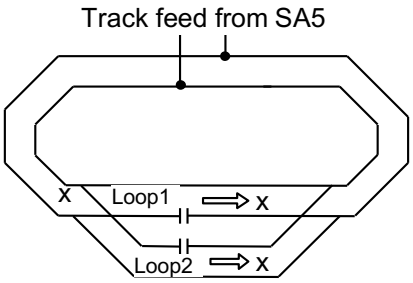
## INSTRUCTIONS FOR THE SA5 AND SA5-S

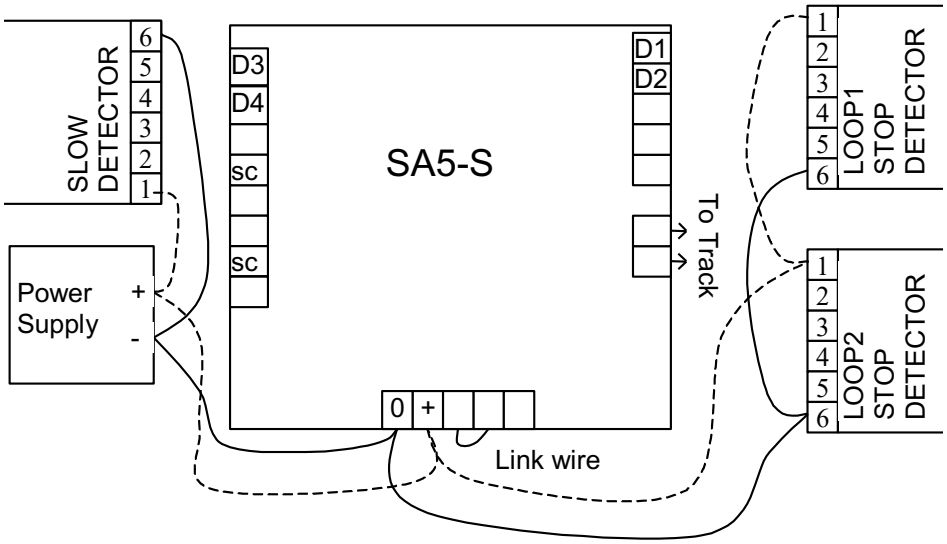
The SA5 operates the points signals and train speeds for the loop. Operation can begin with either a train in each loop or a train in one loop and the other loop empty.

A start slowing train detector is required at the approach to the loop and a stop train detector is required to detect the front of the train at its stopping position at the end of each loop.




### POWER CONNECTIONS

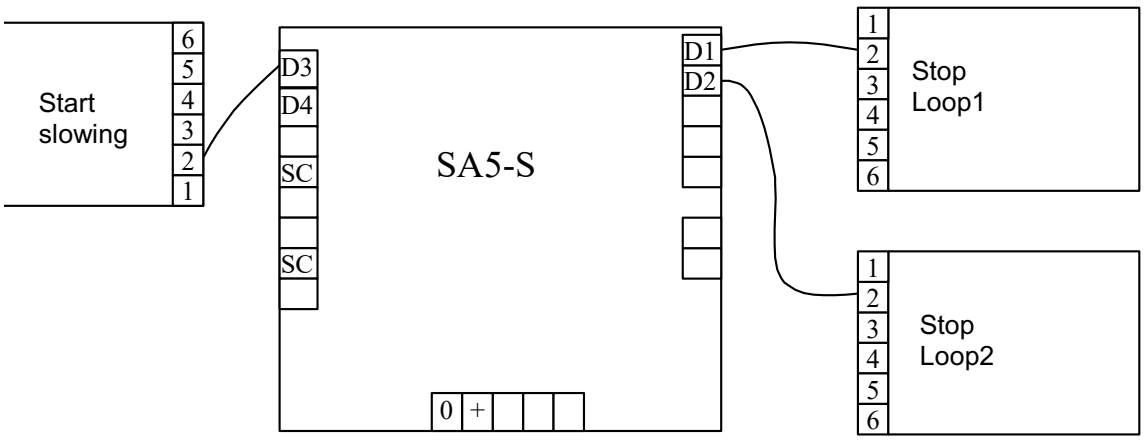
For a 12 volt DC supply connect the supply positive to the "+" and supply negative to the "o" terminals of the SA5. When the power is switched on the red LED will light on the SA5-S followed a few seconds later by the green. The link wire (to the right of the "+" terminal) is left in place for 12 volt DC operation. Wire the two right hand terminals of the SA5-S to the track and place an engine on the track. Initially set the "max" speed adjustment midway (see adjustments). When the green LED lights the train will accelerate to the maximum speed setting. The two wires to the track set the direction the train moves. Reverse these if the train is travelling in the wrong direction. Adjust the maximum speed to the desired setting.




