

# TURNSTAR



RELIABLE ★ DURABLE ★ GUARANTEED

## PRODUCT MANUAL



## TRIBUNE TURNSTILE

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## **1. COPYRIGHT & LIABILITY**

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## **2. INTRODUCTION**

### **2.1 About this manual**

This manual is specifically compiled to train and refer the technical staff of TURNSTAR to assemble, test and fault find the specific product this is directed at. The manual will discuss features of the product for the reader to gain an understanding of the operation and maintenance required.

### **2.2 About technical standards**

Turnstar strives for repeatable quality instilled in its product range and to achieve this, there is an agreed standard for manufacturing, assembly and testing. For more information on these standards, refer to the TURNSTAR Technical Standards documentation.

### **2.3 Symbols and Terms used in this manual**

There are a few symbols used in this manual that the reader should understand. These will help to point out important notes, warnings and guidelines to the technician and assembler.

There are some important terms to take note of which will be used in this manual.

	<p>1. ELECTRICAL HAZARD – Risk of electrical shock due to high voltage. Proceed with care.</p>
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	<p>2. RISK OF INJURY – Risk of injury possible. Proceed with care.</p>
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	<p>3. TAKE NOTE – An important note to consider.</p>
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4. SUPPLEMENTAL DOCUMENT – More information is contained in a supplemental document, with document number included, if available. Revision placeholder is marked as XX.

## 2.4 Employees Responsibility

The employee must accept to undergo fitness tests to carry out the tasks set forth in this manual. The employee will agree to use this manual as the standard to which work on the product is carried out.

## 2.5 Fasteners tightening

All bolts and cap screws will be tightened to a 'snug tight' fit, which is defined at TURNSTAR as full contact between faces, plus a quarter turn. This will apply to all fasteners except when explicitly stated otherwise.

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## **3. OVERVIEW**

### **3.1 About the Tribune**

The TRIBUNE is a bi-directional single reader turnstile, which is also referred to as a 'mantrap' turnstile. The term is identified by the fact that a pedestrian gets trapped on 90 degree rotation and needs to provide valid identification in the trapped position, to be allowed through. If the identification is invalid, the pedestrian will not be allowed through and can only return to the area of entry.

The identification is typically a biometric reader.

The TRIBUNE is only available in a single 4-arm configuration.

Typical applications and places of use include Factories, warehouses, stadiums, universities, prisons, cash & carries, factories/warehouses toilets and any application requiring a high level of security and strict controls for time & attendance.

### **3.2 The Mechanism**

The TRIBUNE mechanism is a TURNSTAR ROTALOK® 4-ARM mechanism, with added limit switches installed behind the pawls and 3 limit switches installed on the top plate with two cams for the limit switches, a four arm micro cam and a TRIBUNE micro cam.

See section XXXX for more detail on the function of the mechanism and turnstile.

### **3.3 Key features**

- The Biometric reader cannot be reached from outside the turnstile. The TRIBUNE Rotor arms are spaced apart 50mm apart on the top section, and the arms are made from 51.8mm diameter tube. The small spacing ensures that a person's hand cannot reach through.
- The vertical screen tubes are also spaced 50mm apart, preventing access to the reader from the outside.
- The reader is housed in a box which is 300mm deep.
- The reader box partially protects the reader from the elements such as rain. However, it is still recommend that a roof be installed over the turnstile if the reader is not designed for outdoor use. The reader box also removes the reader from full view, thereby decreasing the chances that the reader may be damaged by vandals.
- Once inside the turnstile it impossible to activate the reader and then climb out of the turnstile as a cage (see figure below) is welded to the top channel of the turnstile. The cage can also be replaced with a flat roof canopy – this must be specified prior to manufacture.
- Two of the four quadrants are blocked and cannot be used for transactions (see figure below).

