

BARRIER LOGIC WITH LOOP DETECTOR

MODEL - BL103B



The BL103B combines the features of a loop detector and barrier logic into a single unit. The unit has been developed to control barriers using BLDC motors with ease of installation and without the need for a separate loop detector.

APPLICATIONS

Typical applications are the control of barriers/booms in the parking and access control environments.

FEATURES - LOGIC

SELECTABLE MEMORY/NON MEMORY INPUT

The memory input feature will allow opening inputs to be memorized. This will then enable a number of vehicles to pass over the closing loop before the barrier lower output is enabled. The purpose of this feature is to enable vehicles to pass the barrier without opening and closing for each vehicle and hence allowing rapid entry or exit of vehicles.

AUTOMATIC/MANUAL MODE

This mode allows the barrier to be manually operated for maintenance purposes using the toggle switch mounted on front of the unit.

BARRIER RAISE/LOWER OUTPUTS

These outputs are used to control the BLDC controller which raises or lowers the barrier.

TICKET VEND INTERLOCK OUTPUT

This output is used to prevent tickets from being issued when the barrier is in the raised position.

TIME OUT IF VEHICLE REVERSES OUT

(Auto Close) On some occasions a vehicle may raise the barrier and then reverse out. In this situation the logic will time-out (switch selectable) and automatically lower the barrier.

ROLL-BACK PROTECTION

After a vehicle has passed the closing loop and the barrier is closing, it is possible for the vehicle to roll backwards under the closing barrier. In this situation the logic will raise the barrier again until the vehicle moves forward off the closing loop.

AUTOMATIC CLOSING FROM LOOP DETECTOR OUTPUT

The loop detector is connected internally to the logic and is used to close the barrier when the vehicle has passed over the loop. The detector can be disabled using the switch settings if a loop is not required. In this case an external beam can be used as the safety device.

TOGGLE INPUT

The barrier can be raised and lowered from a remote pushbutton or radio receiver contact by using the toggle input. Dip switch used to enable or disable auto close.

FACILITY FOR EXTRA LOOP DETECTOR FOR OPENING INPUT INTERLOCK

An arming loop detector may be used to prevent the barrier from being raised when there is no vehicle present at the ticket issuing machine. This is done by placing a loop in front of the barrier and a vehicle must be present on this loop to allow opening of the barrier.

FACILITY FOR FREE EXIT LOOP DETECTOR

Another loop detector may be placed after the barrier and used to raise the barrier as a free exit option. This feature is normally used in a bi-directional lane.

MOTOR POWER

When the motor is stopped, the logic can be configured to switch OFF power to the motor or the logic can apply a small amount of power to the motor to keep it in the stop position.

LEARN MODE

This feature is used to enable the logic to learn the travel time of the barrier. If the closing barrier hits an obstacle before it is closed, then it will automatically open again.

FEATURES - LOOP DETECTOR

SWITCH SELECTABLE SENSITIVITY

The detect sensitivity is the minimum change in inductance required to produce a detect output. (% Δ L/L). Four sensitivity settings are available on the switches to allow flexibility in configuration.

SENSITIVITY BOOST

This feature sets the undetect level to maximum sensitivity and is used to prevent loss of detection of high-bed vehicles.

SWITCH SELECTABLE FREQUENCY

Two frequency settings are available to prevent cross-talk between adjacent loops.

DETECTOR ON/OFF

This feature enables or disables the units internal loop detector.

INDICATORS

POWER INDICATOR

This LED Indicator illuminates when power is present.

BARRIER RAISE INDICATOR

This LED also has the following functions:

1. STEADY ON

The main function of this LED is to illuminate when the barrier output relay is switched on to raise the barrier.

2. FAST FLASH

This LED will flash fast when the MI/NMI raise input is activated. The purpose is for diagnostics to test the input circuit.

3. SLOW FLASH

This LED will flash slowly when the Beam input is activated. The purpose is for diagnostics to test the input circuit.

