the final running is smooth.
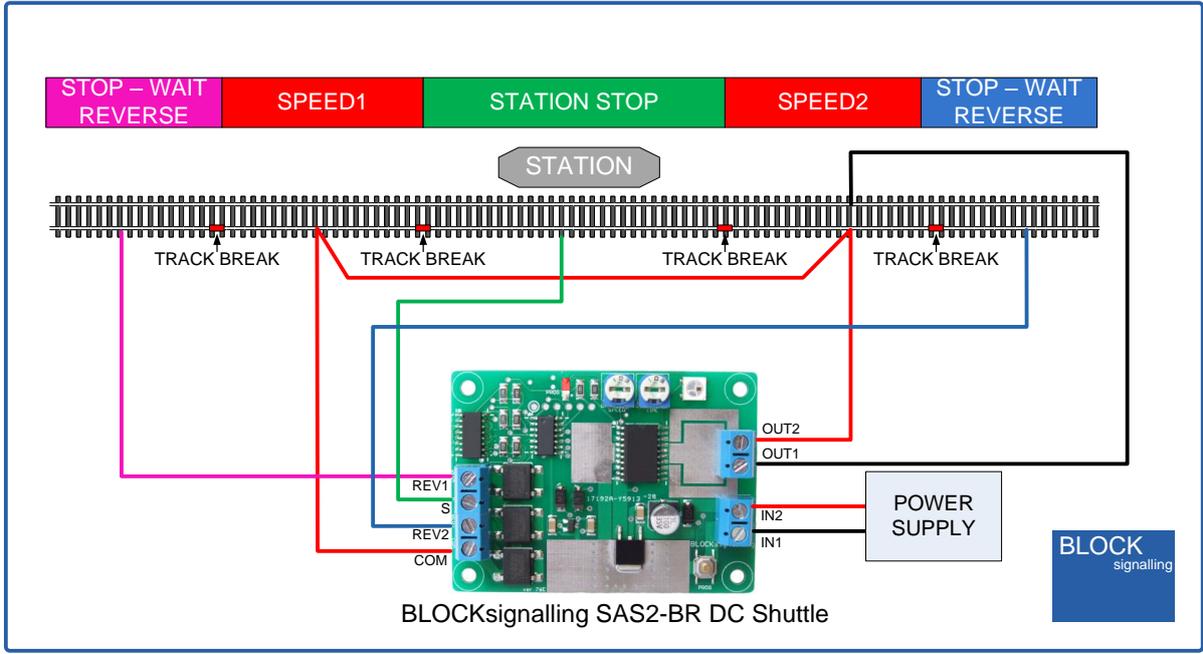
The right-hand rail is relative to the forwards direction of the locomotive.

The length of the end sections of the track should be sized to allow for the loco to enter, be detected and to stop. Carriages with lights which draw power from the rails will be detected if they draw more than 4mA.

STOP – WAIT REVERSE | SPEED1 | STOP – WAIT REVERSE

TRACK BREAK

TRACK BREAK

REV1
REV2
COM

OUT2
OUT1
IN2
IN1

POWER SUPPLY

BLOCK signalling

BLOCKsignalling SAS2-BR DC Shuttle

If the station stop function is being used, then form isolated sections for each station.

These will need to extend either side of the platform, to allow time for the train to decelerate.

STOP – WAIT REVERSE | SPEED1 | STATION STOP | SPEED2 | STOP – WAIT REVERSE

STATION

TRACK BREAK | TRACK BREAK | TRACK BREAK | TRACK BREAK

REV1
S
REV2
COM

OUT2
OUT1
IN2
IN1

POWER SUPPLY

BLOCK signalling

BLOCKsignalling SAS2-BR DC Shuttle

Factory Reset

To reset the module back to factory settings, switch off the power to the module and hold down the Push Button. Apply the power and continue holding the push button until 1 flash of the led is seen. At this point, release the button. You will see a long flash of five seconds.

The led will begin flashing again. When you have seen 1 flash press the button. You will see a long flash of five seconds and then 10 rapid flashes. The reset procedure is then complete and the module will restart with factory settings, and run the lamp test mode. If you make a mistake programming, simply repeat the process.

Program Flow Diagram

The diagram below shows all the programming options.

Programming is performed by holding down the Push Button when switching on the power.

The red led on the PCB flashes at 1 second intervals. When the required number of flashes is seen (see later for the list of possible choices) the button is released to store the first value. At this point the led comes on for five seconds to confirm the value is stored.

The led then starts flashing again, and this time the button needs to be pressed to store the second value.

Once the two values to be stored have been entered, the led flashes 10 times rapidly, and the module starts operating.

Most values entered can range between 1 and 255 (see below for limits). If more are seen, or the programming is aborted by switching off, then the programming must be repeated.

Following the diagram is a detailed explanation of all the settings.