The first diagram shows the track wiring for electro frog points. Power is fed to the track so that trains are isolated by the points setting.

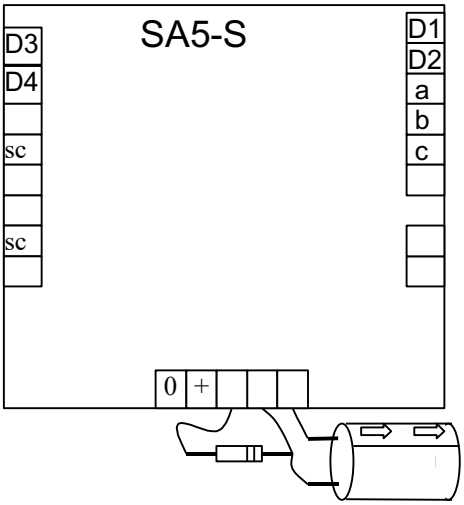
The IRDOT-1s are wired to the power supply as shown in the diagram above. Connect the terminal 1s to positive and the terminal 6s to negative. Now check that each IRDOT-1 is working correctly. The LED supplied fitted to the IRDOT-1 should light when your hand moves over the IRDOTs infra red sensors. If the LED does not light recheck the power wiring. If the LED is permanently lit check for infra red reflections off sleepers etc.

**TRAIN DETECTORS:** Wire from terminal 2 of the slow down train detector to terminal D3 of the SA5-S. Wire from




terminal 2 of the loop 1 IRDOT to D1. Wire from terminal 2 of the loop 2 IRDOT to terminal D2.

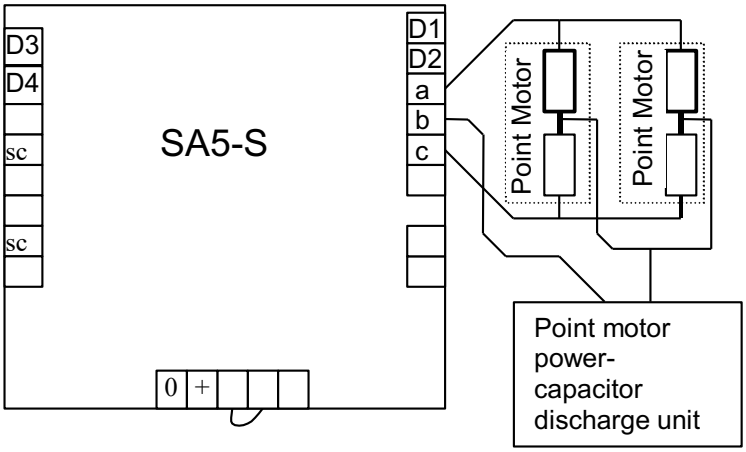
Reed switches can be used instead of IRDOT-1 train detectors. Wire one end of every reed switch to the "o" terminal. . Wire the other end of the reed switch as described for terminal 2 of the IRDOT. To gain familiarity with the SA5 it can be tested without the train detectors: Connect a piece of wire to the "o" terminal. Touch the end of the wire to D3. This simulates a train being detected approaching the passing loops. The red LED will light and the train slow. The minimum speed can now be adjusted. Now touch the piece of wire to the "D1" terminal. This simulates the detector at




the end of the first passing loop. The train will stop and the red and green lights flash alternatively then the train will accelerate away. On the second lap, D3 will again slow the train but D2 will halt it, as the points would now have set for the second loop. Check the IRDOT-1s are wired correctly by placing your hand over the detectors in the same order. Note that the detectors must operate in the correct sequence. A train must operate D3 before it can be stopped by D1 or D2.