DETECT INDICATOR

This LED Indicator is illuminated when there is a vehicle over the loop or the loop is faulty. This LED can also be used to determine the loop frequency. On reset, count the number of times the LED flashes. Multiply this number by 10KHz. For example: if the LED flashes 6 times, then the loop frequency is between 60KHz and 70KHz.

TECHNICAL SPECIFICATIONS

POWER SUPPLY	12VDC
NMI/MI INPUT	This input may be activated by a potential free relay contact or open collector NPN transistor output.
BEAM INPUT	This input may be activated by a potential free relay contact or open collector NPN transistor output. This input is used to keep the barrier open when a vehicle has broken the beam.
TACHO INPUT	This input is used to monitor when the motor has stopped. It is also used to reverse the motor if the barrier hits an object when lowering.
RAISE OUTPUT	This output is a transistor output rated at 100mA/35VDC.
SPEED OUTPUT	This is a voltage output which is used to control the speed of the motor.
TVI OUTPUT	This output is a transistor output rated at 100mA/35VDC.
INDICATORS	LED indicators show: Power, Barrier Raised and Loop Detector.
DETECTOR TUNING RANGE	15 - 1500uH
LOOP FREQUENCY	Approx. 23 - 130KHz
ENVIRONMENTAL TRACKING	Automatic Compensation
PROTECTION	Loop isolation transformer with zener diodes and gas discharge tube.
CONNECTOR	11 Pin Connector on rear of unit.
DIMENSIONS	80mm (height) x 40mm (width) x 79mm (depth excl. connector).
OPERATING TEMPERATURE	-40°C to +70°C
STORAGE TEMPERATURE	-40°C to +80°C

SWITCH SETTINGS

SWITCH NO.	FUNCTION	ON	OFF
10	LEARN MODE	ON	OFF
9	LOW POWER	OFF	ON
8	LOOP DETECTOR DISABLE/ENABLE	OFF	ON
6,7	SENSITIVITY 0.02%	-	S6/S7
6,7	SENSITIVITY 0.05%	S7	S6
6,7	SENSITIVITY 0.1%	S6	S7
6,7	SENSITIVITY 0.5%	S6/S7	-
5	ASB	ON	OFF
4	INPUT MODE	ON	OFF
3	MI/NMI INPUT SELECT OR TOGGLE MODE SELECT	TOGGLE	NORMAL
2	AUTO CLOSE TIME	NONE	20 SEC
1	FREQUENCY	LOW	HIGH

SWITCH SETTING DESCRIPTIONS

SWITCH 1 – FREQUENCY

This switch is used to change the frequency of the loop detector. It is mainly used to prevent crosstalk if there is interference from another loop detector.

SWITCH 2 – AUTO CLOSE TIME

If the switch is in the OFF position, then once the barrier is raised, it will automatically close after 20 seconds. The barrier will not close if there is a vehicle on the loop. When this switch is in the ON position then the auto close is disabled.

SWITCH 3 - NORMAL / TOGGLE

The Raise input on Terminal 7 can be used as an MI/NMI input or as a toggle input. Refer to switch 4 for operation modes.

SWITCH 4 - MI/NMI INPUT SELECT OR TOGGLE MODE SELECT

This switch is used for two functions depending if Switch 3 is ON or OFF.

- **SWITCH 3 OFF (NORMAL OPERATION)**

In the normal mode the raise input is activated to raise the barrier and the beam/loop is used to close the barrier.

- IF SWITCH 4 IS IN THE ON POSITION (MI – MEMORY INPUT)**

- Then each time the raise input is activated an internal counter will be incremented. This same counter will be decremented when the vehicle leaves the loop. The idea is to prevent the barrier from closing between vehicles to speed up the rate at which vehicles can for example leave a parking area.

- IF SWITCH 4 IS IN THE OFF POSITION, (NMI – NON MEMORY INPUT)**

- Then the raise input will not count the vehicles and the barrier will close between every vehicle.

- **SWITCH 3 ON (TOGGLE OPERATION)**

The toggle input is used to open and close the barrier. An example would be with a remote transmitter.

The input is activated to open the barrier, and must be activated again to close the barrier.