APPLY POWER

1=SELECT
FACTORY RESET   1=PERFORM RESET

2=SELECT MODE   1=DC MODE

3=EAST END WAITING   IN SECONDS
DURATION   DEFAULT=5

4=WEST END WAITING   IN SECONDS
DURATION   DEFAULT=10

5=STATION STOP   IN SECONDS
DURATION   DEFAULT=5
                       1=NO STOP

6=SPEED CONTROL   1=ON/OFF
                       2=ACCELERATION & DECELERATION
                       (DEFAULT)

7=ACCELERATION   NUM OF SECONDS TO FULL SPEED
RATE   (DEFAULT 6)

8=DECELERATION   NUM OF SECONDS TO STANDSTILL
RATE   (DEFAULT 2)

9=EAST END DELAY   1=FIXED
                       2=RANDOM

10=WEST END DELAY   1=FIXED
                       2=RANDOM

11=STATION DELAY   1=FIXED
                       2=RANDOM

25=MAINTENANCE
MODE   1=SHOW SOFTWARE VERSION

SAS2-BR
DCC SHUTTLE

BLOCK
signalling

Programming Options

East End Waiting Duration (option 3)

Sets the waiting time when the train arrives at the track section connected to the REV2 terminal.

It a setting of 1 is used, then the waiting time will be set by the TIME adjustment on the module.

Minimum setting 2 seconds.

Maximum setting 255 seconds.

Default setting (after factory reset) 5 seconds.

After the waiting time, the train departs in reverse.

West End Waiting Duration (option 4)

Sets the waiting time when the train arrives at the track section connected to the REV1 terminal.

It a setting of 1 is used, then the waiting time will be set by the TIME adjustment on the module.

Minimum setting 2 seconds.

Maximum setting 255 seconds.

Default setting (after factory reset) 10 seconds.

After the waiting time, the train departs forwards.

Station Stop Duration (option 5)

Sets the waiting time when the train arrives at the track section connected to the S terminal.

It a setting of 1 is used, then the waiting time will be set by the TIME adjustment on the module.

Minimum setting 2 seconds.

Maximum setting 255 seconds.

Default setting (after factory reset) 5 seconds.

After the waiting time, the train departs in same direction as it arrived.

Speed Control (option 6)

Sets whether the train stops and starts using the acceleration and deceleration settings, or simply starts and stops with full power immediately applied and removed.

1=starts and stops with full power immediately applied and removed.

2=gradual acceleration and deceleration.

Rate of Acceleration (option 7)

Sets rate of acceleration applied.

Time in seconds for the voltage applied to the track to be raised from OFF up to the maximum set by the adjuster on the board.

A higher value results in slower acceleration.

Note: the smoothness of the acceleration is highly dependent on the model and the amount of friction present. Sometimes a longer acceleration time will be required, as the model will not move during the initial application of voltage to the track.

Minimum setting 1 second.

Maximum setting 20 seconds.

Default setting (after factory reset) 6 seconds.

Rate of Deceleration (option 8)

Sets rate of deceleration applied.

Numerical value is the time in seconds for the voltage applied to the track to be lowered from the maximum set by the adjuster on the board to OFF.

Minimum setting 1 second.

Maximum setting 20seconds.

Default setting (after factory reset) 2 seconds.

East End Delay (option 9)

Sets whether the waiting time when the train arrives at the track section connected to the REV2 terminal is fixed or randomised.

When randomised, the waiting time varies between 25% and 100% of the set waiting time.

1=fixed

2=randomised

West End Delay (option 10)

Sets whether the waiting time when the train arrives at the track section connected to the REV1 terminal is fixed or randomised.

When randomised, the waiting time varies between 25% and 100% of the set waiting time.

1=fixed

2=randomised

Station Delay (option 11)

Sets whether the waiting time when the train arrives at the track section connected to the S terminal is fixed or randomised.

When randomised, the waiting time varies between 25% and 100% of the set waiting time.

1=fixed

2=randomised

Maintenance Mode (option 25)

When set to 1, displays the software version of the module by flashing the led on module to signal a group of four digits.

The power must be removed to reset the module.

Step-by-step Connecting Up

There follows a step-by-step approach to connecting up and testing the unit. This process can also be followed in case of the unit not functioning as expected.

1. Connect power to the module. The supply module is designed for a 12V DC supply.

2. Switch on the power. The led on the PCB should light for 1 second, then flicker at about 1/4 brightness.

3. Switch off the power and connect the continuous rail (the one without any breaks) to the terminal marked OUT1. Connect the other rail to the terminal marked OUT2 and also insert a link between OUT2 and the COM terminal. Place a locomotive on the track and switch on the power. After a few seconds, the locomotive should move forwards. If necessary turn the SPEED adjustment on the module clockwise until the locomotive moves. Switch off the power.

4. If you have a station section, connect it to the terminal marked S. Place a locomotive on the track so that it will move towards the station section and switch on the power. After a few seconds, the locomotive should move forwards. When it reaches the station section, it should come to a stop for a few seconds then move off again. Switch off the power.

5. Any track after the station should be connected with a link to the track before the station, to ensure it receives power.