**POINT MOTORS:**

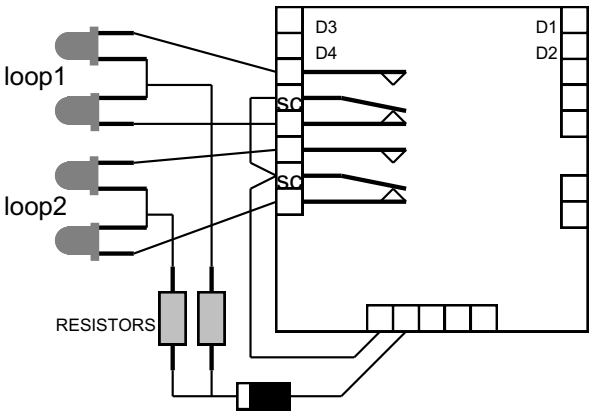
The SA5-S has two relays for switching the point motors. These are best thought of as automatically operated switches. The contacts are normally open. They close for a second then reopen. Both points are operated together. The wiring is the same as using a manual switch. Either a capacitor discharge unit or a transformer is used to power the point motors in the normal way. Repeat the test with the wire to check that the points are switching correctly.




**SIGNALS**

Relays on the SA board switch the signals. These contacts are not electrically connected to the rest of the SA board. Wiring a signal to the SA board is identical to wiring to a change over switch.

The signals can use the same power as the SA5-S or a separate supply. The diagram shows wiring common positive LED signals using the SA5-S supply. The diode is only required if an AC supply is used. A resistor (usually supplied with the signal) is used with each signal to limit the current through the LEDs. Bulb signals can also be used.




The internal relay contacts are shown as thick lines. "sc" is the common to which one wire of the signals power connects. This is switched to one of the adjacent terminals by the SA5-S to light either the red or green. To give a realistic effect there is a short pause between the points changing and the signal changing to green then another delay before the train moves away.

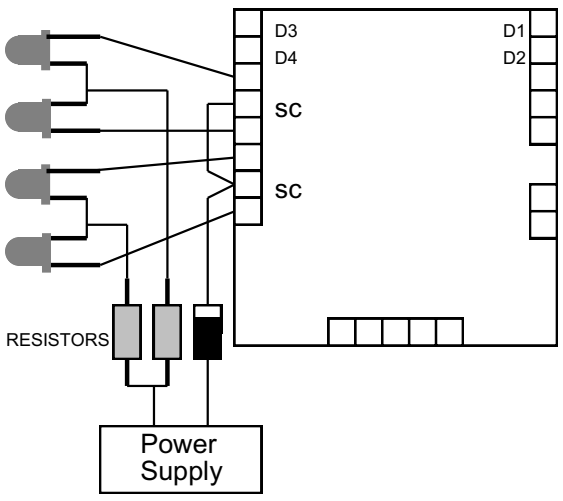
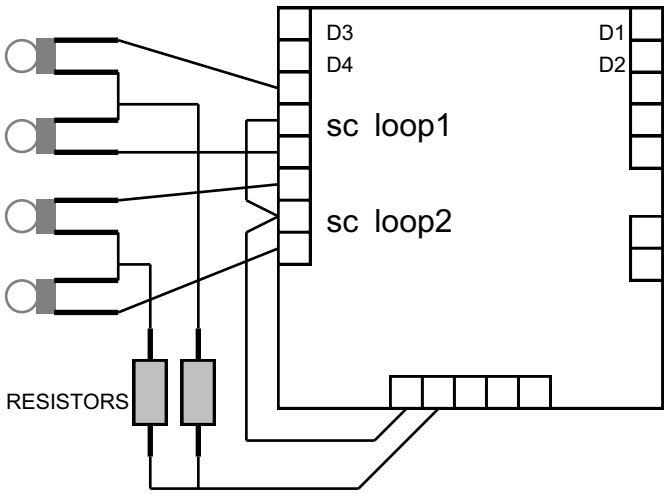



Diagram on left shows common negative signals powered from a separate supply. Diode is only necessary if the supply is AC.

Diagram on right shows bulb signals. Use of resitors depends on voltage of bulbs and voltage of power supply.




**POWERING FROM 16 VOLTS AC:** The SA5-SB and IRDOTs can be powered from 16 volts AC. This requires the link wire to be replaced by a diode. The band on the diode must be in the direction shown.. If AC is used the output at the track will be half wave rectified DC. If a 12-volt DC supply is used the output at the track will be pure DC. The capacitor can be used. This will smooth the DC. The side of the capacitor with the minus signs and arrows must connect to the terminal shown.

