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| <b>HM TEC</b> | <b>INSTALLATION MANUAL</b> | Document No.: | TN-M01-0001 |
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|               | <b>MRL - CONTENTS</b>      | Name:         | N.R.Kim     |
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# MRL INSTALLATION MANUAL

**2009. 03. 02**

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## 1. HOISTWAY CONSTRUCTION CHECK

### 1-1. Layout Overview

Check the hoistway dimension based on approved layout drawings.

1-1-1. Hoistway : Clear Inside width & Clear Inside depth

1-1-2. Entrance : Rough Opening width & Rough Opening height

1-1-3. Pit depth

1-1-4. Floor heights

1-1-5. Overhead height

1-1-6. Hoist beam position/location

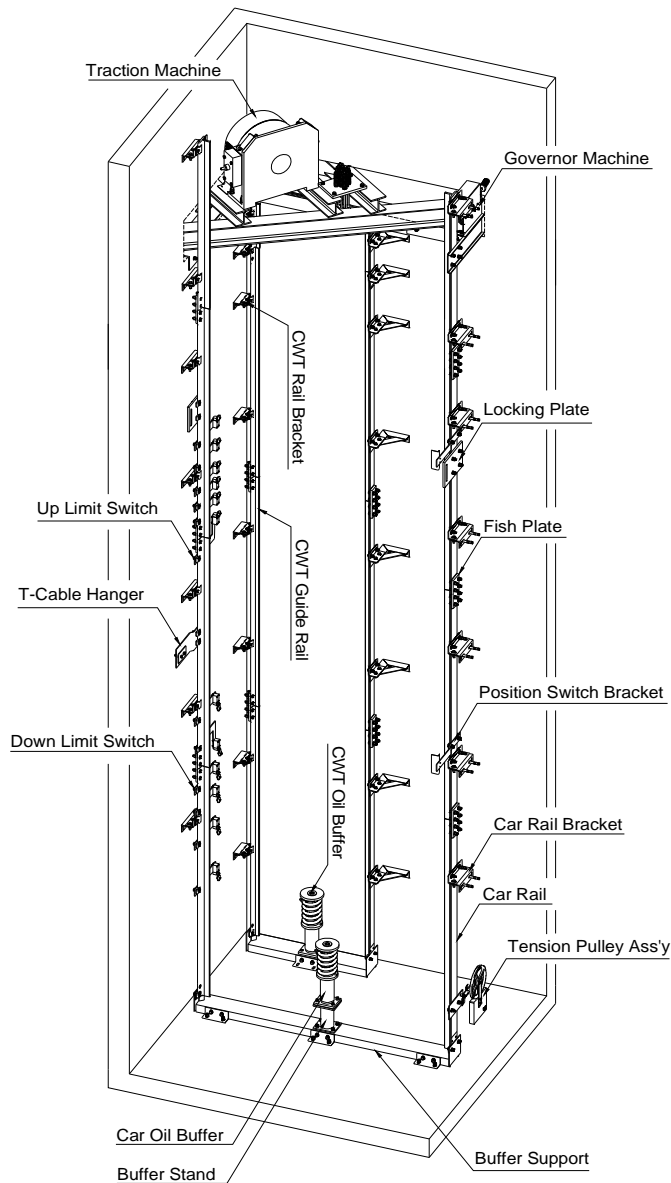
1-1-7. Control Room : Clear Inside width & Clear Inside depth width & height

1-1-8. Overhead part pocket dimension and position

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## 2. HOISTWAY

### 2-1. Hoistway Section



**Fig. 2-1. HOISTWAY SECTION**

|        |                     |               |             |
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## 2-2. Buffer Support Installation

2-2-1. Locate buffer support at the accurate position of pit floor. (See Fig. 2-2-1.)

Note that keep the tolerance within 1/16"

2-2-2. Place Buffer Support Fix Bracket on the Buffer support assembly Tap position, and mark on Bracket's Anchor Bolt assembly hole position.

2-2-3. Make hole at the marked position with Anchor Bolt by Hammer drill

2-2-4. Insert Anchor bolt into Anchor Bolt Hole.

2-2-5. Fasten Bracket to adjust Anchor Bolt. Fasten Buffer support and Bracket together.

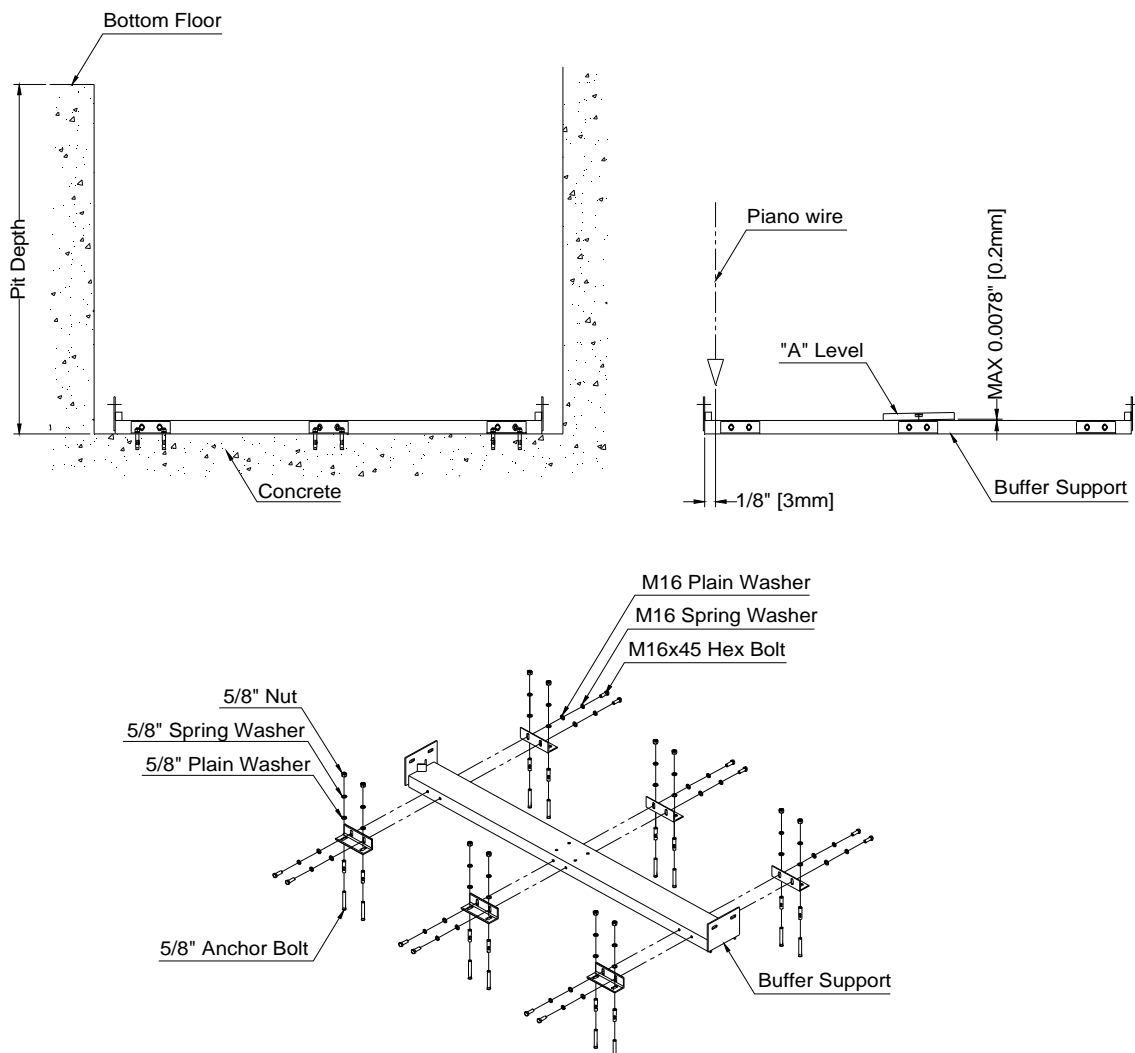
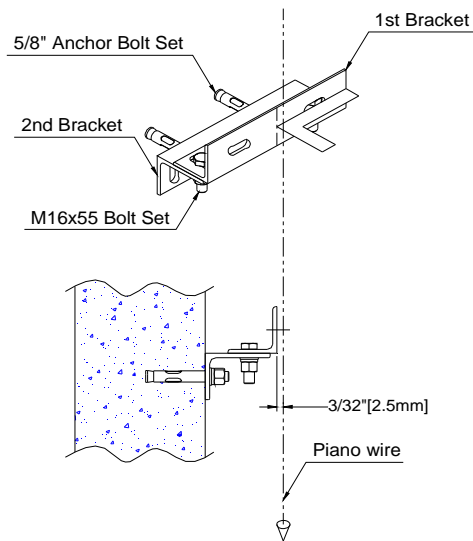


Fig. 2-2-1. BUFFER SUPPORT INSTALLATION

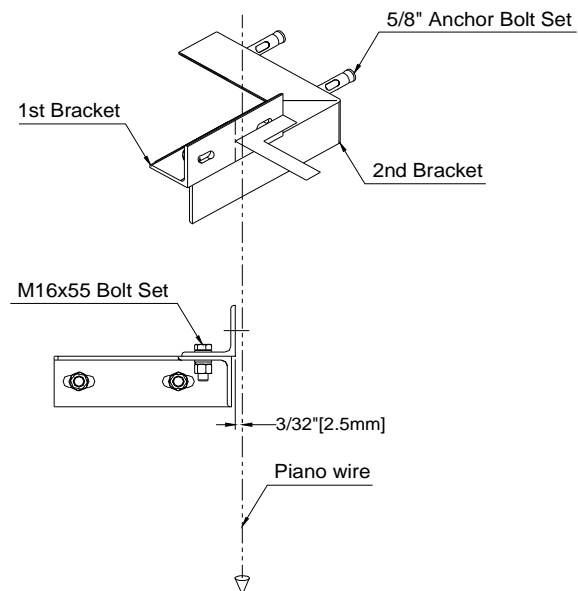
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## 2-3. Rail Bracket Installation

2-3-1. Rail Bracket (See Fig. 2-3-1-A. & Fig. 2-3-1-B.)



**Fig. 2-3-1-A CAR RAIL BRACKET**



**Fig. 2-3-1-B. CWT RAIL BRACKET**

|        |                     |               |             |
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## 2-3-2. Rail Bracket (See Fig. 2-3-2-A. & Fig. 2-3-2-B.)

### (1) 1st Rail Bracket Installation

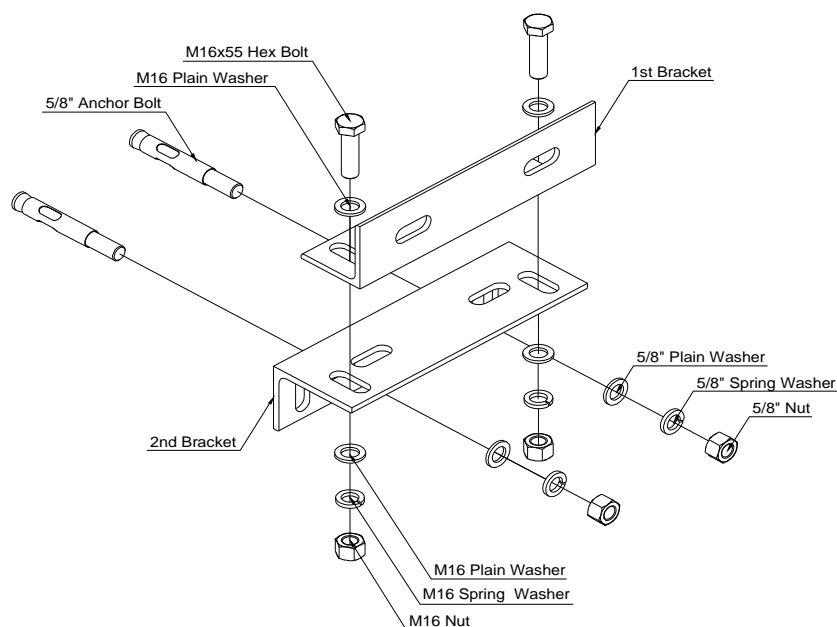
- ① Locate 1st rail bracket on the wall where 2nd rail bracket would be installed, mark on Anchor bolt assembly hole position of rail bracket that should be horizontal with piano wire.
- ② Make hole at the marked position with Anchor Bolt by Hammer drill
- ③ Insert anchor bolt into Anchor Bolt Hole.
- ④ Fasten 2nd Rail Bracket fitted into Anchor Bolt.

#### [attention]

- a) Rail Bracket 's horizontal angle must be less than  $3/16''$  [5mm].
- b) Rail Bracket 's vertical angle must be less than  $0.0118''$  [0.3mm].

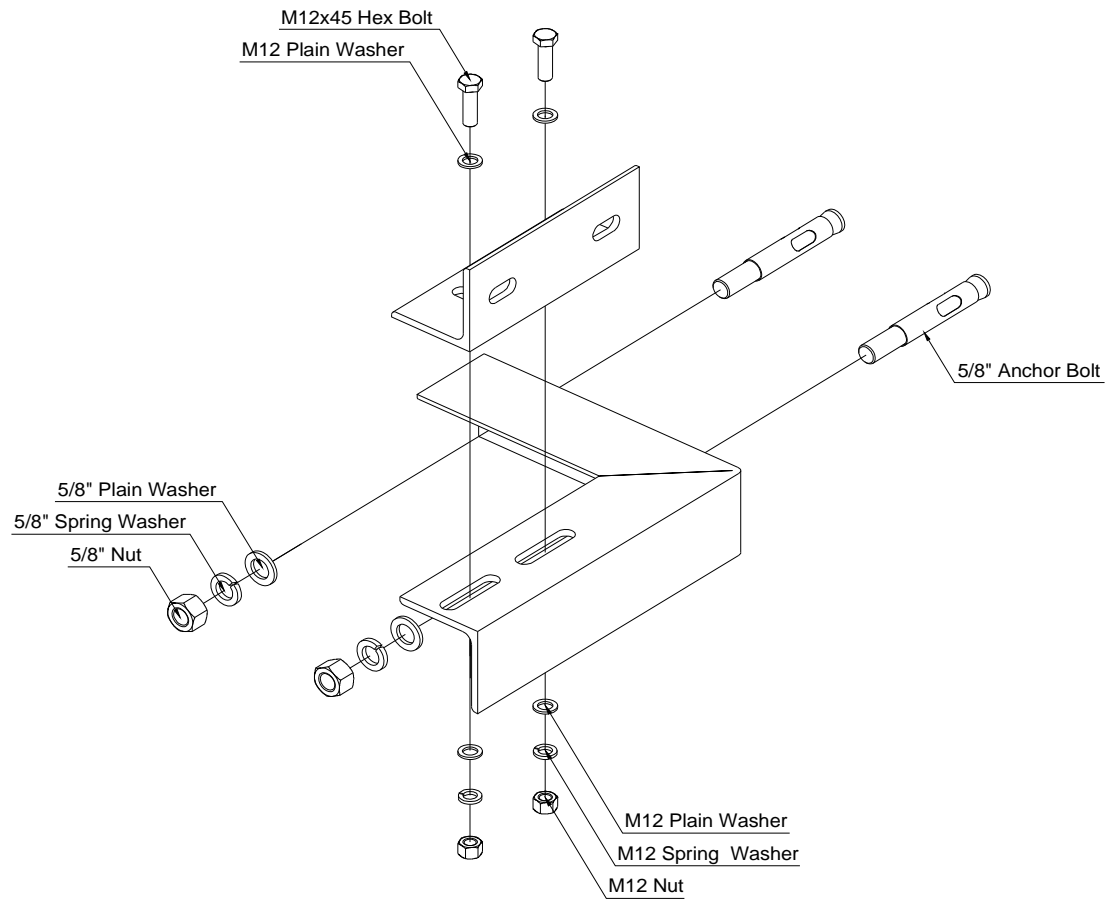
### (2) 2nd rail bracket installation

- ① Place 1st rail bracket on the 2nd rail bracket. (refer to layout drawing for distance)
- ② Make space with piano wire that should be  $3/32''$  [2~3mm] .
- ③ Mount 2nd rail bracket and 1st rail bracket by Clamp.
- ④ Complete Rail Bracket installation as 2-4(guide rail bracket installation).



**Fig. 2-3-2-A. CAR RAIL BRACKET**

|        |                     |               |             |
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**Fig. 2-3-2-B. CWT RAIL BRACKET**

|        |                     |               |             |
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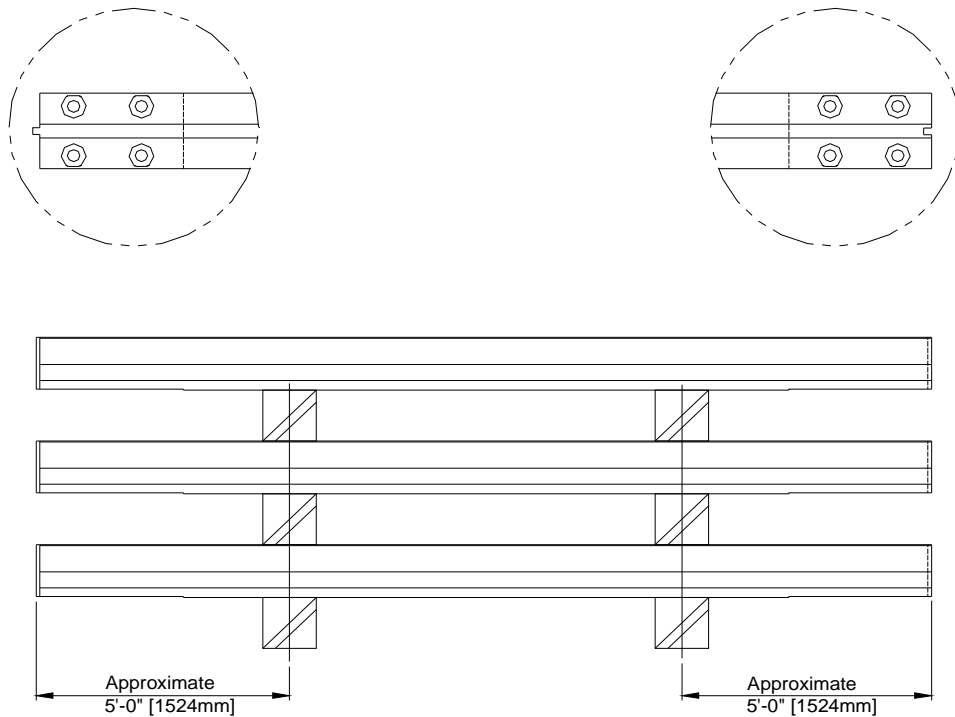
## 2-4. Guide Rail Bracket Installation

Elevator operating condition depends on the accuracy of Guide Rail or Rail Bracket installation. So it is very important to follow the standard for accurate installation.

### 2-4-1. Installation Preparatory

#### (1) Guide Rail Storage (See Fig. 2-3-1-A.)

- ① When you load the guide rail, it should be the same direction as rail joint .
- ② Place Wood Support at distance of 5'-0" [1500mm] from the each end of Guide Rail.
- ③ Locate top and bottom wood support of guild rail on the same vertical line.
- ④ Guild Rail should not be loaded over 3.
- ⑤ Generally it should be loaded indoor. If it is not applicable, it should be covered that can stay away from dirt, rain, sewage etc.

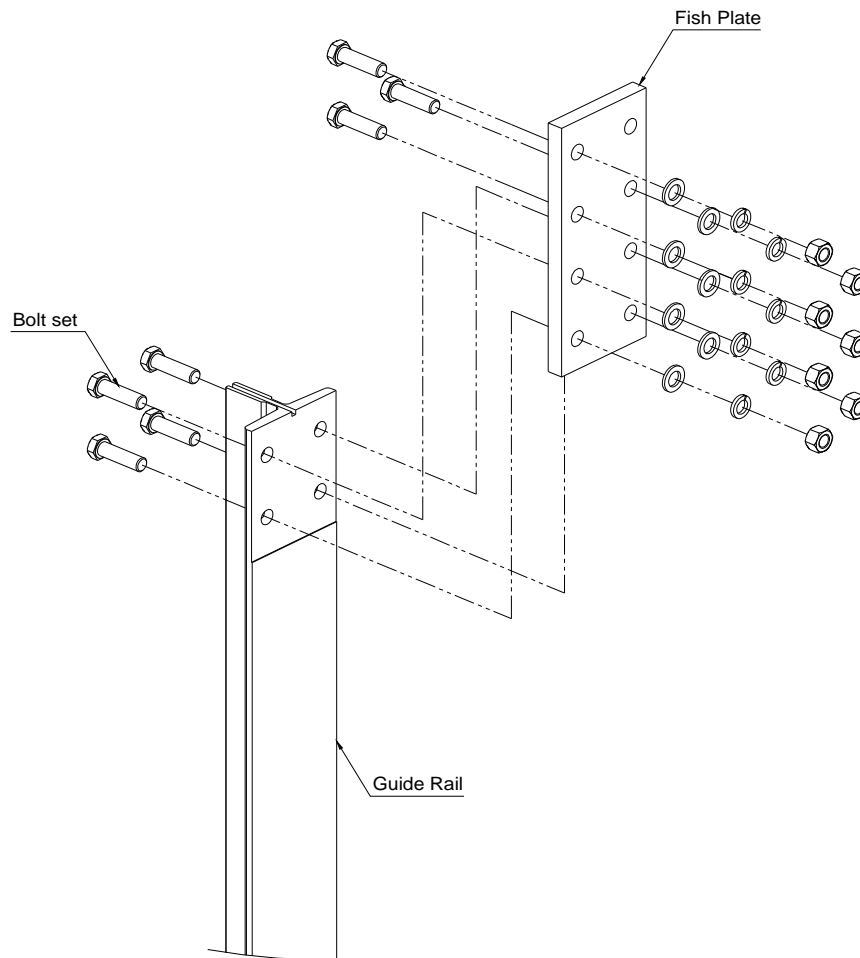


**Fig. 2-4-1-A. STORAGE of GUIDE RAIL**

|        |                     |               |             |
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## (2) Installation Preparatory

- ① Clean the fish plate's machining surface and edge of guide rail machining surface.
- ② Temporarily fasten guide rail and fish plate with bolt.  
Except, a bolt using for loading should not be assembled.
- ③ Place the woods on the floor to secure the edge of guide rail.
- ④ Check any defected part of guide rail.



**Fig. 2-4-1-B. FISH PLATE TEMPORARY ASSEMBLY**

|        |                     |               |             |
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## 2-4-2. Guide Rail Installation

### (1) Lower Guide rail installation Type "A" (Fig. 2-4-2-A.)

- ① Place bottom of lower guide rail on buffer support.
- ② Temporarily assemble Guide Rail to Rail Bracket with rail clip.  
At this time, insert shim between rear of guide rail and rail bracket.
- ③ Install the right and left of first Guide Rail of counterweight or car as above.
- ④ Level the right and left position of guide rail, then temporarily install.

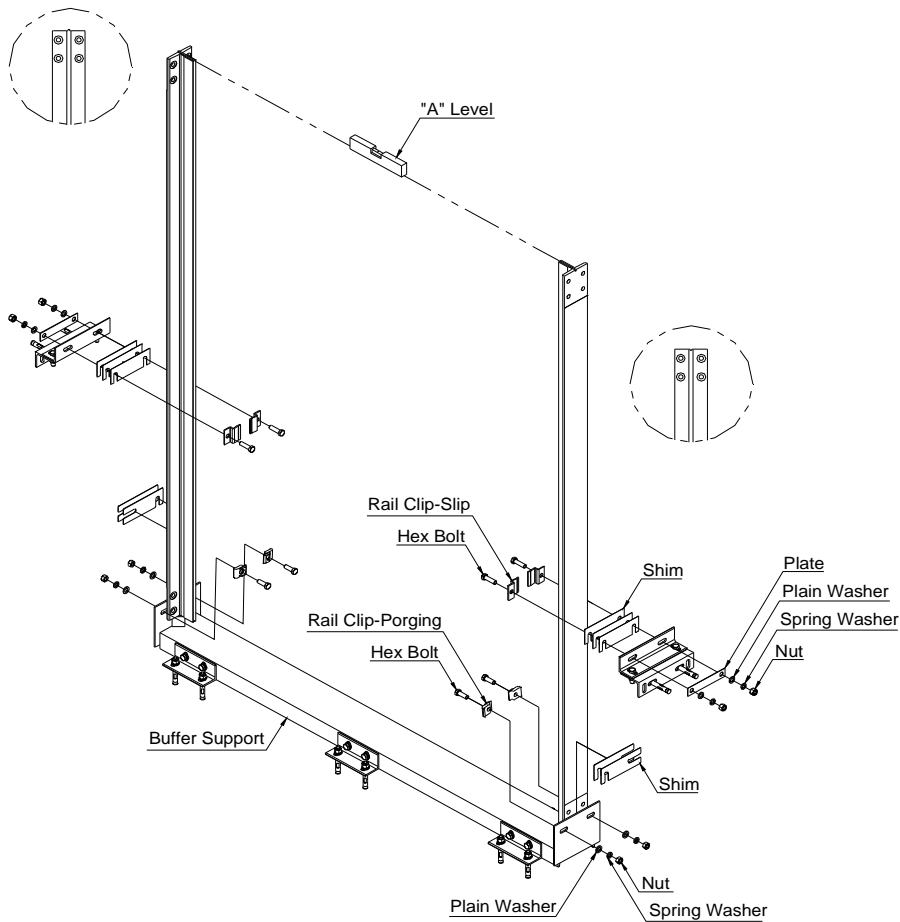


Fig. 2-4-2-A. BOTTOM GUIDE RAIL INSTALLATION TYPE "A"

| Rev. no. | Added    | Approved by | Date      |  |
|----------|----------|-------------|-----------|--|
| ①        | TYPE "A" | DU Seo      | 16-May-11 |  |
|          |          |             |           |  |
|          |          |             |           |  |

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(2) Lower Guide rail installation Type "B" (Fig. 2-4-2-B.)

- ① Place bottom of lower guide rail Fix Bracket
- ② Temporarily assemble Guide Rail to Rail Bracket with rail clip.  
At this time, insert shim between rear of guide rail and rail bracket.
- ③ Install the right and left of first Guide Rail of counterweight or car as above.
- ④ Level the right and left position of guide rail, then temporarily install.

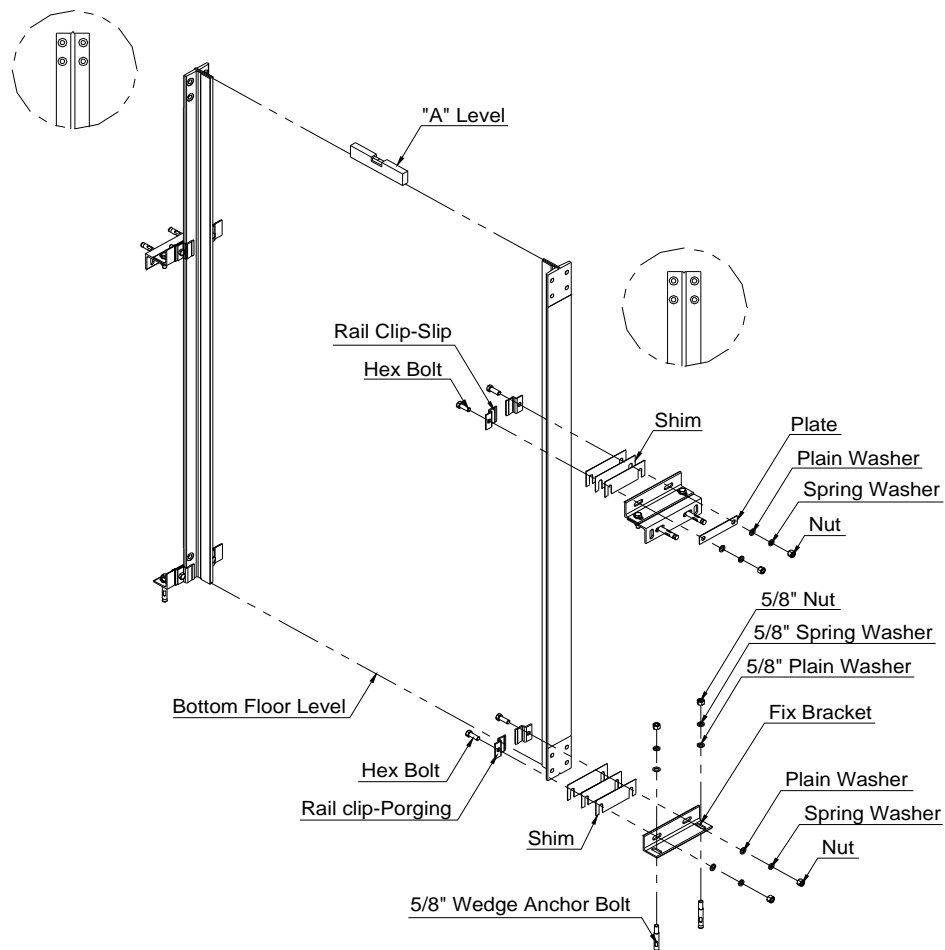


Fig. 2-4-2-B. BOTTOM GUIDE RAIL INSTALLATION TYPE "B"

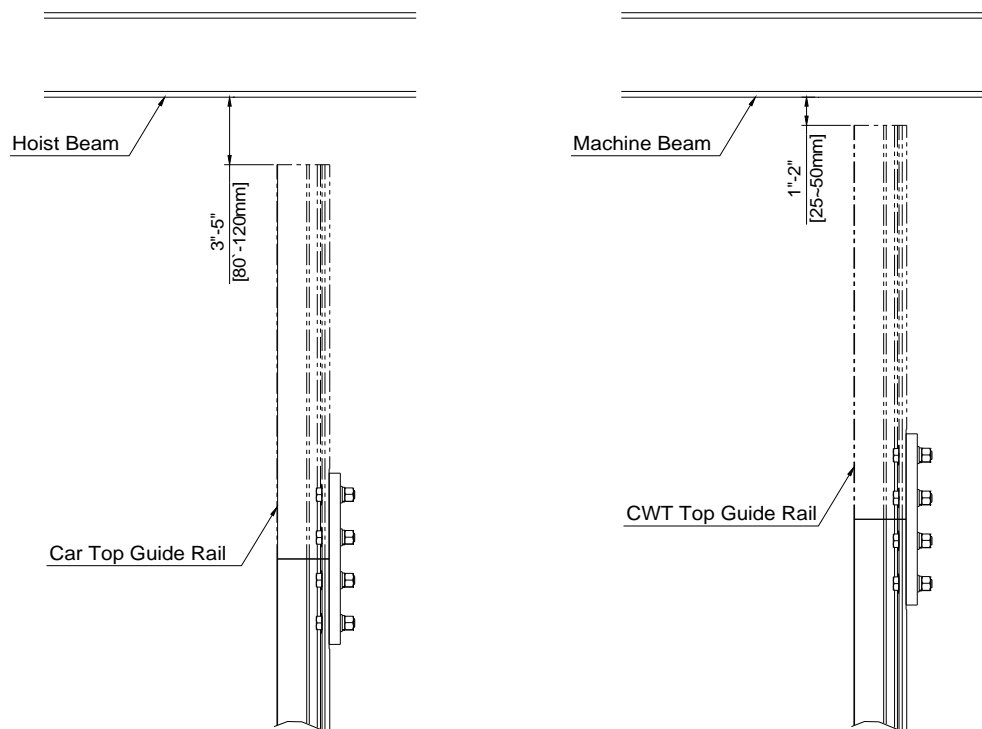
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### (3) Temporal assembling of Guide Rail and Fish plate

- ① Loosen the temporarily fastened bolt from Guide Rail Fish plate.
- ② Temporarily fasten immediate upper guide rail with bolt to Fish plate of lowest Guide rail.
- ③ Temporarily assemble the rest of Guide Rail parts as above.  
Noted that the end of Guide Rail should not be damaged.
- ④ In order for the space not to float between Guide Rail and Guide Rail, it assembles.

### (4) Top Guide Rail Assembling (Fig. 2-4-2-C.)

- ① Measured the remaining distance from lower part of Hoist Beam and cut Guide Rail, except the length of 3"~5" [80~120mm]. Then, assemble temporarily.
- ② Measured the remaining distance from lower part of Hoist Beam and cut Guide Rail, except the length of 1"~2" [25~50mm]. Then, assemble temporarily.



**Fig. 2-4-2-C. TOP GUIDE RAIL ASSEMBLY**

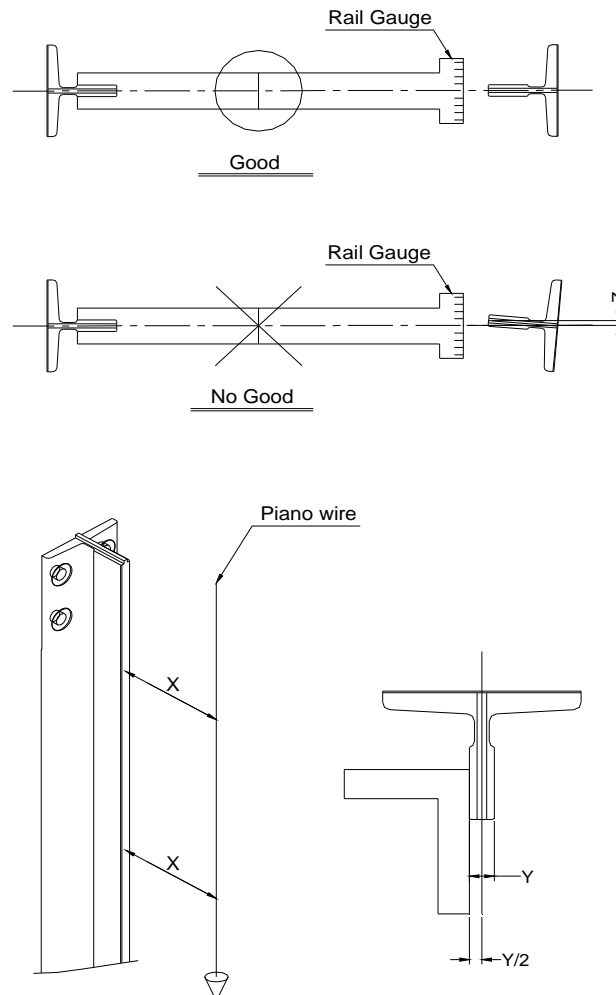
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### 2-4-3. Guide Rail or Fishplate Adjustment

#### (1) Guide Rail Adjustment (Fig. 2-4-3-A.)

Adjustment should be initiated from lower bracket to upper.