- IF SWITCH 4 IS IN THE OFF POSITION**

- Then after a toggle input, if a vehicle travels over the loop the barrier will automatically close and not wait for the second toggle input to close.

- IF SWITCH 4 IS IN THE ON POSITION**

- Then after a toggle input, if a vehicle travels over the loop the barrier will not automatically close and the second toggle input is required to close the barrier.

SWITCH 5 – ASB

This is the automatic sensitivity boost switch for the loop detector.

- If the switch is in the OFF position then the undetect sensitivity level will be half of the detect sensitivity level.
- If the switch is in the ON position then the undetect sensitivity level will set to maximum sensitivity.
- This feature is normally used to boost the sensitivity when the loop is being used with high bed vehicles to prevent the loop detector from undetecting when the rear of the vehicle is still over the loop.

SWITCH 6/7 – LOOP DETECTOR SENSITIVITY

These switches are used to set the loop detector sensitivity. The smaller the number the more sensitive the loop, so 0.02% is high and 0.5% is low.

SWITCH 8 - LOOP DETECTOR DISABLE/ENABLE

When this switch is in the OFF position the internal loop detector will be in operation. If the switch is in the ON position then the loop detector is disabled. The main use of this switch is to disable the loop detector if there is no loop being used in the installation. In this case the beam could be used as the safety device.

SWITCH 9 – LOW POWER (MOTOR STOPPED)

When the motor is stopped, the logic can be configured to switch OFF power to the motor or the logic can apply a small amount of power to the motor to keep it in the stopped position.

SWITCH 10 – LEARN MODE

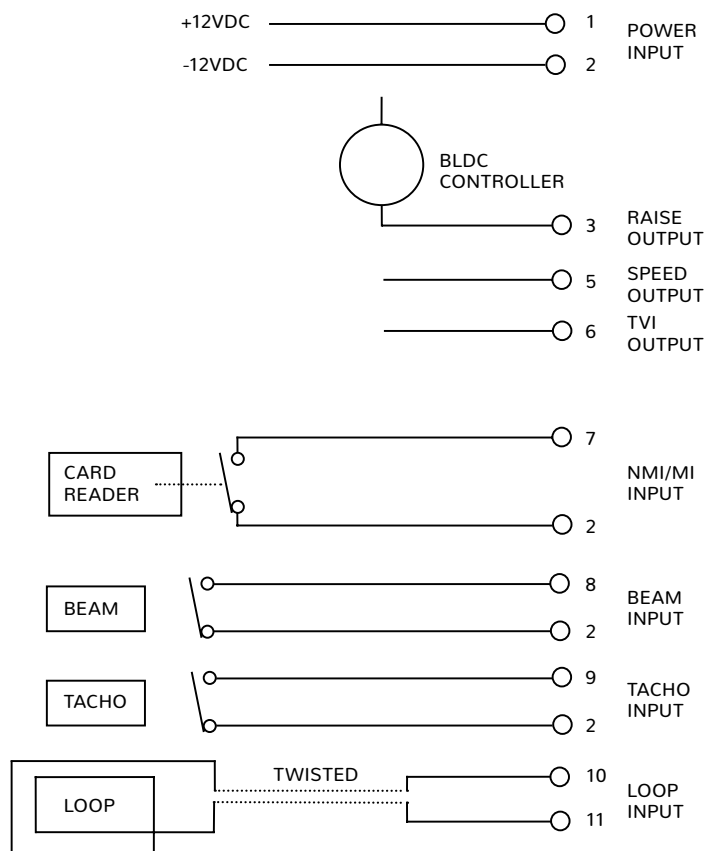
Switch ON SW10 for 5 seconds until the barrier starts opening. Then switch it OFF. The barrier will open and close a couple of times to learn the travel time. This is used to reverse the barrier if it hits an obstacle when closing. This only has to be done once on commissioning.