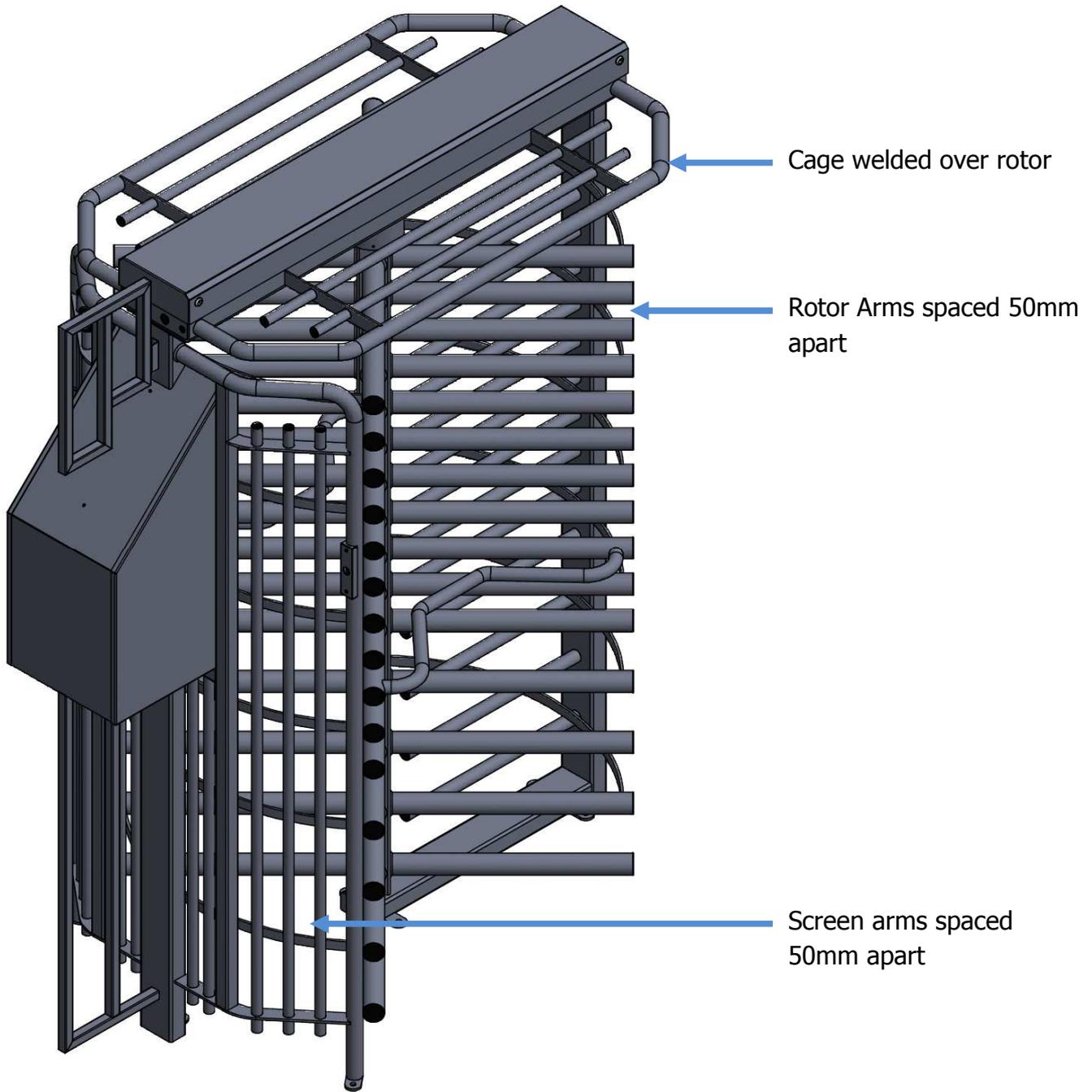


Figure 3.1: Isometric View of TRIBUNE

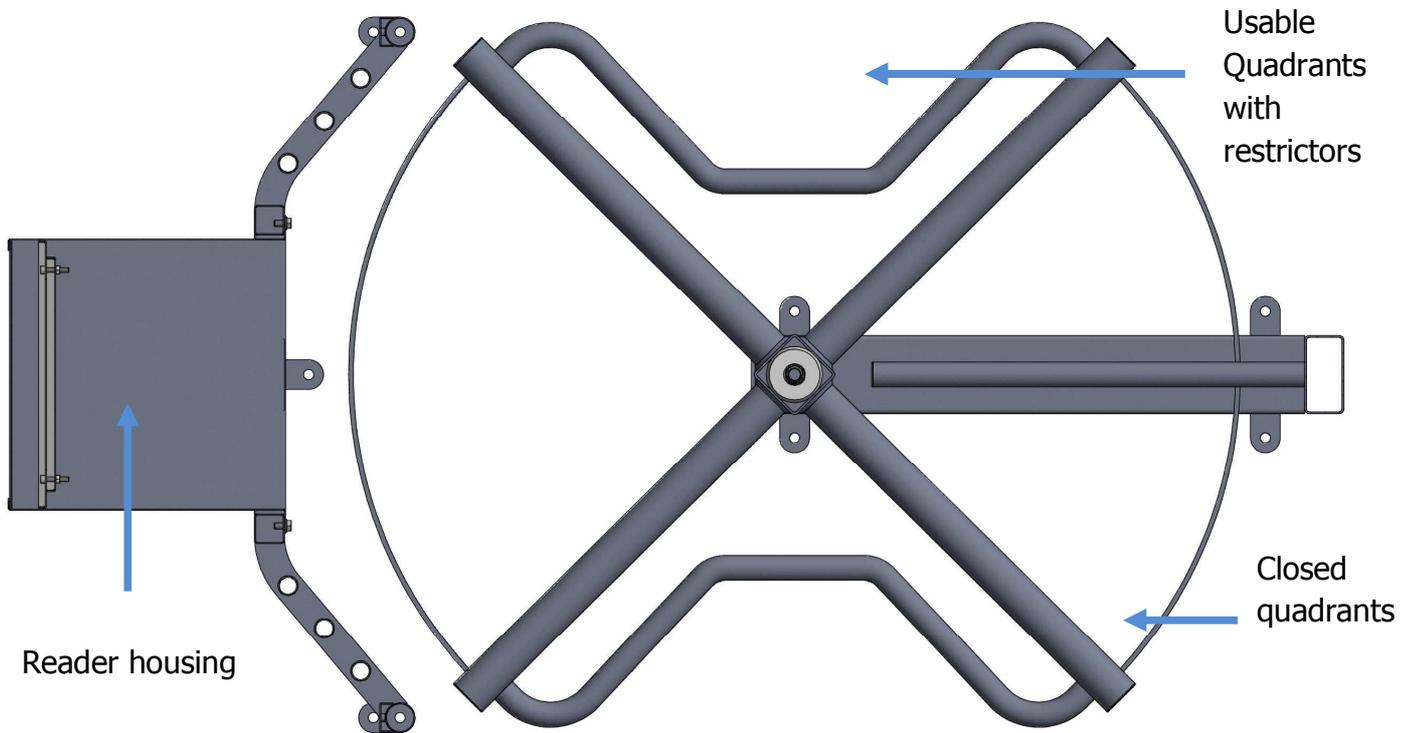


Figure 3.2: Section over Reader Housing, Rotor shown in open position

- Restrictor tubes welded on the rotor arms, waist high, increase the level of security for the Turnstile, making it difficult for more than one person to enter pass through.

The TRIBUNE requires a trigger, either a reader or a pushbutton from the outside to start the cycle.

In order to benefit from all the features of the TRIBUNE, the reader must be correctly integrated with the turnstile. The biometric/fingerprint reader is to be configured to remain inactive/off until the person is in the trapped position. If the reader is active during rotation, then a person can activate the reader and then simulate rotation, thereby removing the '100% validated access' feature.

When the turnstile is in the trapped position, a relay closes on the printed circuit board of the turnstile and the access control system can use that signal to activate the reader. Most biometric/fingerprint readers have a long start-up time and are not designed to be continuously switched on and off.

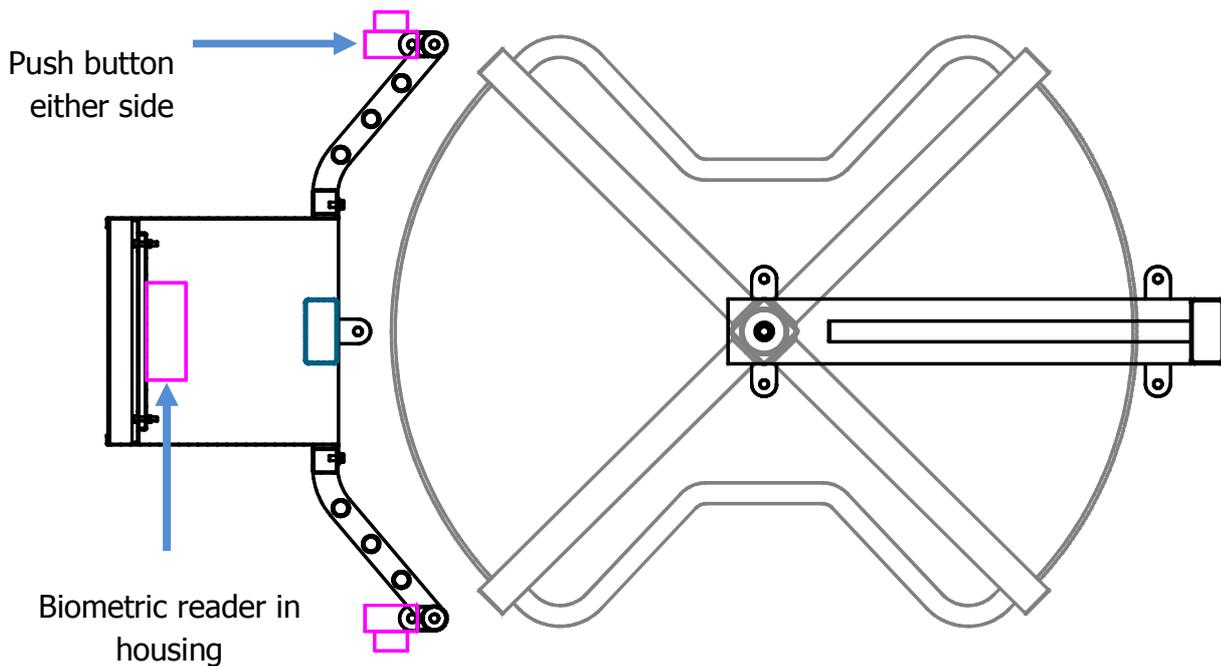


Figure 3.3: Typical set up

### 3.4 Operation

The TRIBUNE has two usable quadrants only. This prohibits a person from gaining free passage by following valid pedestrians through the rotation cycle. Having two quadrants accessible makes the TRIBUNE a 180 degree cycle Turnstile. This means at first trigger (this is typically a pushbutton mounted both sides), the pedestrian enters the Turnstile and the rotor locks after a 90 degree turn. The pedestrian needs to provide biometric validation and when validated, the Turnstile rotor turns another 90 degrees to allow the pedestrian out. This is defined as a 180 degree cycle.

See Figure 3.4 for detail on operation.

- 1) Step 1: A pedestrian triggers the pushbutton on either side of the TRIBUNE, mounted on the screen.
- 2) Step 2: The pedestrian enters the Turnstile and the rotor locks in 90 degree position, activating the Biometric reader. The pedestrian presents his/her fingerprint to the reader.
- 3) Step 3A: The Biometric reader validates the pedestrian and allows him/her through.
- 4) Step 3B: (Option) The Biometric reader fails the validation and the pedestrian has to return to the original area.

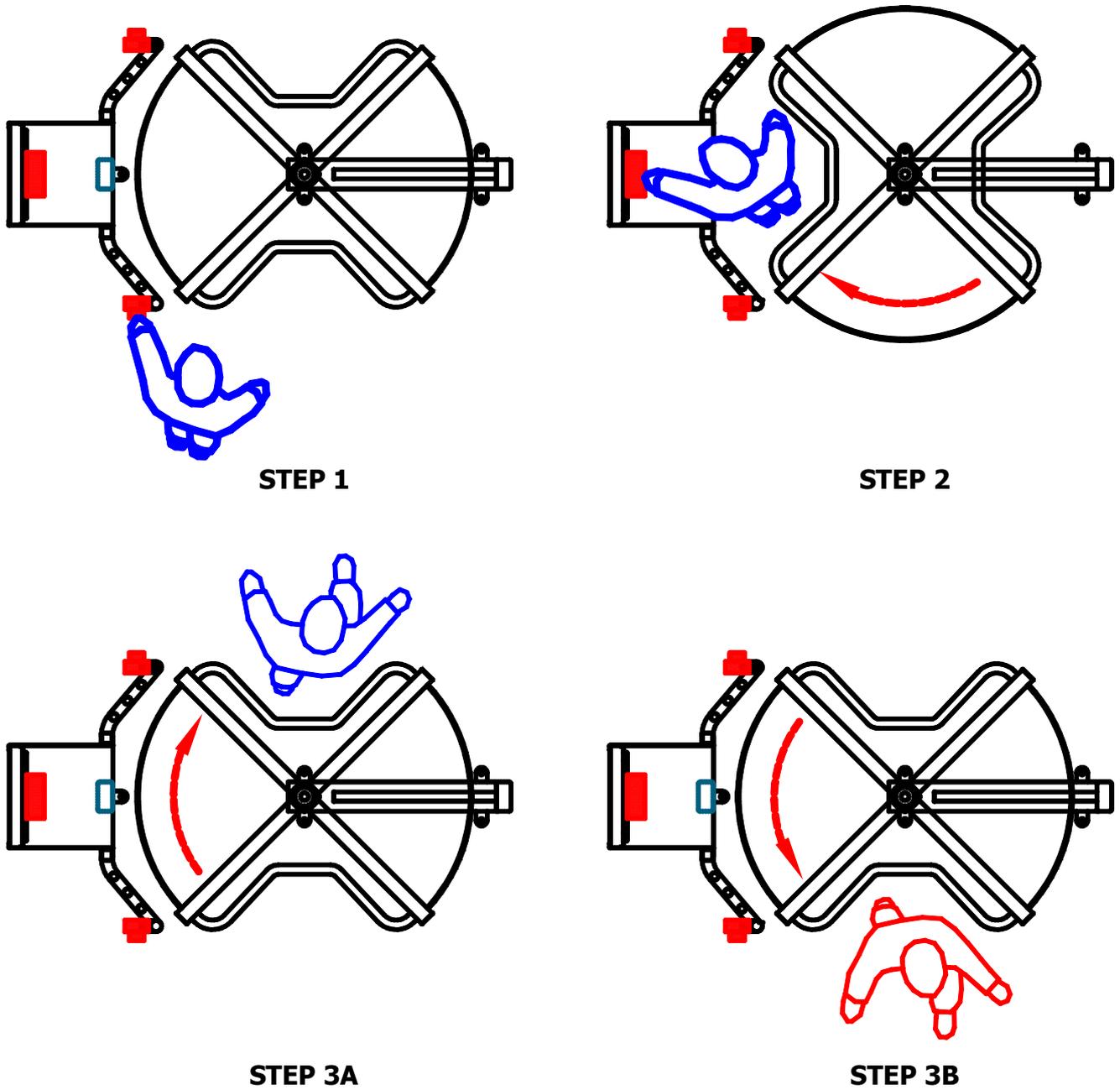


Figure 3.4: Operation Steps

### 3.5 Flow rate

The TRIBUNE flow rate is typically 1 person every 8 seconds. This is slightly slower than the standard Turnstile flow rate of 1 person every 6 seconds, but this is as a result of the 180 degree operation.