- ① Adjust length and vertical degree of Guide Rail Standard Dimension based on D.B.G
- ② Prepare Shim.
- ③ Clean the surface of guide rail.
- ④ Attach Rail Gauge between guide rails.
- ⑤ Measure the dimension of "X,Y,Z" on piano wire, and adjust within table 2-4-3-1 below.



**Fig. 2-4-3-A. GUIDE RAIL CENTER AND ALIGNMENT**

|        |                     |               |             |
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**Table 2-4-3-1 Standard tolerance**

| Size     | Content  | Standard tolerance |
|----------|--|--------------------|
| Size "X" | Distance from Piano wire to Guide Rail Surface                           | D.B.G. +1-0 mm     |
| Size "Y" | Distance from Piano wire to Guide Rail Side                              | ±0                 |
| Size "Z" | Deflected distance from opposite Guide Rail Piano wire to right or left. | ±0.5 mm            |

#### Adjustment

- ① Size "X" : Add or remove shim between guide rail and rail bracket
- ② Size "Y" : Slowly move guide rail to reach the square on the side of guide rail.
- ③ Size "Z" : Insert half of shim into the greater deflected distance to right or left.

Or, move temporarily fastened rail bracket, which is located immediate above.

- ⑥ After adjustment is completed, securely fasten the bolts and weld 4 point to be mounted.
- ⑦ After remove welding slag from welded part, check welding Bead
- ⑧ Perform other rail brackets the same as above.

#### (2) Guide Rail Fishplate Adjustment (Fig. 2-4-3-B.)

- ① Clean top/bottom surface and right/left of rail fishplate.
- ② Completely mount bolts of fishplate to measure the space.
- ③ Attach straight gauge to front and side of guide rail.
- ④ Measure and record gap of each part. (Gap "A,B,C,D,E,F")
- ⑤ As 2-4-3-A, adjust the size "X" direction within D.B.G +1-0mm and size "Y" to 0mm.
- ⑥ Based on measured data, insert shim into fishplate bolt of guide rail and adjust as referred table 2-4-3-2 guide rail fishplate standard tolerance.
- ⑦ After you complete adjustment, mount all the bolts of fishplate.
- ⑧ Perform other guide rail fishplates the same as above.

**Table 2-4-3-2 Guide Rail fishplate standard tolerance.**

| Speed                         | Standard Tolerance |                 | Remarks           |
|-------------------------------|--------------------|-----------------|-------------------|
|                               | Car                | CWT             |                   |
| 400~800 fpm<br>[2.0-4.0 m/s]  | 0.006" [0.15 mm]   | 0.012" [0.3 mm] | Gap "A,B,C,D,E,F" |
| 350 fpm [1.75 m/s]<br>or less | 0.01" [0.25 mm]    | 0.02" [0.5 mm]  |                   |

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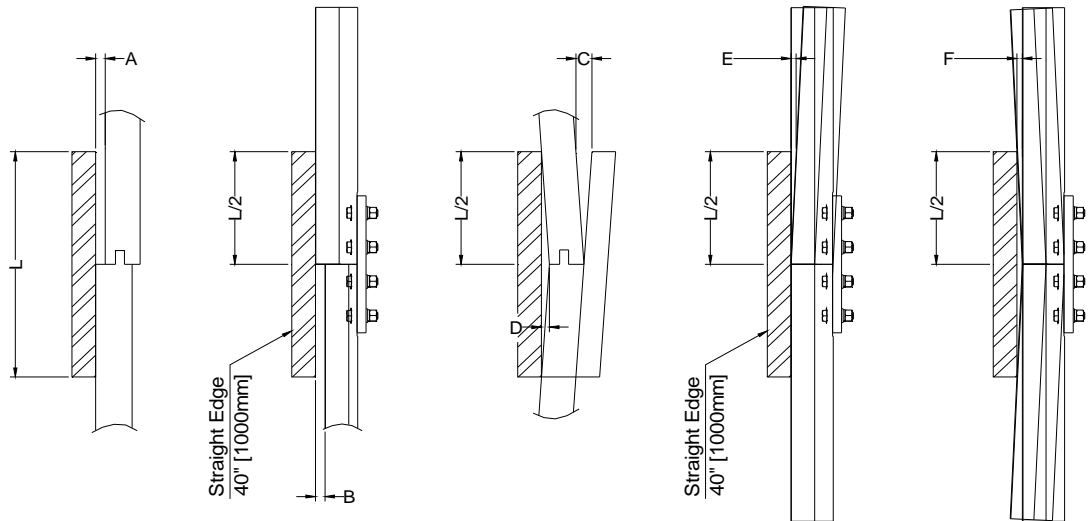


Fig. 2-4-3-B. ALIGNING GUIDE RAIL FISHPLATE

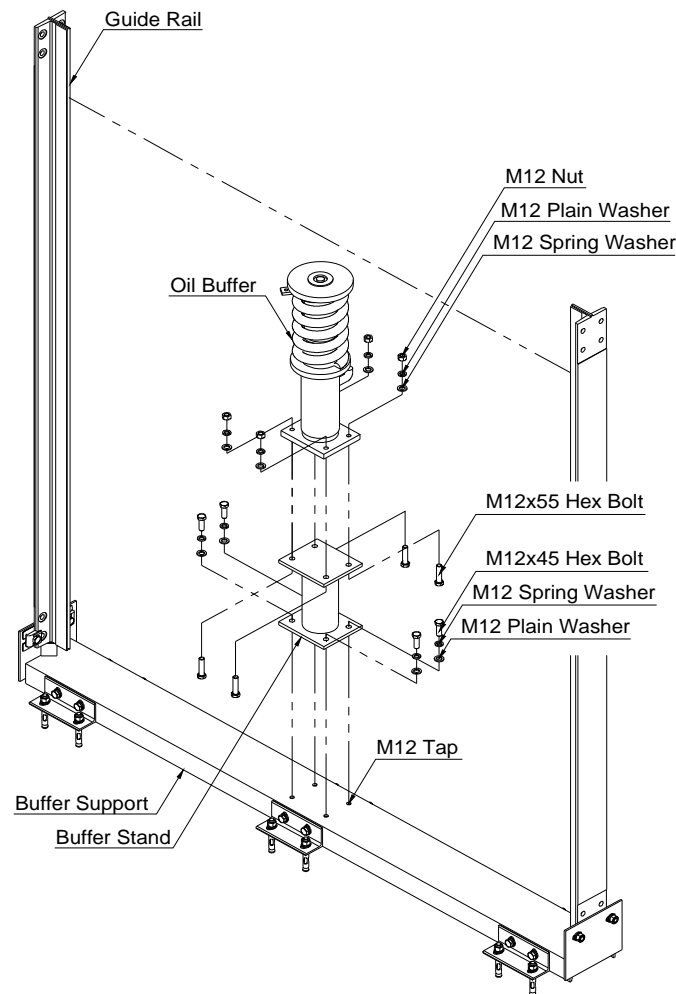
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## 2-5. Hoistway Equipment Installation

### 2-5-1. Buffer Installation

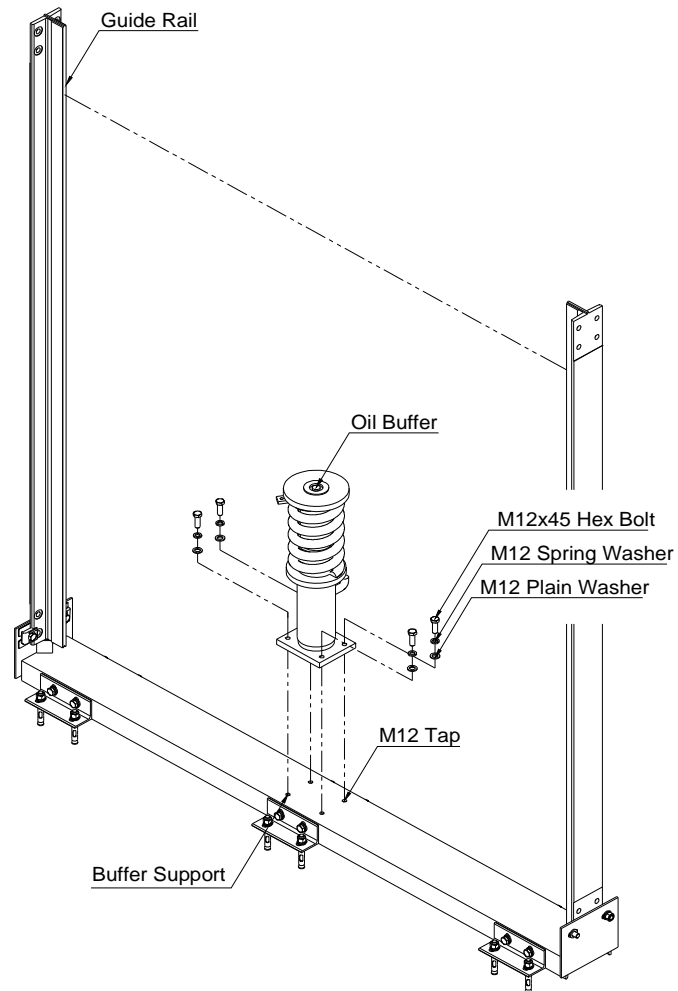
#### (1) Oil Buffer Installation (See Fig. 2-5-1-A. & See Fig. 2-5-1-B.)

- ① If there is buffer support, buffer support should be installed first, then install oil buffer.
- ② If there isn't buffer stand, install oil buffer immediately
- ③ Referred DF BUFFER Use and Maintenance Instructions for injecting oil to oil buffer.



**Fig. 2-5-1-A. BUFFER INSTALLATION  
(with BUFFER STAND)**

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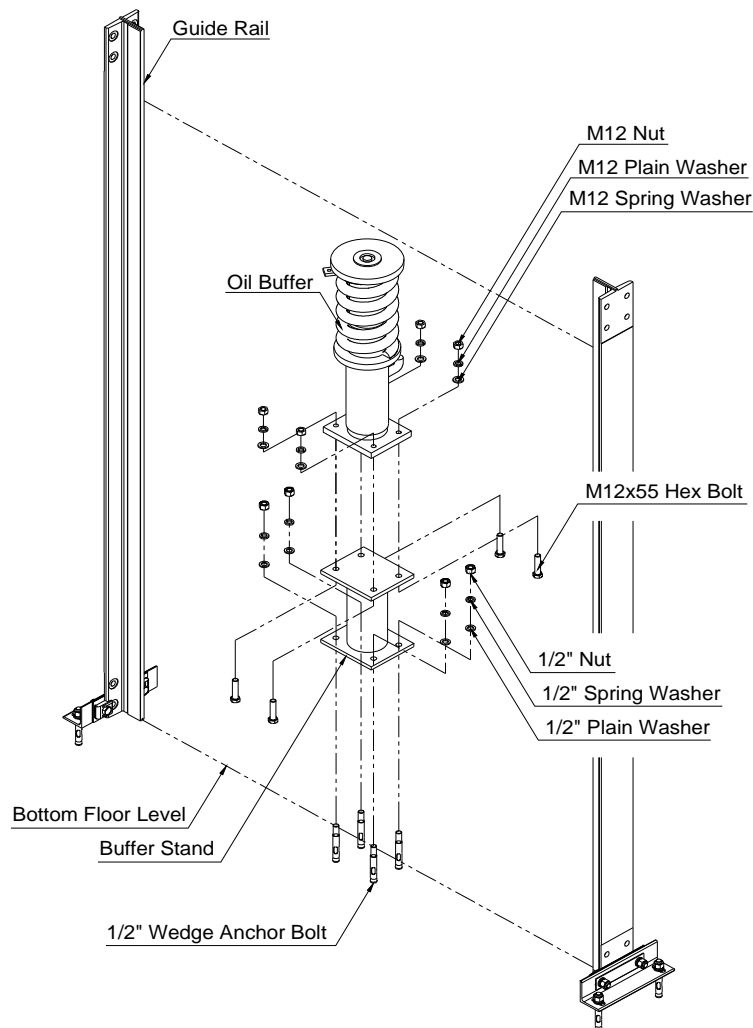


**Fig. 2-5-1-B. BUFFER INSTALLATION**  
**(with out BUFFER STAND)**

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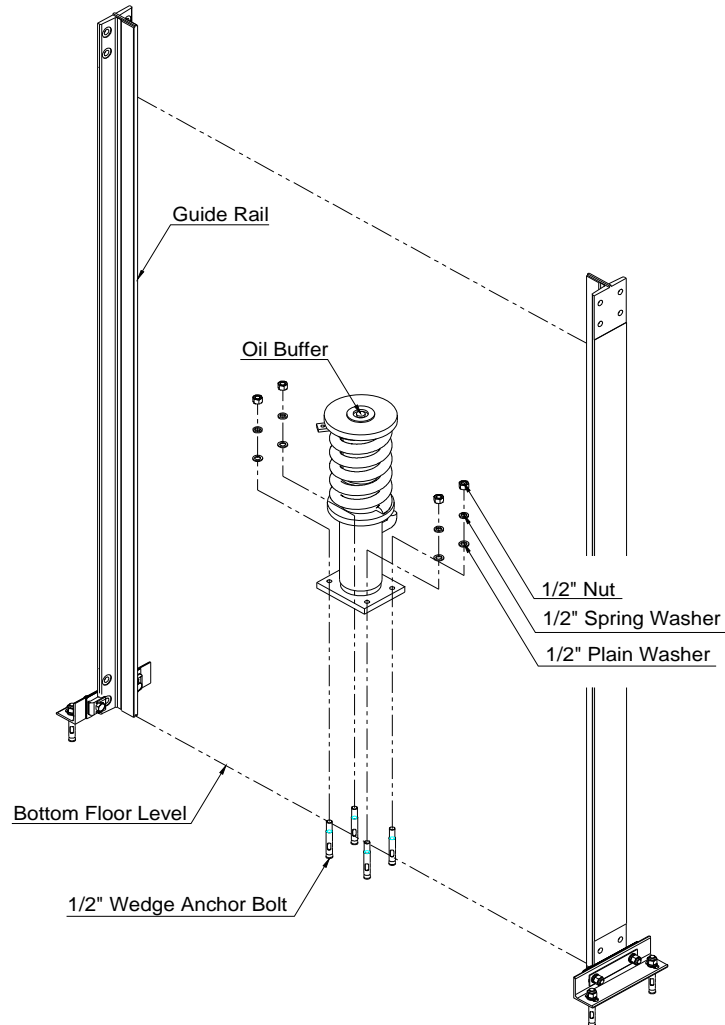
(2) Oil Buffer Installation (See Fig. 2-5-1-C. & See Fig. 2-5-1-D.)

- ① If there isn't buffer stand, install oil buffer immediately
- ② Referred DF BUFFER Use and Maintenance Instructions for injecting oil to oil buffer.



**Fig. 2-5-1-C. BUFFER INSTALLATION**

|        |                     |               |             |
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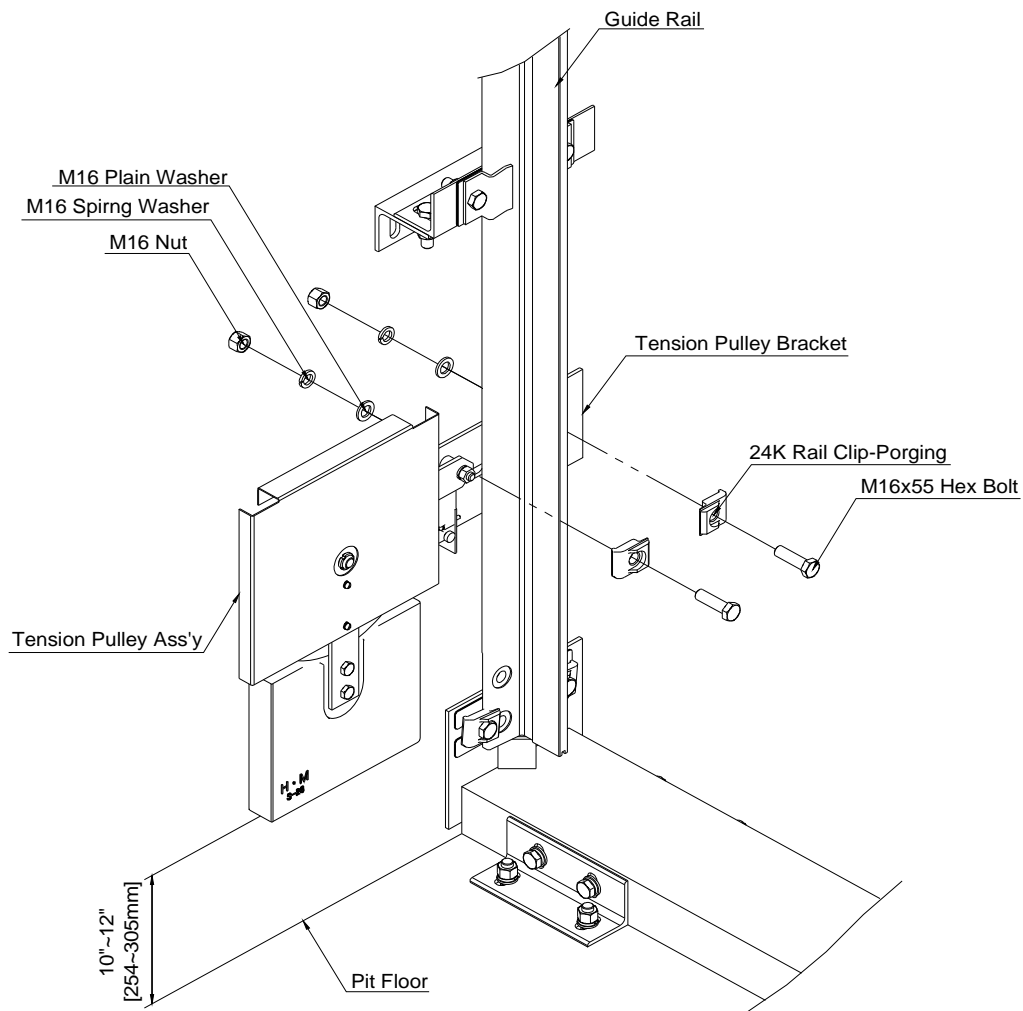
**Fig. 2-5-1-D. BUFFER INSTALLATION  
(with out BUFFER STAND)**

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①

#### 2-5-2. Installation Tension Pulley Type "A" (See Fig. 2-5-2.)

- (1) Check over speed governor position. (refer to layout drawing)
- (2) Temporarily install tension pulley bracket in the lowest guide rail.
- (3) Height from pit floor to bottom of tension pulley should be 10"-12"[254~305mm].



①

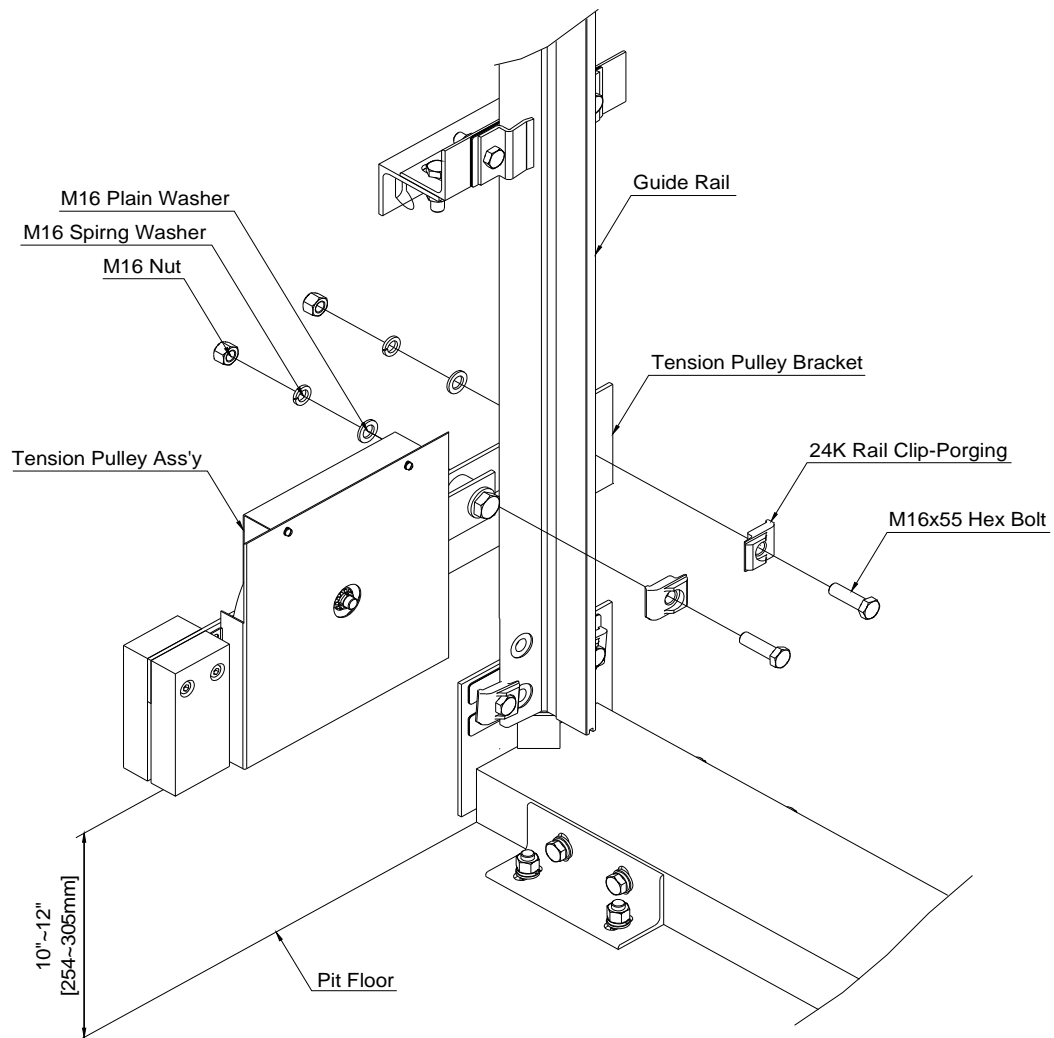
**Fig. 2-5-2. TENSION PULLEY INSTALLATION (TYPE "A")**

| Rev. no. | Description      | Approved by | Date      |  |
|----------|------------------|-------------|-----------|--|
| ①        | ADDED (TYPE "A") | DU Seo      | 23-Dec-09 |  |
|          |                  |             |           |  |
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### 2-5-3. Installation Tension Pulley Type "B" (See Fig. 2-5-3.)

- (1) Check over speed governor position. (refer to layout drawing)
- (2) Temporarily install tension pulley bracket in the lowest guide rail.
- (3) Height from pit floor to bottom of tension pulley should be 10"~12" [254~305mm].

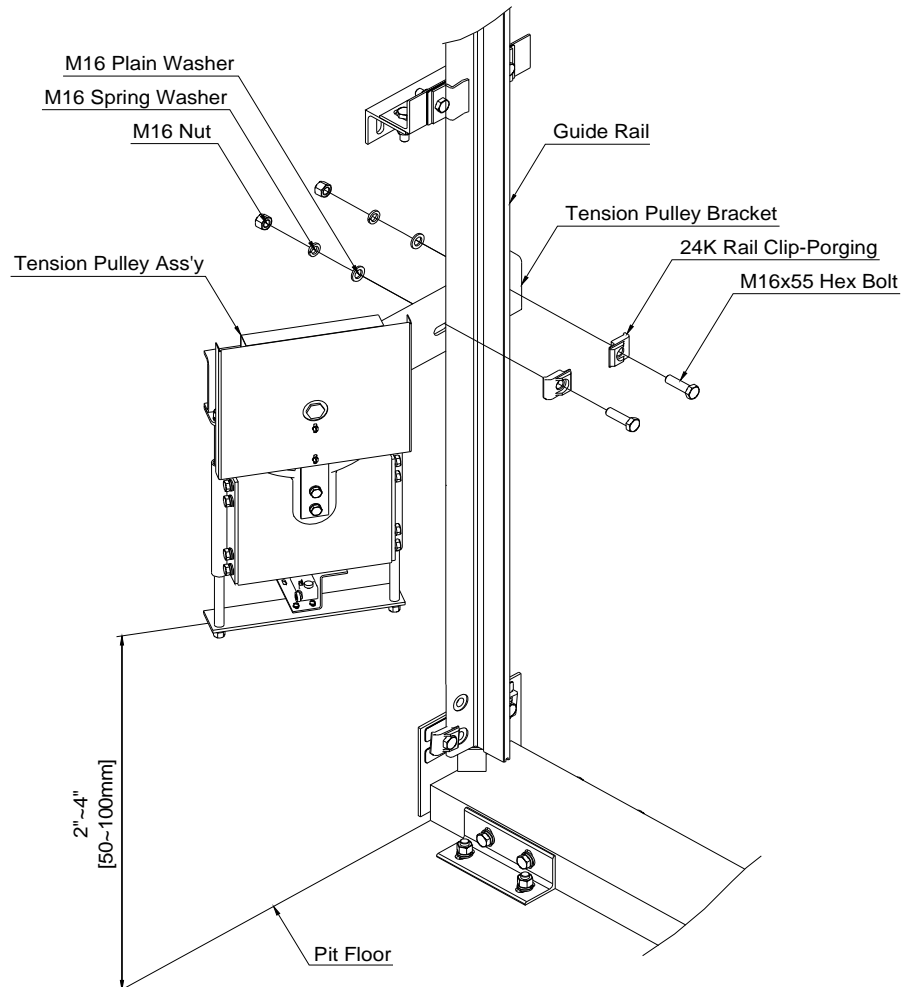


**Fig. 2-5-3. TENSION PULLEY INSTALLATION (TYPE "B")**

|        |                     |               |             |
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#### 2-5-4. Installation Tension Pulley Type "C" (See Fig. 2-5-4.)

- (1) Check over speed governor position. (refer to layout drawing)
- (2) Temporarily install tension pulley bracket in the lowest guide rail.
- (3) Height from pit floor to bottom of tension pulley should be 2"~4" [50~100mm].

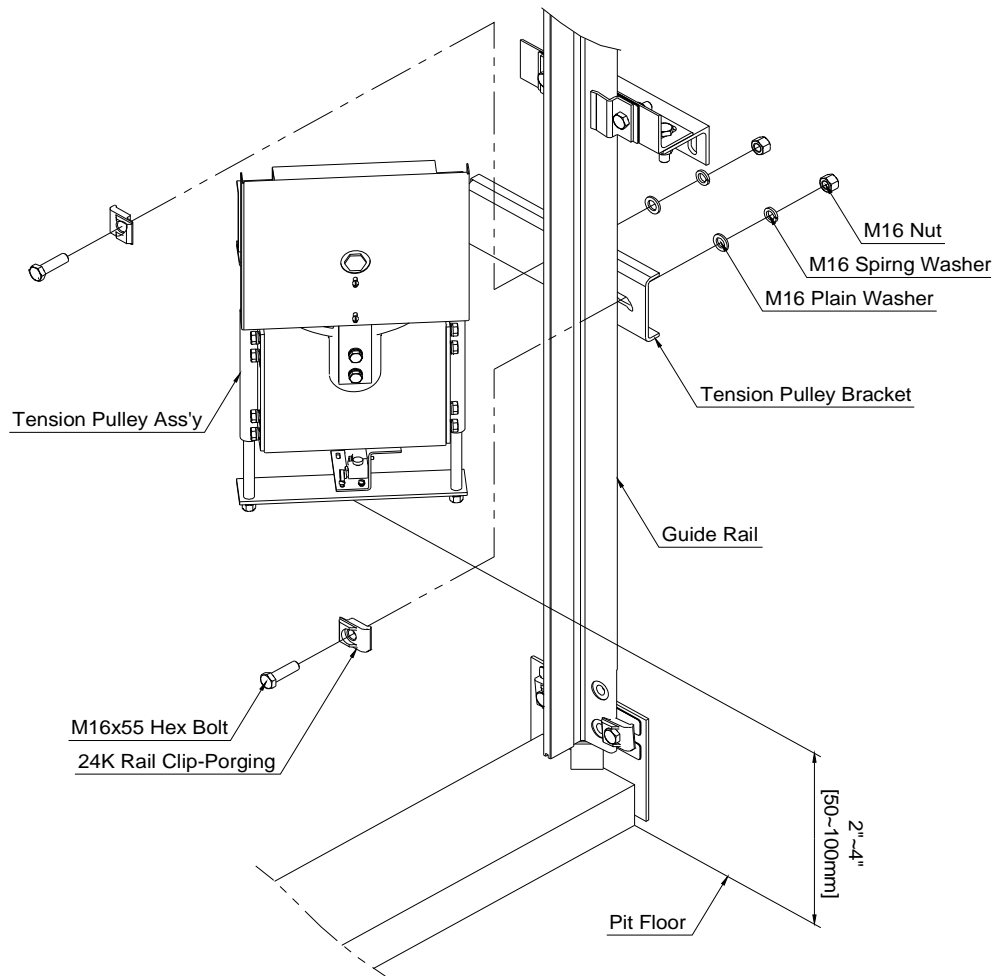


**Fig. 2-5-4. TENSION PULLEY INSTALLATION TYPE "C"**  
**(FORK TYPE)**

|        |                     |               |             |
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#### 2-5-5. Installation Tension Pulley Type "D" (See Fig. 2-5-5.)

- (1) Check over speed governor position. (refer to layout drawing)
- (2) Temporarily install tension pulley bracket in the lowest guide rail.
- (3) Height from pit floor to bottom of tension pulley should be 2"~4" [50~100mm].

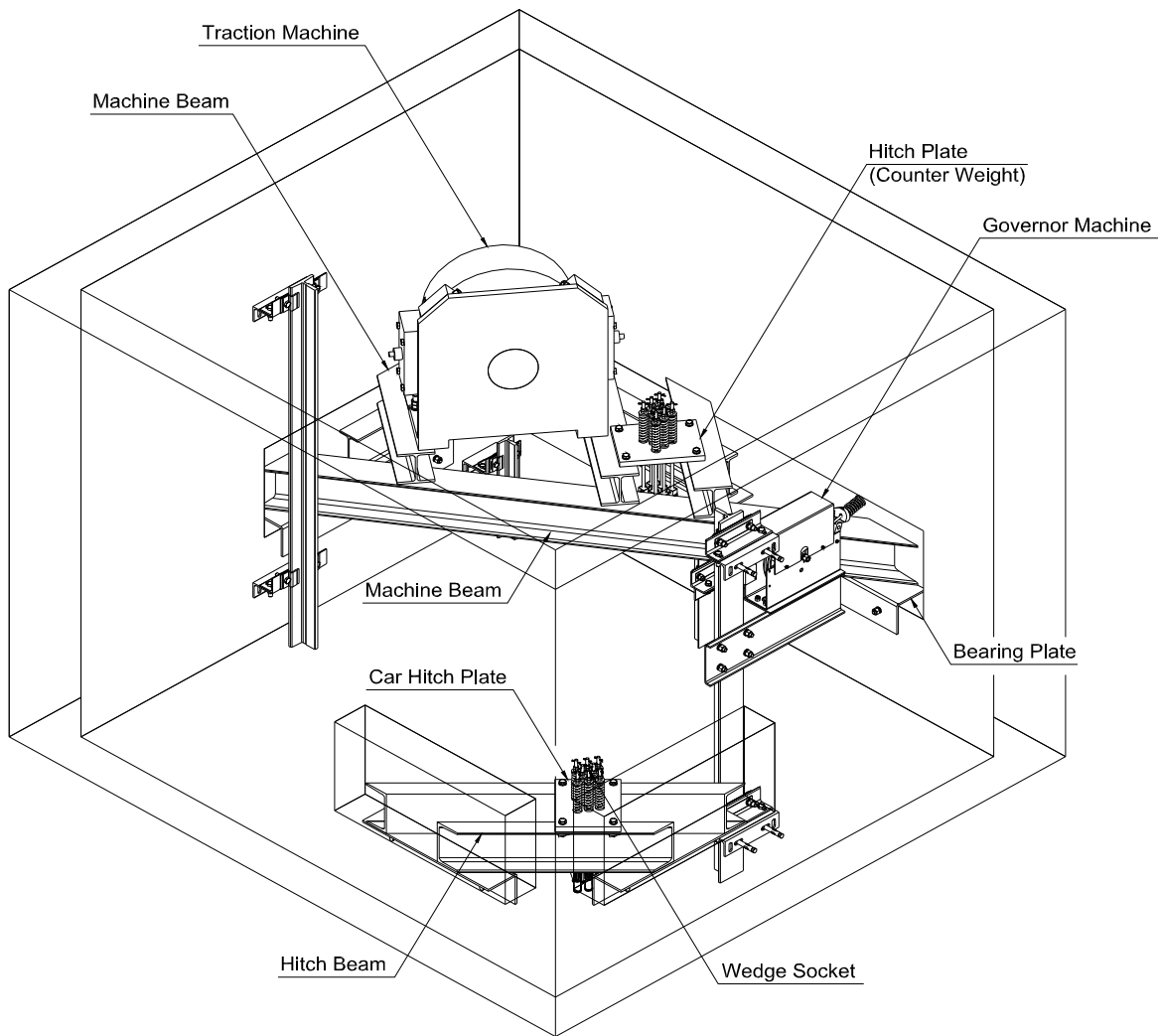


**Fig. 2-5-5. TENSION PULLEY INSTALLATION TYPE "D"**  
**(CORNER POST TYPE)**

|        |                     |               |             |
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### 3. OVERHEAD

#### 3-1. Overhead View



**Fig. 3-1. OVERHEAD VIEW**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
| HM TEC | INSTALLATION MANUAL | Document No.: | TN-M01-0001 |
|        |                     | Date:         | 2-Mar-09    |
|        | MRL - OVERHEAD      | Name:         | N.R.Kim     |
|        |                     | page:         | 3-02        |

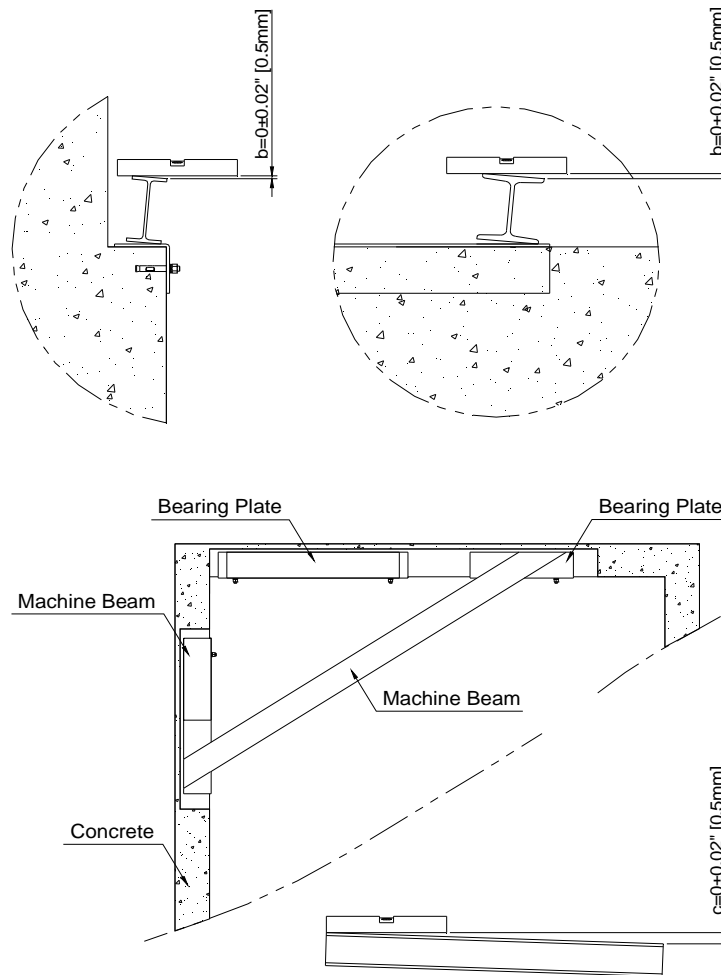
### 3-2. Traction Machine

#### 3-2-1. Machine Beam Installation

(1) Preparatory: Suspend machine beam to hoist beam.