DIAGNOSTICS

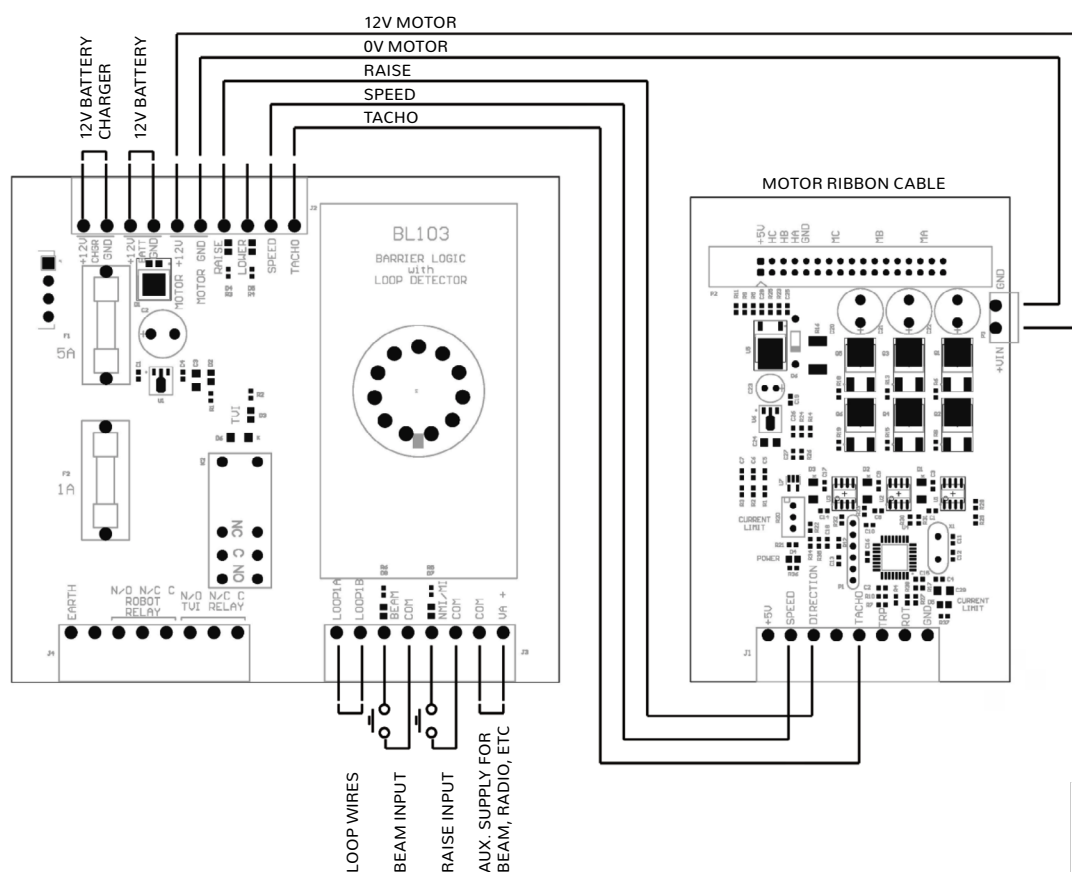
SYMPTOM	POSSIBLE CAUSE	SOLUTION
The POWER LED is not on	No power supply voltage on the input.	Check that the power supply is correctly wired to the detector. (PINS 1 and 2)
The DETECT LED flashes erratically	There may be a poor connection in the loop or loop feeder. The detector may be experiencing crosstalk with the loop of an adjacent detector.	Check all wiring. Tighten screw terminals. Check for broken wires. Try changing frequencies using the frequency switch. Put the detector with the larger loop onto low frequency and the detector with the smaller loop onto high frequency.
The DETECT LED randomly stays on	Faulty loop or loop feeder wiring. Movement of the loop in the ground.	Check the wiring. Tighten screw terminals. Check for pinched or bent wires. Is the feeder wire twisted? Check for cracks in the road surface near the loop.
The DETECT LED is permanently illuminated with no vehicle present on the loop	The loop inductance is too small or the loop is short circuit. The loop inductance is too large or the loop is open circuit.	Check that there is no short circuit on the loop feeder wiring or the loop. If there is no short circuit then the inductance is too small and more turns of wire should be added to the loop. Check that there is electrical continuity on the loop. This can be done using a multimeter on the ohms range ($< 5 \Omega$). If the loop inductance is too large then try reducing the number of turns.