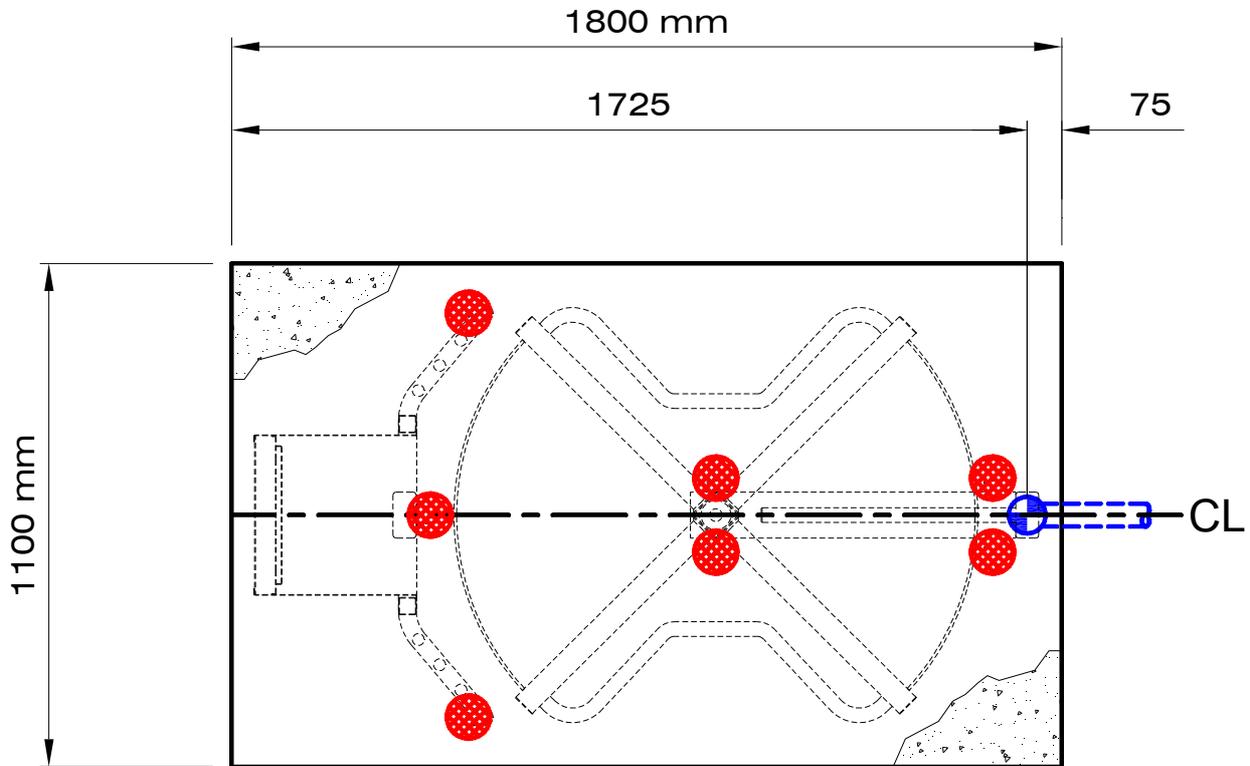
TRIBUNE Flow Rate		
Time	Pedestrians through	Confirmed
8 seconds	1	Yes
1 minute	7	Yes
10 minutes	75	No, estimate
1 hour	450	No, estimate

### 3.6 Emergency operation

The TRIBUNE is typically not used for emergency operation in case of a fire. It is highly recommended that the TRIBUNE is installed with a gate alongside designated for emergency escape.

## 4. INSTALLATION

### 4.1 Plinth requirements



Concrete Plinth @ 20MPa, 1800 x 1100 x 125 deep

● = Anchoring Points - Keep free of conduit

Figure 4.1: Plan View of Plinth

The TRIBUNE requires a plinth of 1800mm x 1100mm. The concrete should be 125mm deep and have a strength of 20MPa. From the base there is one access point, 75mm from the back side of the TRIBUNE.

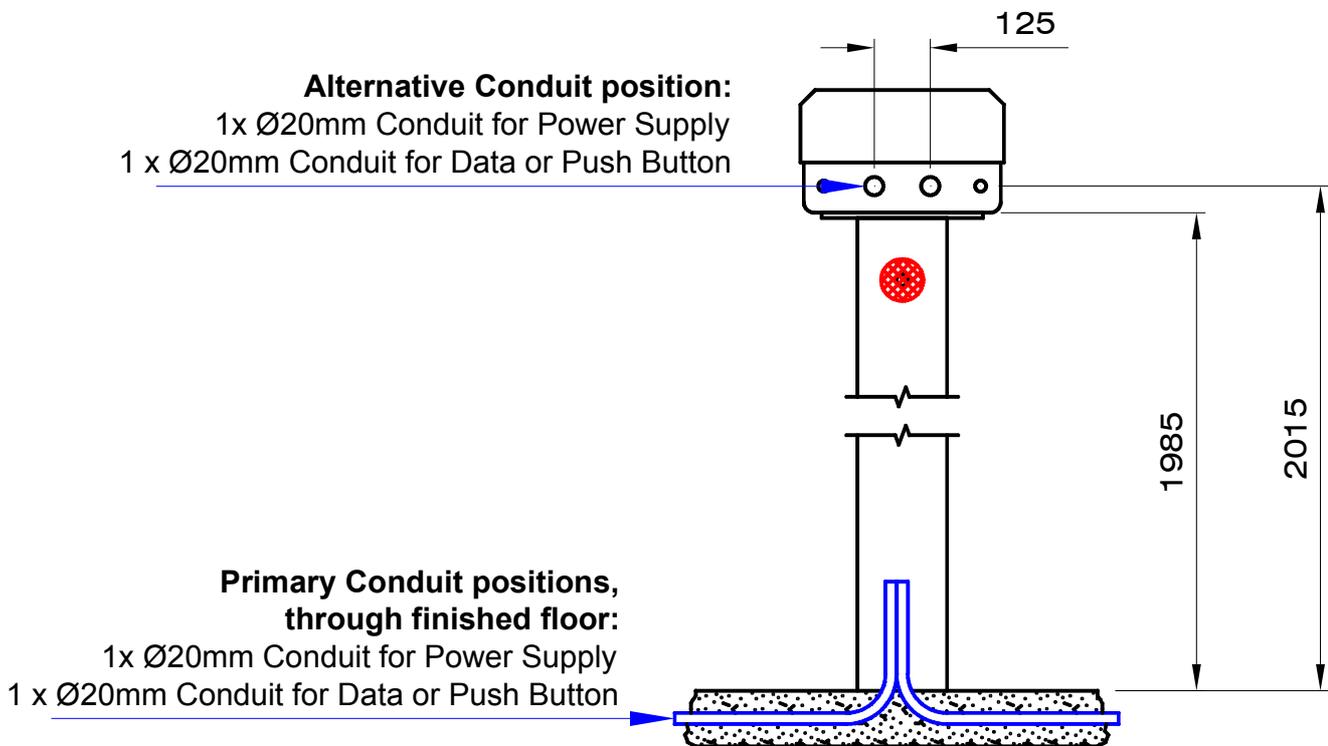


Figure 4.2: Elevation of plinth and side conduit access

From the side, there are access holes in the top channel for cabling to enter to the control panel.

Turnstar provides draw wire from the mounting bracket on the screen to exit into the channel, to facilitate cables that need to be pulled through the screen for pushbuttons or readers.

The TRIBUNE requires bolting on 7 points on the floor level and at least one side (preferably the comb) bolted to a wall or adjoining Turnstile / Gate. The screen provides stability but it is recommended to fix the comb to a wall (see Figure 4.3).

M12 x 80 suitable Nylon anchors or RAWL sleeves can be used. If the bolting wall / floor is very brittle, Turnstar recommends that chemical anchors be used.