(2) Machine Beam Installation (Fig. 3-2-1.)

- ① Place Machine Beam as referred to layout drawing.
- ② Distance between each of beam should be within 0.04" [1mm]
- ③ Horizontal angle of machine beam should be within  $\pm 0.02^\circ$  [0.5mm] .
- ④ Both horizontal angle of machine beam should be within  $\pm 0.04^\circ$  [1.0mm] .



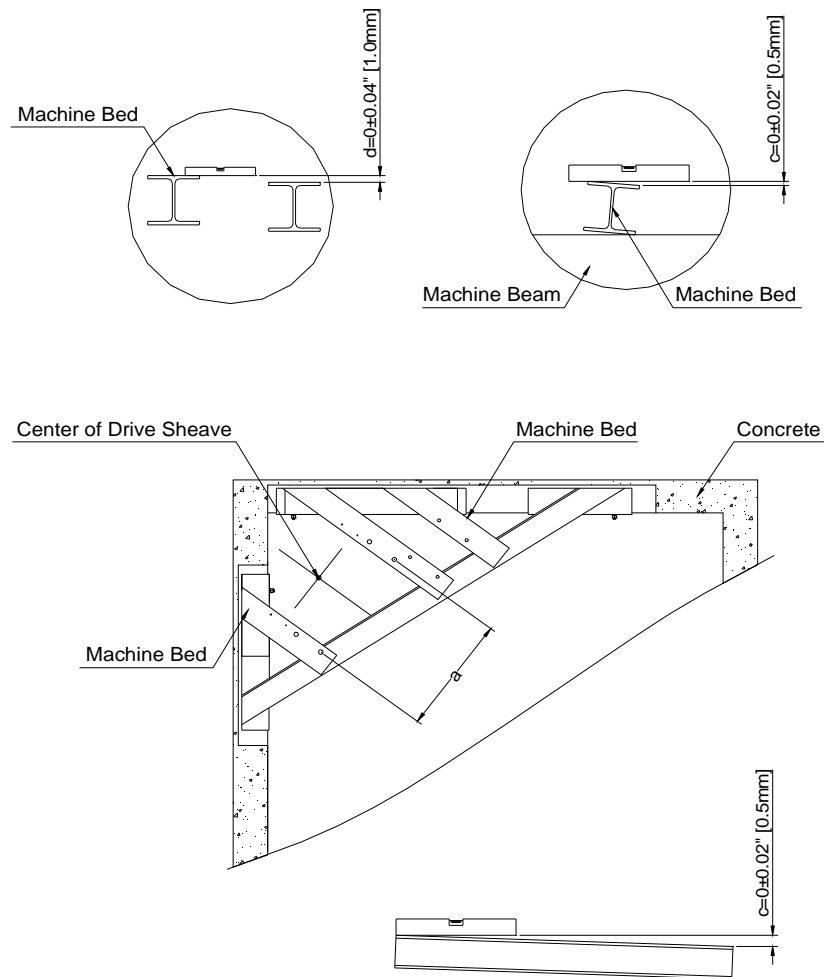
**Fig. 3-2-1. MACHINE BEAM INSTALLATION**

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|--------|---------------------|---------------|-------------|
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|        |                     | Date:         | 2-Mar-09    |
|        | MRL - OVERHEAD      | Name:         | N.R.Kim     |
|        |                     | page:         | 3-03        |

### 3-2-2. Traction Machine Assembly

#### (1) Traction Machine Components (Fig. 3-2-2.)

- ① Temporarily assemble Traction Machine and Bed Beam with bolt
- ② Locate Traction machine on the machine beam.
- ③ Distance between each of beam should be within 0.04" [1mm].
- ④ Each horizontal angle of machine bed should be within  $\pm 0.02^\circ$  [0.5mm]
- ⑤ Both horizontal angle of machine bed should be within  $\pm 0.04^\circ$  [1.0mm].



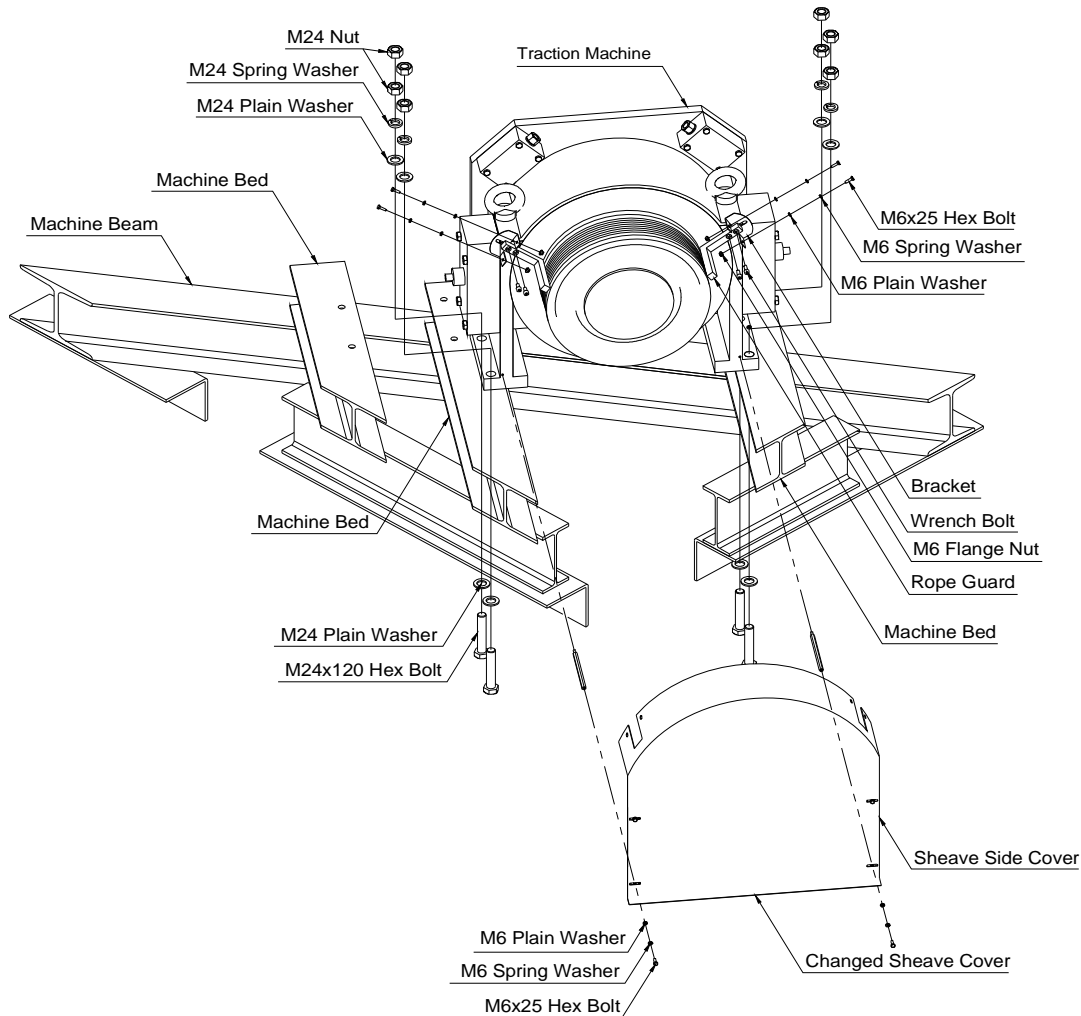
**Fig. 3-2-2. MACHINE BED INSTALLATION**

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|--------|---------------------|---------------|-------------|
| HM TEC | INSTALLATION MANUAL | Document No.: | TN-M01-0001 |
|        |                     | Date:         | 2-Mar-09    |
|        | MRL - OVERHEAD      | Name:         | N.R.Kim     |
|        |                     | page:         | 3-04        |

### 3-2-3. Traction Machine Setting

#### (1) Plumbness of Drive Sheave (Fig. 3-2-3-A. & Fig. 3-2-3-B.)

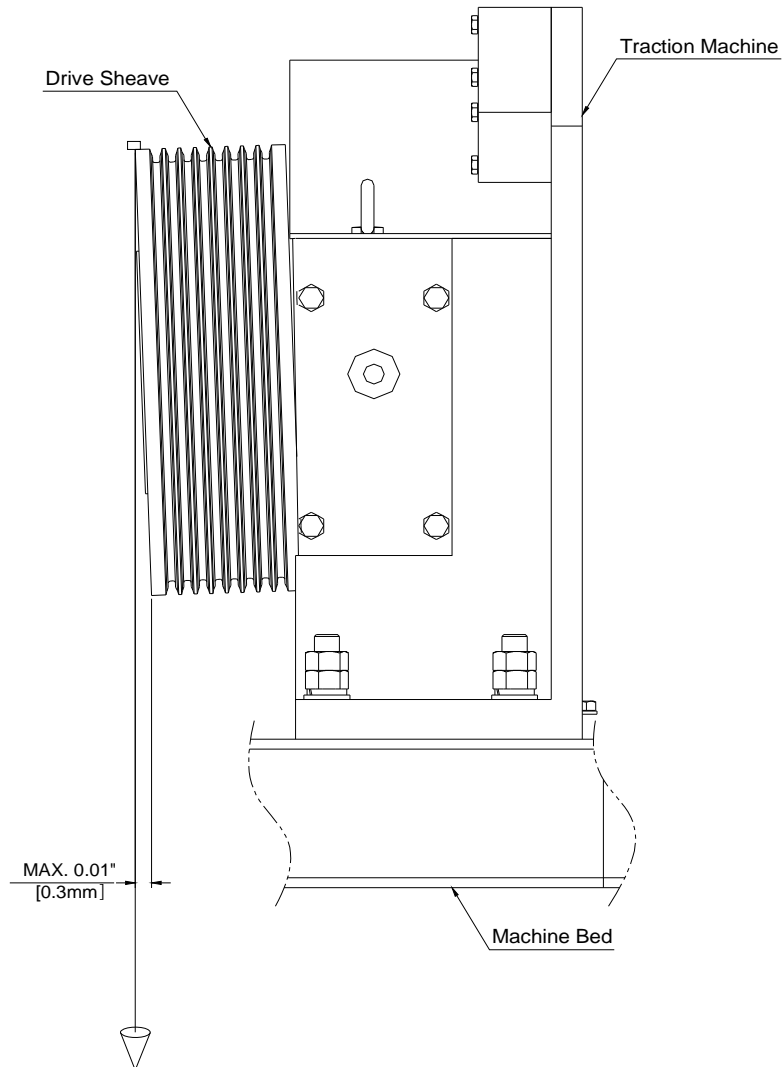
- ① Plumb Drive sheave per Fig. 3-2-3-A Establish centerline of Wire ropes as shown
- ② Weld 4 point of Machine bed beam and Machine beam.
- ③ Install permanently with bolt.
- ④ Completely mount by welding machine bed beam and machine beam.
- ⑤ Remove welding slag from the welded part and check welding bead.



**Fig. 3-2-3-A. MACHINE SETTING**

| Rev. no. | Description          | Approved by | Date     |  |
|----------|----------------------|-------------|----------|--|
| ①        | Changed Sheave cover | DU Seo      | 8-Jan-10 |  |
|          |                      |             |          |  |
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|        | MRL - OVERHEAD      | Name:         | N.R.Kim     |
|        |                     | page:         | 3-05        |



**Fig. 3-2-3-B. MACHINE SETTING**

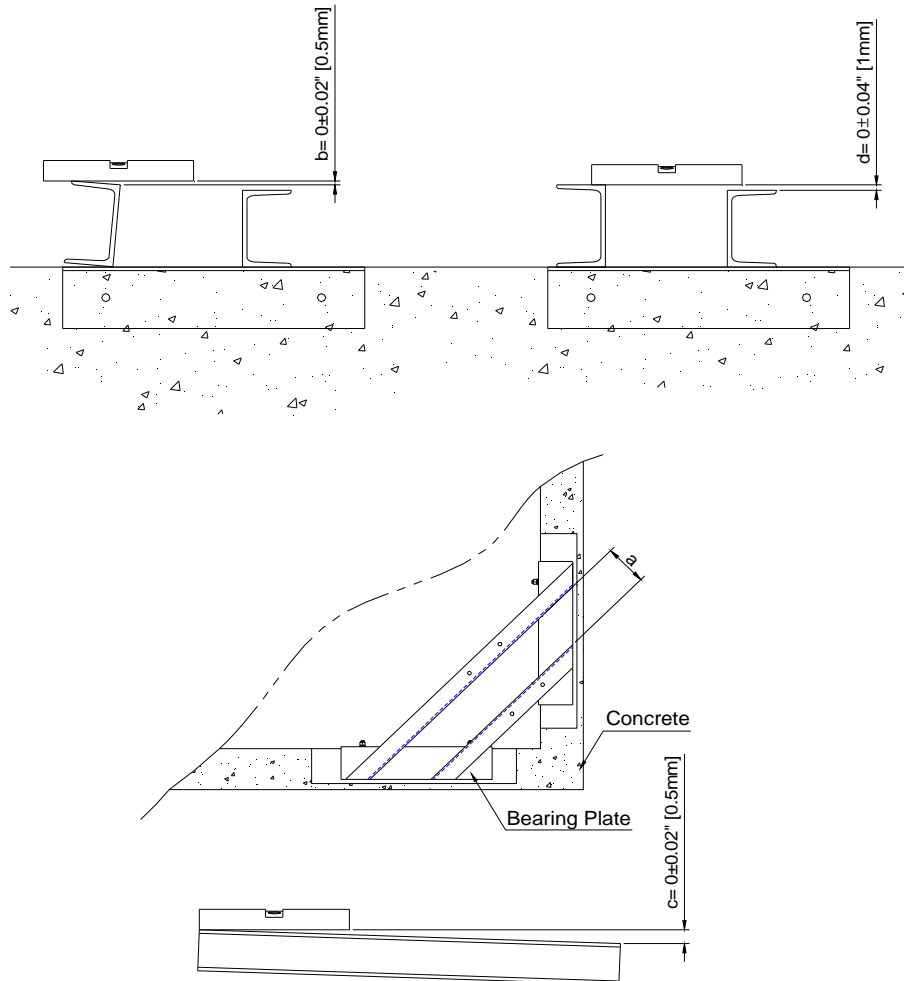
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| HM TEC | INSTALLATION MANUAL | Document No.: | TN-M01-0001 |
|        |                     | Date:         | 2-Mar-09    |
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|        |                     | page:         | 3-06        |

### 3-2-4. Car Hitch Beam Installation

(1) Preparatory : Suspend Hitch Beam to Hoist Beam.

(2) Machine Beam Installation (Fig. 3-2-4.)

- ① Place Hitch Beam as shown on Layout Drawing.
- ② Distance each of Beam should be within 0.04" [1mm].
- ③ Each horizontal angle of Hitch Beam should be within  $\pm 0.02"$  [0.5mm].
- ④ Both horizontal angle of Hitch Beam should be within  $\pm 0.04"$  [1.0mm].



**Fig. 3-2-4. HITCH BEAM INSTALLATION**

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|        |                     | Date:         | 2-Mar-09    |
|        | MRL - OVERHEAD      | Name:         | N.R.Kim     |
|        |                     | page:         | 3-07        |

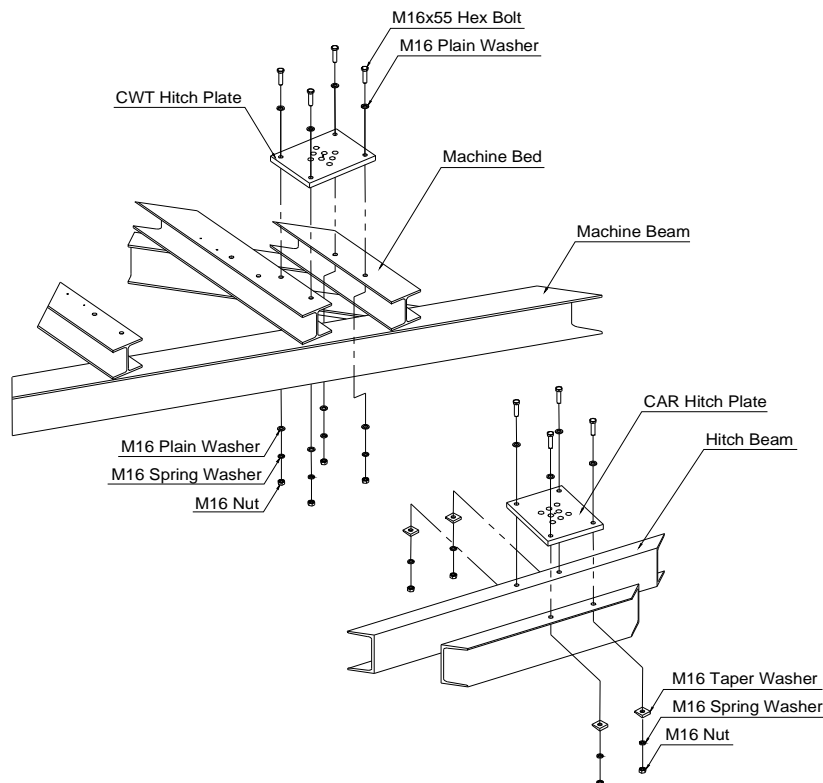
### 3-2-5. Car & CWT. Hitch Plate Installation

#### (1) Car Hitch Plate (See Fig. 3-2-5.)

- ① Temporarily fasten Car Hitch plate fitted to Hitch Beam with prepared bolt.
- ② Check direction of Car Sheave Groove and Hitch Plate Hole and then mount them permanently

#### (2) CWT. Hitch Plate (See Fig. 3-2-5.)

- ① Adjust CWT. Hitch plate to Machine Bed and fasten temporarily with prepared bolt.
- ② Check direction of CWT. Sheave Groove and Hitch Plate Hole.
- ③ Weld 4 points of Machine bed beam and Machine beam.
- ④ Install permanently with Bolt.
- ⑤ Weld Machine bed beam and Machine beam to mount permanently.
- ⑥ Remove welding slag from welded part, and then check welding bid/bead?



**Fig. 3-2-5. HITCH PLATE INSTALLATION**

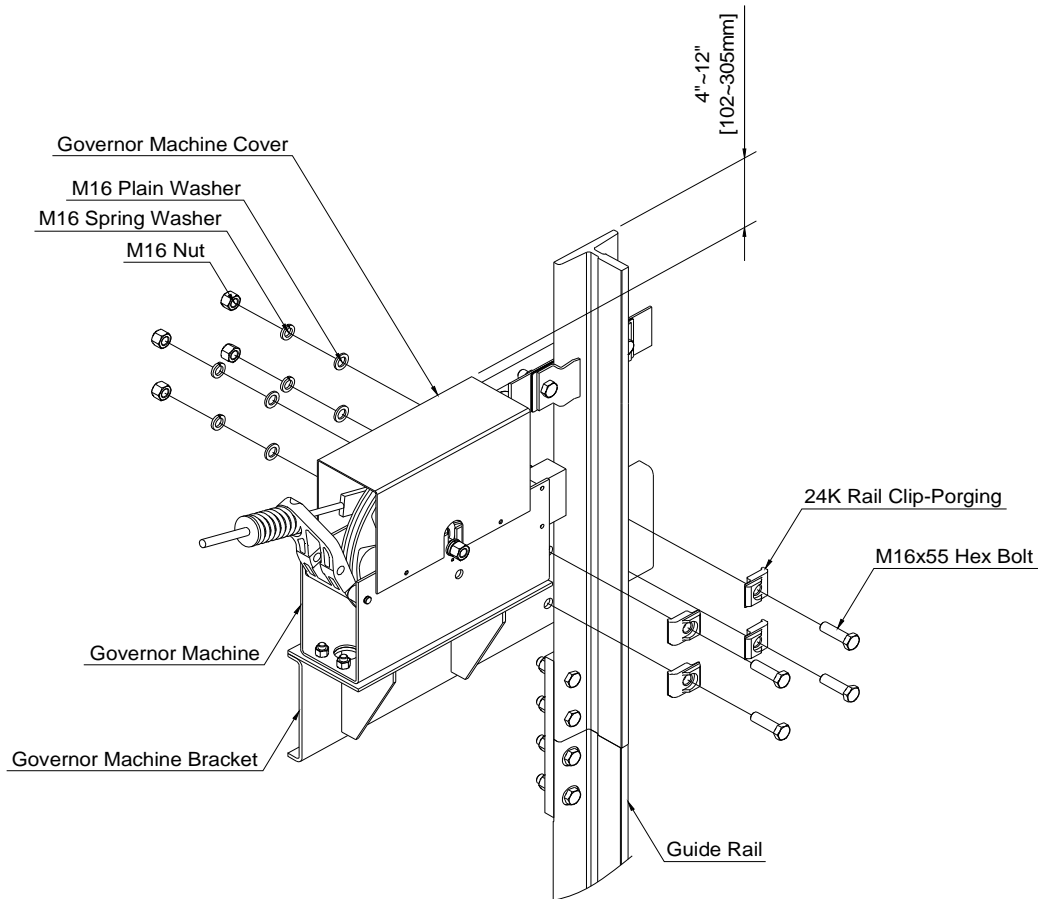
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|        |                     | Date:         | 2-Mar-09    |
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|        |                     | page:         | 3-08        |

### 3-3. Overspeed Governor Installation

①

3-3-1. Type of Elevator : MRL (See Fig. 3-3-1.)

- (1) Check the position of Over speed Governor. (See Layout Drawing)
- (2) Temporarily install Over speed Governor at Top Guide Rail.
- (3) Height from top Guide Rail to upper Over speed Governor should be 4"~12" [102~305mm].
- (4) Install permanently with bolt.



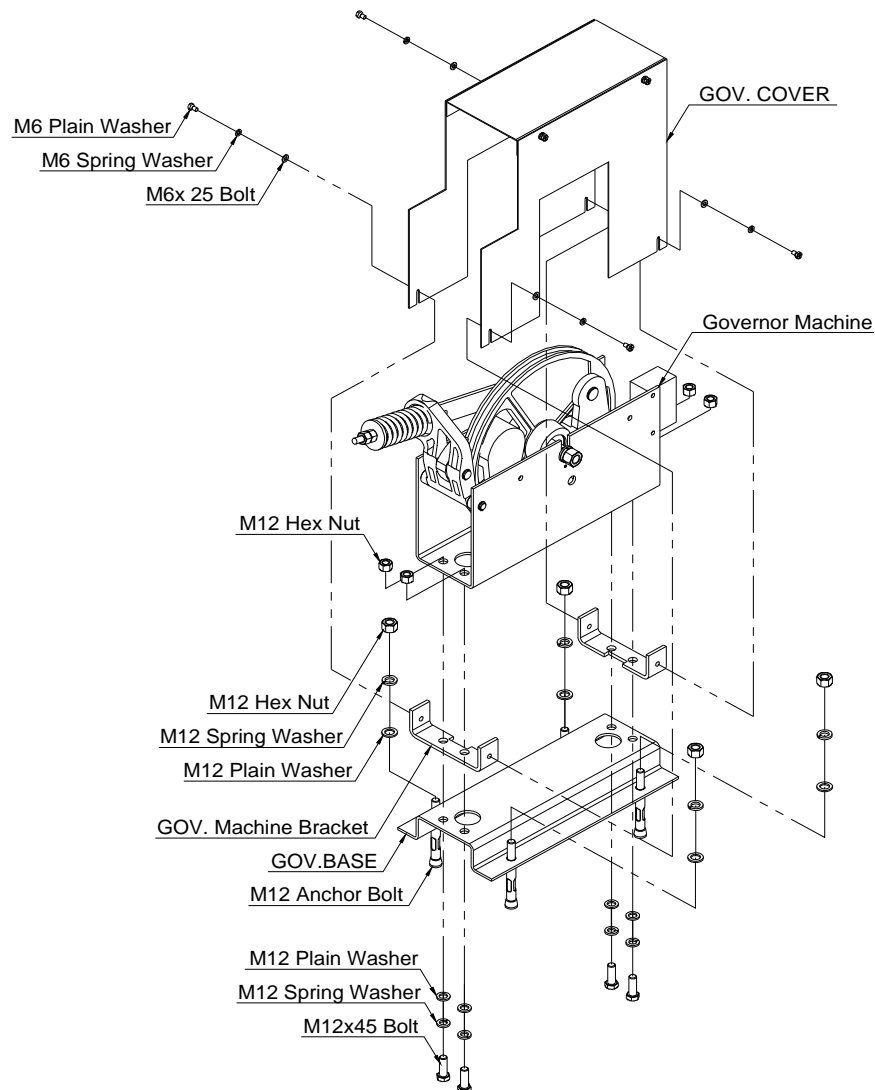
**Fig. 3-3-1. OVERSPEED GOVERNOR INSTALLATION (MRL)**

| Rev. no. | Description | Approved by | Date      |  |
|----------|-------------|-------------|-----------|--|
| ①        | ADDED       | DU Seo      | 23-Dec-09 |  |
|          |             |             |           |  |
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| HM TEC | INSTALLATION MANUAL | Document No.: | TN-M01-0001 |
|        |                     | Date:         | 25-Aug-10   |
|        | MRL - OVERHEAD      | Name:         | N.R.Kim     |
|        |                     | page:         | 3-09        |

3-3-2. Type of Elevator : MMR (See Fig. 3-3-2.)

- (1) Check the position of Over speed Governor. (See Layout Drawing)
- (2) Check for proper clearance between governor rope holes.
- (3) Assembly overspeed governor using anchor bolts and level/plumb.

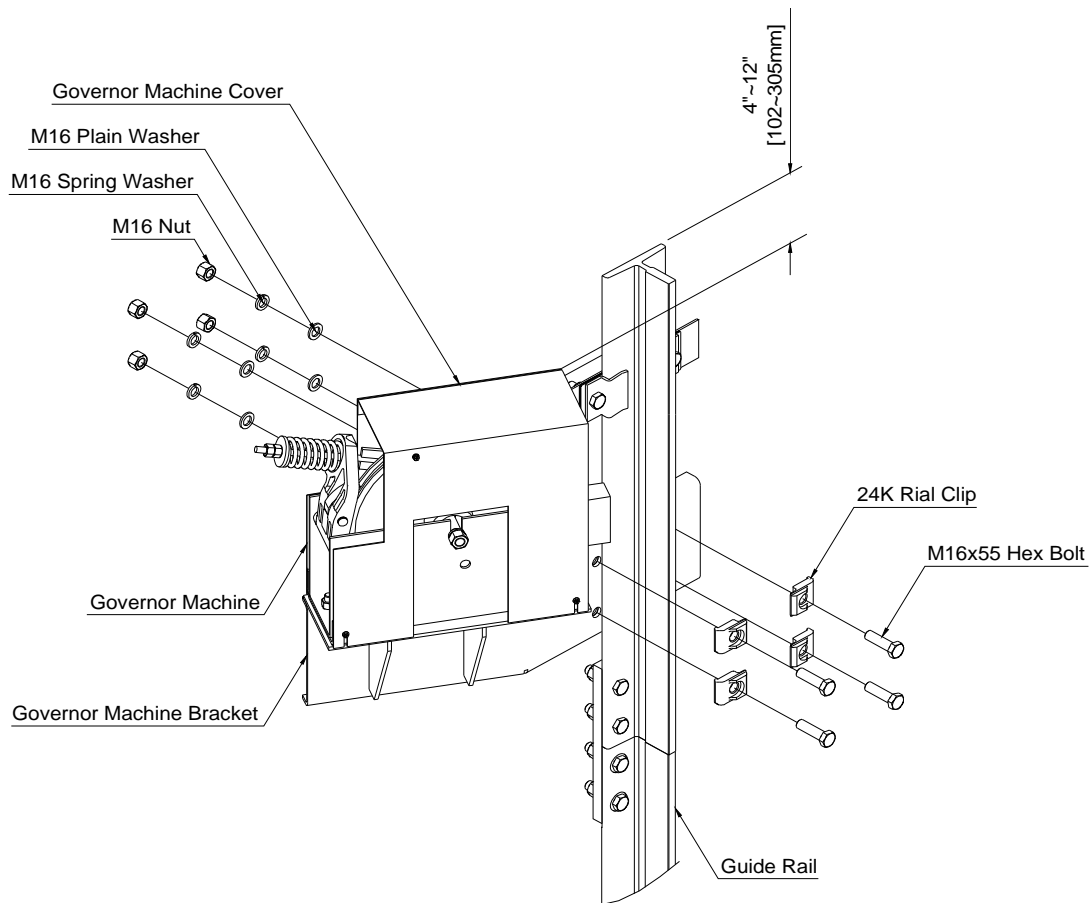


**Fig. 3-3-2. OVERSPEED GOVERNOR INSTALLATION (MMR)**

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|--------|---------------------|---------------|-------------|
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|        | MRL - OVERHEAD      | Name:         | N.R.Kim     |
|        |                     | page:         | 3-10        |

3-3-3. Type of Elevator : Fork type (See Fig. 3-3-3.)

- (1) Check the position of Over speed Governor. (See Layout Drawing)
- (2) Check for proper clearance between governor rope holes.
- (3) Assembly overspeed governor using anchor bolts and level/plumb.

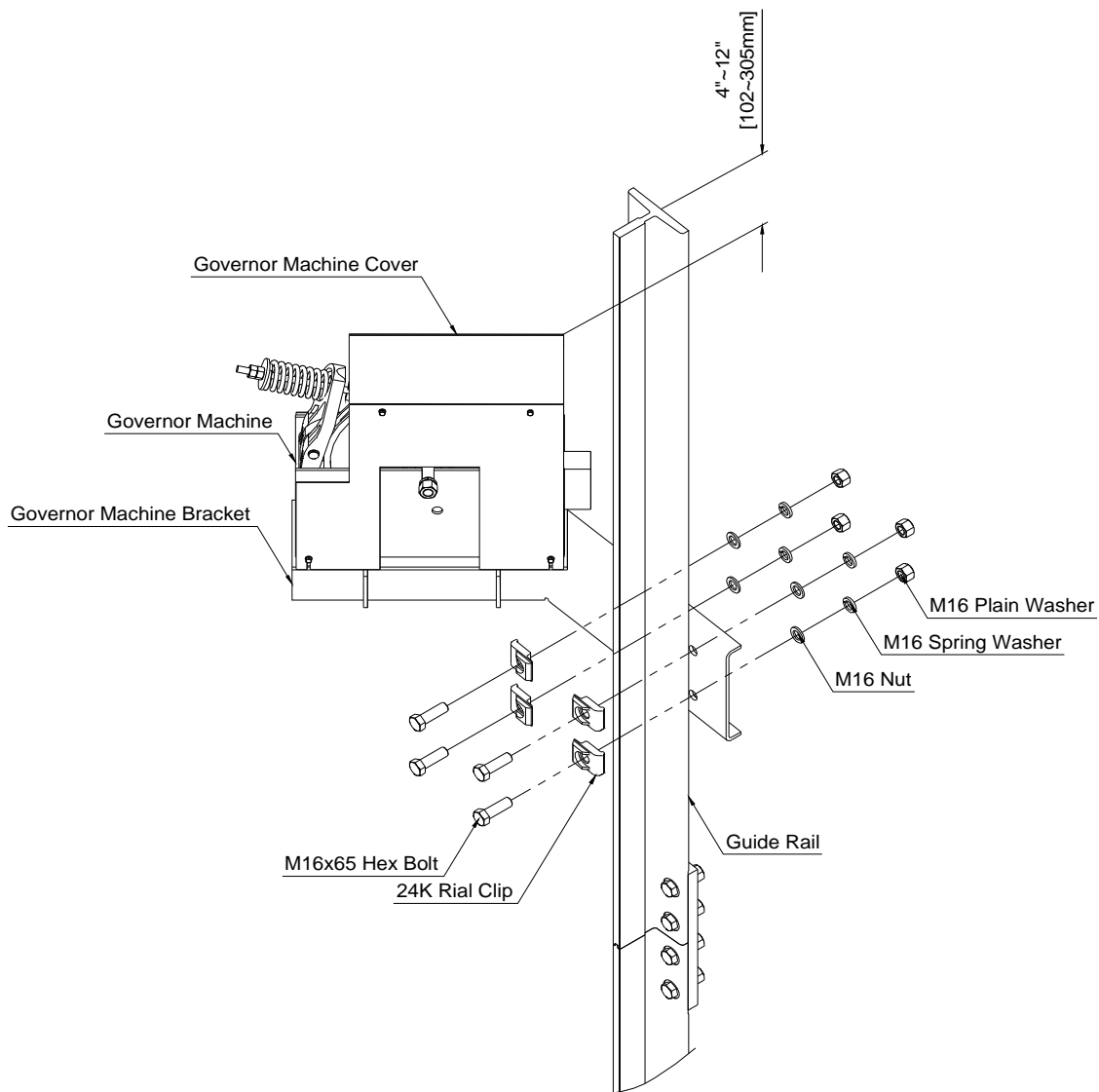


**Fig. 3-3-3. OVERSPEED GOVERNOR INSTALLATION  
(FORK TYPE)**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
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|        |                     | Date:         | 25-Aug-10   |
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|        |                     | page:         | 3-11        |

3-3-4. Type of Elevator : Corner Post type (See Fig. 3-3-4.)