**ADDING A CONTROLLER:** A controller can be connected into the SA board. The controller will set the maximum speed but the SA board will still slow and stop the train. Away from the passing loop the controller will control the engines speed and direction. Either 12 volts DC or 16 volts AC is still required to power the SA board this must be from a separate transformer to the controllers. Feedback controllers will not work with the SA board. The link wire is removed and the controller wired int the two bottom right hand terminals. The reason for adding a controller in this way is that part of the track is automated, the rest is under manual control and the engine is able to smoothly cross between the two control systems.

**PARTIAL AUTOMATION:** If it is required to be able to change between automatic control (using the SA boards) and manual controls some suggestions are:

A double pole switch in the wiring to the track can select between connecting either the SA board or a controller to the track.

The points can have normal switching in parallel with the SA relay contacts. To stop the SA switching the points insert a switch to cut off the power supply to the SA board. The "over ride/interlock" terminal can also be connected to a switch causing the train to slow and stop. After the train has stopped, the double pole switch can be used to connect a controller to the track for shunting. On completion the switches are opened and the automatic operation restarts.

**ADJUSTMENTS**

All the SA units have gradual acceleration and braking built in. Each board has the following screwdriver adjustments:

DELAY TIME: This adjusts the length of time between trains arriving and departing.

MAXIMUM SPEED: This adjusts the fastest speed the train reaches after accelerating.

MINIMUM SPEED: The minimum speed setting is provided so that the train will stop at exactly the right place. When the train slows, it slows to the minimum speed setting not to a stop. This allows it to continue moving slowly until it is detected at the stopping position. Power is then switched off the track by the SA board.

ACCELERATION/BRAKING: This adjusts the rate at which speed increases or decreases. The length of track over which this happens can be from a few inches to approx.10 foot. Turn this setting clockwise to act abruptly whilst the minimum and maximum speeds are adjusted. Otherwise you may be adjusting them whilst the train is still accelerating or braking.

**LED INDICATIONS**

The SA boards have a red and a green LED. These show what the SA board is doing.

**RED LED lit:** train is braking or travelling at minimum speed.

**GREEN LED lit:** train is accelerating or travelling at maximum speed.

**RED and GREEN LED's FLASHING ALTERNATIVELY:** the SA board is timing the adjustable delay between one train arriving and another departing or a train waiting at the station. The longer the flashes the longer the delay.

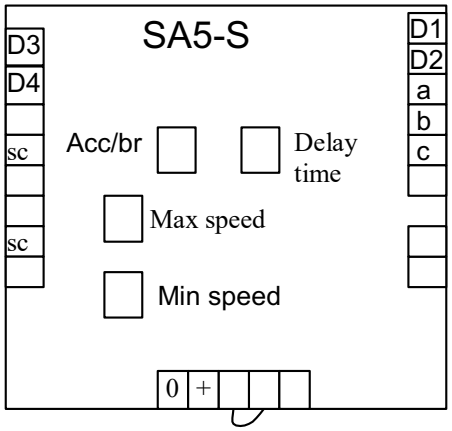
**RED AND GREEN LED's BOTH LIT:** There is an overload on the track caused by a derailment or short circuit. Current is automatically cut off from the track until the short circuit is removed. This safety feature protects both the SA board and the locomotive from damage.

### SETTING UP THE TRAIN SPEEDS

There must either be trains on both loops or a train on either one of the loops when first powering up the SA5-SB. If both loops have trains on them then the sequence will start with one of the trains departing. If only one loop has a train then this train will not depart until a train arrives at the other loop.

Turn the Acc/br to abrupt. Turn Min speed to MIN. Whilst the green LED is lit adjust the max speed to the desired setting. As the train approaches it will very rapidly stop as the red LED lights. Turn up Min until the train just moves. Now Acc/br can be adjusted to give a gradual stop.

More fault finding information is contained in our Catalogue/Manual.




## Non Stop Trains

"D4" is the non stop terminal. After this terminal has been connected to 0volts the next train will be a non stop train. The connection may be made to the SA6 (storage siding controller) so that certain sidings hold non stop trains or to a switch which connects D4 to the 0 terminal, or a reed switch may be connected between "D4" and "0" . Non stop trains are fitted with a magnet to activate the reed switch.

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