6. The stopping section which causes the train to switch from forwards to reverse should be connected to terminal REV2. Place a locomotive on the track so that it will move towards the end section and switch on the power. After a few seconds, the locomotive should move forwards. When it reaches the end section, it should come to a stop for a few seconds, then reverse back.   Be ready to cut the power in case it does not stop in time or does not reverse. Switch off the power.

7. Fit the final end section and connect to the REV1 terminal. Repeat the tests in full to confirm that the train runs as expected backwards and forwards.

8. If you want to adjust any of the settings, this can now be undertaken.

Troubleshooting

Q. The locomotive does not move when the module is first switched on.

A. The locomotive should be moving forwards within 10 seconds. If not increase the SPEED adjustment on the module clockwise. Gently nudge the loco forwards in case mechanical or electrical resistance is preventing it moving. If required, test the locomotive in the same position with your DC controller to check it operates correctly.

Q. The locomotive runs in the wrong direction when the module is first switched on.

A. The locomotive motor may be wired incorrectly or the connections between the module and the track wired incorrectly (reversed).

Q. At the end of the track the locomotive stops briefly, and then continues in the same direction rather than changing direction.

A. When the train reaches the end of the track connected to REV2, it will stop then reverse. When the train reaches the end of the track connected to REV1, it will stop then leave the section in the forward direction. Check the connection from the track ends to the module to check they are correct.

Q. The train does not stop at a section.

A. The gap in the rail could be blocked by swarf or debris, or the deceleration time could be set to too long. This is also possible if the REV1 and REV2 ends are incorrect (reversed).
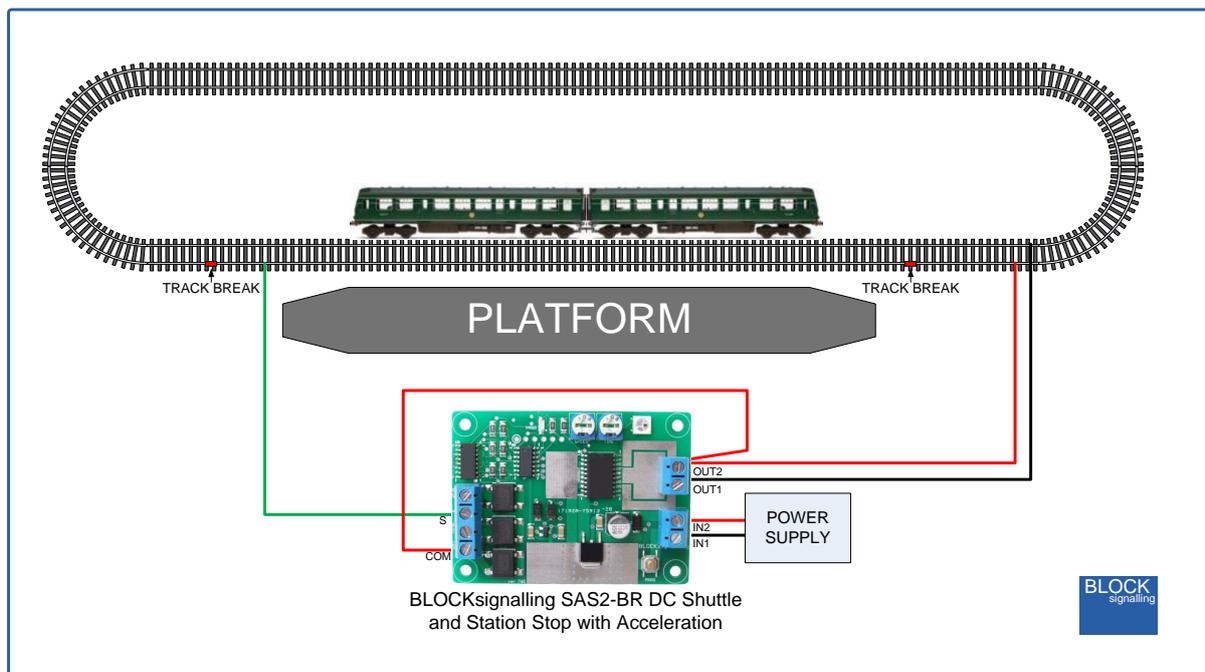
Q. The acceleration is not very smooth.

A. The train has to overcome friction before moving off, after which the friction reduces. For this reason, more realistic acceleration can be achieved with a longer acceleration time. This effect is not seen when the locomotive is decelerating.

Other Ideas

The SAS2-BR can be used to provide a Station Stop on a loop.

The locomotive travels forwards around the loop, stopping each time at the station for a delay period set by the time adjustment on the module.

TRACK BREAK

PLATFORM

TRACK BREAK

OUT2
OUT1

POWER
SUPPLY

S

IN2
IN1

COM

BLOCK
signalling

BLOCKsignalling SAS2-BR DC Shuttle
and Station Stop with Acceleration

If you don't want the module to stop trains at the station, you can place a switch across one of the rail gaps.

When the switch is closed, the module will not detect trains at the station and so the trains will not be stopped.