- (1) Check the position of Over speed Governor. (See Layout Drawing)
- (2) Check for proper clearance between governor rope holes.
- (3) Assembly overspeed governor using anchor bolts and level/plumb.



**Fig. 3-3-4. OVERSPEED GOVERNOR INSTALLATION  
(CORNER POST TYPE)**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
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|        |                     | page:         | 3-12        |

### 3-4. Control Room

#### 3-4-1. Preparatory

- (1) Check the Control Room Dimension.
- (2) Check whether building cutout, power supply and voltage are appropriate.

#### 3-4-2. Control Panel Installation (See Fig. 3-4-2.)

- (1) Place Control panel in the assigned position of Control Room. (Layout Drawing 참조)
- (2) Place to fit in Control Panel assemble Tap, and mark on the position of Anchor Bolt Assemble Hole of Bracket.
- (3) Make a hole on the marked position with hammer drill, which is fitted to Anchor Bolt Standard.
- (4) Insert Anchor Bolt into Anchor Bolt Hole.
- (5) Fasten Bracket with Anchor Bolt. Fasten Control Panel and Bracket as well.

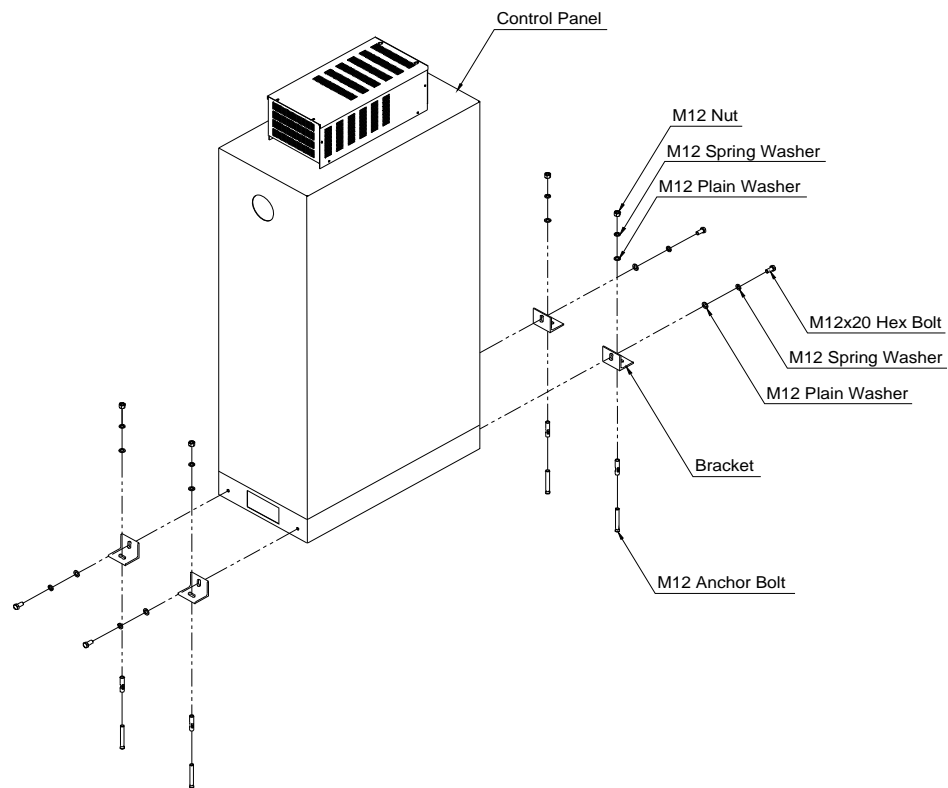
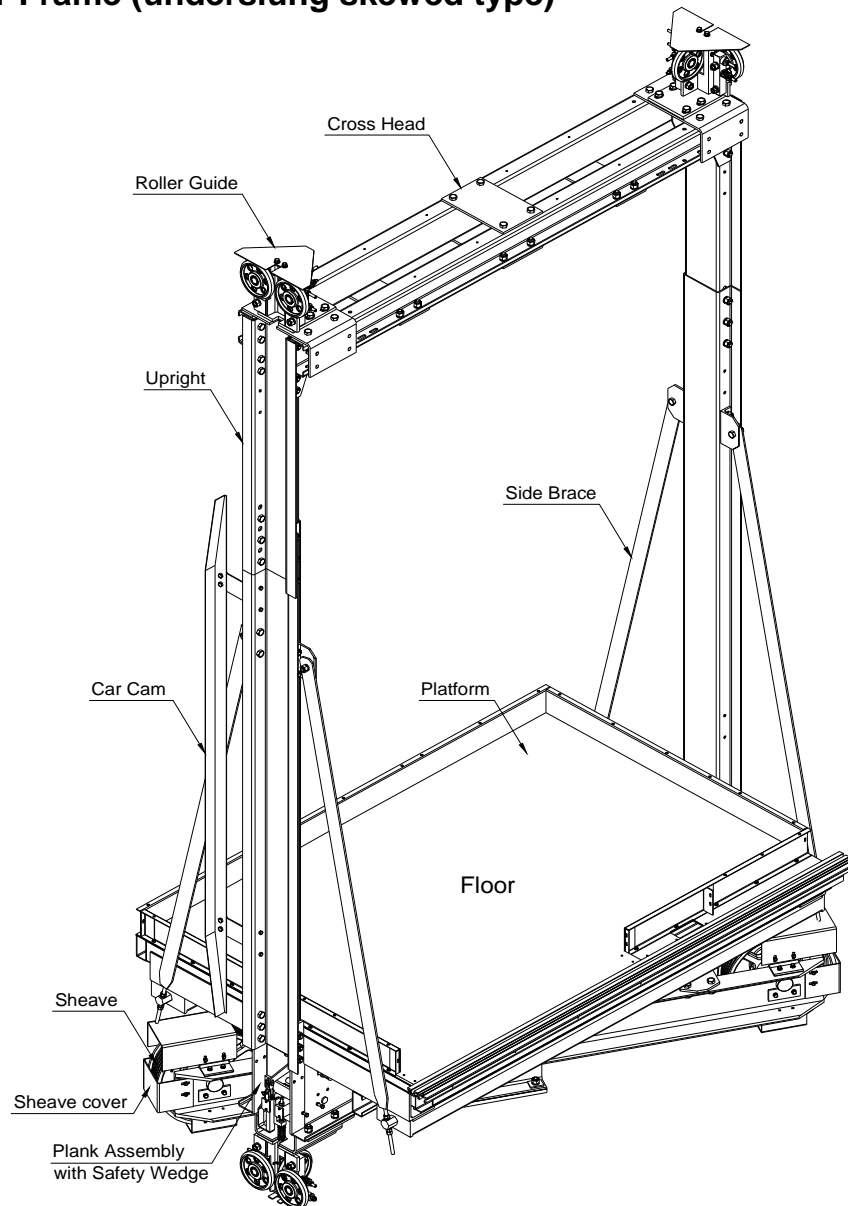


Fig. 3-4-2. CONTROL PANEL INSTALLATION

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|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-01        |

## 4. CAGE and COUNTERWEIGHT

### 4-1. Car Frame (underslung skewed type)



**Fig. 4-1. CAR FRAME ASSEMBLY (Underslung Skewed type)**

| Rev. no. | Description | Approved by | Date      |  |
|----------|-------------|-------------|-----------|--|
| ①        | ADDED       | DU Seo      | 20-Apr-10 |  |
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| <b>HM TEC</b> | <b>INSTALLATION MANUAL</b>       | Document No.: | TN-M01-0001 |
|               |                                  | Date:         | 2-Mar-09    |
|               | <b>MRL - Cage, counterweight</b> | Name:         | N.R.Kim     |
|               |                                  | page:         | 4-02        |

#### 4-1-1. Underslung Skewed type Plank Assembly

##### (1) Assembling Preparatory

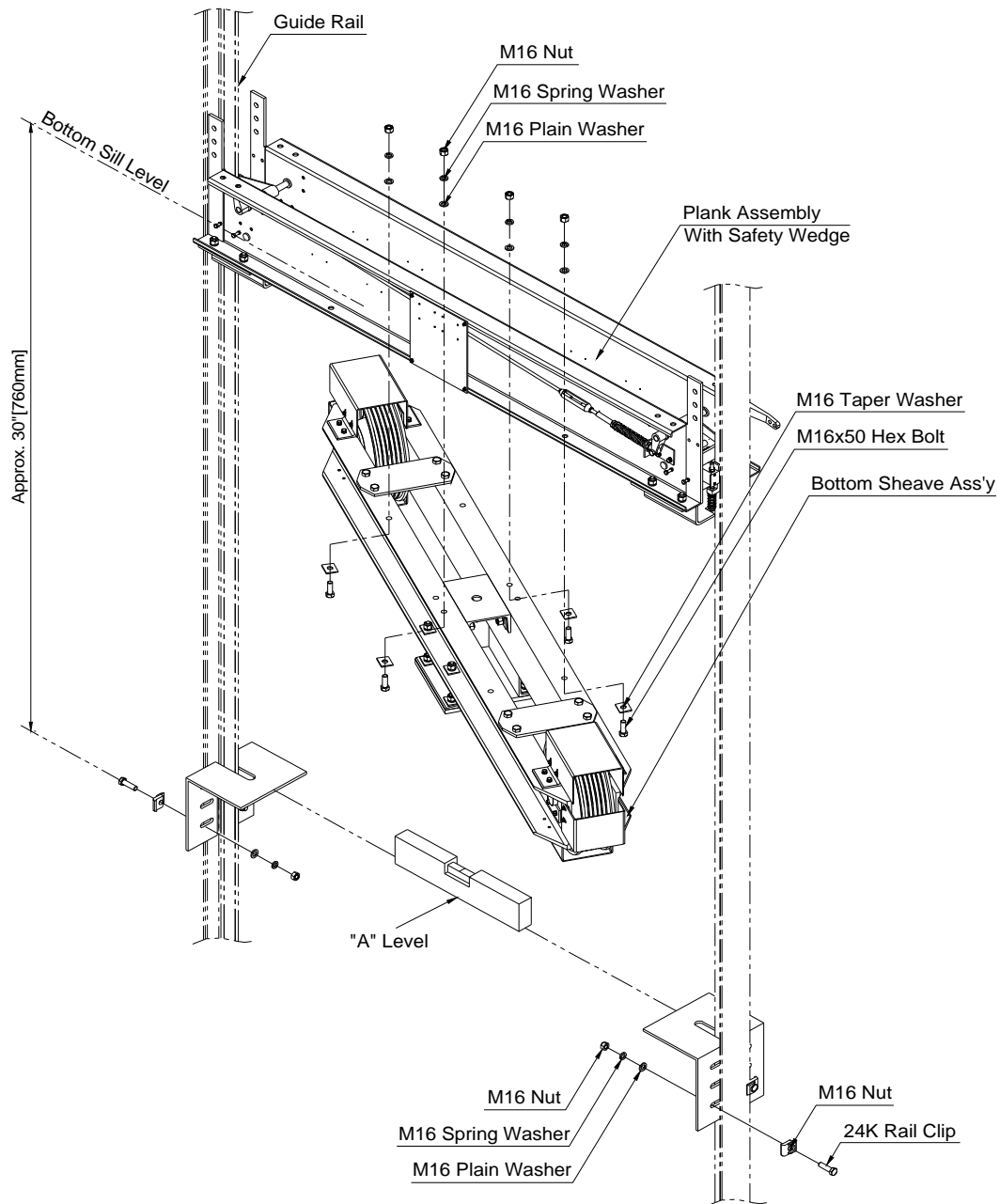
- ① Separate both Guide Shoe from Floor.
- ② Separate right side of Plank Assembly with Safety Wedge.
- ③ Mount supporting Jig at appropriate height of Car right or left side of Guide Rail.

Reference : Adjust Landing Sill and Car Sill for Car Assembling.

##### (2) Plank Assembly Installation (See Fig. 4-1-1-A. & See Fig. 4-1-1-B. & Fig. 4-1-1-C.)

- ① Place separated Plank Assembly with Safety Wedge on the Supporting Jig and insert into Guide Rail. Then, mount it temporarily.
- ② Place Plank Assembly with Safety Wedge and assemble with bolt.
- ③ Place PF Support Angle on the Plank Assembly and mount it temporarily.
- ④ Temporarily mount front and rear of Balancing Beam.
- ⑤ Accurately adjust Platform support Angle with Balancing Beam, and fasten completely.

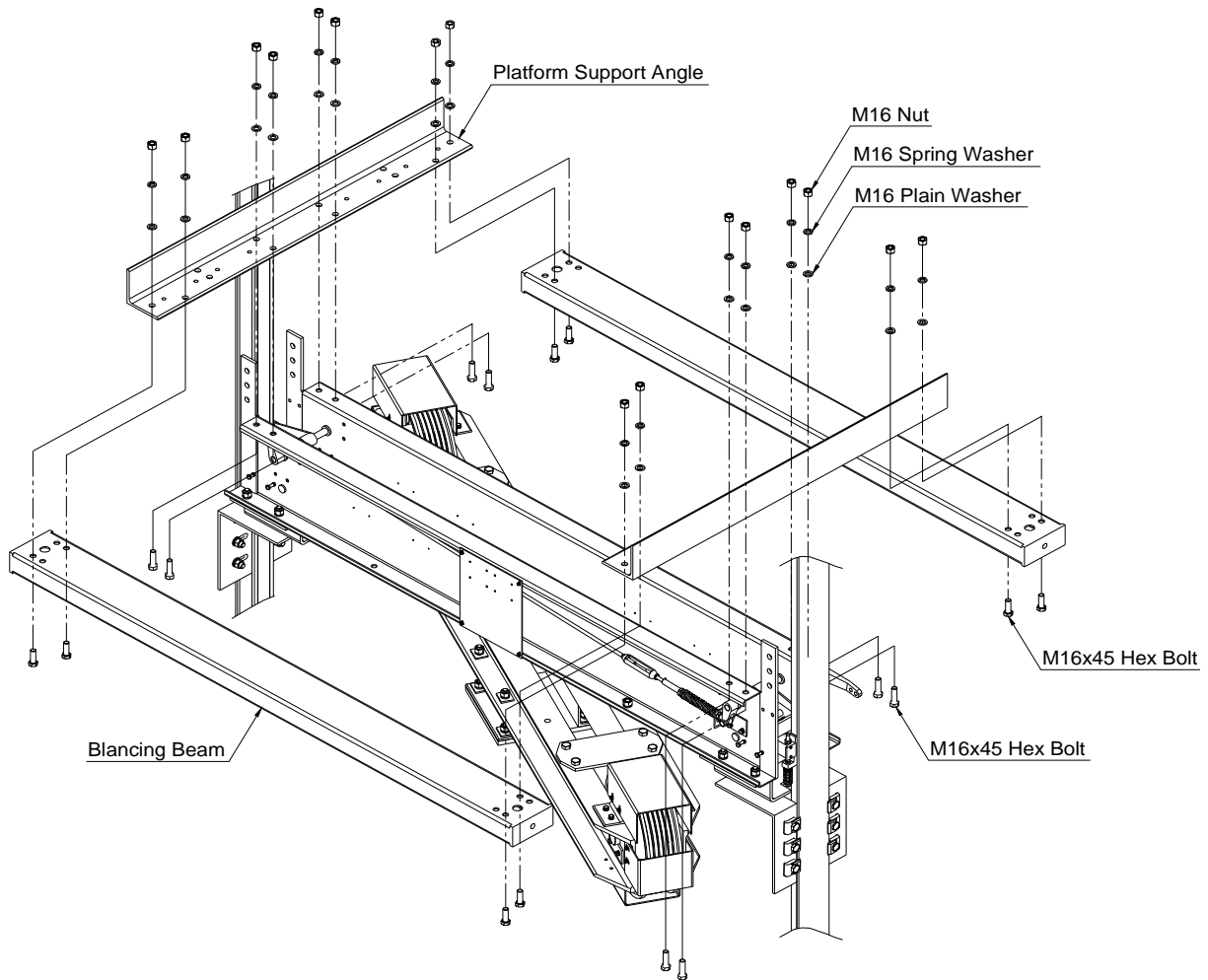
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|        |                           | Date:         | 2-Mar-09    |
|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-03        |



**Fig. 4-1-1-A. PLANK ASSEMBLY INSTALLATION (Underslung Skewed type)**

| Rev. no. | Description | Approved by | Date      |  |
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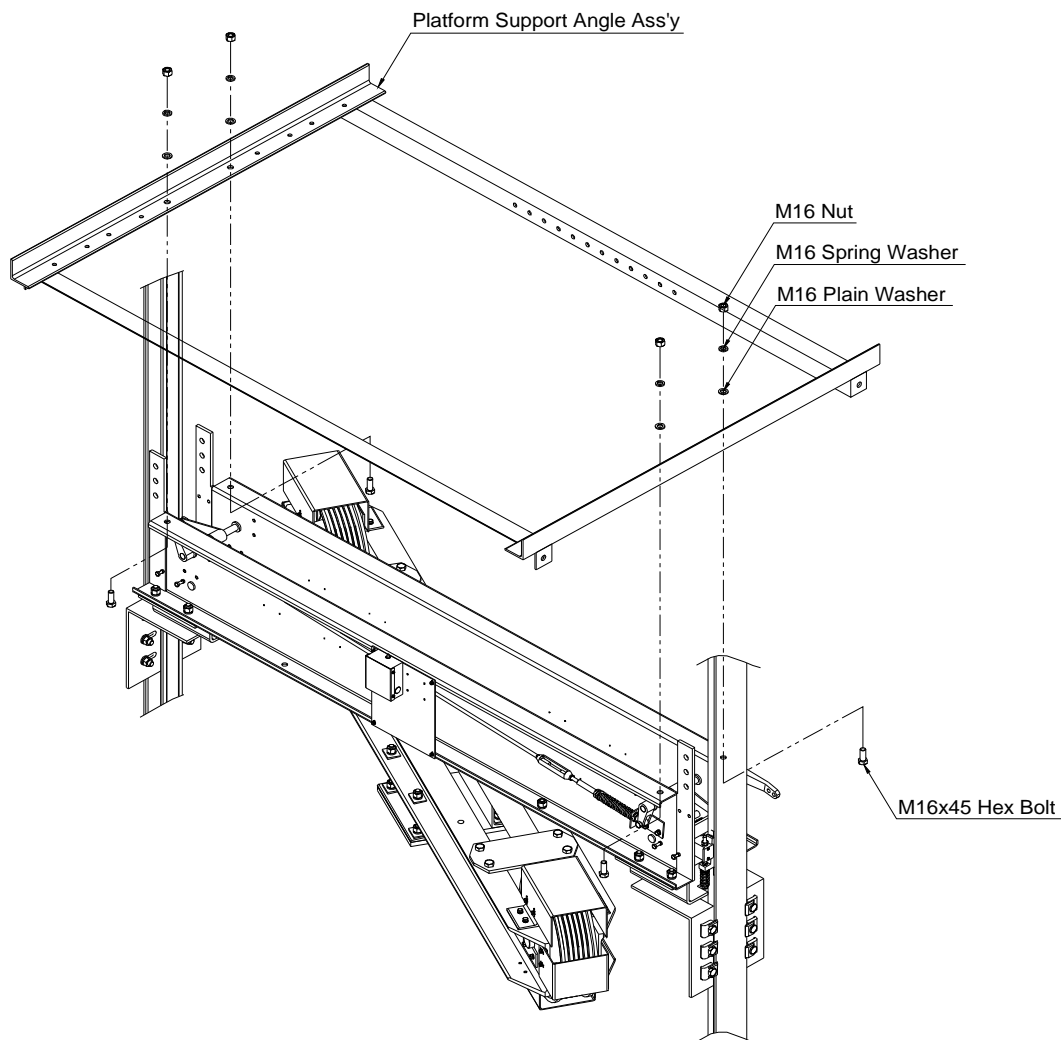
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| HM TEC | INSTALLATION MANUAL       | Document No.: | TN-M01-0001 |
|        |                           | Date:         | 2-Mar-09    |
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|        |                           | page:         | 4-04        |



**Fig. 4-1-1-B. PLATFORM SUPPORT ANGLE and BLANCING BEAM INSTALLATION**  
 ① (Underslung Skewed type, Above of Capacity 3000 lbs.)

| Rev. no. | Description | Approved by | Date      |  |
|----------|-------------|-------------|-----------|--|
| ①        | ADDED       | DU Seo      | 20-Apr-10 |  |
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|        |                           | Date:         | 2-Mar-09    |
|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-05        |

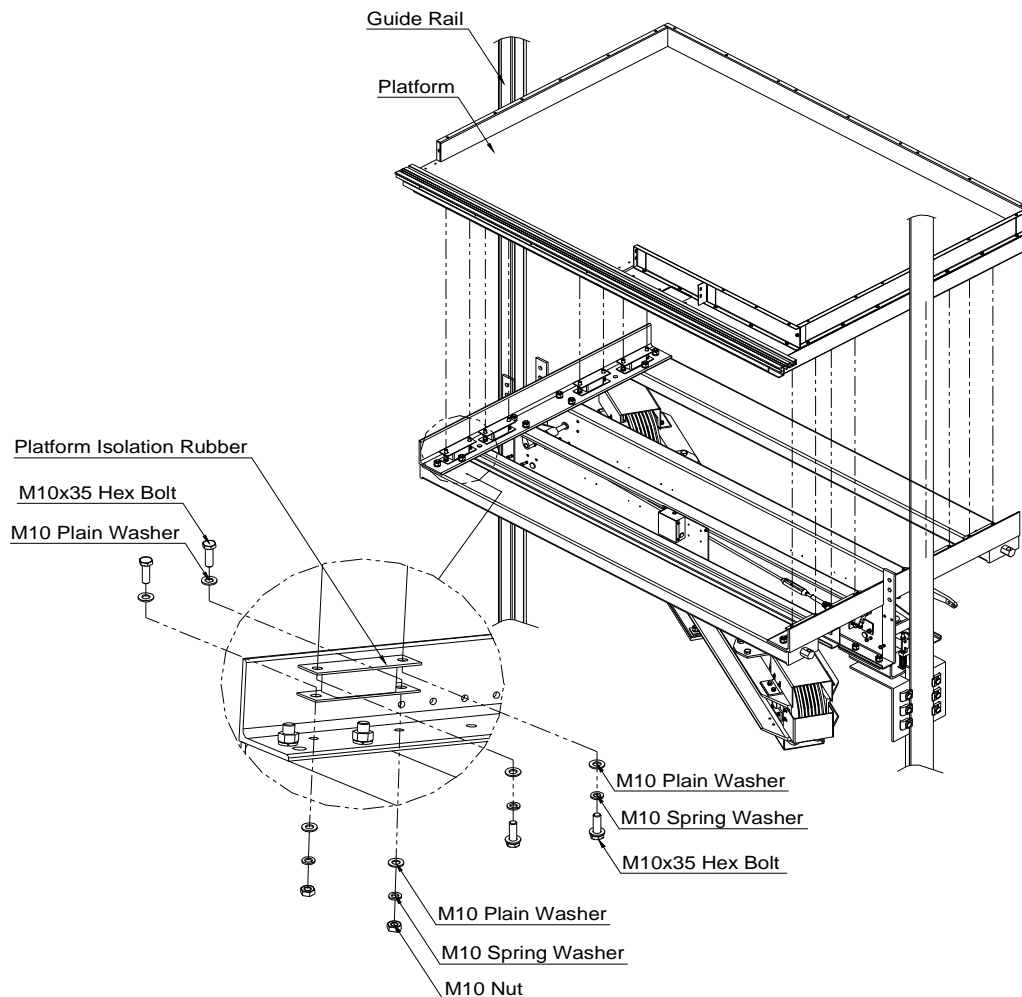


**Fig. 4-1-1-C. PLATFORM SUPPORT ANGLE and BLANCING BEAM INSTALLATION**  
**(Underslung Skewed type, Above of Capacity 2000-2500 lbs.)**

|        |                           |               |             |
|--------|---------------------------|---------------|-------------|
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|        |                           | Date:         | 2-Mar-09    |
|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-06        |

#### 4-1-2. Underslung Skewed type Platform Assembly (See Fig. 4-1-2.)

- (1) Place Platform Isolation Rubber on the Platform Support Angle and mount temporarily with bolt.
- (2) Adjust Platform on the Platform Isolation Rubber.
- (3) Adjust hole of Platform Isolation Rubber and Platform and mount temporarily with bolt.
- (4) Accurately adjust gap of Landing Sill and Car Sill, and then fasten Platform Isolation Rubber completely.



**Fig. 4-1-2. PLATFORM ASSEMBLY INSTALLATION**

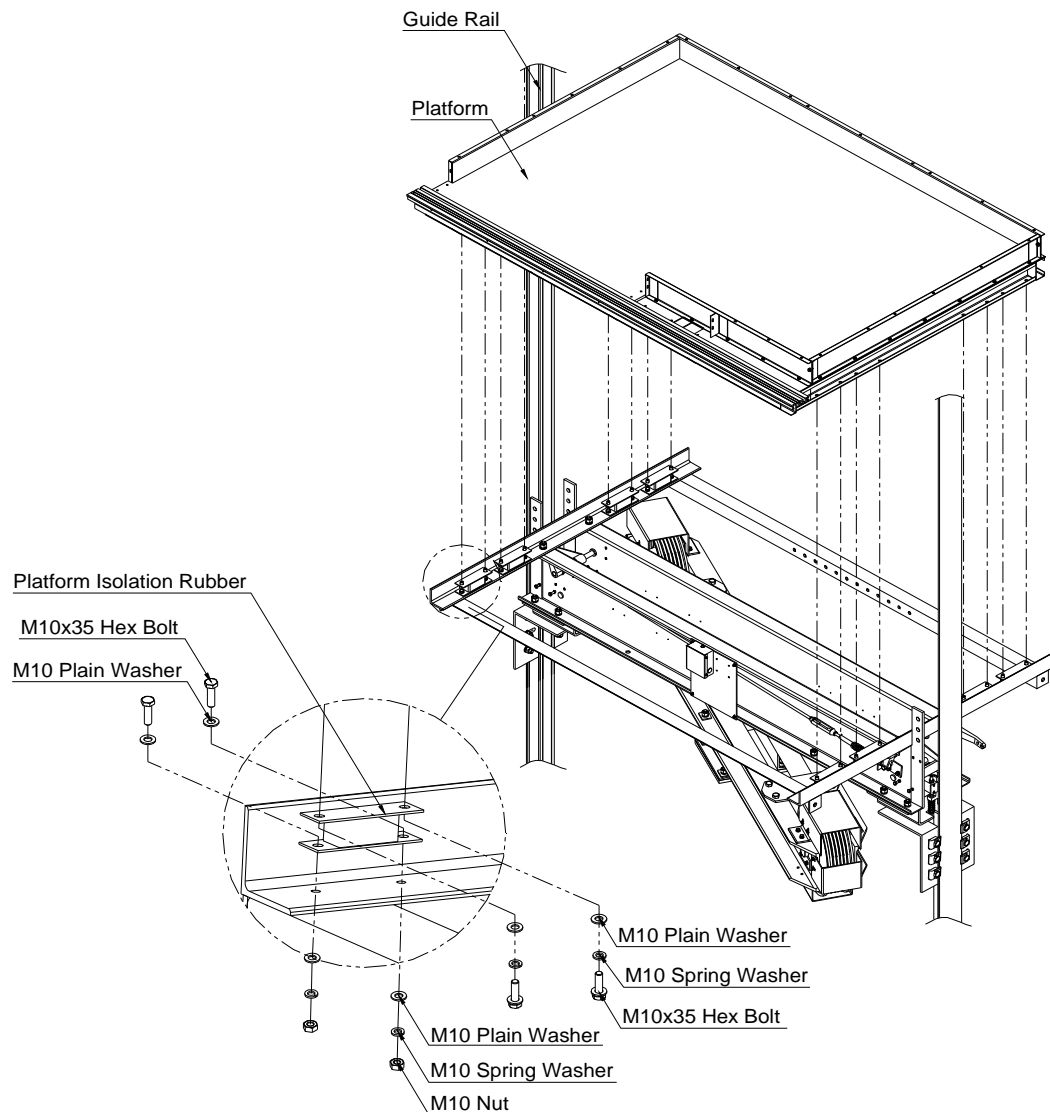
① (Underslung Skewed type, Capacity 3000 lbs.)

| Rev. no. | Description | Approved by | Date      |  |
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| ①        | ADDED       | DU Seo      | 20-Apr-10 |  |
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|        |                           | Date:         | 2-Mar-09    |
|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-07        |

#### 4-1-3. Underslung Skewed type Platform Assembly (See Fig. 4-1-3.)

- (1) Place Platform Isolation Rubber on the Platform Support Angle and mount temporarily with bolt.
- (2) Adjust Platform on the Platform Isolation Rubber.
- (3) Adjust hole of Platform Isolation Rubber and Platform and mount temporarily with bolt.
- (4) Accurately adjust gap of Landing Sill and Car Sill, and then fasten Platform Isolation Rubber completely.



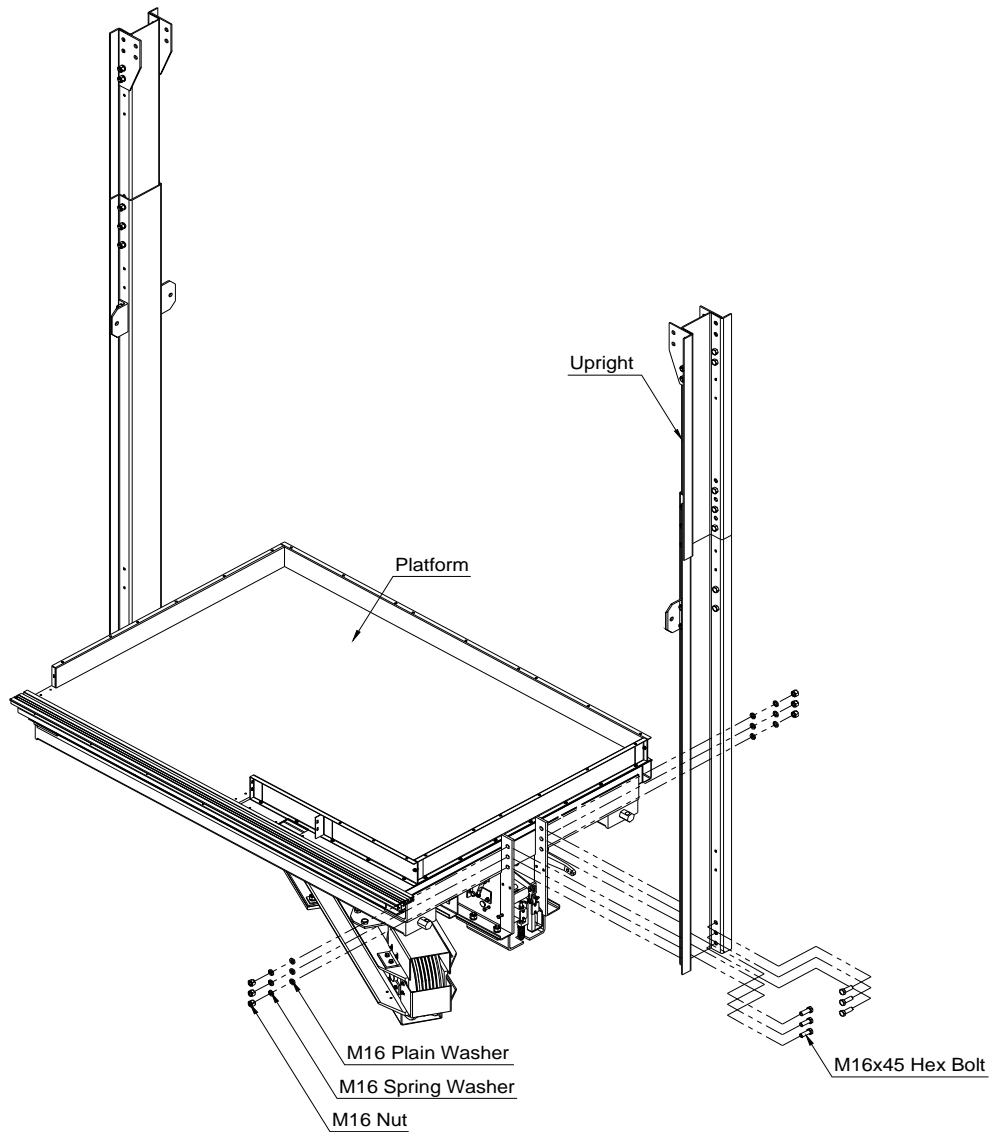
**Fig. 4-1-3. PLATFORM ASSEMBLY INSTALLATION**  
(Underslung Skewed type, Capacity 2000-2500 lbs.)

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| HM TEC | INSTALLATION MANUAL       | Document No.: | TN-M01-0001 |
|        |                           | Date:         | 2-Mar-09    |
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|        |                           | page:         | 4-08        |

4-1-4. Underslung Skewed type Upright Assembly (See Fig. 4-1-4.)

- (1) Adjust right side of Plank Frame to right Upright, and then mount temporarily with bolt.
- (2) Adjust left side as above.

Attention) After Upright is temporarily assembled, Upright Top should be mounted to Guide rail to prevent fall down.



①

**Fig. 4-1-4. UPRIGHT INSTALLATION (Underslung Skewed type)**

| Rev. no. | Description | Approved by | Date      |  |
|----------|-------------|-------------|-----------|--|
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|        |                           | Date:         | 2-Mar-09    |
|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-09        |

#### 4-1-5. Underslung Skewed type Crosshead Assembly (See Fig. 4-1-5.)

(1) Temporarily assemble Crosshead to adjust Top Upright.

