Timpdon Electronics

ServoSwitch Model SCS4

Toggled servo operation with single pulsed trigger switch input.

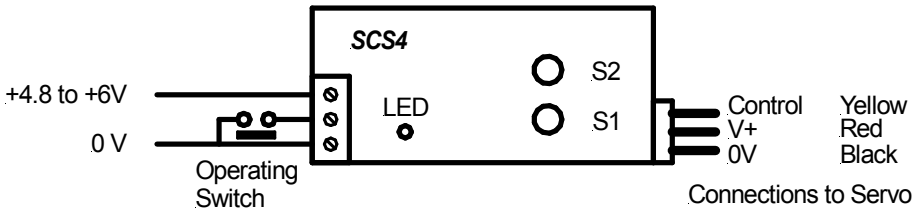
Designed primarily for automatic signal operation from track mounted reed switch and vehicle mounted magnet.

Programmable delay between trigger and servo operation.

Features

- Controlled toggled motion between two servo positions with a single pulsed trigger switch, using a standard RC servo.
- Fully user programmable for independent servo end positions, rotation speed and end of travel bounce. Programmed settings retained when power removed.
- Fully user programmable for delay between trigger and servo operation, in range zero to 25 seconds.
- Ideal for automatic control of semaphore signals by passing train.
- Digital microprocessor controlled.
- Small size – 50mm x 20mm x 16mm.
- 4.8 V to 6 V d.c. supply.
- Screw terminals for connections to supply and control switch. 3 pin plug for direct servo connection.

Installation and Wiring



Notes

1 Connect a d.c. supply of between 4.8 V and 6V to the screw terminals, as shown. – Please read the **Cautionary Notes** below, before selecting your power source.

Do not exceed the maximum permitted nominal supply voltage of 6 V. Although the ***SCS4*** will accommodate higher voltages without blowing up, many RC servos will not.

Ensure that the power supply polarity is correct before powering up.

2 Connect a single pole normally open operating switch between the switch input terminal and the 0V supply, as shown.

For automatic operation this could be a reed switch mounted between the rails at the required trigger position, operated by a vehicle mounted magnet.

For advice on using magnet operated reed switches, refer to **Technical Note 3 - Using Magnet Operated Reed Switches**, available in the **Downloads** section of the ***Timpdon Electronics*** website.

3 Plug the servo connector on to the three pin plug connector on the opposite end of the ***SCS4***. Ensure that the **black** wire on the servo is positioned towards the bottom edge of the ***SCS4***, adjacent to the 0V screw terminal.

4 On power up, the servo will automatically rotate to the **reset** position.

Operation

1 Once programmed, as described below, each time the operating switch is pulsed **closed**, the servo will rotate to the **opposite** setting, **set** or **reset**, at the programmed rotation speed.

2 If a **trigger delay** has been programmed, as described below, the servo will start rotating only after the programmed delay period.

3 The **LED** will illuminate as soon as the unit is triggered, and will remain lit until servo rotation has been completed, and for a further 2.5 seconds thereafter. While the **LED** is lit, the unit will not respond to any further trigger commands.

In order to prevent a reversal of the servo at the end of its rotation, the trigger switch **must be opened** before the **LED** is extinguished at the end of the rotation period.

4 If a bounce level is programmed for the current direction of travel then, as soon as the programmed end position is reached the servo will reverse to the bounce position at the same speed, reverse again and finally return to the programmed end position at the same speed. This feature may be used to realistically simulate bounce at end of travel of semaphore signal arms or crossing gates and barriers. If you do not require bounce in either direction of travel, program the relevant bounce level to zero bounce.

Caution

When powering up the ***SCS4***, ensure that switches **S1** and **S2** are **not** both pressed, unless you are intending to program the Trigger Delay period, as described below.

Programming - Servo Settings

Programming or re-programming may be performed at any time, using push button switches **S1** and **S2**, with indication provided by the **LED** indicator.

Programming is performed in five steps, in order – **Set Position**, **Reset Position**, **Rotation Speed, Reset Bounce Level** and **Set Bounce Level**. No new programmed settings will be saved unless **all five** programming steps are correctly completed, in sequence.

The **Set** and **Reset** positions of the servo may be anywhere within the controlled operating range of the servo – approximately 160 degrees rotation on most servos.

Programming Procedure - Servo Settings

Ensure that the unit has been powered up with both programming switches **released**. Then press and hold both switches **S1** and **S2** together until the **LED** illuminates continuously, after about 2 seconds. Then release both switches.

1 You are now in **Step 1 – Program Reset Position**.
The **LED** will flash with **single short** flashes.

Adjust the required **Reset** position using either **S2** to increase the servo position or **S1** to decrease it. The actual rotation direction is servo dependent.

When satisfied, press and hold both switches **S1** and **S2** together until the **LED** illuminates continuously, after about two seconds. Then release both switches.

2 You are now in **Step 2 – Program Set Position**.
The **LED** will flash with **double short** flashes.

Adjust the required **Set** position using either **S2** to increase the servo position or **S1** to decrease it. The actual rotation direction is servo dependent.

When satisfied, press and hold both switches **S1** and **S2** together until the **LED** illuminates continuously, after about two seconds. Then release both switches.