WIRING DIAGRAMS

STANDARD CONFIGURATION

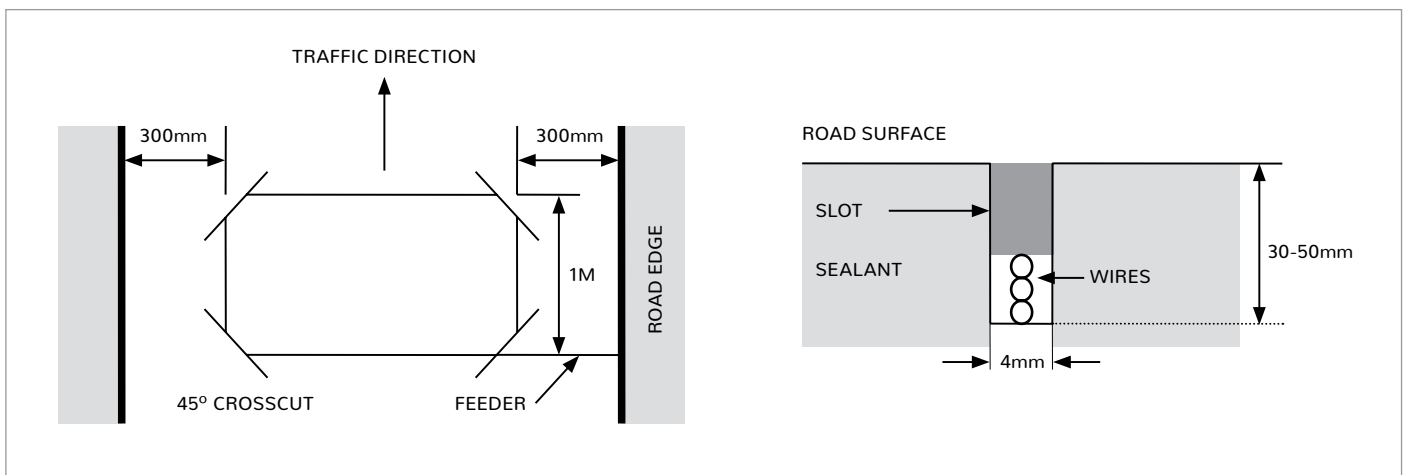


MOTHERBOARD AND BLDC MOTOR CONTROLLER



LOOP INSTALLATION GUIDE

1. The barrier logic should be installed in a waterproof housing as close to the loop as possible.
2. The loop and feeder should be made from insulated copper wire with a minimum cross-sectional area of 1.5mm^2 . The feeder should be twisted with at least 20 turns per metre. Joints in the wire are not recommended and must be soldered and made waterproof. Faulty joints could lead to incorrect operation of the detector. Feeders which may pick up electrical noise should use screened cable, with the screen earthed at the detector.
3. The loop should be either square or rectangular in shape with a minimum distance of 1 metre between opposite sides. Normally 3 turns of wire are used in the loop. Large loops with a circumference of greater than 10 metres should use 2 turns while small loops with a circumference of less than 6 metres should use 4 turns. When two loops are used in close proximity to each other it is recommended that 3 turns are used in one and 4 turns in the other to prevent cross-talk.
4. Cross-talk is a term used to describe the interference between two adjacent loops. To avoid incorrect operation of the detector, the loops should be at least 2 metres apart and on different frequency settings.
5. For loop installation, slots should be cut in the road using a masonry cutting tool. A 45° cut should be made across the corners to prevent damage to the wire on the corners. The slot should be about 4mm wide and 30mm to 50mm deep. Remember to extend the slot from one of the corners to the road-side to accommodate the feeder.
6. Best results are obtained when a single length of wire is used with no joints. This may be achieved by running the wire from the detector to the loop, around the loop for 3 turns and then back to the detector. The feeder portion of the wire is then twisted. Remember that twisting the feeder will shorten its length, so ensure a long enough feeder wire is used.
7. After the loop and feeder wires have been placed in the slot, the slot is filled with epoxy compound or bitumen filler.



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