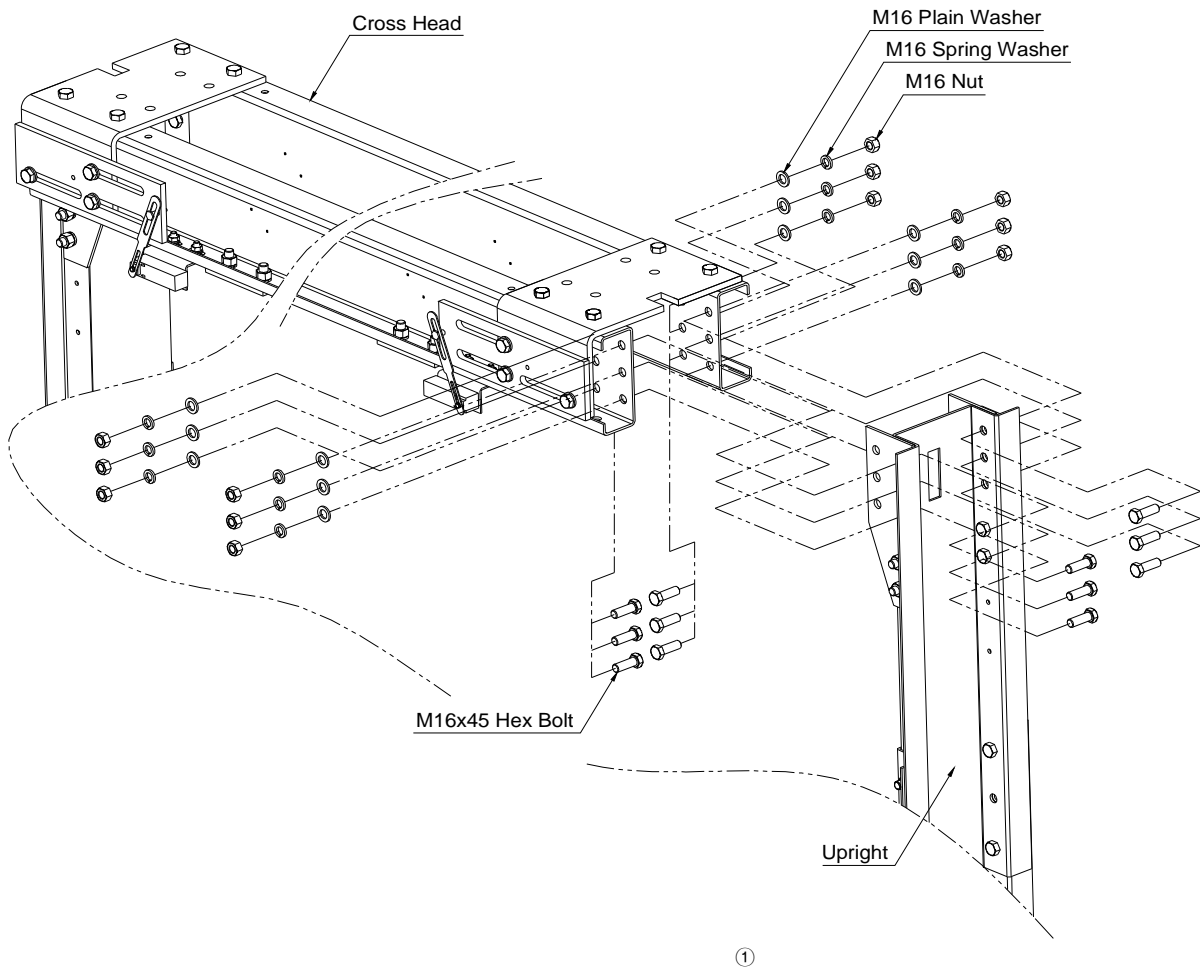


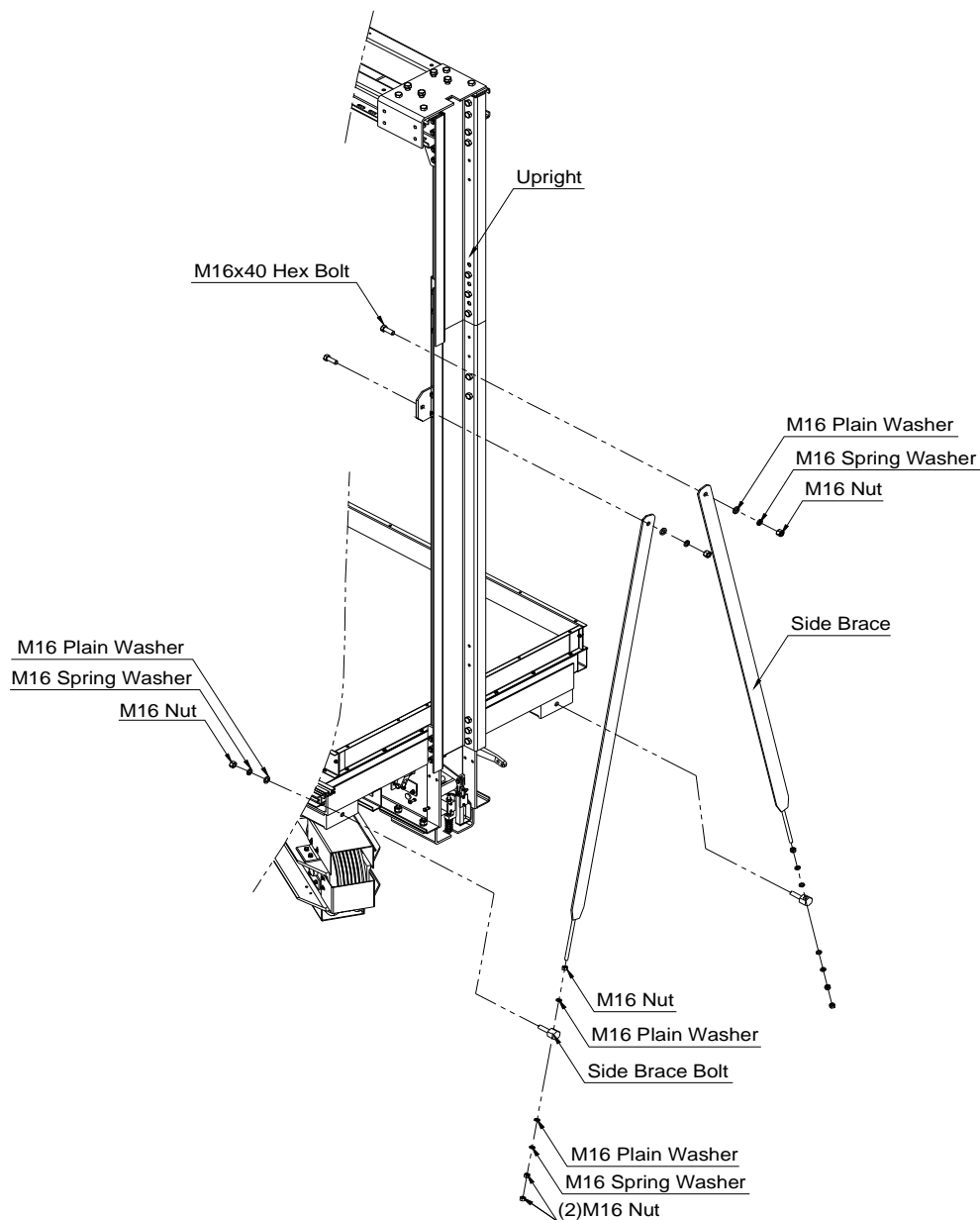
Fig. 4-1-5. CROSSHEAD INSTALLATION (Underslung Skewed type)

| Rev. no. | Description | Approved by | Date      |  |
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| ①        | ADDED       | DU Seo      | 20-Apr-10 |  |
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|        |                           | Date:         | 2-Mar-09    |
|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-10        |

#### 4-1-6. Underslung Skewed type Side Brace Assembly (See Fig. 4-1-6.)

- (1) Temporarily assemble Side brace to adjust Hole and Upright of the end of Balancing Beam.



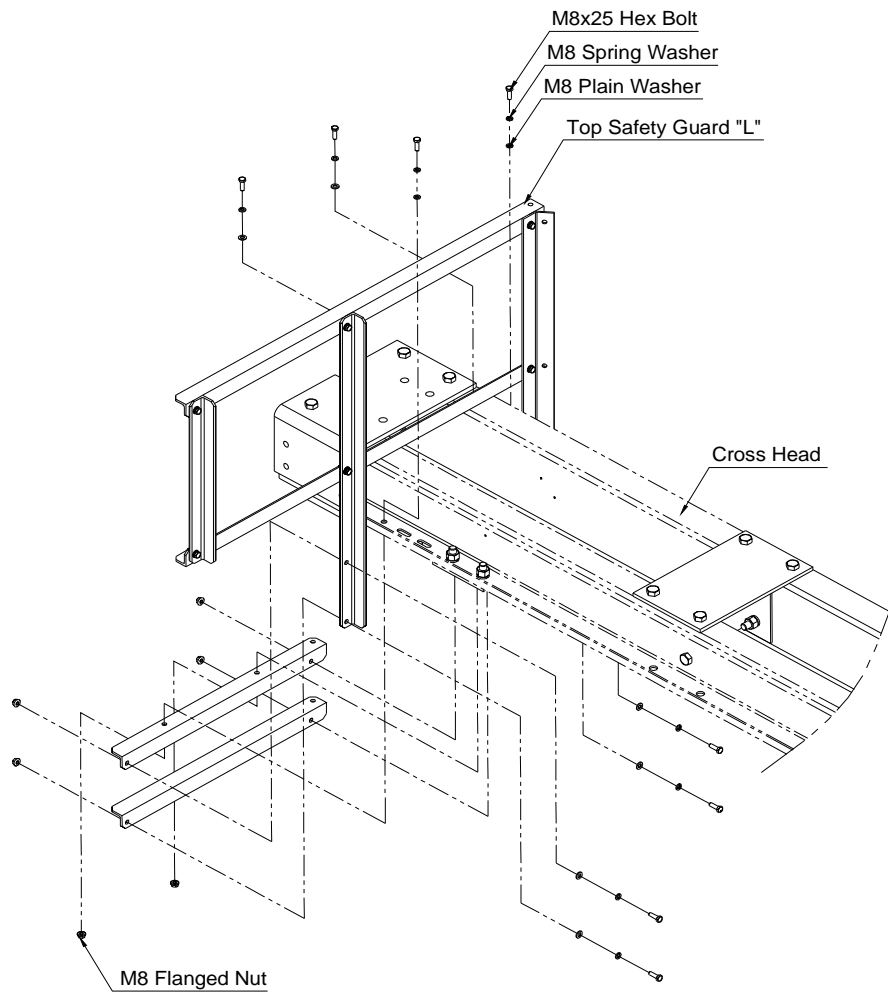
**Fig. 4-1-6. SIDE BRACE INSTALLATION (Underslung Skewed type)**

| Rev. no. | Description | Approved by | Date      |  |
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| ①        | ADDED       | DU Seo      | 20-Apr-10 |  |
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|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-11        |

4-1-7. Underslung Skewed type Car Top Safety Guard Assembly (See Fig. 4-1-7.)

(1) Assemble Car Top Safety Guard as shown on Fig. 4-1-7-A, Fig. 4-1-7-B, Fig. 4-1-7-C.

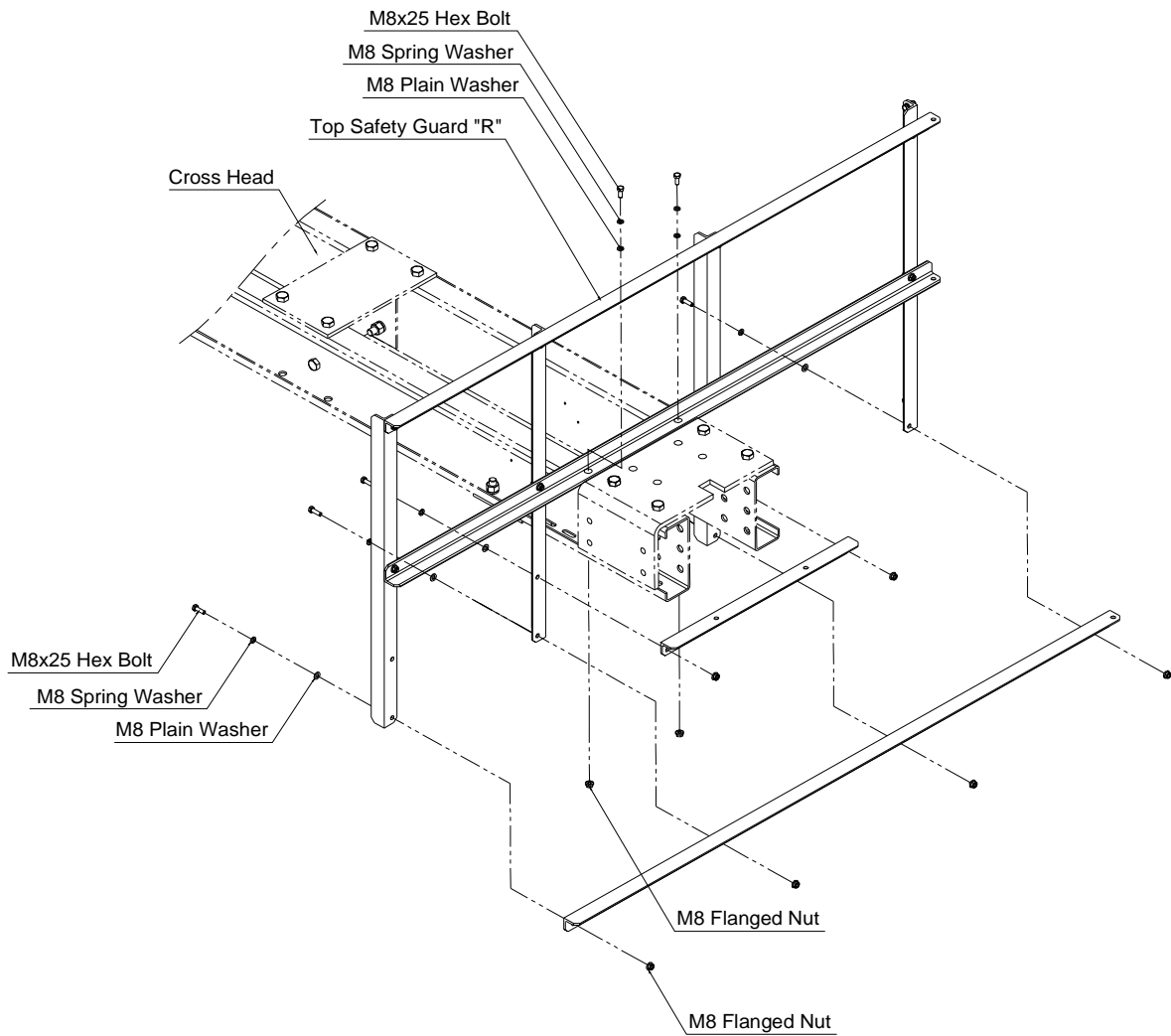


**Fig. 4-1-7-A. CAR TOP SAFETY GUARD (LEFT SIDE) INSTALLATION**

① (Underslung Skewed type)

| Rev. no. | Description | Approved by | Date      |  |
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| ①        | ADDED       | DU Seo      | 20-Apr-10 |  |
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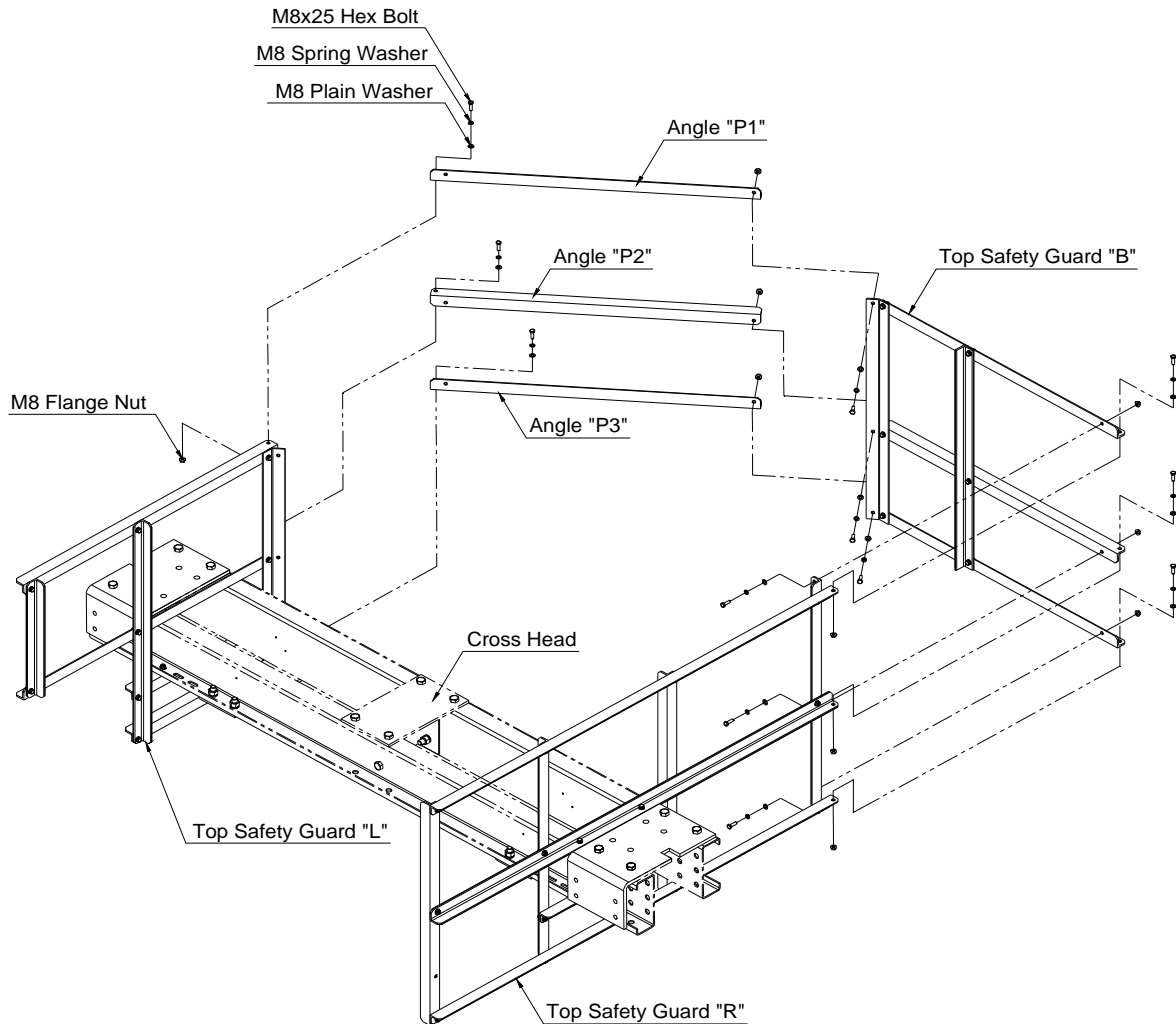
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|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-12        |



**Fig. 4-1-7-B. CAR TOP SAFETY GUARD (RIGHT SIDE) INSTALLATION**  
**① (Underslung Skewed type)**

| Rev. no. | Description | Approved by | Date      |  |
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**Fig. 4-1-7-C. CAR TOP SAFETY GUARD (REAR SIDE) INSTALLATION**  
**① (Underslung Skewed type)**

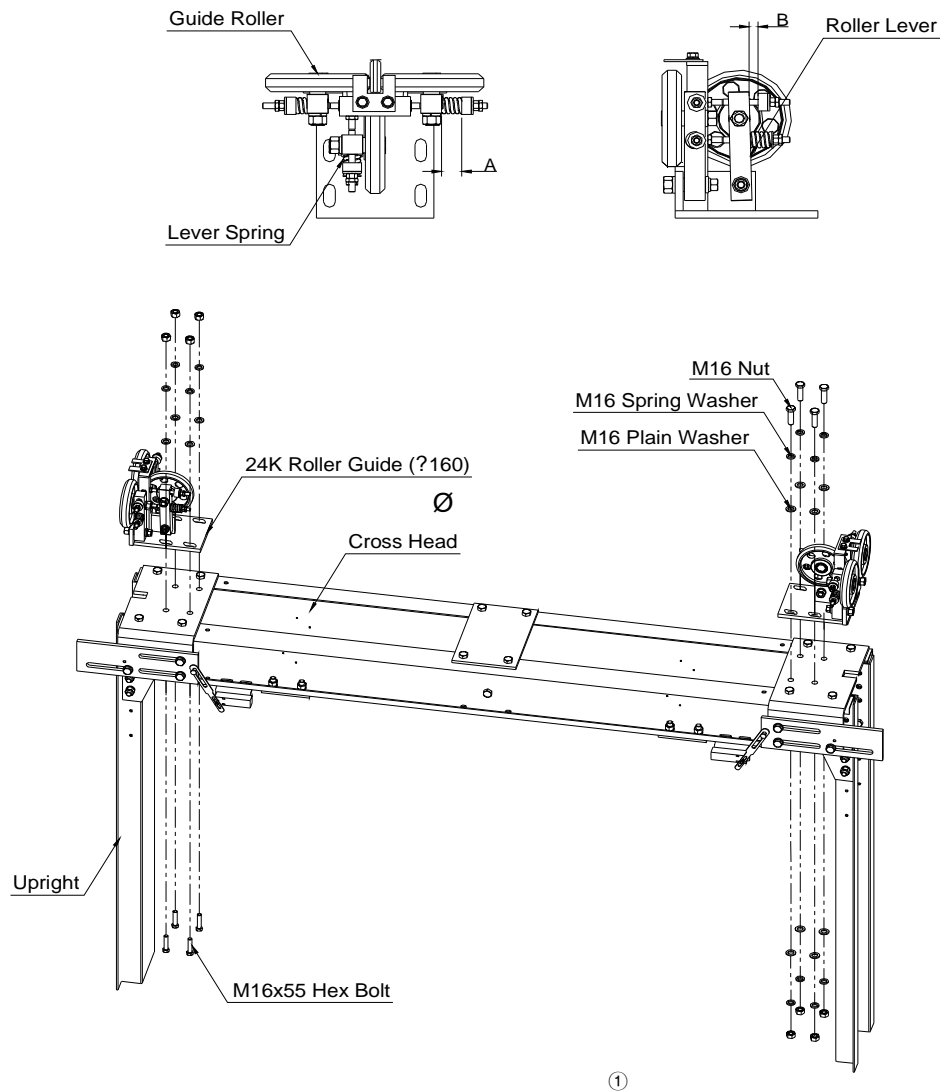
| Rev. no. | Description | Approved by | Date      |  |
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| ①        | ADDED       | DU Seo      | 20-Apr-10 |  |
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|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-14        |

#### 4-1-8. Underslung Skewed type Top Guide Roller Assembly (See Fig. 4-1-8.)

- (1) Assemble Top Roller Guide to Crosshead
- (2) Adjust Compression Spring within Standard Setting Tolerance with double nuts.
- (3) Adjust Stopper within Standard Setting Tolerance with double nuts.

Reference ] Assemble Bottom Roller Guide after Car Roping works done.

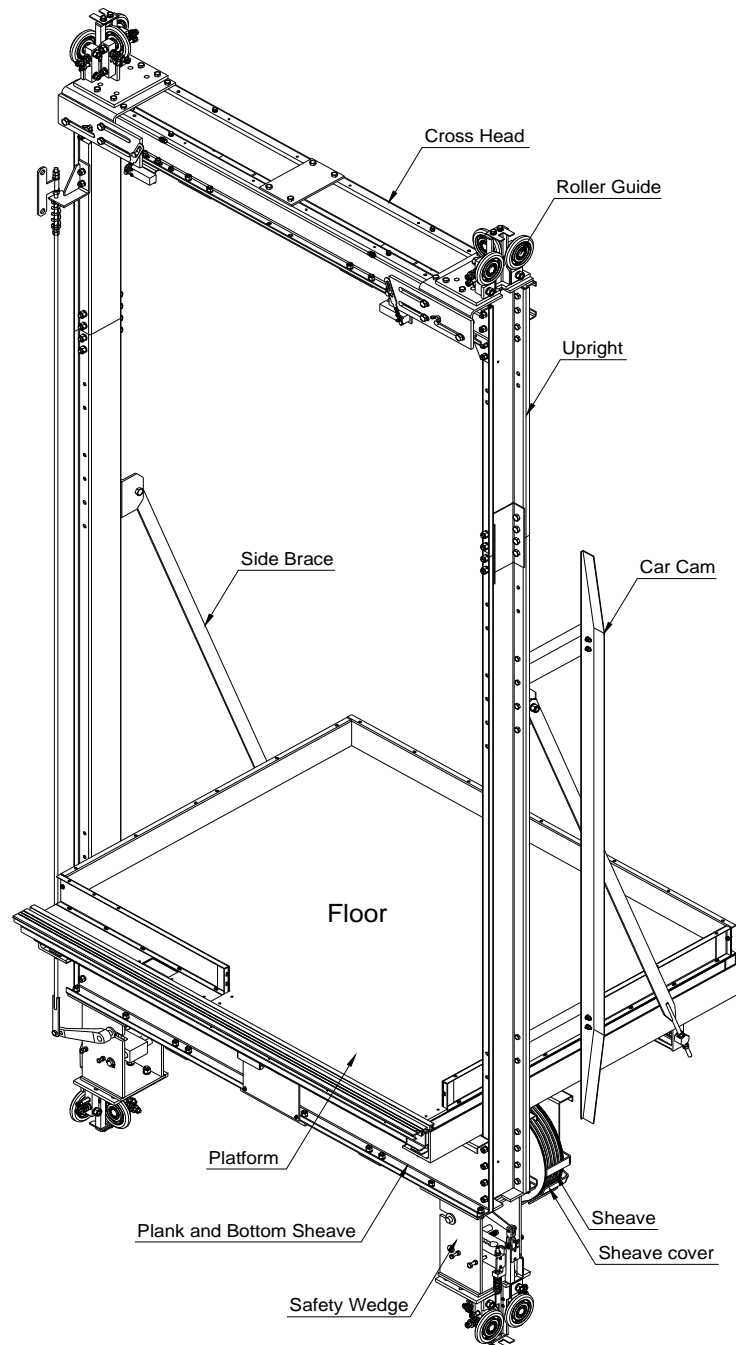


**Fig. 4-1-8. TOP GUIDE ROLLER INSTALLATION (Underslung Skewed type)**

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|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
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#### 4-2. Car Frame (underslung fork type)



**Fig. 4-2. CAR FRAME ASSEMBLY (Underslung Fork type)**

|               |                                  |               |             |
|---------------|----------------------------------|---------------|-------------|
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|               | <b>MRL - Cage, counterweight</b> | Name:         | N.R.Kim     |
|               |                                  | page:         | 4-16        |

#### 4-2-1. Underslung Fork type Plank Assembly

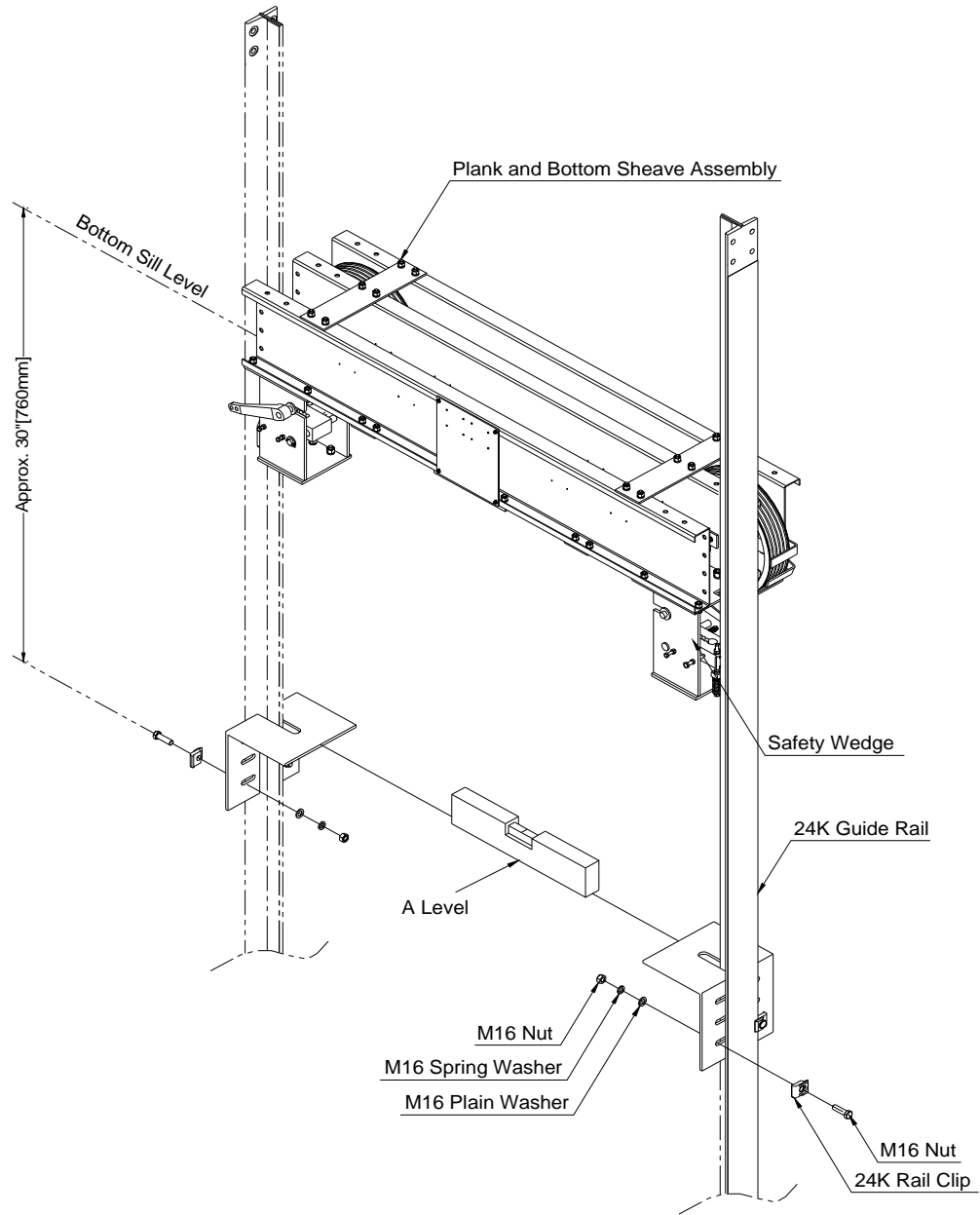
##### (1) Assembling Preparatory

- ① Separate both Guide Shoe from Floor.
  - ② Separate right side of Plank Assembly with Safety Wedge.
  - ③ Mount supporting Jig at appropriate height of Car right or left side of Guide Rail.
- Reference : Adjust Landing Sill and Car Sill for Car Assembling.

##### (2) Plank Assembly Installation (See Fig. 4-2-1-A. & See Fig. 4-2-1-B.)

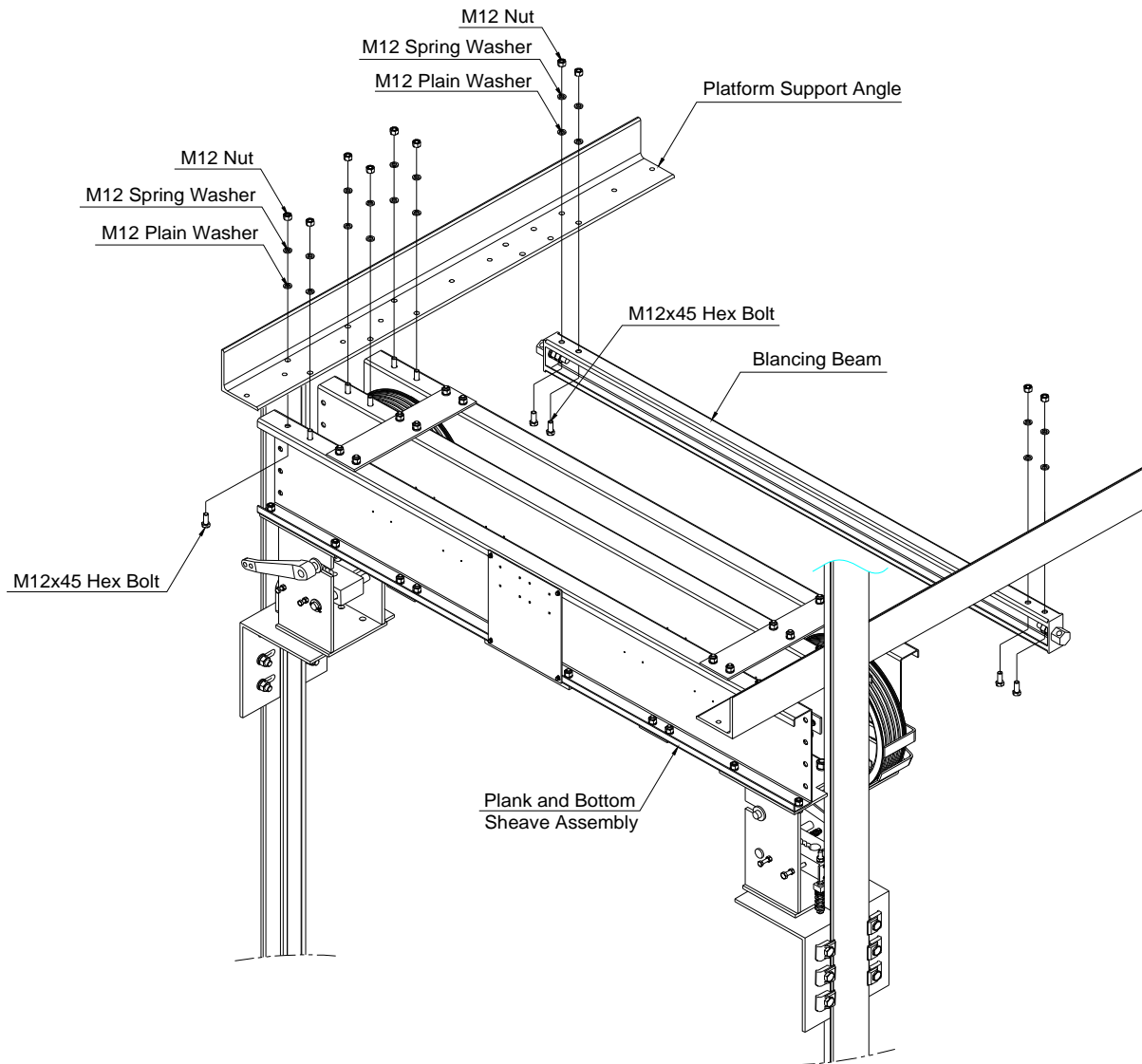
- ① Place separated Plank Assembly with Safety Wedge on the Supporting Jig and insert into Guide Rail. Then, mount it temporarily.
- ② Place Plank Assembly with Safety Wedge and assemble with bolt.
- ③ Place PF Support Angle on the Plank Assembly and mount it temporarily.
- ④ Temporarily mount front and rear of Balancing Beam.
- ⑤ Accurately adjust Platform support Angle with Balancing Beam, and fasten completely.