3 You are now in **Step 3 – Program Rotation Speed**.
The **LED** will flash with **single long** flashes.

In programming step 3, the servo will rotate continuously between the two end positions which have already been programmed, at the current rotation speed.

There are sixteen steps of rotation speed, varying from about 0.25 s to 20 s for 90 degree rotation. Press and release **S2** to increase the speed by one step, or press and release **S1** to decrease it by one step.

Please read the **Cautionary Notes** below before attempting to use very high rotation speeds.

After the last step, the rotation speed will revert to the other end of the speed scale.

When satisfied, press and hold both switches **S1** and **S2** together until the **LED** illuminates continuously, after about two seconds. Then release both switches.

4 You are now in **Step 4 – Program Reset Bounce Level**.
The **LED** will flash with **single long** followed by **single short** flashes.

In programming step 4, the servo will rotate continuously between the programmed **Reset** position and the position represented by current Reset Bounce level, at the programmed rotation speed.

There are sixteen steps of bounce level, varying from zero to approximately 20% of the programmed servo range between **Set** and **Reset**. Press and release **S2** to increase the bounce level by one step, or press and release **S1** to decrease it.

After the last step, the bounce level will revert to the other end of the setting range. To disable bounce, set the bounce level to zero.

When satisfied, press and hold both switches **S1** and **S2** together until the **LED** illuminates continuously, after about two seconds. Then release both switches.

5 You are now in **Step 5 – Program Set Bounce Level**.
The **LED** will flash with **single long** followed by **double short** flashes.

In programming step 5, the servo will rotate continuously between the programmed **Set** position and the position represented by current Set Bounce level, at the programmed rotation speed.

There are sixteen steps of bounce level, varying from zero to approximately 20% of the programmed servo range between **Set** and **Reset**. Press and release **S2** to increase the bounce level by one step, or press and release **S1** to decrease it.

After the last step, the bounce level will revert to the other end of the setting range. To disable bounce, set the bounce level to zero.

When satisfied, press and hold both switches **S1** and **S2** together until the **LED** illuminates continuously, after about two seconds. Then release both switches.

6 At this point **only**, programming is complete. All new settings will now be saved in non-volatile memory, and applied to ***SCS4*** operation. The unit will then automatically exit programming mode, the **LED** will extinguish and the ***SCS4*** is ready for normal operation.

Programming - Trigger Delay

You may optionally program a trigger delay of between zero and 25 seconds. This is a fixed period for which the unit will wait, after it has been triggered, before servo rotation is initiated.

This function is primarily intended to be used on layouts where the ***SCS4*** is used to operate an signal automatically, triggered by a track mounted reed switch and a vehicle operated magnet, and where the signal is required to change only after the vehicle has progressed a short way past the signal trigger point.

Re-programming of the trigger delay may be performed at any time and the last set value is retained in non-volatile memory until changed by the user.

As supplied from the factory, all ***SCS4*** units are pre-programmed with a Trigger Delay of **zero**.

Programming Procedure - Trigger Delay

Programming of the trigger delay can only be performed at power up, by following the procedure below. The delay period may be set anywhere within the range zero to 25 seconds in 0.1 second increments.

1 **Ensure that the SCS4 is unpowered**.

2 Press and hold both switches **S1** and **S2**.

3 Then apply power to the ***SCS4***. Immediately, the **LED** will start flashing rapidly.

4 Start timing the required trigger delay period as soon as the **LED** starts flashing.

5 At the end of the required trigger delay period, release both switches **S1** and **S2**.

6 The programmed period will be automatically saved to non-volatile memory, and the unit will revert to normal operation, with the newly programmed trigger delay period operational.

Cautionary Notes

1 The current consumption of a servo, when in motion, increases with the rotation speed. At high rotation speeds, the current on a single standard servo can reach as much as 500 mA.

Most small batteries [eg AA cells] used by many modellers to power servos can not supply this level of current without a very significant voltage drop, in the order of one or two volts, at the battery terminals. With 4.8V supplies, or with partially discharged batteries, this may well result in erratic servo operation if the battery terminal voltage falls below the minimum specified servo operating voltage.

If you experience such erratic operation, either reduce the servo rotation speed or improve your power supply arrangements before assuming that the ***SCS4*** is faulty and returning it for repair

2 Although the rotation speed of the ***SCS4*** can be programmed to a maximum speed of 0.25 seconds for 90 degree rotation, many servos can not achieve this speed.

If you program a rotation speed higher than the servo can actually achieve the servo will not be able to keep up with the programmed output of the ***SCS4*** when moving between **Set** and **Reset**, and vice versa.

If this occurs, and you have bounce levels programmed, the actual bounce levels achieved in normal operation may vary considerably from those programmed, or even be lost completely. This problem is likely to be more apparent if you have programmed a large angle of rotation between **Set** and **Reset**.

If this happens, reduce the programmed rotation speed until the effect is corrected, or change the servo for one with a higher maximum rotation speed.

For the ***ACOMS AS17*** servo, supplied by ***Timpdon Electronics***, the maximum specified rotation speed is approximately 0.35 s for 90 degree rotation at 5V.