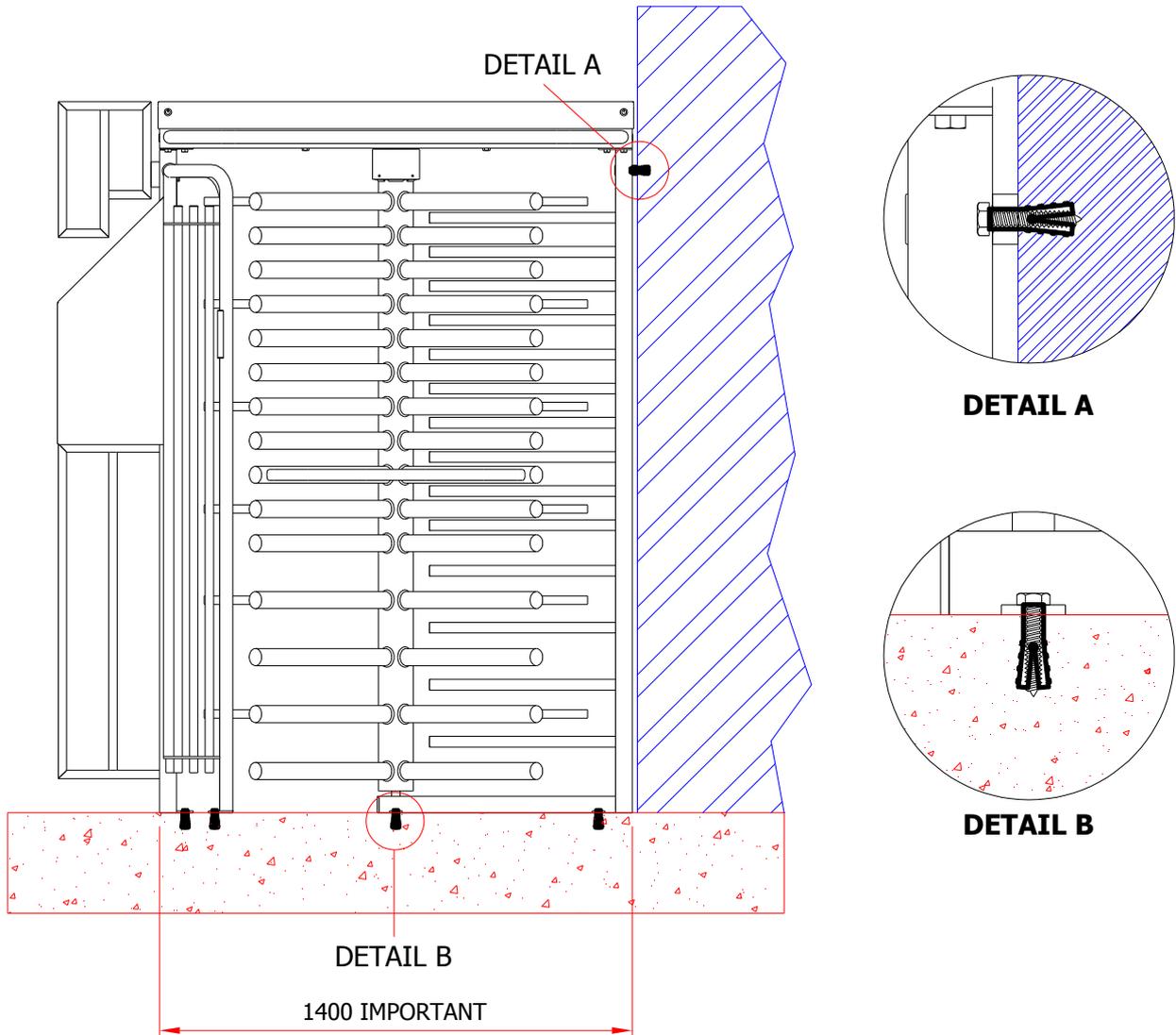
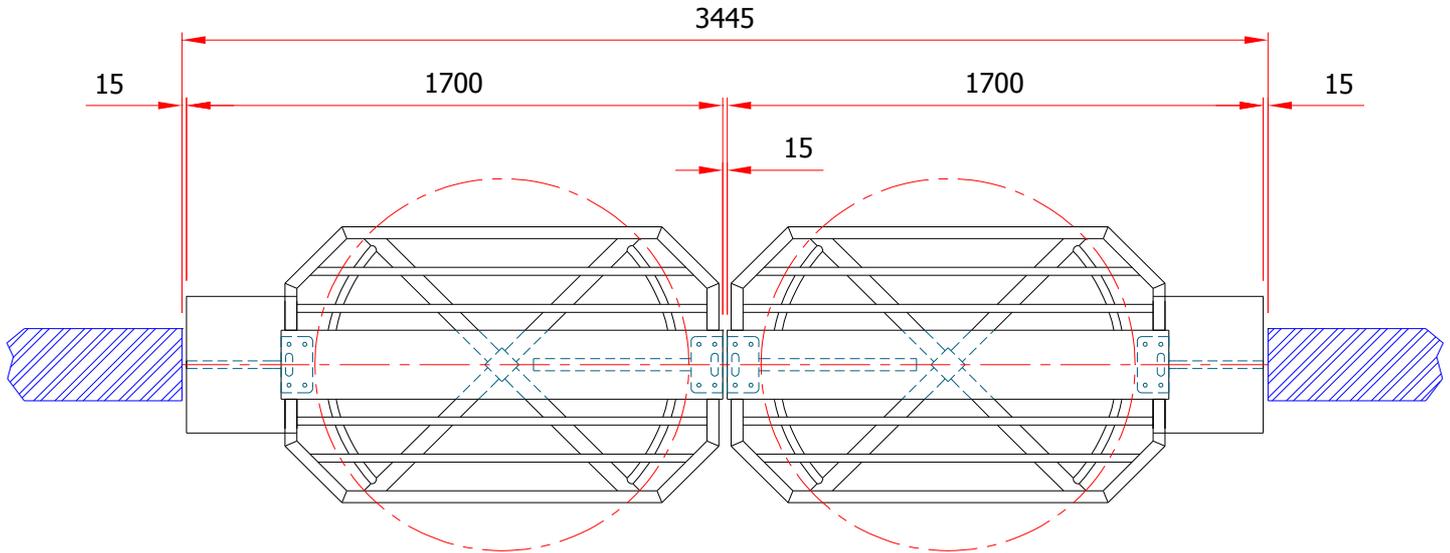
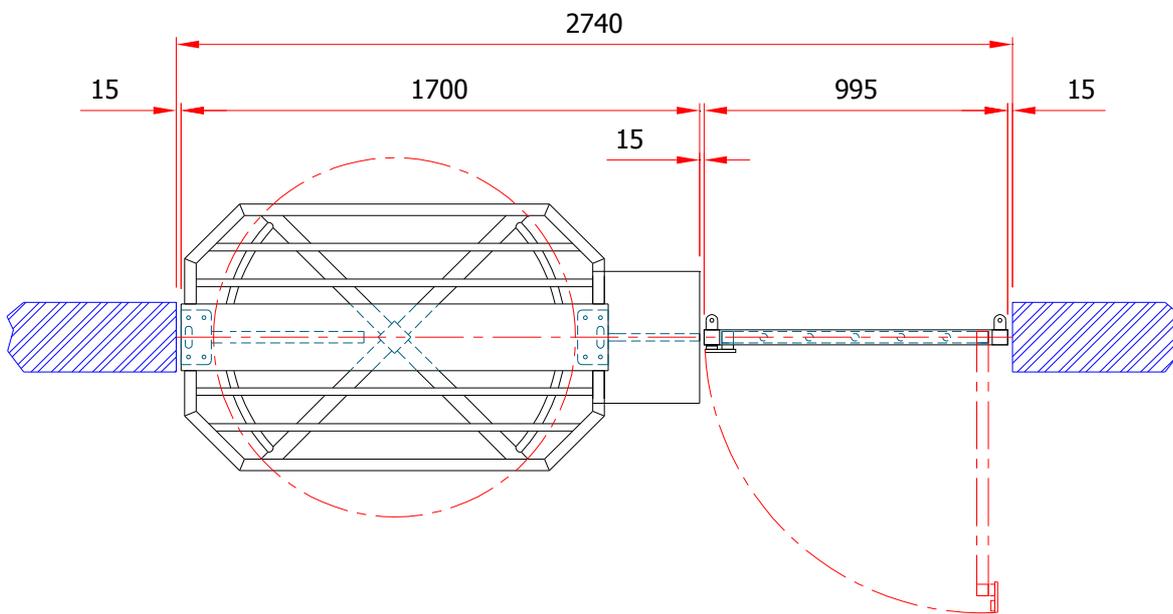


Figure 4.3: Bolting requirements

**4.2 Typical installations**



**Figure 4.4: Double TRIBUNES installed in opening of 3445mm**



**Figure 4.5: TRIBUNE with gate installed in 2740mm opening**

## 5. CONTROL PANEL

### 5.1 Control panel overview

The TRIBUNE control panel controls the entire locking and unlocking operation of the turnstile.

The control panel consists of a chassis plate, power terminal block, isolator, 24V transformer, battery backup board and printed circuit board.