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|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
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**Fig. 4-2-1-A. PLANK and BOTTOM SHEAVE ASSEMBLY INSTALLATION**  
**(Underslung Fork type)**

|        |                           |               |             |
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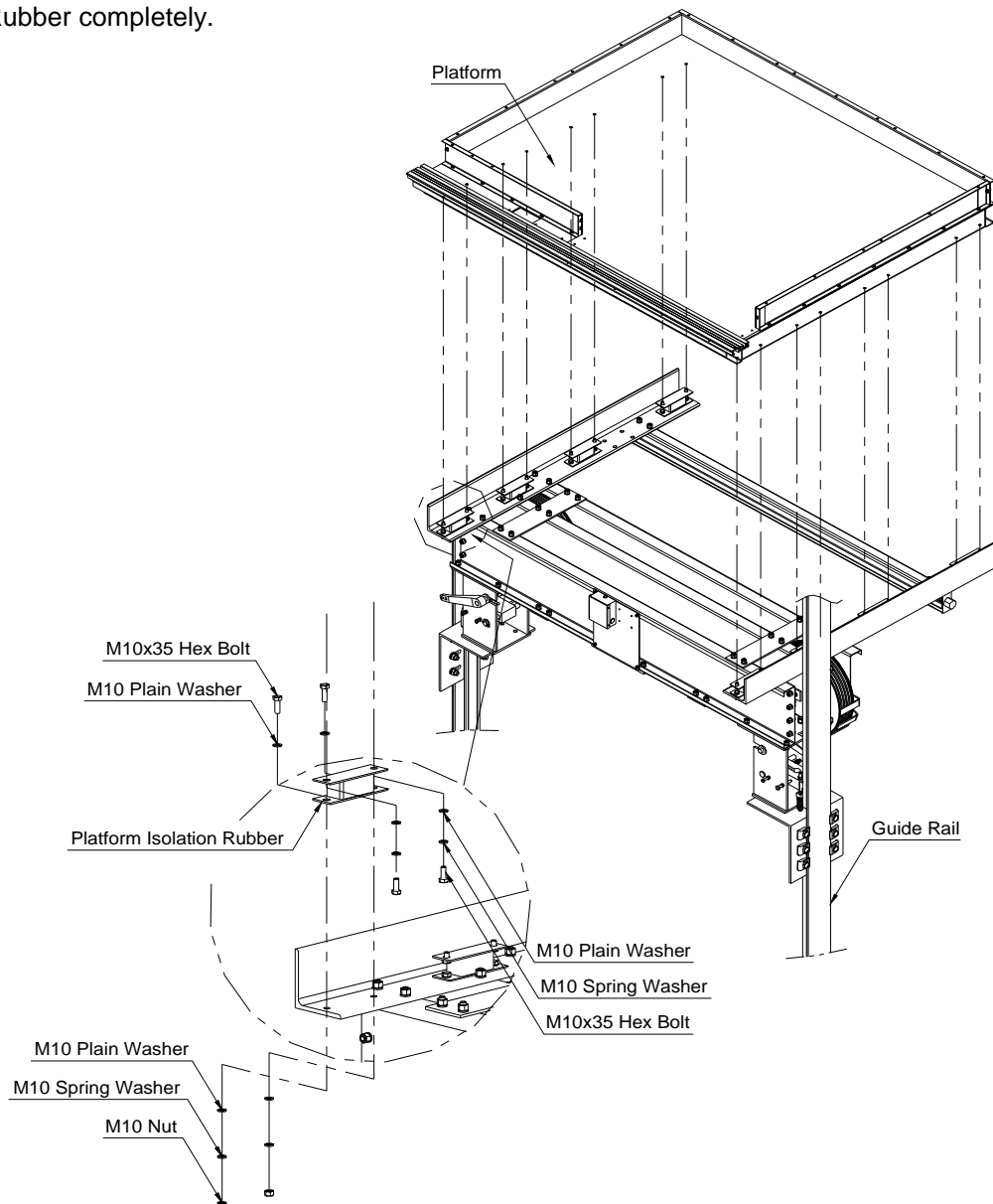


**Fig. 4-2-1-B. PLATFORM SUPPORT ANGLE and BLANCING BEAM INSTALLATION**  
(Underslung Fork type)

|        |                           |               |             |
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|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-19        |

#### 4-2-2. Underslung Fork type Platform Assembly (See Fig. 4-2-2.)

- (1) Place Platform Isolation Rubber on the Platform Support Angle and mount temporarily with bolt.
- (2) Adjust Platform on the Platform Isolation Rubber.
- (3) Adjust hole of Platform Isolation Rubber and Platform and mount temporarily with bolt.
- (4) Accurately adjust gap of Landing Sill and Car Sill, and then fasten Platform Isolation Rubber completely.



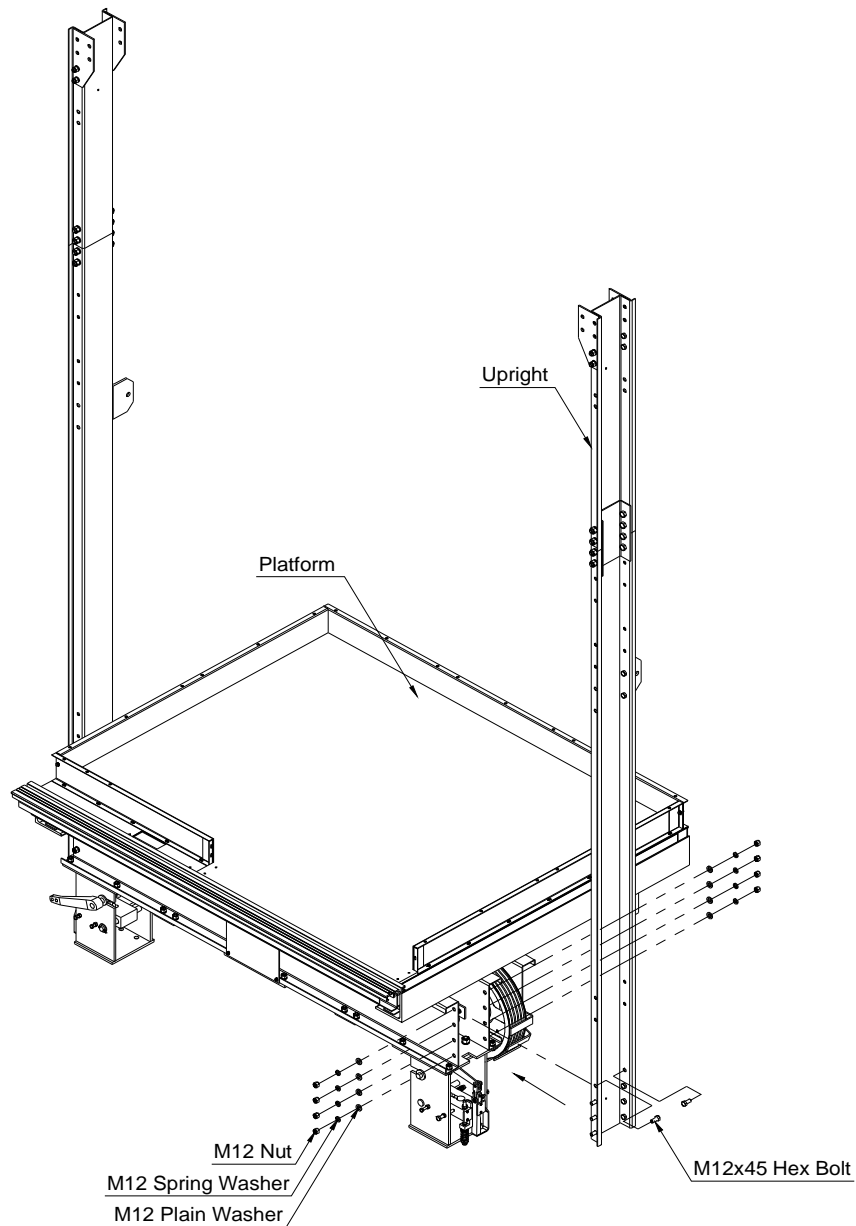
**Fig. 4-2-2. PLATFORM ASSEMBLY INSTALLATION (Underslung Fork type)**

|        |                           |               |             |
|--------|---------------------------|---------------|-------------|
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|        |                           | page:         | 4-20        |

#### 4-2-3. Underslung Fork type Upright Assembly (See Fig. 4-2-3.)

- (1) Adjust right side of Plank Frame to right Upright, and then mount temporarily with bolt.
- (2) Adjust left side as above.

Attention] After Upright is temporarily assembled, Upright Top should be mounted to Guide rail to prevent fall down.

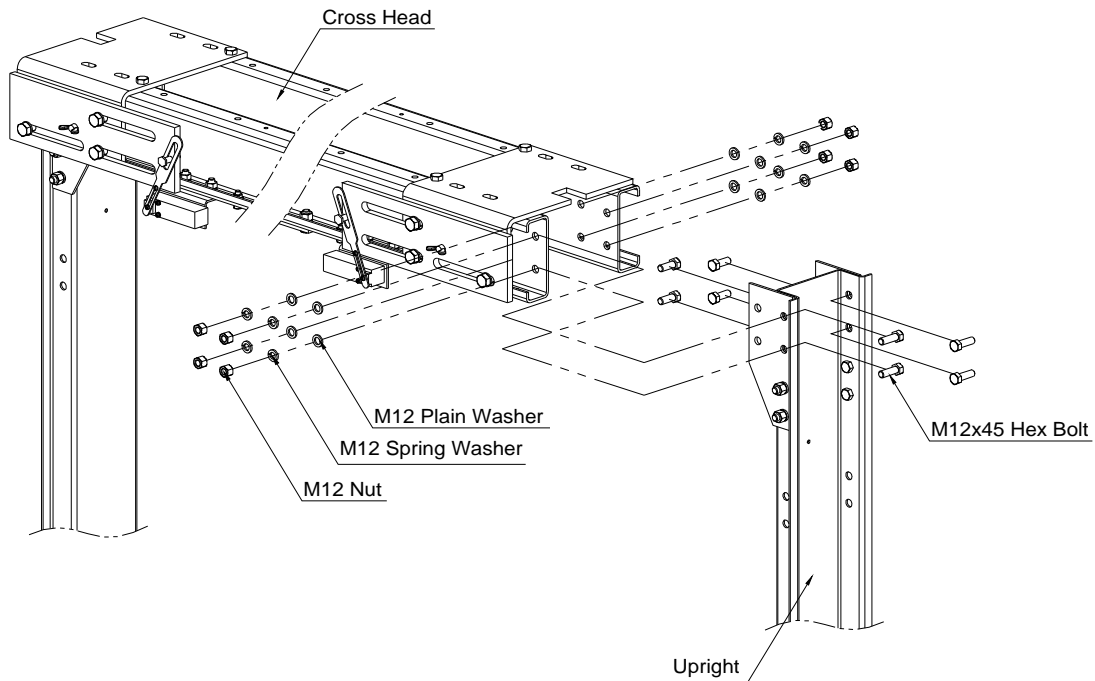


**Fig. 4-2-3. UPRIGHT INSTALLATION (Underslung Fork type)**

|        |                           |               |             |
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|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
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#### 4-2-4. Underslung Fork type Crosshead Assembly (See Fig. 4-2-4.)

(1) Temporarily assemble Crosshead to adjust Top Upright.

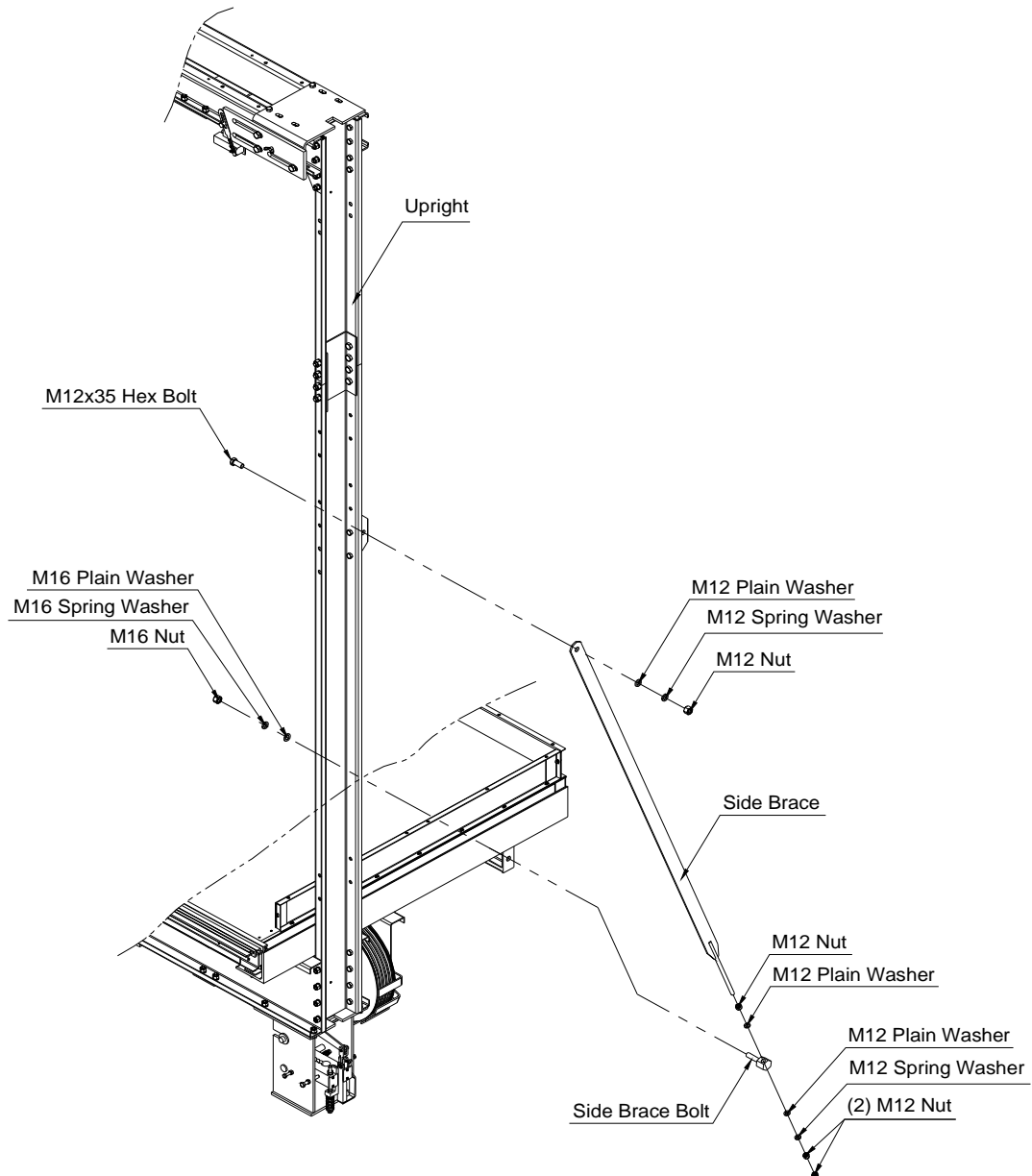


**Fig. 4-2-4. CROSSHEAD INSTALLATION (Underslung Fork type)**

|        |                           |               |             |
|--------|---------------------------|---------------|-------------|
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|        |                           | page:         | 4-22        |

#### 4-2-5. Underslung Fork type Side Brace Assembly (See Fig. 4-2-5.)

- (1) Temporarily assemble Side brace to adjust Hole and Upright of the end of Balancing Beam.

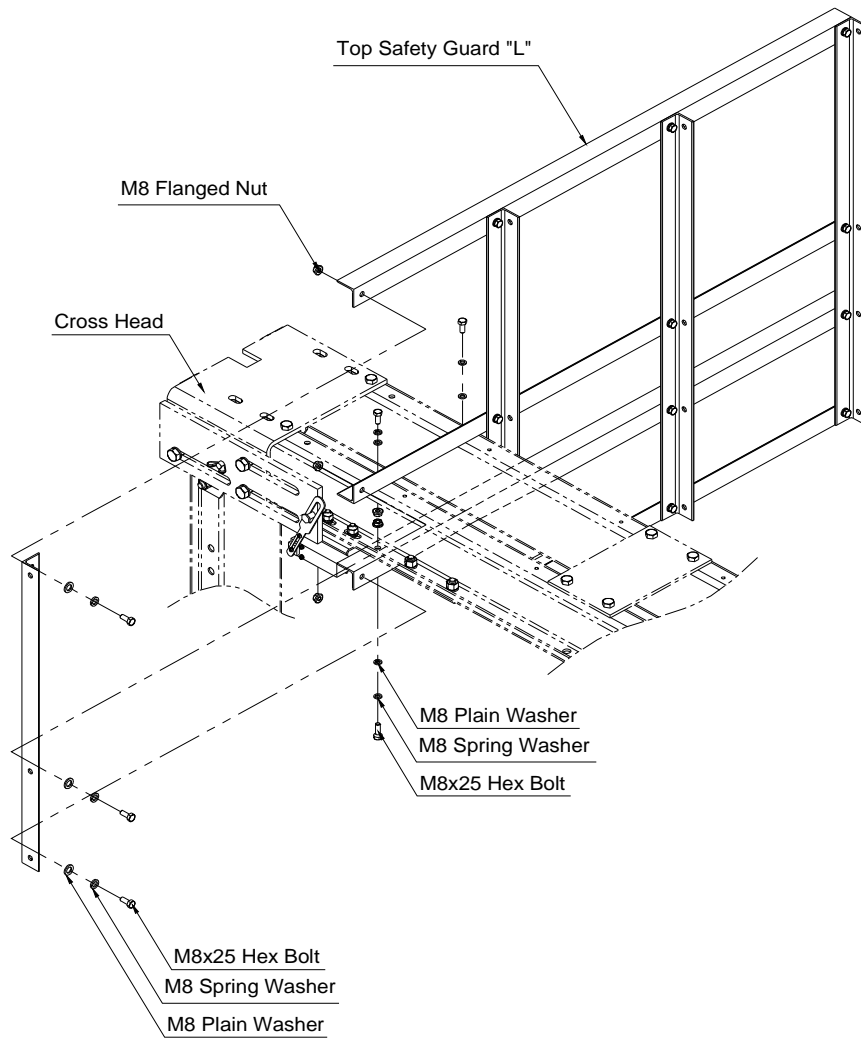


**Fig. 4-2-5. SIDE BRACE INSTALLATION (Underslung Fork type)**

|        |                           |               |             |
|--------|---------------------------|---------------|-------------|
| HM TEC | INSTALLATION MANUAL       | Document No.: | TN-M01-0001 |
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|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
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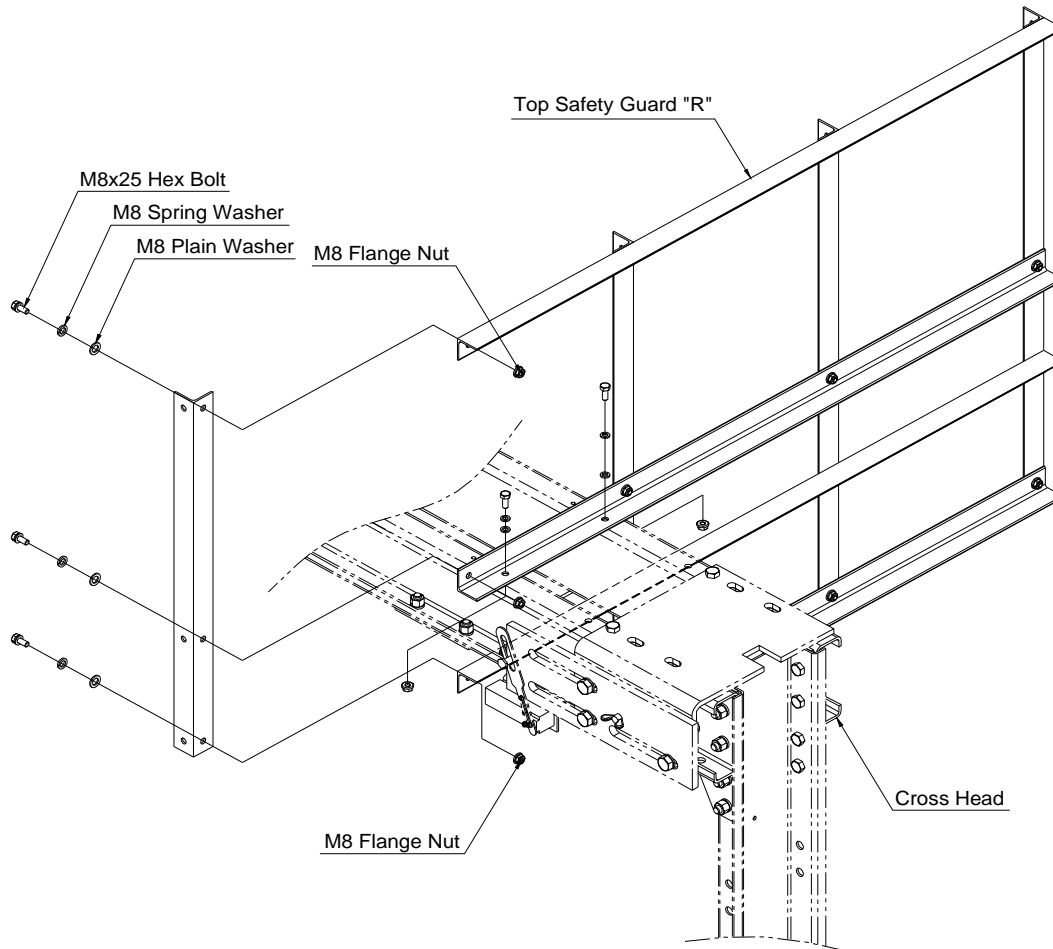
4-2-6. Underslung Fork type Car Top Safety Guard Assembly (See Fig. 4-2-6.)

(1) Assemble Car Top Safety Guard as shown on Fig. 4-2-6-A, Fig. 4-2-6-B, Fig. 4-2-6-C.



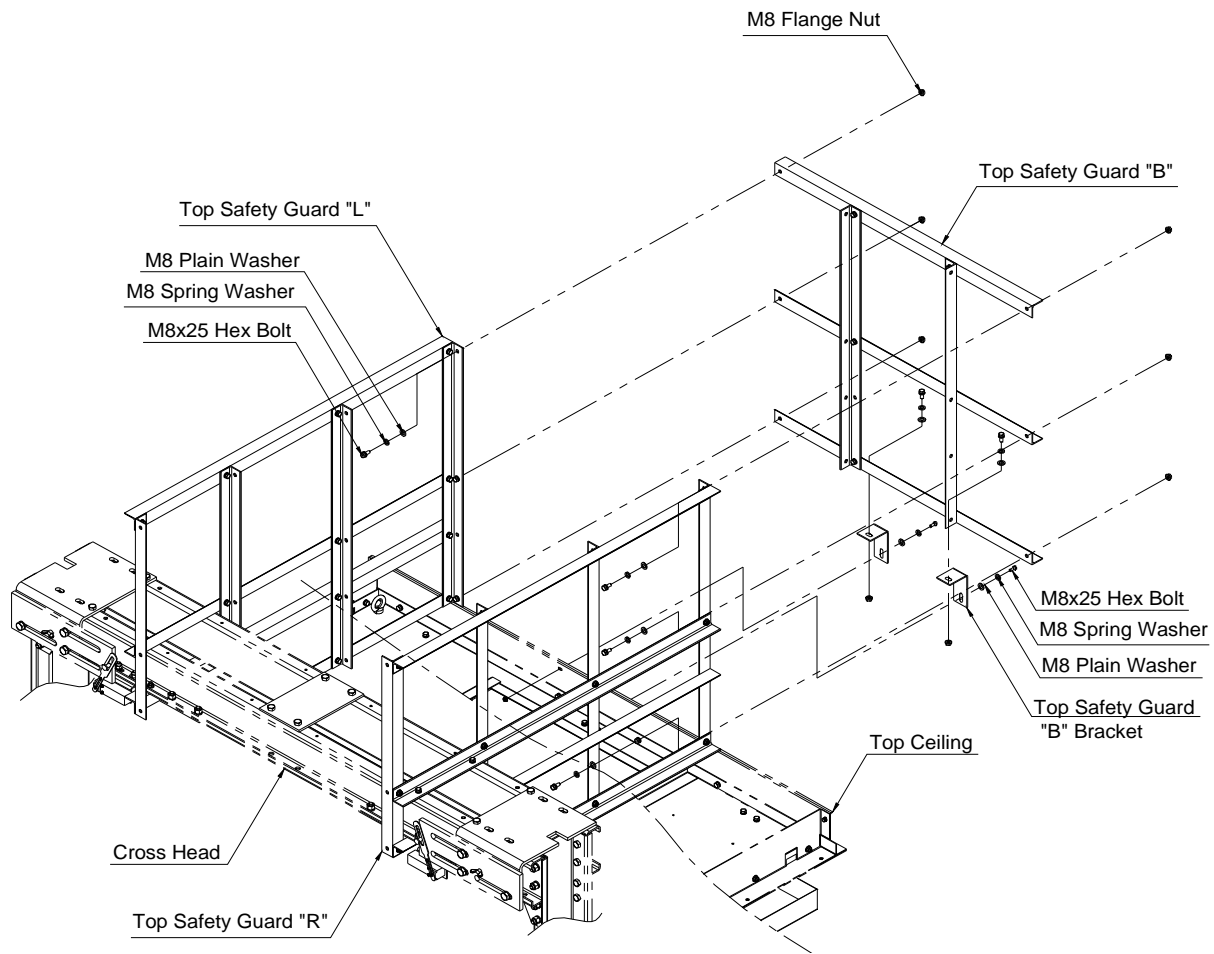
**Fig. 4-2-6-A. CAR TOP SAFETY GUARD (LEFT SIDE) INSTALLATION**  
(Underslung Fork type)

|        |                           |               |             |
|--------|---------------------------|---------------|-------------|
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|        |                           | page:         | 4-24        |



**Fig. 4-2-6-B. CAR TOP SAFETY GUARD (RIGHT SIDE) INSTALLATION**  
**(Underslung Fork type)**

|        |                           |               |             |
|--------|---------------------------|---------------|-------------|
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|        |                           | page:         | 4-25        |



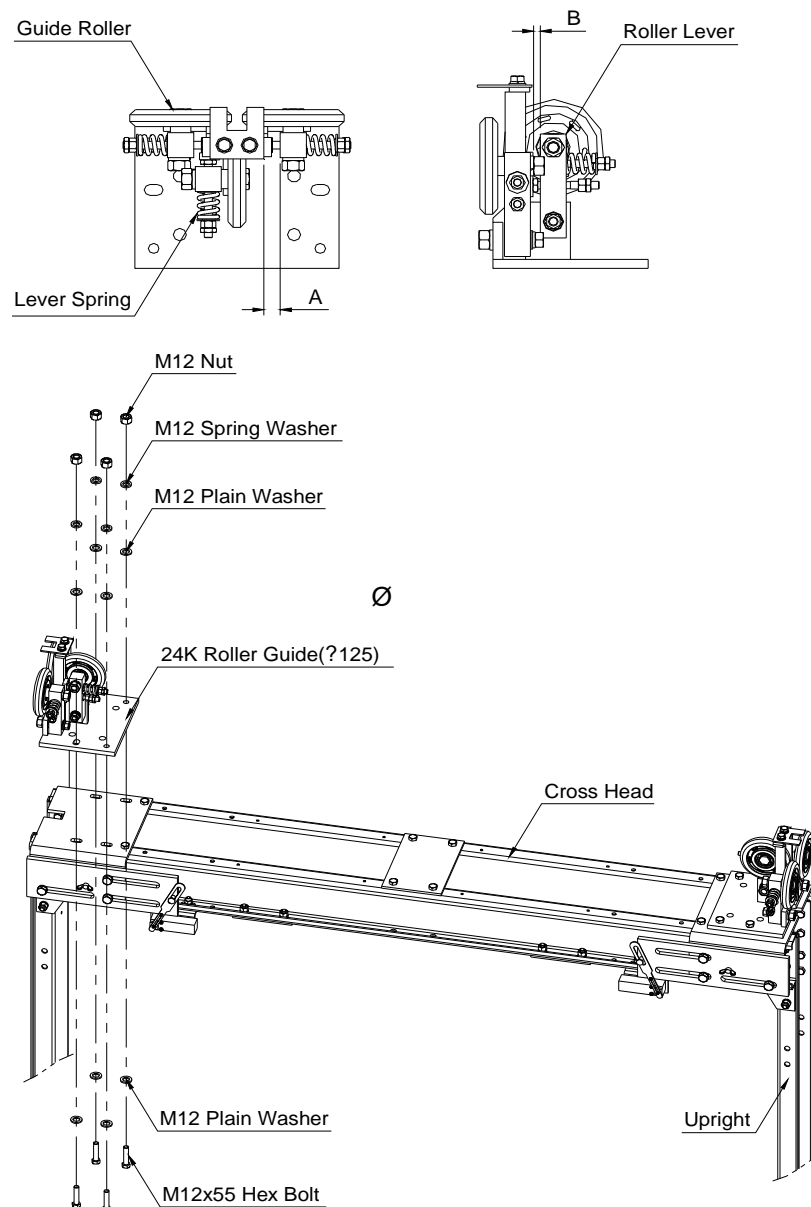
**Fig. 4-2-6-C. CAR TOP SAFETY GUARD (REAR SIDE) INSTALLATION  
(Underslung Fork type)**

|        |                           |               |             |
|--------|---------------------------|---------------|-------------|
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|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-26        |

#### 4-2-7. Underslung Fork type Top Guide Roller Assembly (See Fig. 4-2-7.)

- (1) Assemble Top Roller Guide to Crosshead
- (2) Adjust Compression Spring within Standard Setting Tolerance with double nuts.
- (3) Adjust Stopper within Standard Setting Tolerance with double nuts.

Reference] Assemble Bottom Roller Guide after Car Roping works done.



**Fig. 4-2-7. TOP GUIDE ROLLER INSTALLATION (Underslung Fork type)**

|        |                           |               |             |
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|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-27        |

#### 4-3. Car Frame (underslung corner post type)

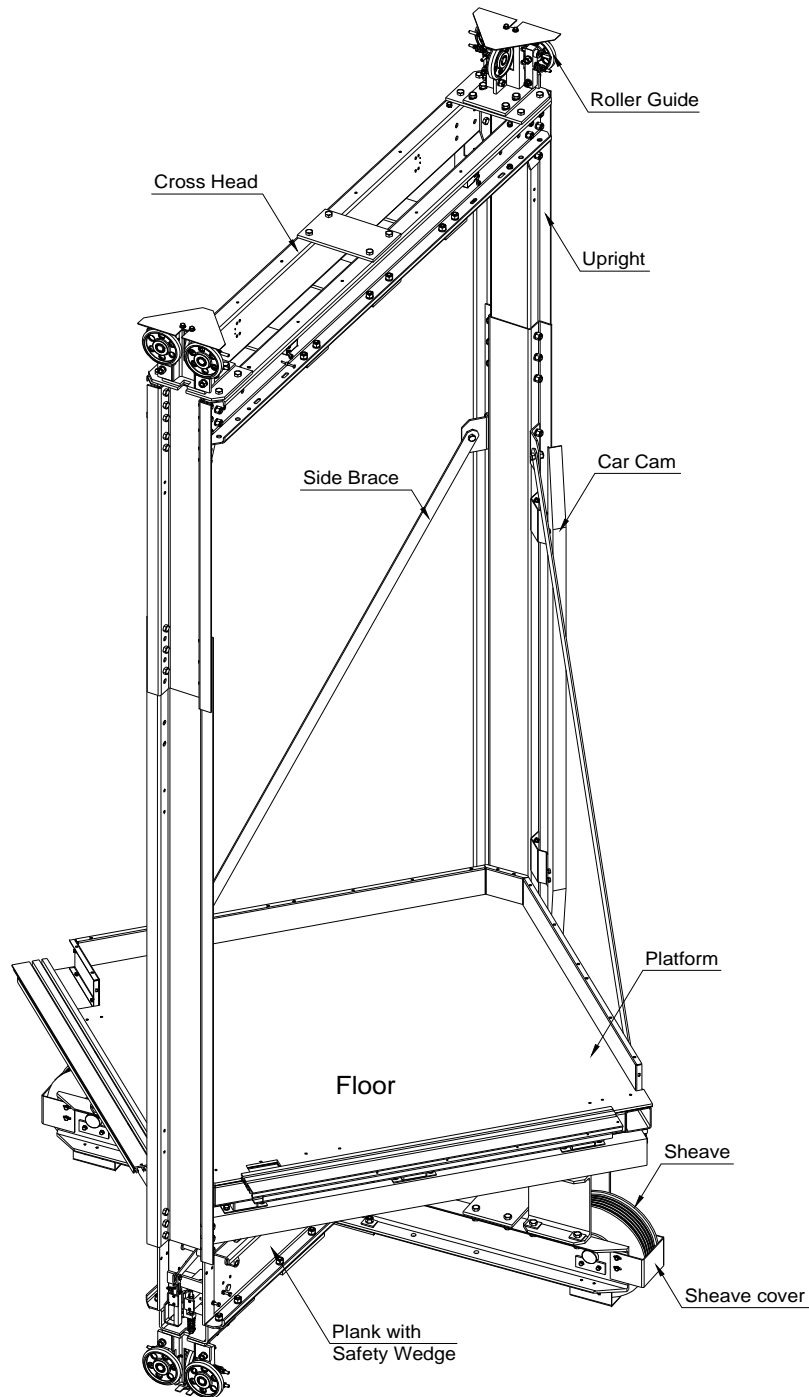


Fig. 4-3. CAR FRAME ASSEMBLY (Underslung Corner post type)

|               |                                  |               |             |
|---------------|----------------------------------|---------------|-------------|
| <b>HM TEC</b> | <b>INSTALLATION MANUAL</b>       | Document No.: | TN-M01-0001 |
|               |                                  | Date:         | 26-Apr-10   |
|               | <b>MRL - Cage, counterweight</b> | Name:         | N.R.Kim     |
|               |                                  | page:         | 4-28        |

#### 4-3-1. Underslung Corner post type Plank Assembly

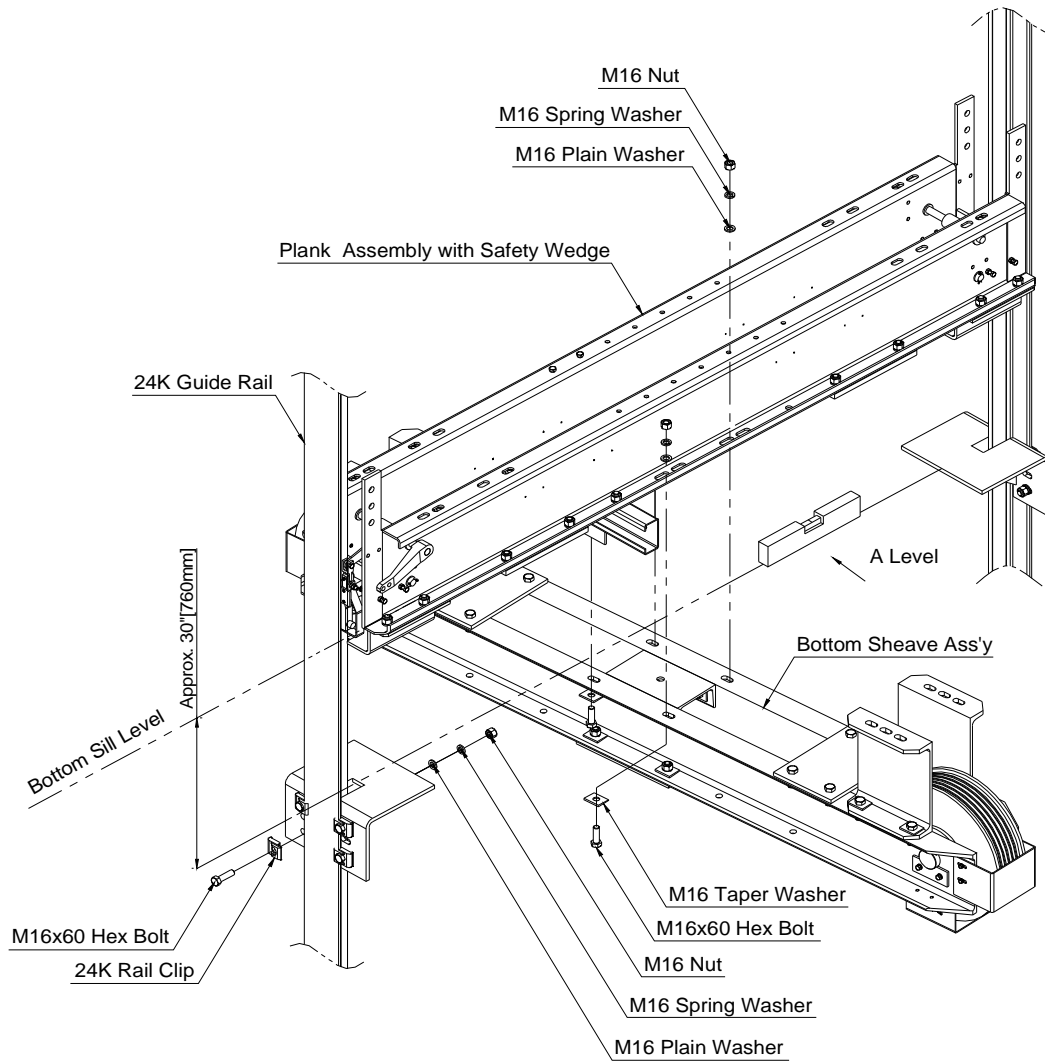
##### (1) Assembling Preparatory

- ① Separate both Guide Shoe from Floor.
- ② Separate right side of Plank Assembly with Safety Wedge.
- ③ Mount supporting Jig at appropriate height of Car right or left side of Guide Rail.  
Reference] Adjust Landing Sill and Car Sill for Car Assembling.

