Operation Manual for Car/Landing Door Mechanism (For all types & sizes)

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Green Field control system (I) Pvt. Ltd was founded in 1997 at Gandhinagar, capital city of the Gujarat, INDIA with a main focus on providing an automation solution by research, development and production of **Dynamic Car Door Mechanism & Dynamic Landing Door Mechanism**. We have been in this industry since 10 years with the reputed name as **GREEN FIELD CONTROL SYSTEM (I) PVT. LTD.** Believe that company is interested to developed relationship with their customers not only as professional but company would also like to develop “Devotional relationship”.

We have taken every care to make this Dynamic Car Door Mechanism & Dynamic Landing Door Mechanism - a reliable and efficient one and will give you a long trouble free service. Using good quality of raw materials and production techniques, our range of products are most durable and effective.

As per the requirement of customers every time company came with improved ideas along with the great kind of services for the products after sales.

Using our vast knowledge of this industry, we have revolutionized the concept of Remote Operated Gates and Door. To cater to our clients effectively, we have integrated production facility and well-equipped with modern machines. We also ensure to manufacture this range as per the contemporary trends used by customers. With several design and sizes, our products can also be customized to meet varied requirements of our clients.

GANPATLAL D. PATEL (DIRECTOR),

**GREEN FIELD CONTROL SYSTEM (I) PVT. LTD.**
Introduction

**Car Door Mechanism & Landing Door Mechanism** is a fully digital and high end microcontroller based Mechatronics product.

This mechanism has been designed to fulfill all your needs and expectation for Passenger lift as well as Goods carriage lift.

**Dynamic Car Door Mechanism & Dynamic landing Door Mechanism** made by three basic parts: **Car Door Mechanism, Landing Door Mechanism and Door Operation Controller.**

**Car Door Mechanism** is a vertically moving part of the product; the **Door Operation Controller** Circuitry attached with car door mechanism which controls the whole the operation of mechanism, by the software code programmed in the Micro-controller IC of drives.

The Car Door Mechanism moving vertically in the entire building and make an alignment with one of the Landing Door Mechanism among all.

When the alignment becomes perfect, an appropriate task will be executed, as programmed in the micro-controller IC.

**Landing Door Mechanism** is not a moving part, but it is installed on every floor of the building.

In this way a single Car Door Mechanism & a single Door Operation Controller are required per set, and set may include more than one landing door mechanism, depends on the number of floors of the entire building.

There are two basic kinds of mechanism: **Centre Opening & Side Opening.**

In the center opening mechanism, the drives open the door from center, whereas in the side opening mechanism, the drive open the door either from the left side or from the right side, depends on the two sub types of side opening, left side and right side, respectively.

The mechanism itself run a short test to check its mechanical locks, and based on the successful result of this self test, it'll generates the required electronics signal to operate the door.
Landing Door Alignment with the Car Door Mechanism

There are six different kinds of door mechanisms we manufactured. Two of them are of Center opening type, and the remaining ones are side opening types.

The below figure (a) & (b) show the center opening types, and the figure (c) through (f) show the side opening.

Fig (a): Center opening

Fig (b): Center opening

Fig (c): Side opening

Fig (d): Side opening
Fig (e): Side opening

Fig (f): Side opening
General description of Car Door Mechanism

Fig (1): Center opening
Fig (2): Side opening

Major parts of the car door mechanism are:

1. **Main Car Door Mechanism plate**: where the BLDC motor along with its assembly, an aluminum track, female contactors and belt with the use of clamp is connected.

2. **Aluminum track**: over which both eccentric and upper wheel is moving to operate the doors horizontally.

3. **Roller**: Basically two types of rollers are used here, eccentric and upper. Two Eccentric rollers are used in each two door plates of both left hand side and right hand side. And also, two upper rollers are used in each two door plates of both left hand side and right hand side door plates.

4. **Motor and assembly**: BLDC motor is attached here with, also the pulley of left hand side is attached with this motor assembly, and the other right hand side pulley is tied with main car door mechanism plate by clamps. The adjustment of the tension of the belt is provided with the use of screw, at the right hand side pulley.

5. **Door plates**: Two door plates are connected with the main plate of the car door mechanism. The doors are connected here with the help of hanging bolt,
   a. Skate and male contactor is connected with the left hand side door plate.
b. Right hand side male contactor is connected with right hand side door plate.

Also, the door plates are connected with belt too.

At the rear side of these door plates, eccentric and upper rollers are connected by screw bolts, so that the attached doors can move horizontally to operate the doors, as the rollers move along the aluminum track.

6. **Contractor:** The female contactor is connected with the main plate of the car door mechanism, where it will make the contact with each two male contactors of the door plates. The contactors play a significant role in checking of the position of the doors whether is it fully closed or opened?

7. **Washers:** Two different types of washers are used: first type single washer is used to clean the aluminum plate, and second type two washers are used to clean the belt.

8. **Skate:** The skate is a special mechanism that is operated after the checking of alignment between both the door mechanisms. In task of opening and closing of the doors, skate will be operated first. And after successful execution of the skate mechanism, the door will be going to open/close.
General description of Landing Door Mechanism

Fig (3): Center opening
Fig (4): Side opening
1. **Main Landing Door mechanism plate:** Where the aluminum track, Female Contactors and D-lock is connected.

2. **Aluminum track:** over which both eccentric and upper wheel is moving to operate the doors horizontally. Also note that the rope, to operate the landing doors, is connected with this aluminum track, not with the main plate of landing door mechanism as the case with car door mechanism.

3. **Roller:** Basically two types of rollers are used here, eccentric and upper. Two Eccentric rollers are used in each two door plates of both left hand side and right hand side. And also, two upper rollers are used in each two door plates of both left and right hand side. 
   One can adjust the tension of the rope with the use of screw, connected with the left hand side door plate.