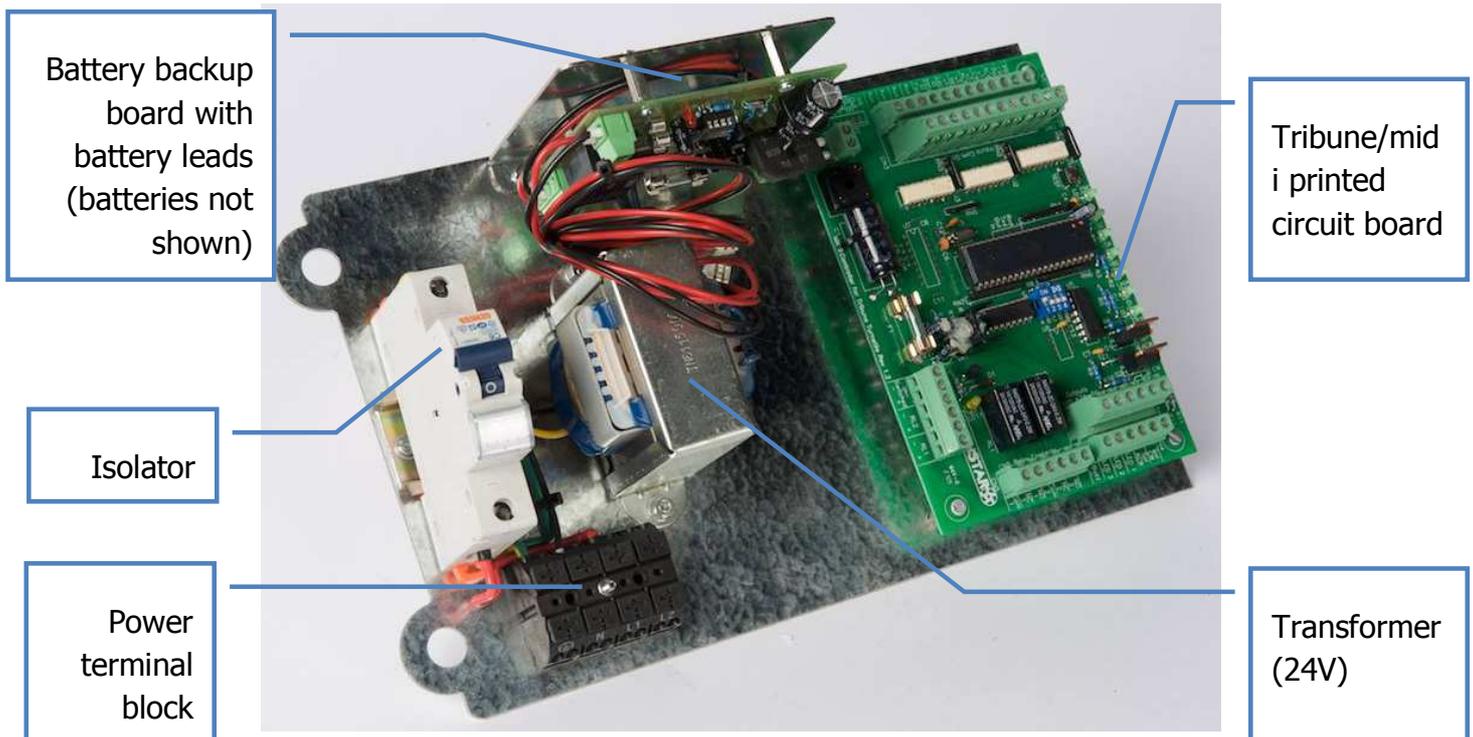


Figure 5.1: Control panel

The printed circuit board is fitted with a microchip which contains the computer program which runs all the turnstile functions. The microchip for the TRIBUNE program is marked with two orange dots.

The printed circuit board is also fitted with four dip switches. The first two dip switches are used to adjust the timeout period whilst in the trapped position.

DIP Switch Position		
Switch 1	Switch 2	Time-out in seconds
OFF	OFF	25
ON	OFF	20
OFF	ON	15
ON	ON	10