##### (2) Plank Assembly Installation (See Fig. 4-3-1-A. & See Fig. 4-3-1-B.)

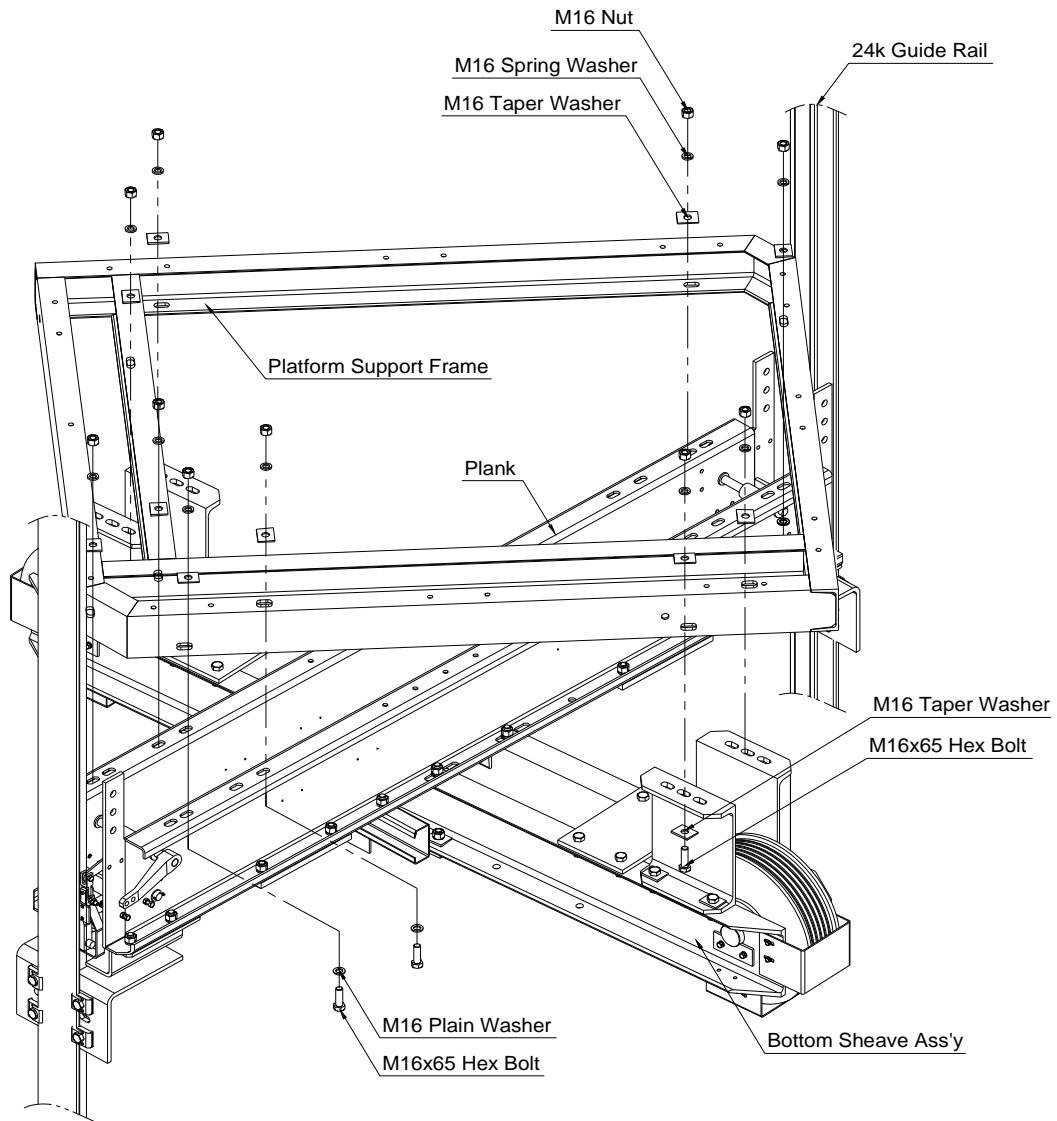
- ① Place separated Plank Assembly with Safety Wedge on the Supporting Jig and insert into Guide Rail. Then, mount it temporarily.
- ② Place Plank Assembly with Safety Wedge and assemble with bolt.
- ③ Place PF Support Angle on the Plank Assembly and mount it temporarily.
- ④ Temporarily mount front and rear of Balancing Beam.
- ⑤ Accurately adjust Platform support Angle with Balancing Beam, and fasten completely.

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|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
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**Fig. 4-3-1-A. PLANK and BOTTOM SHEAVE ASSEMBLY INSTALLATION**  
**(Underslung Corner post type)**

|        |                           |               |             |
|--------|---------------------------|---------------|-------------|
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|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
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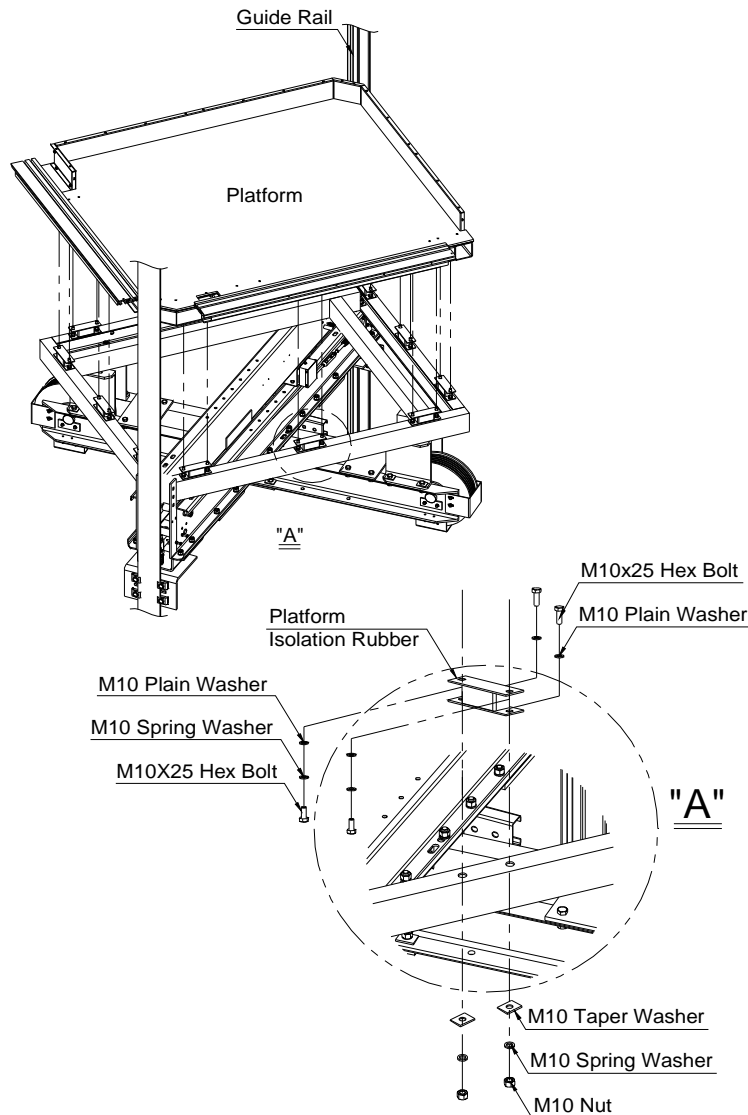


**Fig. 4-3-1-B. PLATFORM SUPPORT FRAME INSTALLATION**  
**(Underslung Corner post type)**

|        |                           |               |             |
|--------|---------------------------|---------------|-------------|
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|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-31        |

4-3-2. Underslung Corner post type Platform Assembly (See Fig. 4-3-2.)

- (1) Place Platform Isolation Rubber on the Platform Support Angle and mount temporarily with bolt.
- (2) Adjust Platform on the Platform Isolation Rubber.
- (3) Adjust hole of Platform Isolation Rubber and Platform and mount temporarily with bolt.
- (4) Accurately adjust gap of Landing Sill and Car Sill, and then fasten Platform Isolation Rubber completely.



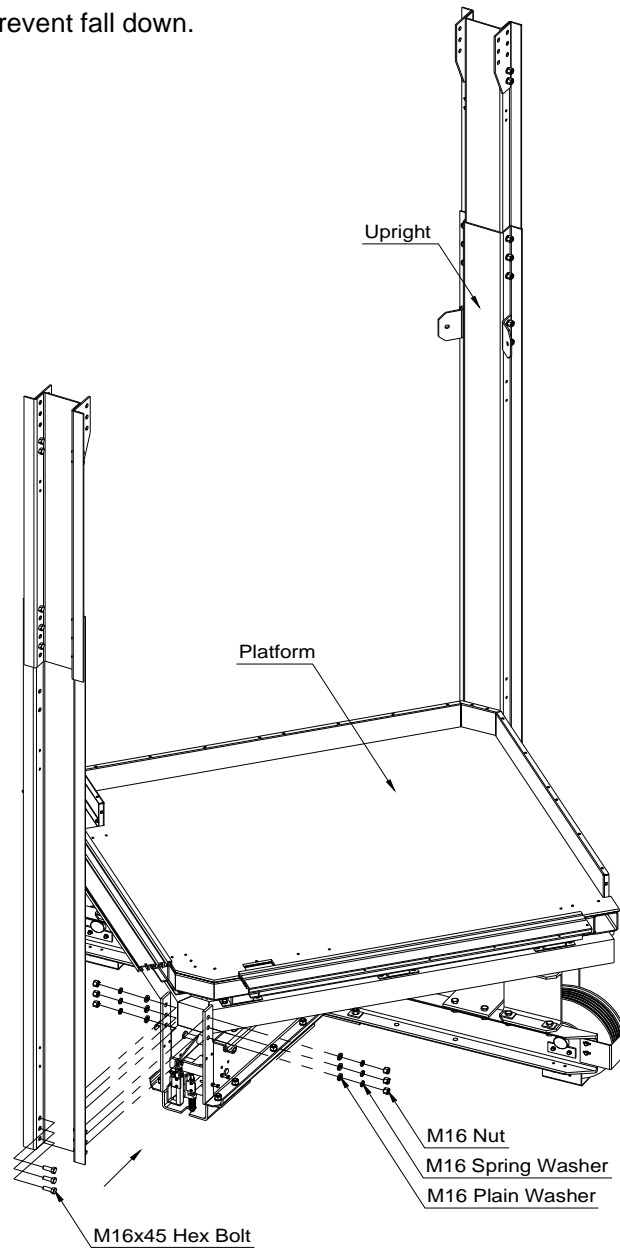
**Fig. 4-3-2. PLATFORM ASSEMBLY INSTALLATION (Underslung Corner post type)**

|        |                           |               |             |
|--------|---------------------------|---------------|-------------|
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|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-32        |

4-3-3. Underslung Corner post type Upright Assembly (See Fig. 4-3-3.)

- (1) Adjust right side of Plank Frame to right Upright, and then mount temporarily with bolt.
- (2) Adjust left side as above.

Attention] After Upright is temporarily assembled, Upright Top should be mounted to Guide rail to prevent fall down.

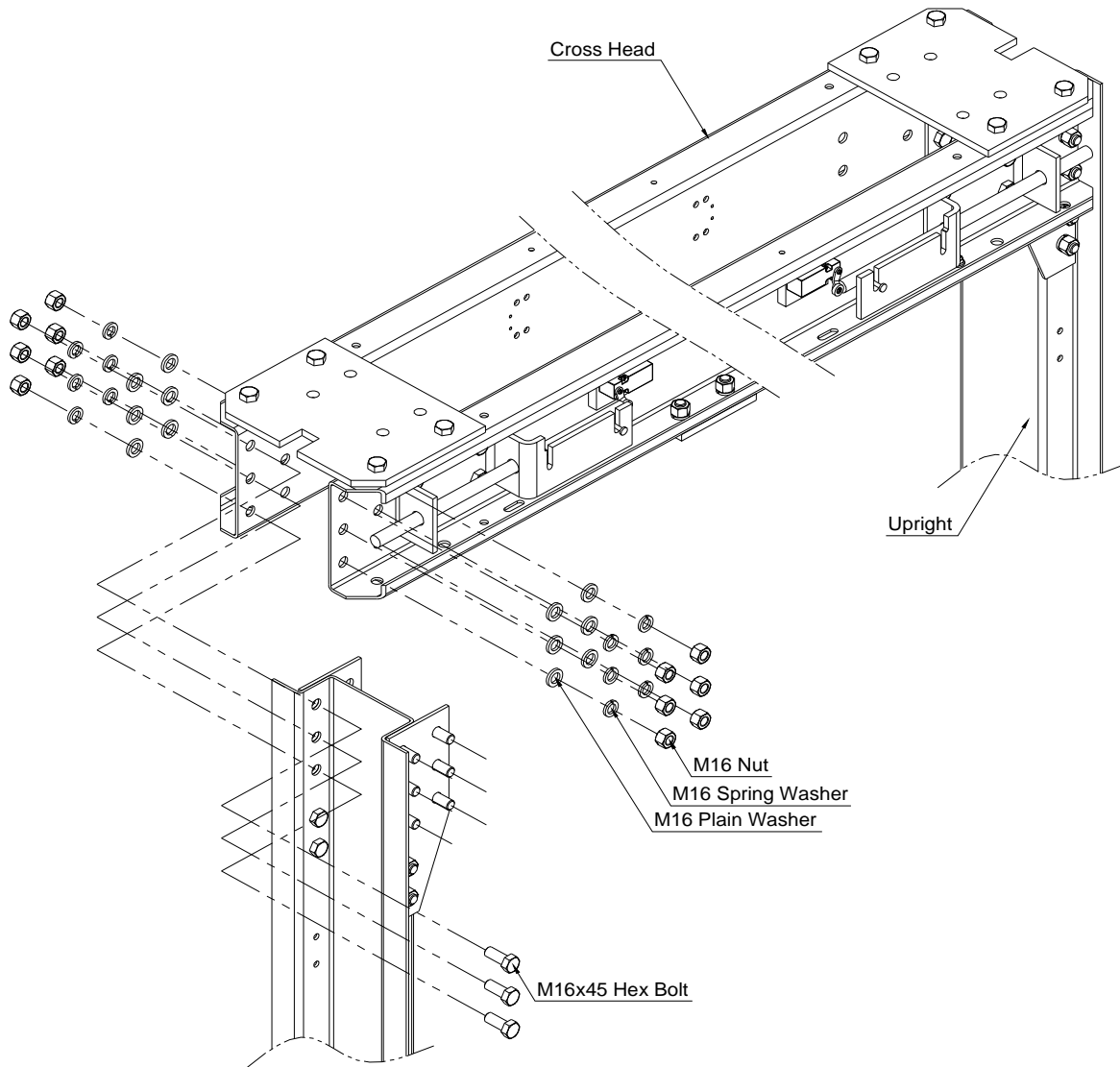


**Fig. 4-3-3. UPRIGHT INSTALLATION (Underslung Corner post type)**

|        |                           |               |             |
|--------|---------------------------|---------------|-------------|
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|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-33        |

4-3-4. Underslung Corner post type Crosshead Assembly (See Fig. 4-3-4.)

(1) Temporarily assemble Crosshead to adjust Top Upright.

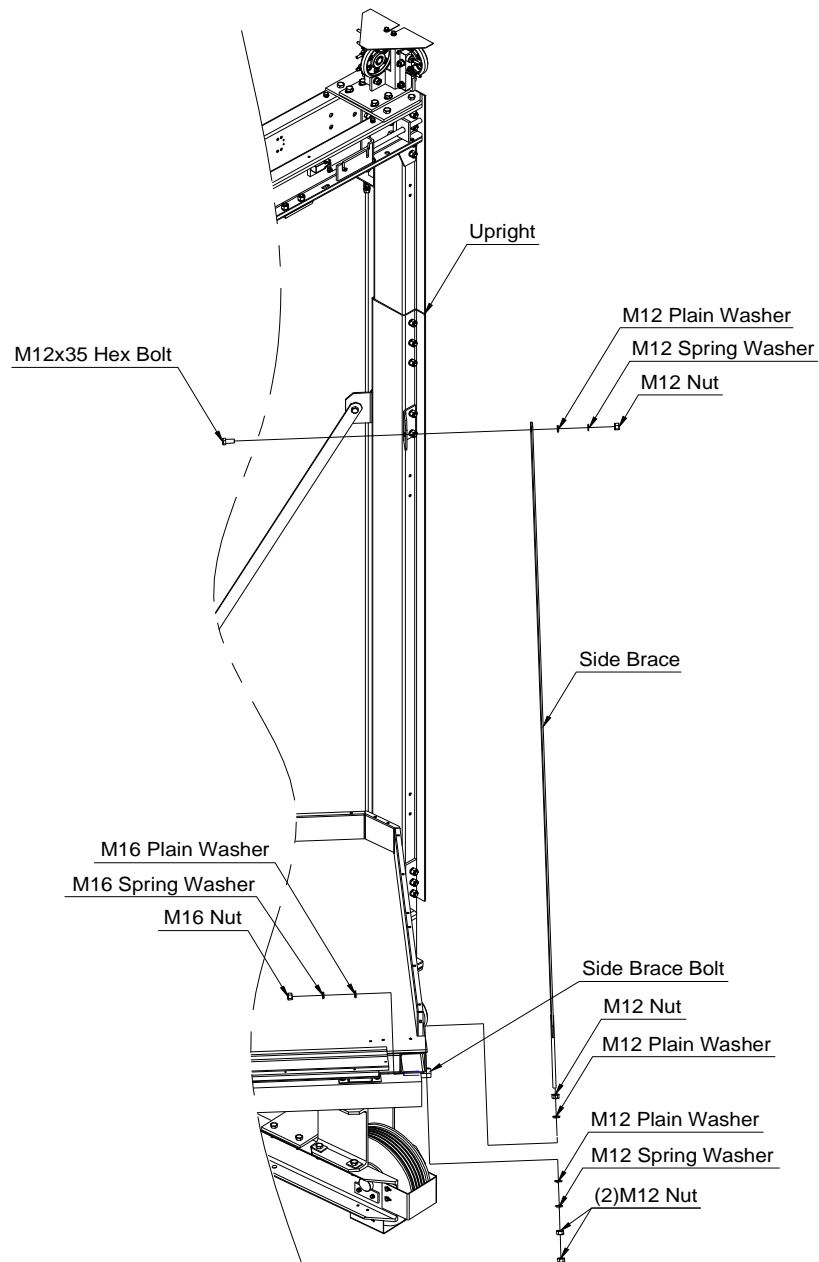


**Fig. 4-3-4. CROSSHEAD INSTALLATION (Underslung Corner post type)**

|        |                           |               |             |
|--------|---------------------------|---------------|-------------|
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|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-34        |

#### 4-3-5. Underslung Corner post type Side Brace Assembly (See Fig. 4-3-5)

- (1) Temporarily assemble Side brace to adjust Hole and Upright of the end of Balancing Beam.

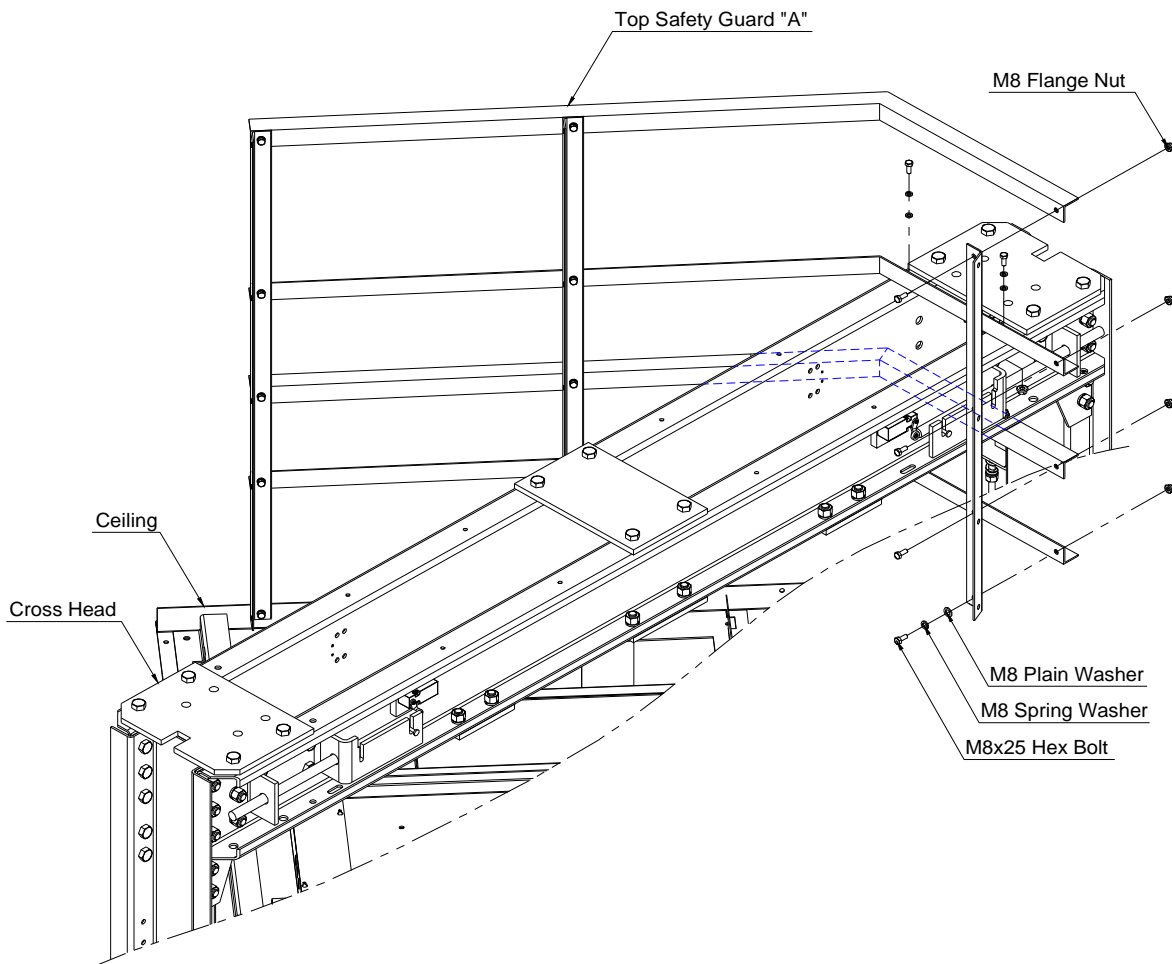


**Fig. 4-3-5. SIDE BRACE INSTALLATION (Underslung Corner post type)**

|        |                           |               |             |
|--------|---------------------------|---------------|-------------|
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|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
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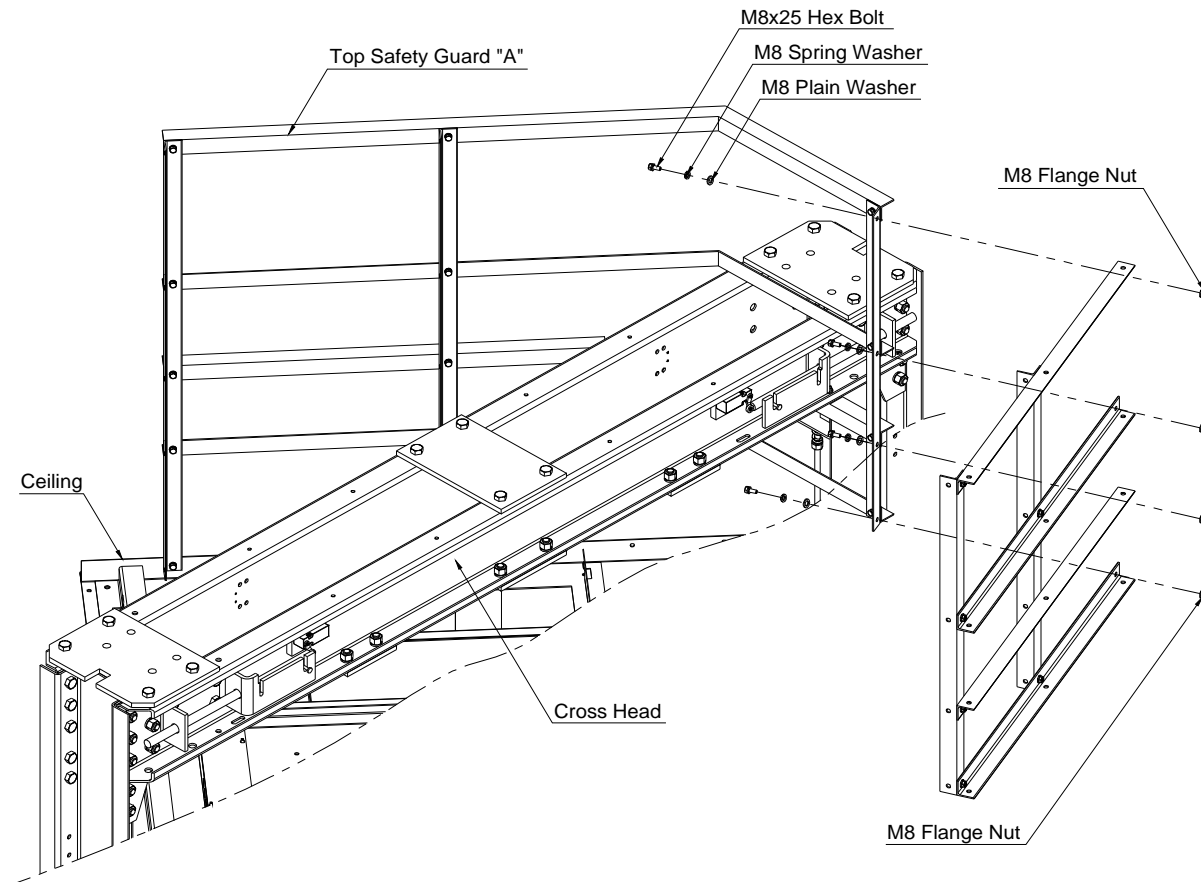
4-3-6. Underslung Corner post type Car Top Safety Guard Assembly (See Fig. 4-3-6.)

(1) Assemble Car Top Safety Guard as shown on Fig. 4-3-6-A, Fig. 4-3-6-B.



**Fig. 4-3-6-A. CAR TOP SAFETY GUARD (LEFT SIDE) INSTALLATION  
(Underslung Corner post type)**

|        |                           |               |             |
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|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
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**Fig. 4-3-6-B. CAR TOP SAFETY GUARD (RIGHT SIDE) INSTALLATION**  
**(Underslung Fork type)**

|        |                           |               |             |
|--------|---------------------------|---------------|-------------|
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|        |                           | page:         | 4-37        |

4-3-7. Underslung Corner post type Top Guide Roller Assembly (See Fig. 4-3-7.)

- (1) Assemble Top Roller Guide to Crosshead
- (2) Adjust Compression Spring within Standard Setting Tolerance with double nuts.
- (3) Adjust Stopper within Standard Setting Tolerance with double nuts.

Reference] Assemble Bottom Roller Guide after Car Roping works done.

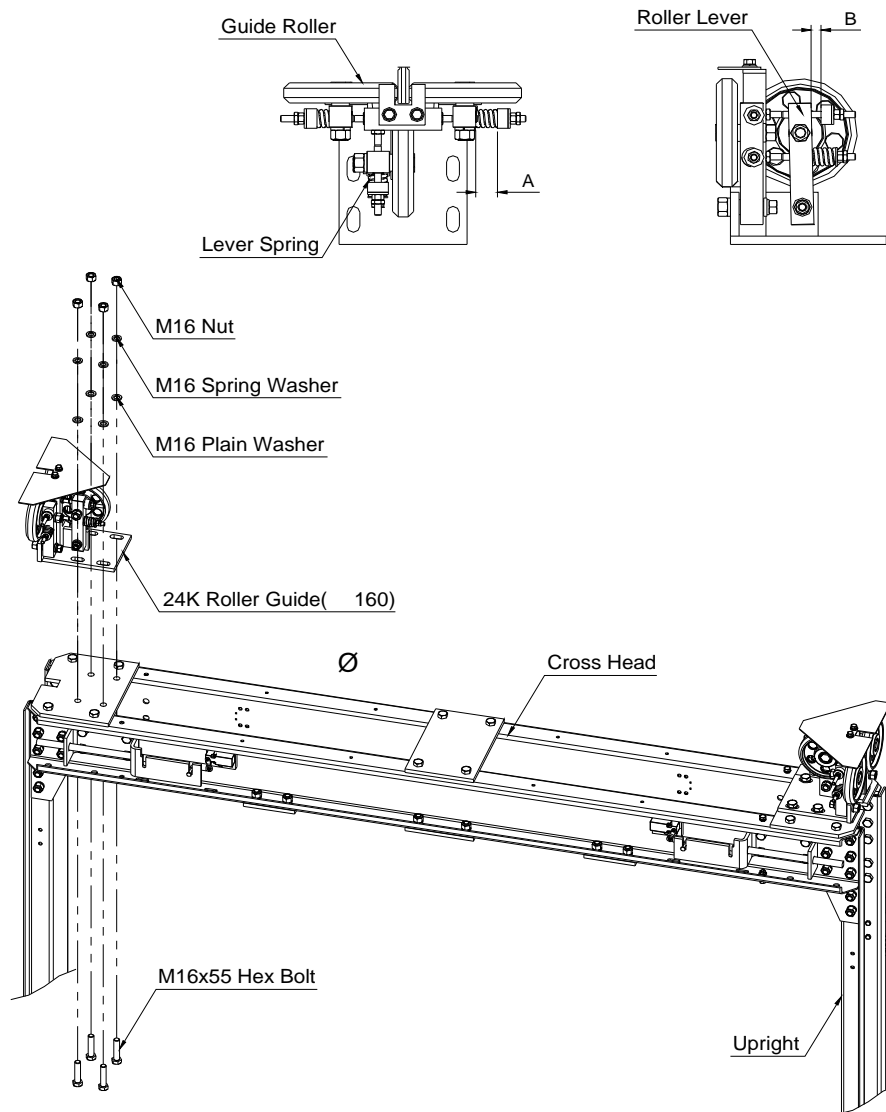
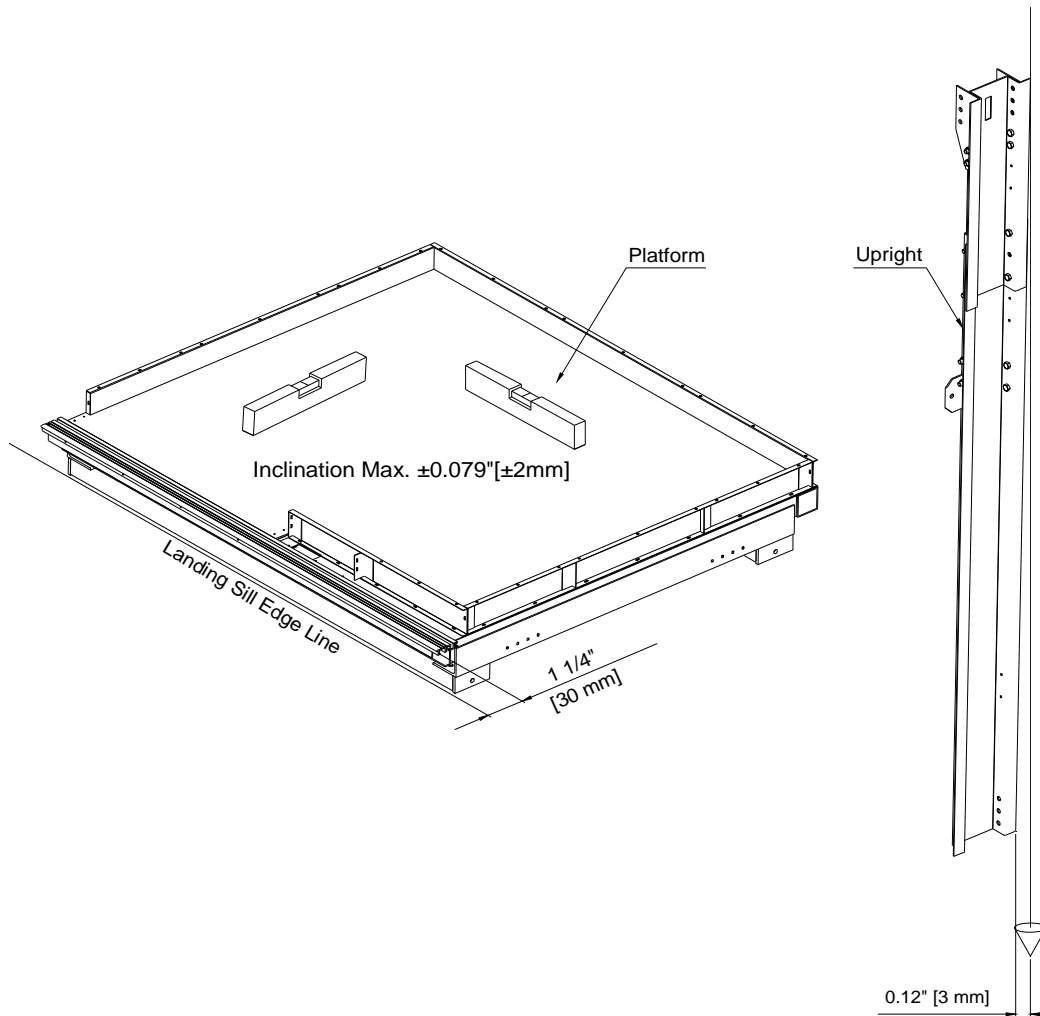


Fig. 4-3-7. TOP GUIDE ROLLER INSTALLATION (Underslung Corner post type)

|        |                           |               |             |
|--------|---------------------------|---------------|-------------|
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|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-38        |

- ①
- 4-4-1. Car Centering (See Fig. 4-4-1.)
- (1) When Top Guide Roller is assembled, adjust gap between Safety Wedge body and Guide Rail. Referred to Safety Gear Adjustment Manual.
  - (2) Plumb Upright from upper to lower within 0.12" [3mm].
  - (3) Adjust gap between Car Sill and Landing Sill within 1 1/4 ±0.078" [32 ±2mm].
  - (4) Adjust horizontally front&rear, right&left from Floor within ±0.079" [±2mm].
  - (5) Now, fasten all bolts in secure.