4. **Door plates:** Two door plates are connected with the main plate of the landing door mechanism. The landing doors are connected here with the help of hanging bolt.
   a. Male contactor is connected with the left hand side door plate.
   b. Right hand side male contactor is connected with right hand side door plate.

5. **Contractor:** The female contactor is connected with the main plate of the car door mechanism, where it will make the contact with each two male contactors of the door plates. The contactors play a significant role in checking of the position of the doors whether is it fully closed or opened?

6. **Washers:** Two different types of washers are used: first type single washer is used to clean the aluminum plate, and second type two washers are used to clean the belt.

7. **D-lock:** D-lock plays the significant role in case of power failure of any electronics parts. One can come outside the lift, by manually operate this d-lock to open the doors.

8. **Spring:** Spring is connected at the rear side of the door plates of the landing door mechanism that keep the doors of the landing door mechanism closed in the absent of the car door mechanism.

9. **Rope:** The rope is connected with the door plate by clamps, in case of center opening, and it is connected by the use of rope hockey in case of side opening, rope hockey is attached with the door plate.

   In this way, the car is moving vertically in the building along with the cabin for passengers and the landing doors that are connected at each floors of the building are stationary and that are operated with some precise fashion and in a step with the doors of the car door mechanism. When the car reaches to
particular floor, some magnetic locks will be checked for correct alignment between the car mechanism and landing mechanism. If the alignment is perfect, then skate will be open first, and consequently the doors connected with both the door mechanisms will be open simultaneously.

✓ Side view:
How to connect the doors

Doors will be connected with the door plates of both the mechanism.

✓ Connection of the doors:

Fig:
As above figure shows there are four horizontal oblums in two door plates of car door mechanism, to hang the doors. Also there should be four vertical oblums too on both the doors. We’ve provided a suitable size of oblums in both the plates, to adjust the door connection alignment for clear opening of the doors.
There are two different sills depend on whether the mechanism is center opening or side opening.

Fig of center & side opening sill:

In center opening mechanism, the doors rotate over the sill by sill rollers that are attached at the bottom side to the doors, whereas in the side opening, the doors rotate over the sill by butterfly that are attached at the bottom side to the doors.
Placing the Mechanism on threshold

Ty-2C

TOTAL HEIGHT = 2460

OPERATOR BASE HEIGHT = 2264

TOTAL HEIGHT = 2210

CLEAR HEIGHT = 2000

Fig (cc):
Fig (cc):
About the Skate

Skate is connected at the left hand side door plate of car door mechanism, with a skate plate. There are two different types of screw bolts to connect the skate assembly to plate.

Figure shows a mechanical drawing of this mechanism.

Fig of skate mechanism:
Adjustment of the Contactors lock

Fig with some description about what to do to connect these contactors

✔ For center opening: At the landing door mechanism, the two male contactors are connected to the door plates. Right hand side male contactor is connected simply by a clamp, that move horizontally as the door moves and it will make contact with the female contact connected vertically on the main landing plate, whereas the other side contactor is connected with a special assembly with the door plate and it will make contact to the female contactor connected horizontally in the main landing plate.

Basically a contactor assembly made of three plates: Roller plate, Center plate and Housing plate. Connection between roller plate & housing plate is made in such a way that the gap between them should be around 5 mm.

Male contactor (left hand side) is connected with the center plate by moving clamp. Also the nock of D-lock is connected with this plate too.

The spring clamp is attached with Housing plate where the one end of the spring is connected. Spring keep the doors closed in the absence of the car door mechanisms.

Rollers that are connected with the roller plate play a significant role in opening of the doors when the car coming on that floor. The skate of the car door mechanism will come between these rollers, and when the skate will be opened it will open the contactors by moving these plates.

✔ For side opening: Same arrangement has been made for side opening too, except that here only a single male contactor is connected with the door plate by the same special assembly that is used with the center opening right hand side door plate. The assembly is connected with either left or right hand side door plate depends on whether it is left side opening or right side opening.

   If the door is operated from right side, the assembly will be the same as described above for center opening.
   And if the is operated from left side, the assembly will be as the mirror image of that use for right hand side.
Position of the skate between the contactors

Only fig (ee):
All about Belt

✓ Replacement of the belt:

Fig(ii):

As the figure indicates, to replace the belt, detach the clamps where the left hand side ideal pulley has been connected. By detaching this clamp, the belt is no longer remains tightly connected with the pulley that is attached with the motor assembly. Now disconnect the belt holder that connects the belt to the car door plates.

✓ Adjustment of belt tension:

The belt is connected at the car door mechanism. One can adjust the tension of the belt by the screw assembly connected near the left hand side ideal pulley over which the belt is moving.

Fig(jj)
All about Rollers

✓ Roller adjustment:
For smooth and proper movement of the rollers on the aluminum track (1), adjust the eccentric bolt on the eccentric roller.

Fig (kk):

Unscrew the bolt (2) with a 19 mm spanner and turn the eccentric bolt (3) clockwise or anticlockwise with a 6 mm allen-key (4), after this adjustment done with allen-key, refit the eccentric bolt. During this procedure, keep in mind that adjustment should be done in such a way that roller can rotate freely on the track.

✓ replacement of rollers:
We suggest the replacement of rollers in below cases:

- Due to ageing, there will be mismatched occurred between the wheels of rollers and the aluminum track as indicated in below figure.

Fig (ll): roller ageing

- In such a situation, there should be the procedure of replacement of rollers executed.
- When the excessive noise of bearing is generated (caused by penetration of dirt between the balls)

Excessive noise due to eccentric deformation (normally this occurs when the doors stand still for a long period of time)