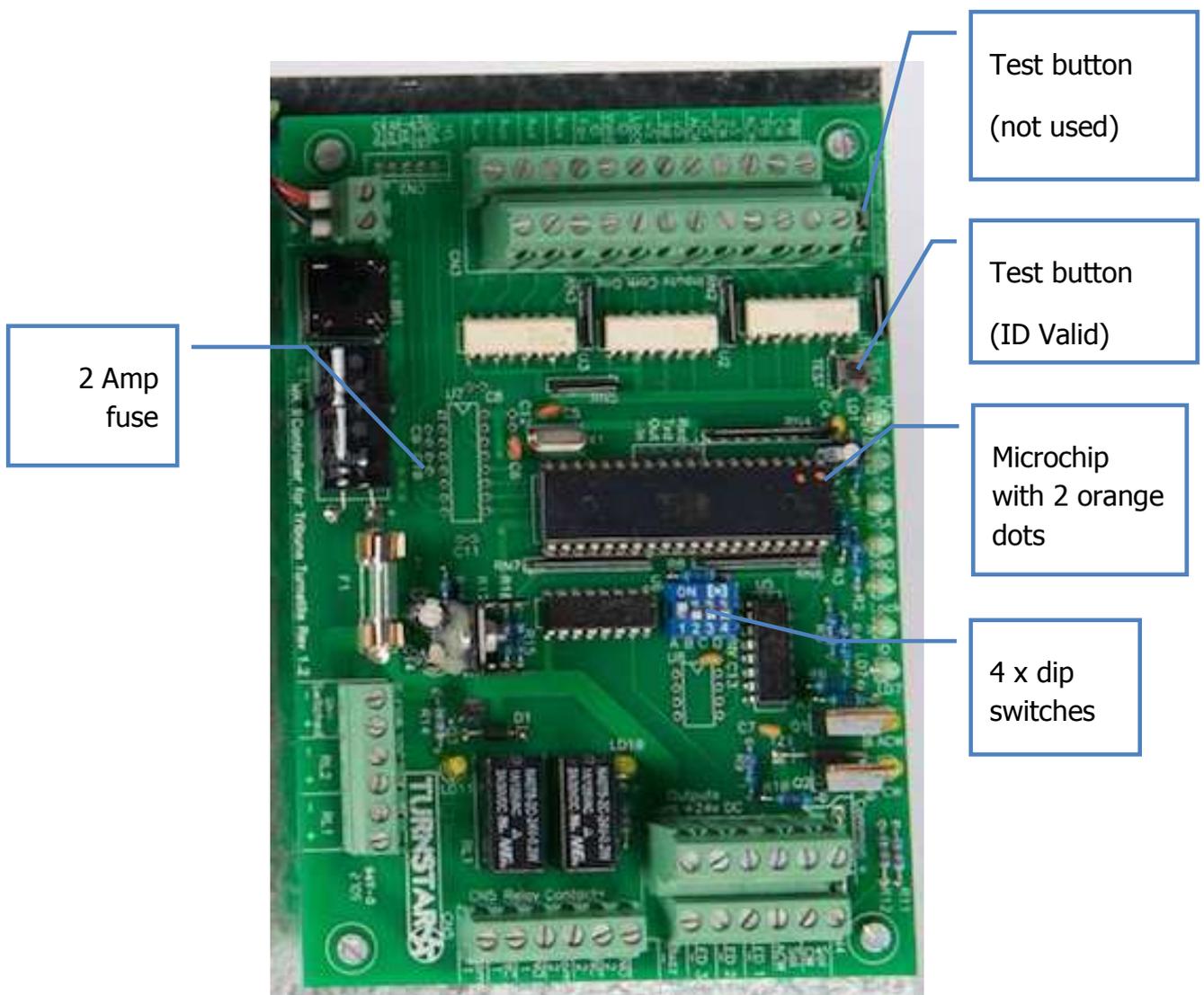


Figure 5.2: MIDI controller printed circuit board

### 5.2 Control panel connections

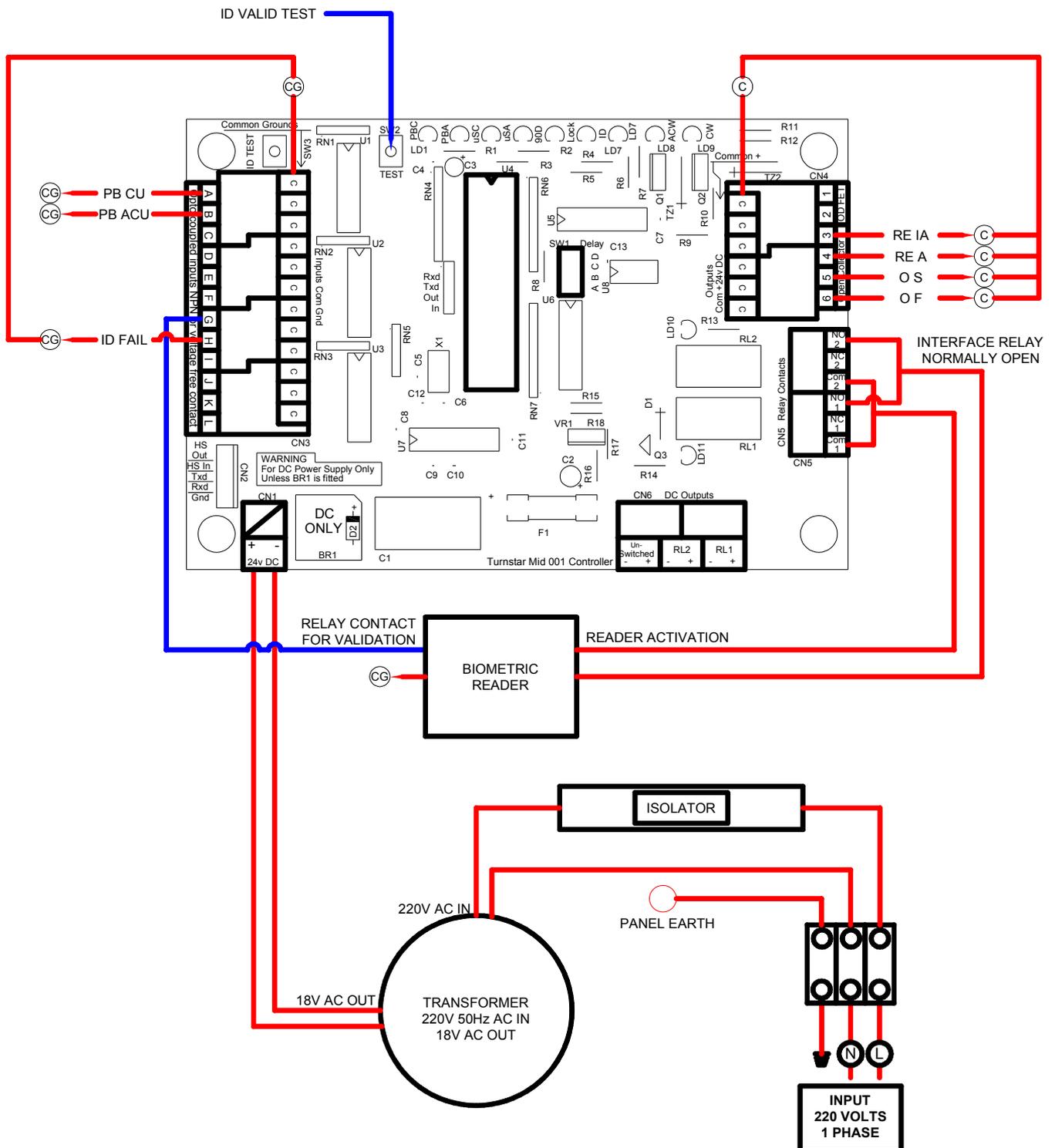


Figure 5.3: Wiring Diagram to MIDI board

MIDI Board INPUTS (to Common Grounds)		
Input	Code	Description
A	PB CU	Push Button Trigger, Clockwise
B	PB ACU	Push Button Trigger, Anti-Clockwise
G	ID VAL	Contact from Biometric Reader to validate pedestrian
H	ID FAIL	Contact from Biometric Reader to fail validation

MIDI Board OUTPUTS (to Common)		
Input	Code	Description
3	RE IA	Contact closed when reader is inactive. Closed when Relay interface is not triggered.
4	RE A	Contact closed when reader is active. Closed when Relay interface is triggered and rotor is in locked position.
5	O S	Output close on successful validation
6	O F	Output close on failed validation

## **6. OPERATION & TEST**

### **6.1 Typical set-up scenario**

The following section describes a set-up with a biometric reader and two push-buttons integrated with the TRIBUNE controls.

Note that the pushbuttons need to be setup to correspond to clockwise (CU) and anti-clockwise (ACU) directional rotation of the Turnstile.



1. ELECTRICAL HAZARD – Risk of electrical shock due to high voltage. Proceed with care.

Take care when connecting to power.

- 1) Two pushbuttons are mounted to the screen facing the entry / exit area of the TRIBUNE. Pushbutton 1 is connected to PB CU and the other wire to CG (Common Ground). Pushbutton 2 is connected to PB ACU and the other wire to CG (Common Ground).
- 2) A biometric reader is mounted inside the box in the TRIBUNE screen. The reader is deactivated by the relay by the CN5 relay contacts on the control board. The reader validate (Relay contact) is connected to ID VAL and the other wire to CG (Common Ground). The reader fail (Relay contact) is connected to ID FAIL and the other wire to CG (Common Ground).
- 3) Live power (Live, Neutral, Earth) 220V AC 50 Hz is connected to the power terminal block on the control panel.

## 6.2 Testing validated passage

- 1) Trigger pushbutton 1 (clockwise direction) and enter the Turnstile.
- 2) Enter the Turnstile to the locking position of the Rotor. The Biometric reader is enabled.
- 3) Validate with the Biometric reader. Validation succeeds.
- 4) Exit the Turnstile in the clockwise direction.

Repeat the test with pushbutton 2 in the anti-clockwise direction.

## 6.3 Testing rejected passage

- 1) Trigger pushbutton 1 (clockwise direction) and enter the Turnstile.
- 2) Enter the Turnstile to the locking position of the Rotor. The Biometric reader is enabled.
- 3) Validate with the Biometric reader. Validation fails.
- 4) Passage to clockwise direction is not possible. Exit the Turnstile in the direction of entry.

Repeat the test with pushbutton 2 in the anti-clockwise direction.

## 7. MECHANISM

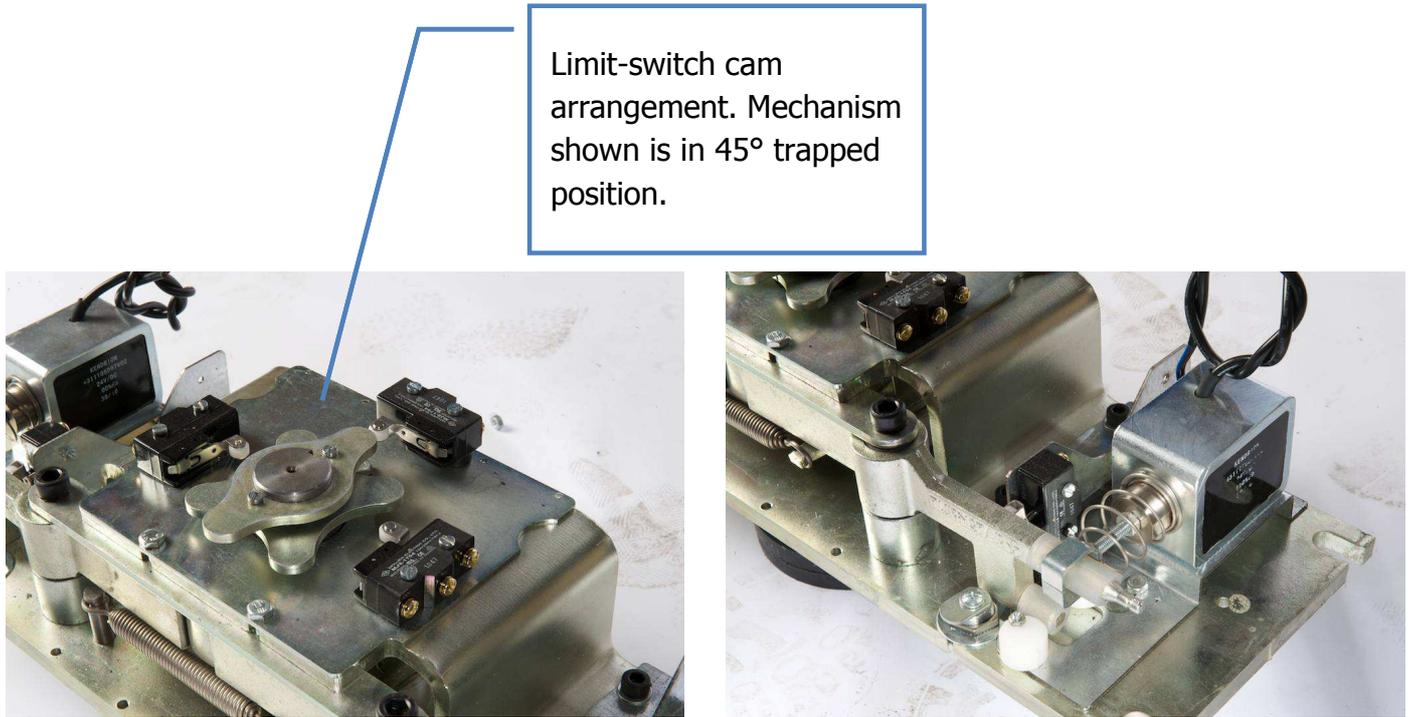
### 7.1 Mechanism overview

The TRIBUNE turnstile is fitted with the same turnstile mechanism which is used for the TRIUMPH/TITAN range. However, the TRIBUNE mechanism is fitted with additional micro-switches and cams for the specific functions that the TRIBUNE has, such as locking in 90 degree position to await validation.



Figure 7.1: Mechanism image & pawl limit-switch

Limit switches		
Limit switch code	Position	Description
LM-R	Right of cam	Limit switch at right of cam. Lower level.
LM-L	Left of cam	Limit switch at left of cam. Lower level.
LM-B	Back of cam	Limit switch at back of cam. Higher level.
LM-RP	Right pawl	Limit switch at back of right pawl.
LM-LP	Left pawl	Limit switch at back of left pawl.



Limit-switch cam arrangement. Mechanism shown is in 45° trapped position.

Figure 7.2:

7.2 Mechanism limit-switches

The TRIBUNE turnstile has 5 limit-switches built in to control the locking and unlocking functions with the rotation sequence.

There are 3 limit-switches mounted on a plate on top of the mechanism and one limit-switch each on the two pawls.

All limit switches must be functioning properly for the turnstile to operate as intended.

	<p>2. RISK OF INJURY – Risk of injury possible. Proceed with care.</p>
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Take care when operating near the mechanism moving parts.

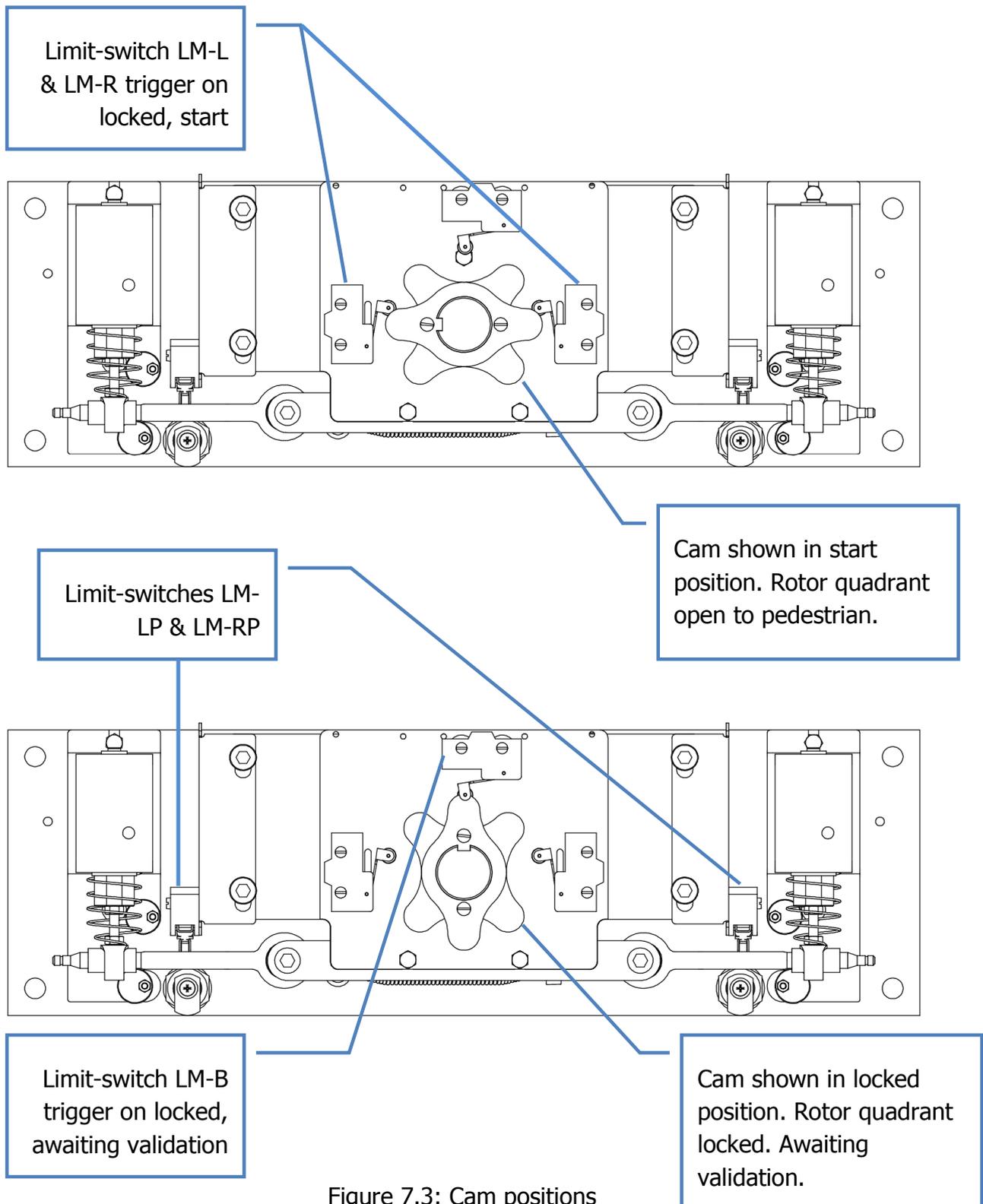


Figure 7.3: Cam positions

### 7.3 Mechanism function with Turnstile operation

The mechanism limit switches will trigger in a particular sequence when the turnstile rotor turns, which will interface with the control panel to create the locked condition.

In figure 7.4, the TRIBUNE is in the open position, awaiting a trigger from a pedestrian. The limit switches and cams are shown in corresponding colours.

In detail A, the 'red' limit switches will be triggered by the 'red' cam and the 'blue' limit switch will be triggered by the 'blue' cam.

In detail Ab, the 'red' limit switch is not triggered by the 'red' pawl.

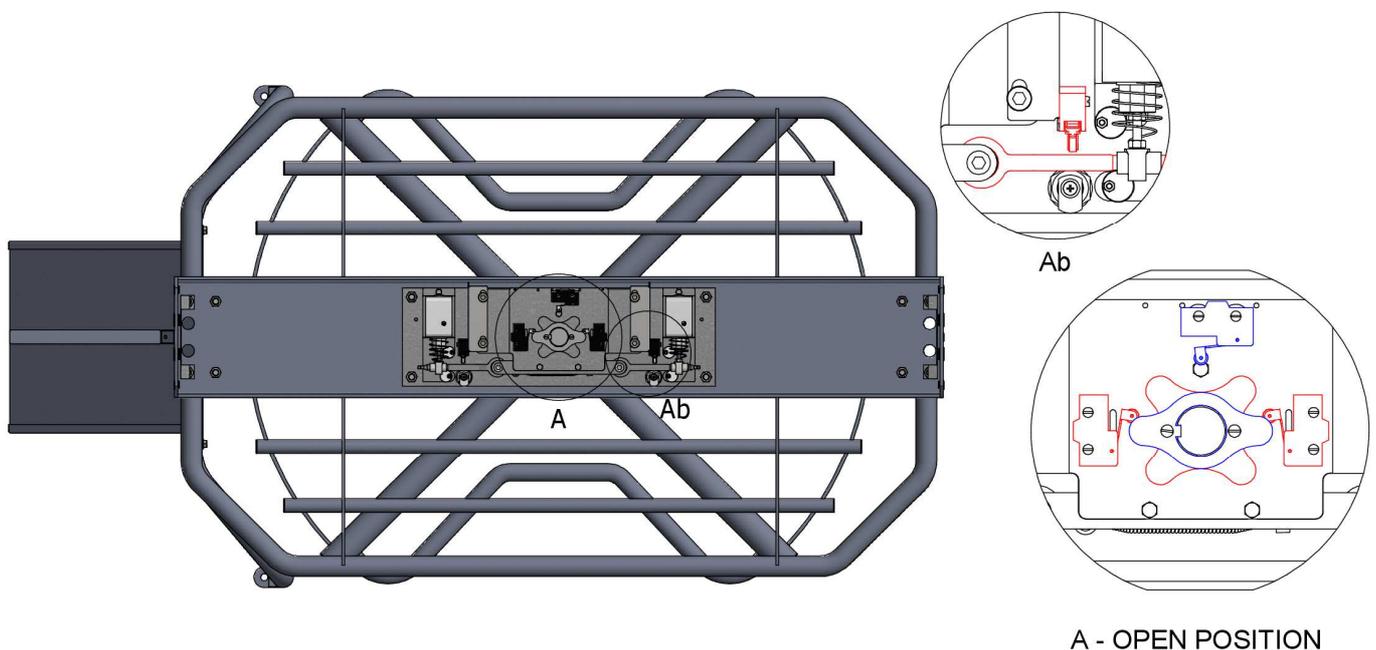


Figure 7.4: Limit switch triggering – Position A (Open)

In figure 7.5, the TRIBUNE is in the 30 degree position, with the rotor being pushed toward the locked position.

In detail B, the 'red' limit-switch on the far right is triggered. The 'blue' limit-switch and the far left 'red' is not yet triggered.

In detail Bb, the 'red' limit-switch is triggered by the 'red' pawl. This extra limit-switch at each pawl ensures that the Turnstile will not return when the turnstile rotates past 30 degree position.

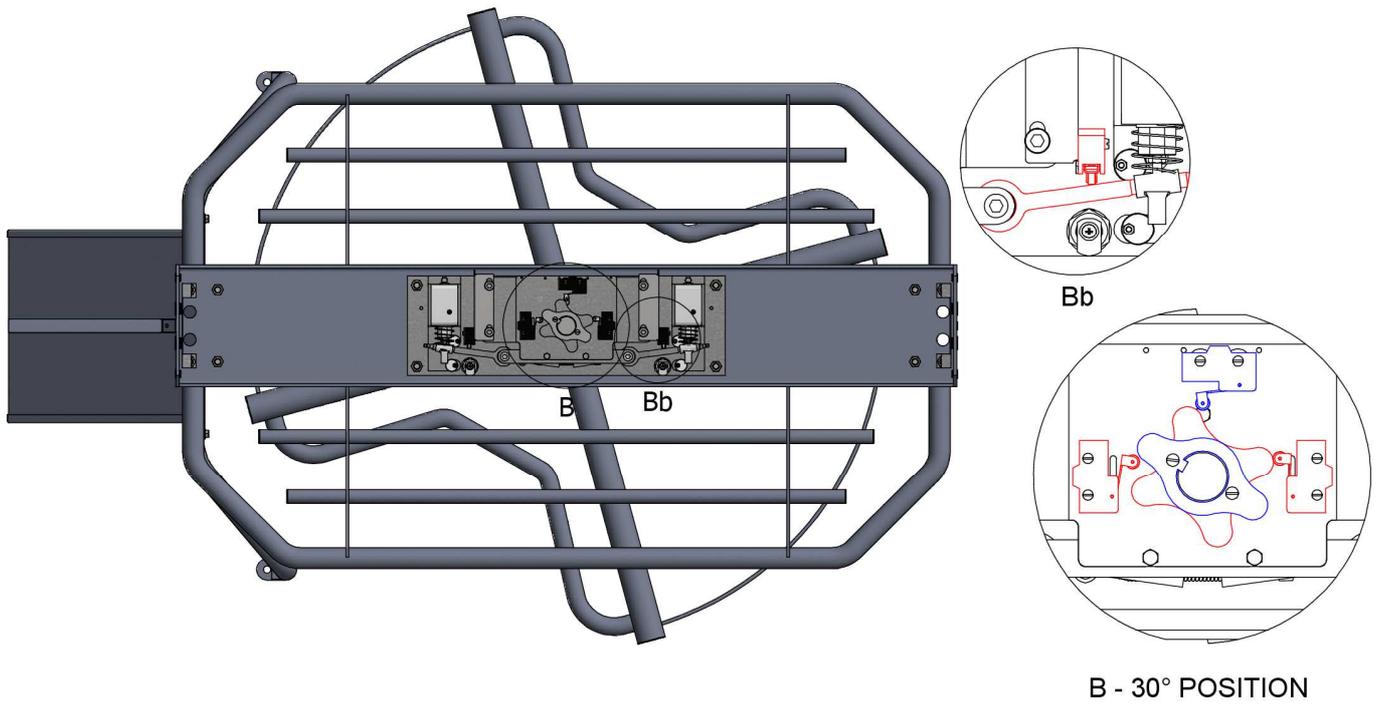


Figure 7.5: Limit-switch triggering – Position B (30 degree)

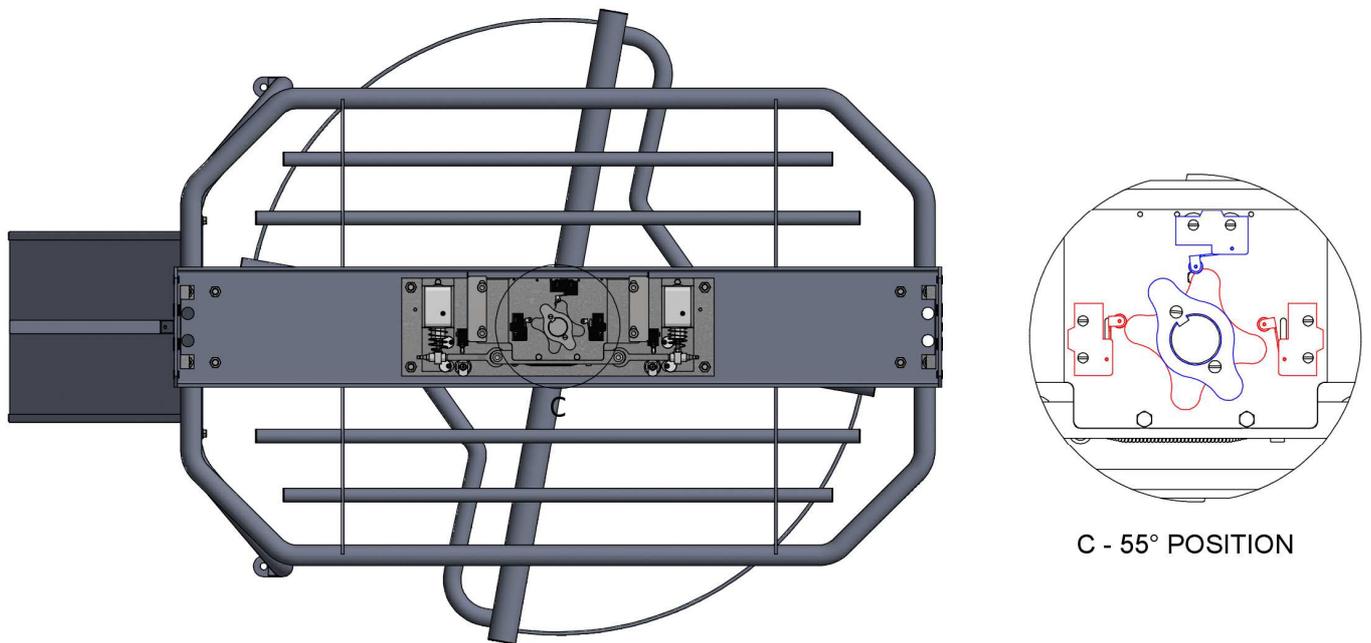


Figure 7.6: Limit-switch triggering – Position C (55 degree)

In figure 7.6, the TRIBUNE is in the 55 degree position, with the rotor being pushed toward the locked position. The rotor has reached the point where it cannot return back to open position and will only move toward the locked position.

In detail C, the 'red' limit-switch on the far left is triggered. The 'blue' limit-switch is not yet triggered.

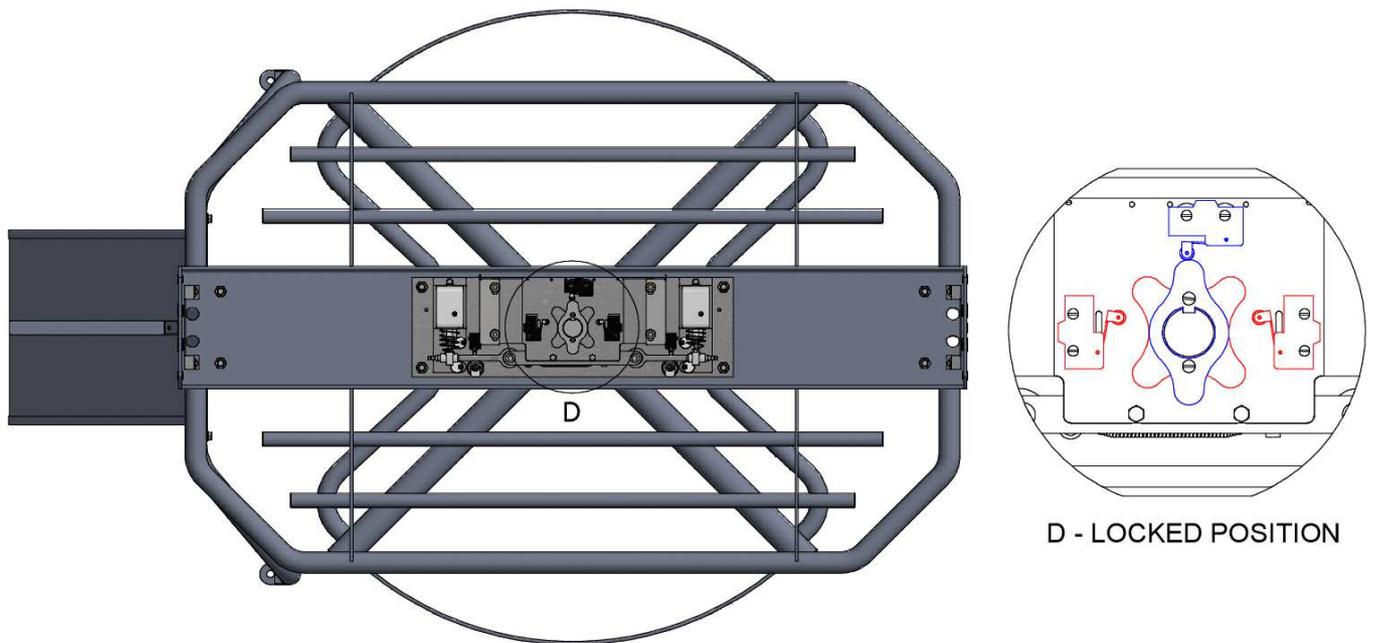


Figure 7.7: Limit-switch triggering – Position D (Locked)

In figure 7.7, the TRIBUNE is in the locked position. The turnstile awaits a validation signal or will time out. In this position, if the control panel receives a validation signal, the turnstile will allow the pedestrian through. If a failed validation signal or no validation signal is received, the turnstile will unlock to let the pedestrian out in the same direction as he / she entered.

In detail D, The 'blue' limit-switch is triggered.