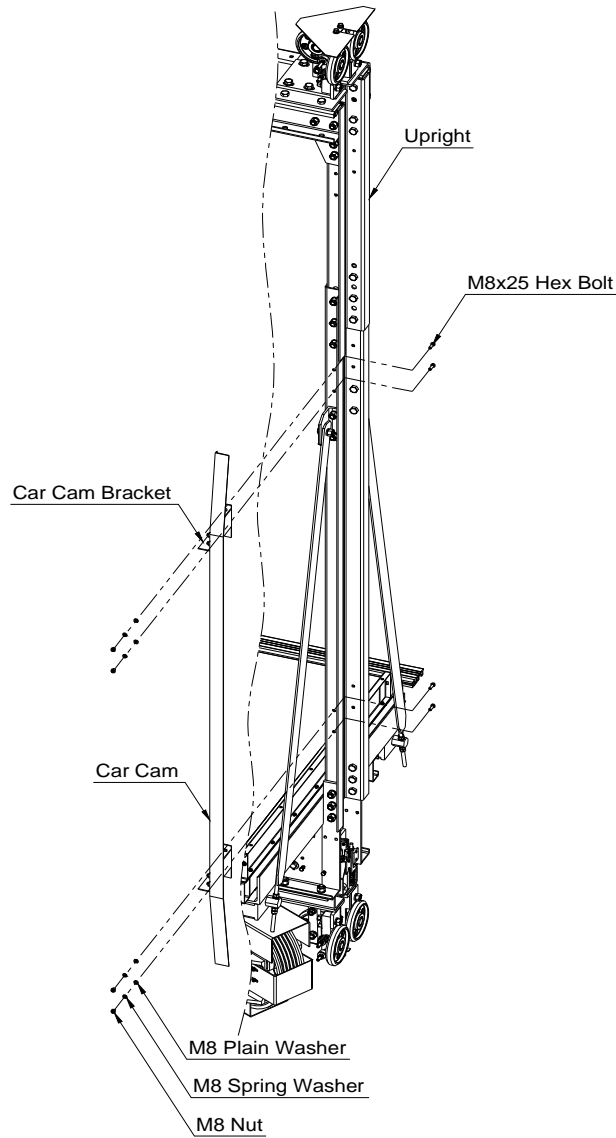
①

**Fig. 4-4-1. CAR CENTERING**

| Rev. no. | Description | Approved by | Date      |  |
|----------|-------------|-------------|-----------|--|
| ①        | WAS 4-1-8   | DU Seo      | 20-Apr-10 |  |
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|--------|---------------------------|---------------|-------------|
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|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
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- ①
- 4-5-1. Limit Switch Cam Assembly (See Fig. 4-5-1.)
- (1) Check the position of Limit Switch Cam (referred as Layout Drawing)
  - (2) Loosen/unfasten the temporarily fastened bolt from Limit Switch Cam.
  - (3) Adjust Limit Switch Cam to Upright and assemble.
  - (4) Fasten in secure after Centering.



①  
**Fig. 4-5-1. LIMIT CAM INSTALLATION**

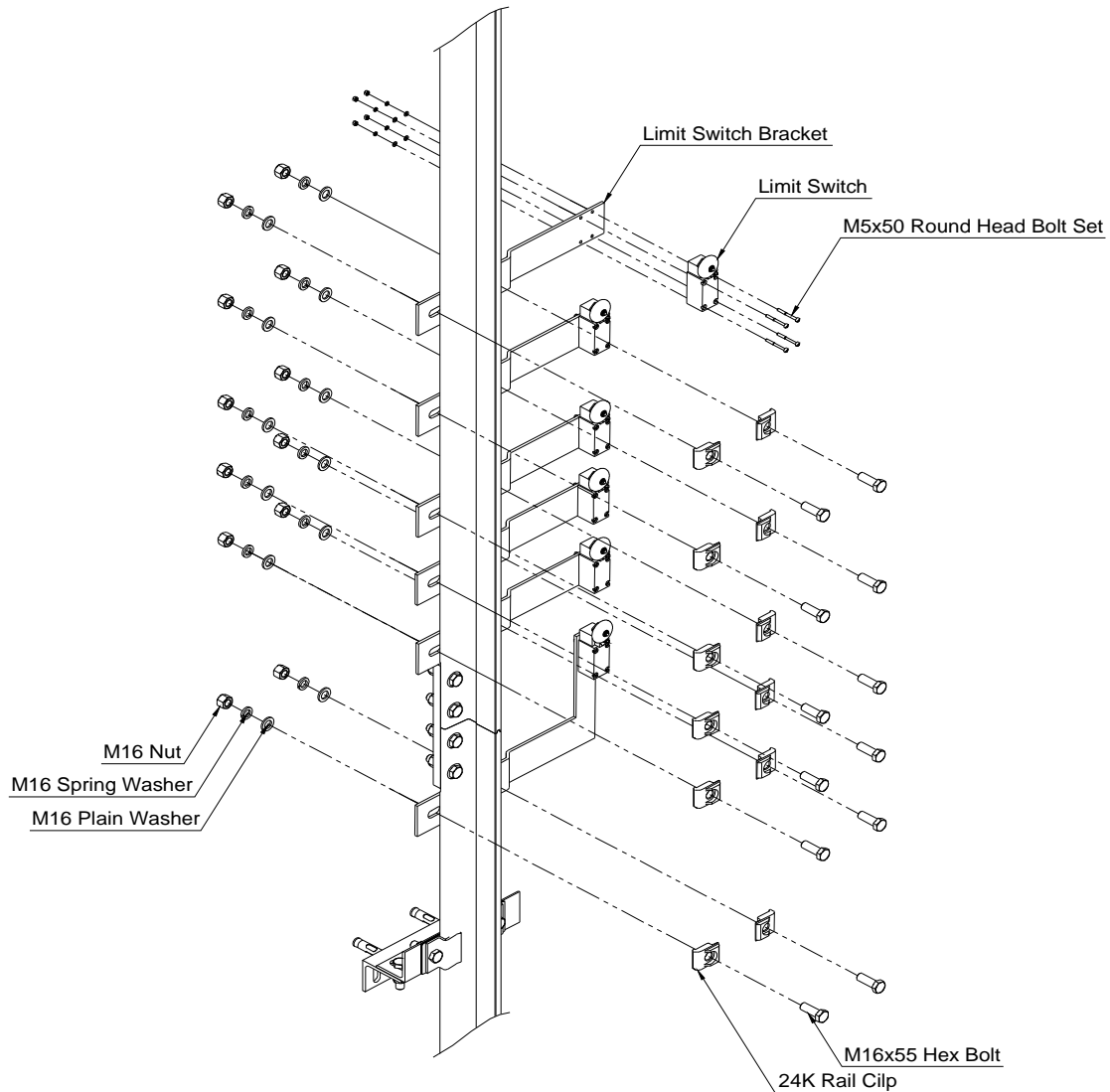
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|----------|-------------|-------------|-----------|--|
| ①        | WAS 4-1-9   | DU Seo      | 20-Apr-10 |  |
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| HM TEC | INSTALLATION MANUAL       | Document No.: | TN-M01-0001 |
|        |                           | Date:         | 2-Mar-09    |
|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-40        |

①  
4-5-2. Limit Switch Assembly (See Fig. 4-5-2.)

②  
(1) Installation of Lower Limit Switch (Fig. 4-5-2-A.)

- ① Temporarily Install Using Limit Switch Bracket and Rail Clip.



①  
**Fig. 4-5-2-A. LOWER LIMIT SWITCH INSTALLATION**

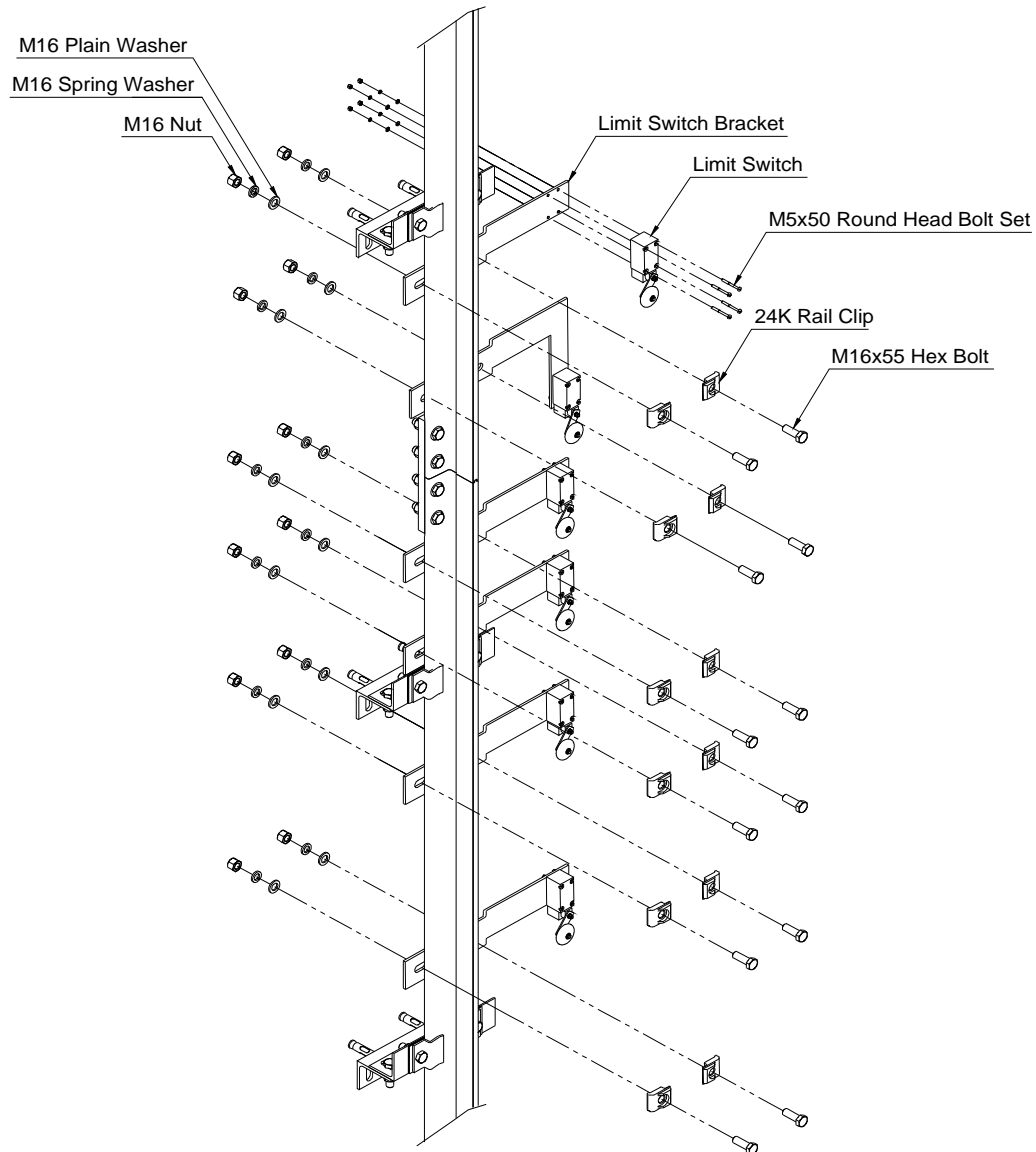
| Rev. no. | Description  | Approved by | Date      |  |
|----------|--------------|-------------|-----------|--|
| ①        | WAS 4-1-10   | DU Seo      | 20-Apr-10 |  |
| ②        | WAS 4-1-10-A | DU Seo      | 20-Apr-10 |  |
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| HM TEC | INSTALLATION MANUAL       | Document No.: | TN-M01-0001 |
|        |                           | Date:         | 2-Mar-09    |
|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-41        |

①

(2) Installation of Upper Lower Limit Switch (Fig. 4-5-2-B.)

① Temporarily Install Using Limit Switch Bracket and Rail Clip.



**Fig. 4-5-2-B. UPPER LIMIT SWITCH INSTALLATION**

| Rev. no. | Description  | Approved by | Date      |  |
|----------|--------------|-------------|-----------|--|
| ①        | WAS 4-1-10-B | DU Seo      | 20-Apr-10 |  |
|          |              |             |           |  |
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| HM TEC | INSTALLATION MANUAL       | Document No.: | TN-M01-0001 |
|        |                           | Date:         | 2-Mar-09    |
|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-42        |

①

#### 4-6. Counterweight Frame Assembly (See Fig. 4-6.)

②

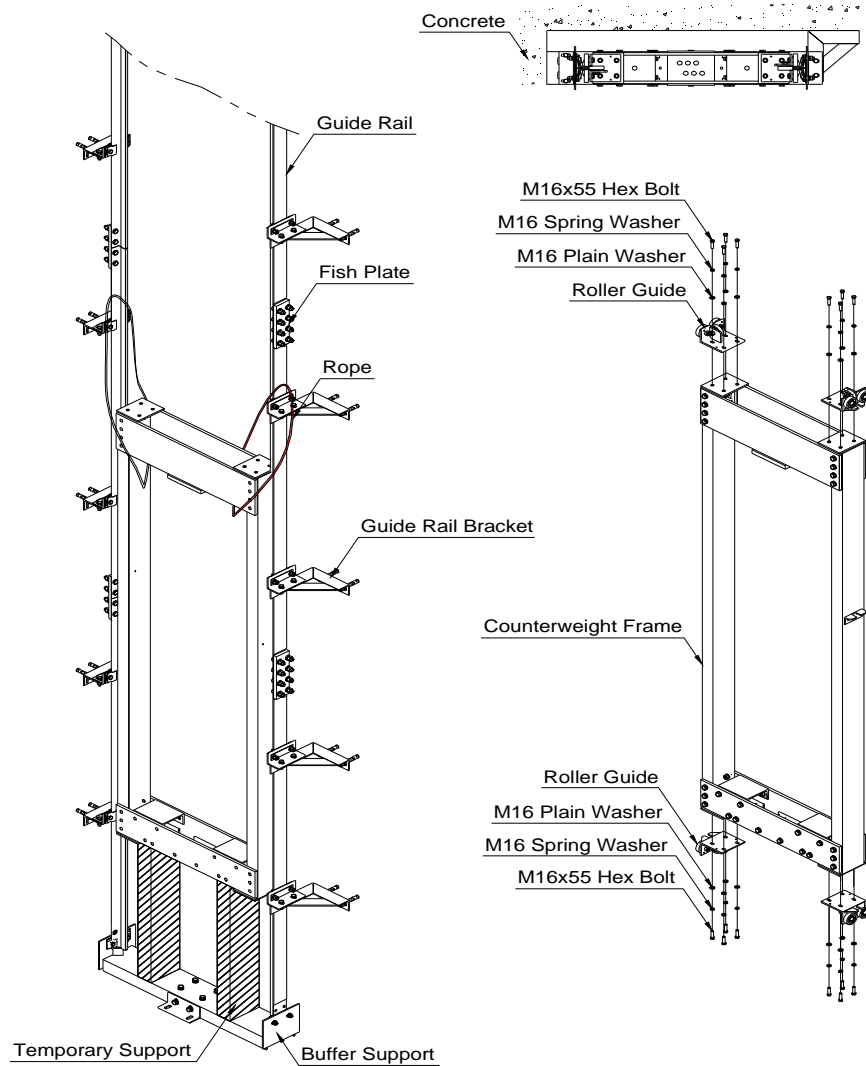
##### 4-6-1. Decide the position of Counterweight Frame

Mount Counterweight Frame in appropriate height with Manila Rope by using temporal support.

③

##### 4-6-2. Counterweight Guide Roller Assembling

Remove Manila Rope after Guide Roller assembly/components are assembled.



①

**Fig. 4-6. COUNTERWEIGHT FRAME INSTALLATION**

| Rev. no. | Description | Approved by | Date      |  |
|----------|-------------|-------------|-----------|--|
| ①        | WAS 4-2     | DU Seo      | 20-Apr-10 |  |
| ②        | WAS 4-2-1   | DU Seo      | 20-Apr-10 |  |
| ③        | WAS 4-2-2   | DU Seo      | 20-Apr-10 |  |

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| HM TEC | INSTALLATION MANUAL       | Document No.: | TN-M01-0001 |
|        |                           | Date:         | 2-Mar-09    |
|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-43        |

②

## 4-7. Car and Overspeed Governor Roping

③

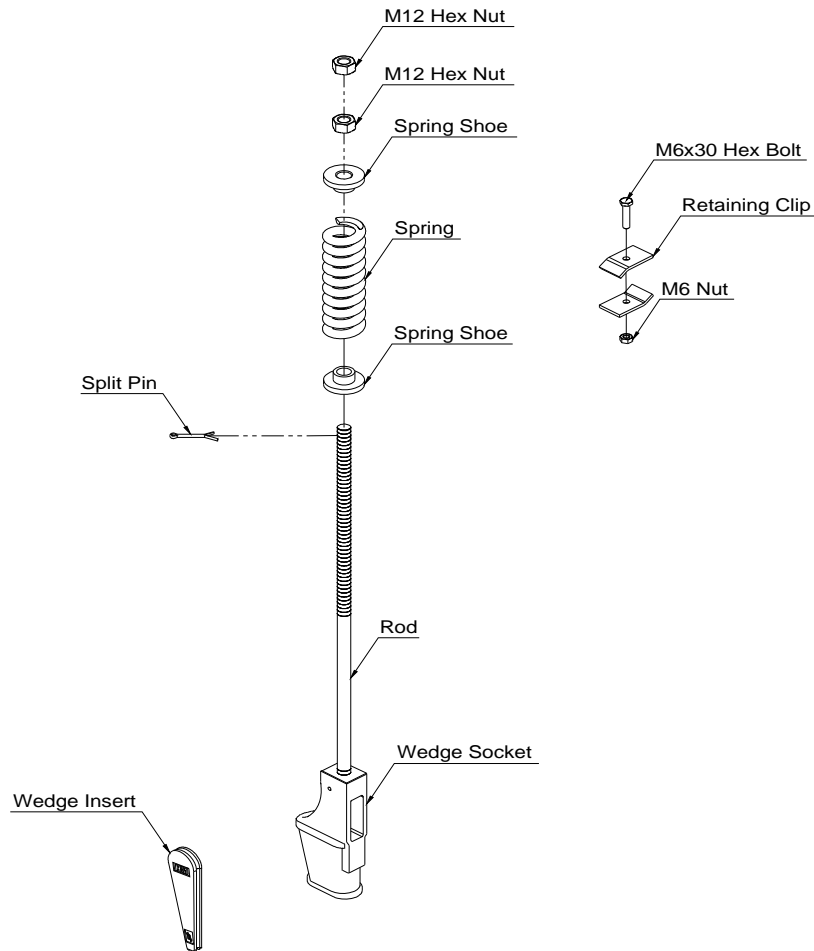
### 4-7-1. Roping (Main Rope)

: After accurate length of Rope is decided, install Hoist Ropes

Ropes by using prepared Shackles.

(1) Wedge Type Rope Socket (See Fig. 4-7-1-A. & 4-7-1-B.)

(2) Car & Counterweight Roping (See Fig. 4-7-1-C. & See Fig. 4-7-1-D. & See Fig. 4-7-1-E.)

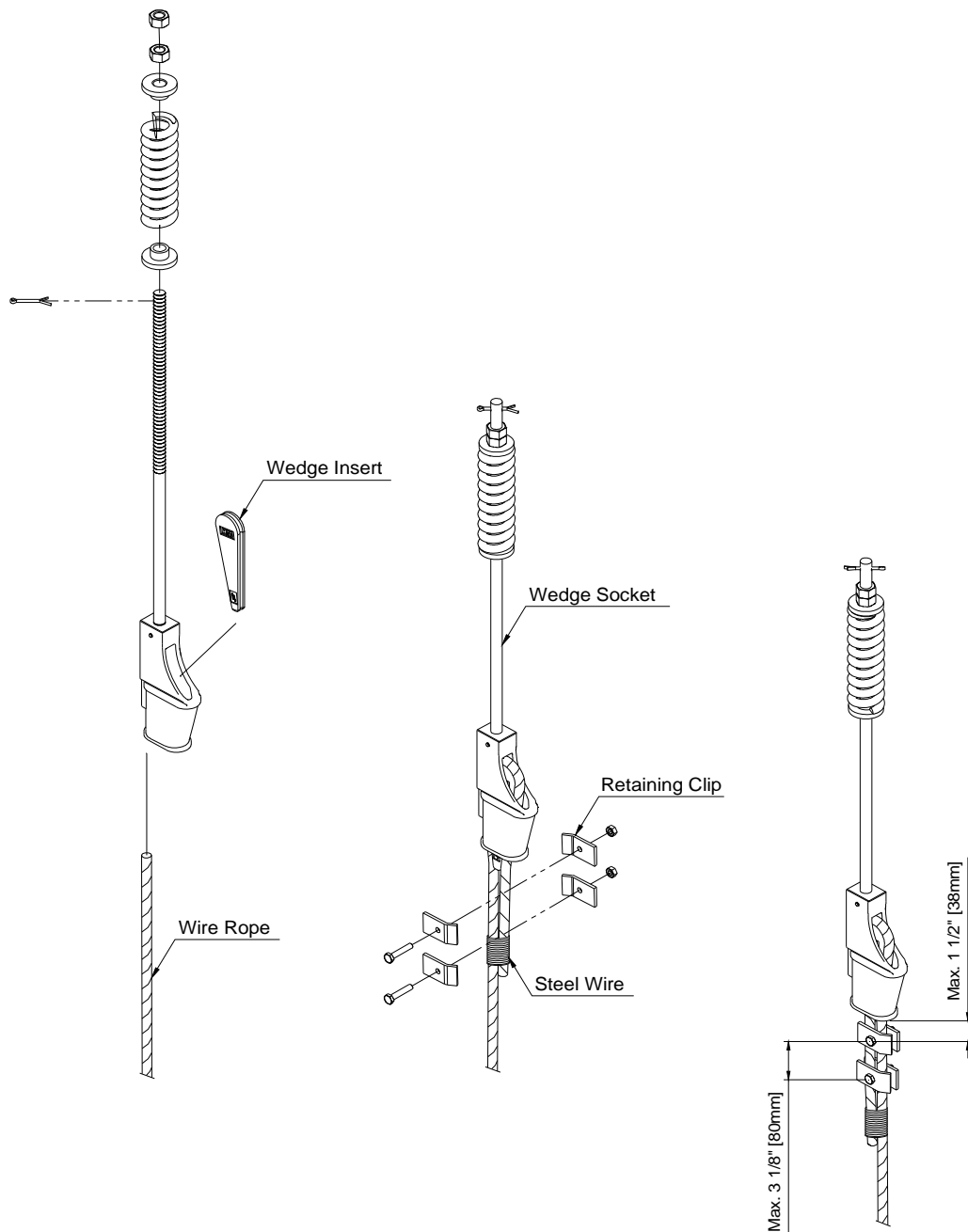


③

Fig. 4-7-1-A. WEDGE TYPE ROPE SOCKET

| Rev. no. | Description | Approved by | Date      |  |
|----------|-------------|-------------|-----------|--|
| ①        | ADDED       | DU Seo      | 24-Dec-09 |  |
| ②        | WAS 4-3     | DU Seo      | 20-Apr-10 |  |
| ③        | WAS 4-3-1   | DU Seo      | 20-Apr-10 |  |

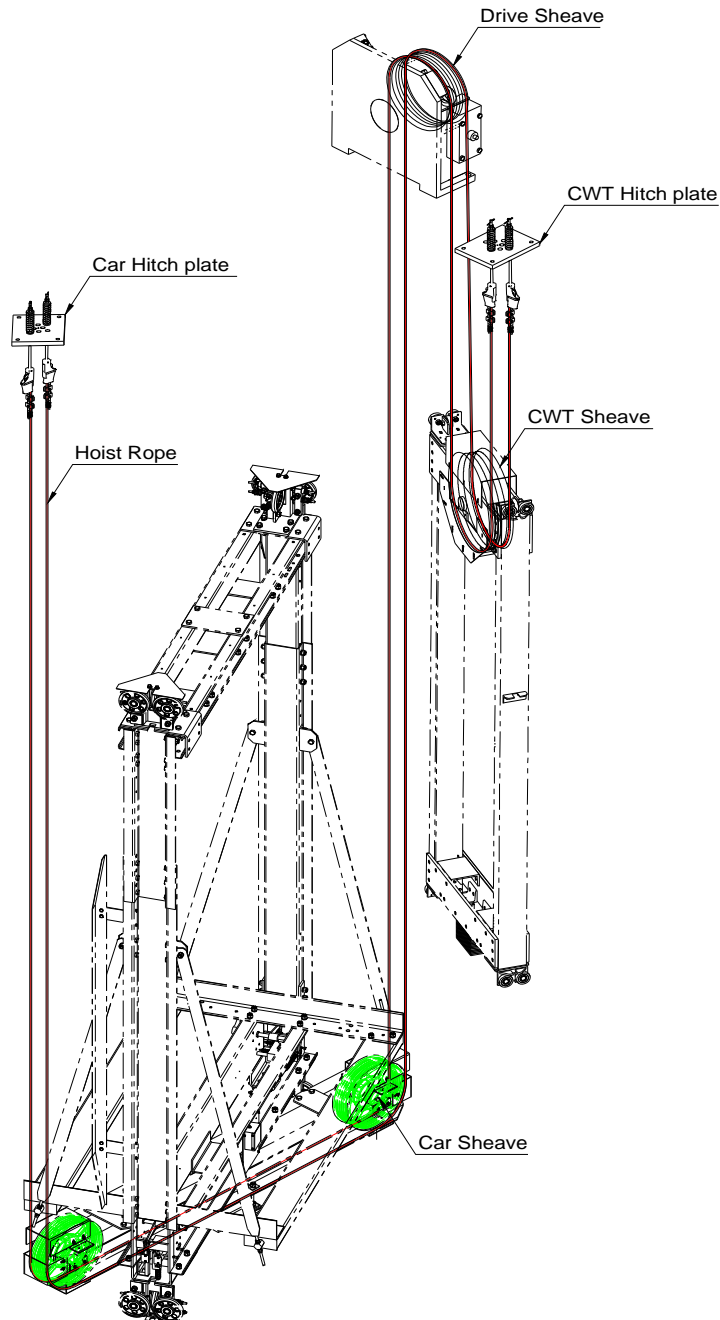
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| HM TEC | INSTALLATION MANUAL       | Document No.: | TN-M01-0001 |
|        |                           | Date:         | 2-Mar-09    |
|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-44        |



①  
**Fig. 4-7-1-B. WEDGE TYPE ROPE SOCKET**

| Rev. no. | Description | Approved by | Date      |  |
|----------|-------------|-------------|-----------|--|
| ①        | WAS 4-3-1-B | DU Seo      | 20-Apr-10 |  |
|          |             |             |           |  |
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|        |                           | Date:         | 2-Mar-09    |
|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-45        |



①

**Fig. 4-7-1-C. CAR and COUNTERWEIGHT ROPPING (Underslung Skewed type)**

| Rev. no. | Description | Approved by | Date      |  |
|----------|-------------|-------------|-----------|--|
| ①        | WAS 4-3-1-C | DU Seo      | 20-Apr-10 |  |
|          |             |             |           |  |
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|        |                           | Date:         | 20-Apr-10   |
|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-46        |

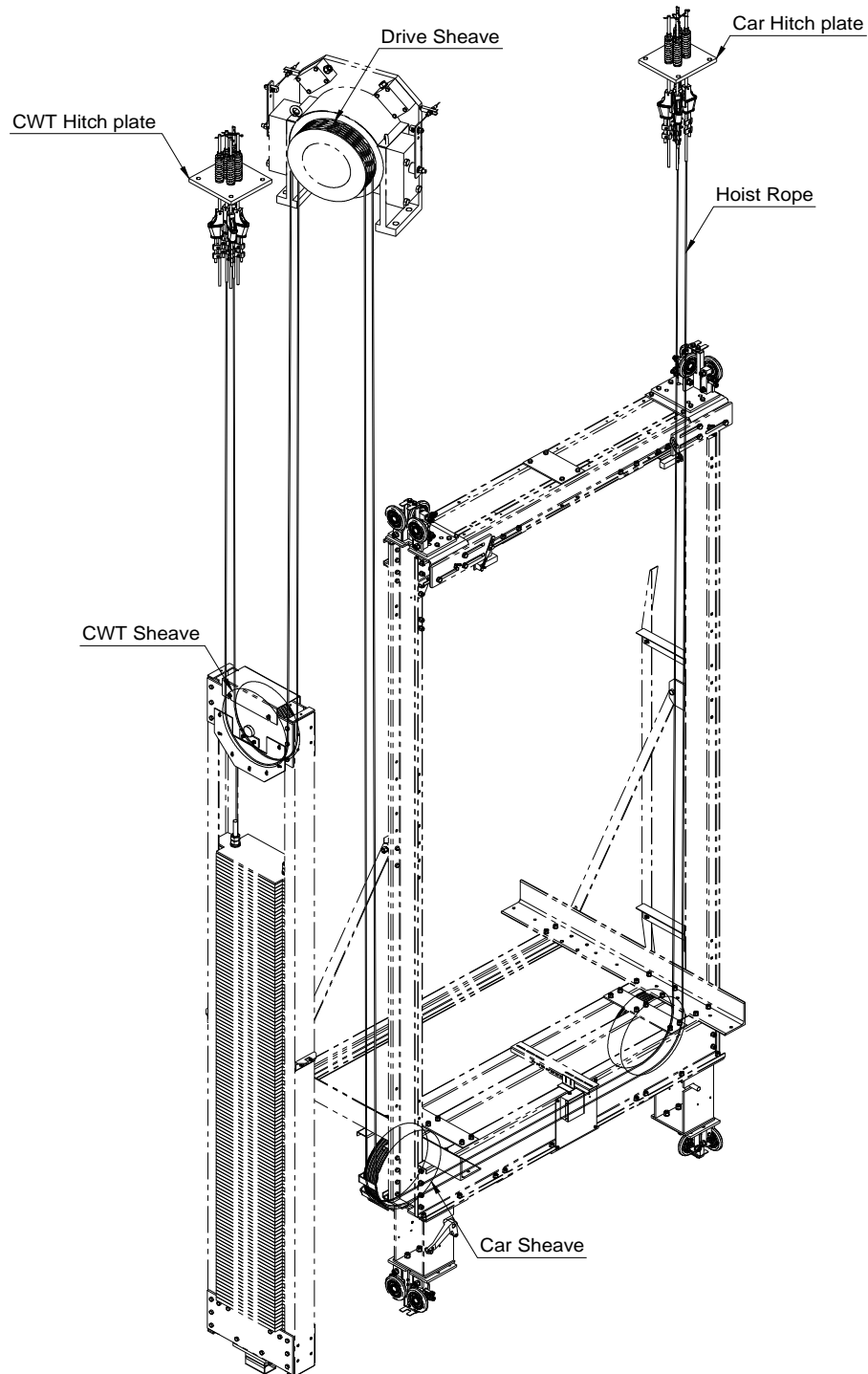


Fig. 4-7-1-D. CAR and COUNTERWEIGHT ROPPING (Underslung Fork type)

|        |                           |               |             |
|--------|---------------------------|---------------|-------------|
| HM TEC | INSTALLATION MANUAL       | Document No.: | TN-M01-0001 |
|        |                           | Date:         | 20-Apr-10   |
|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-47        |

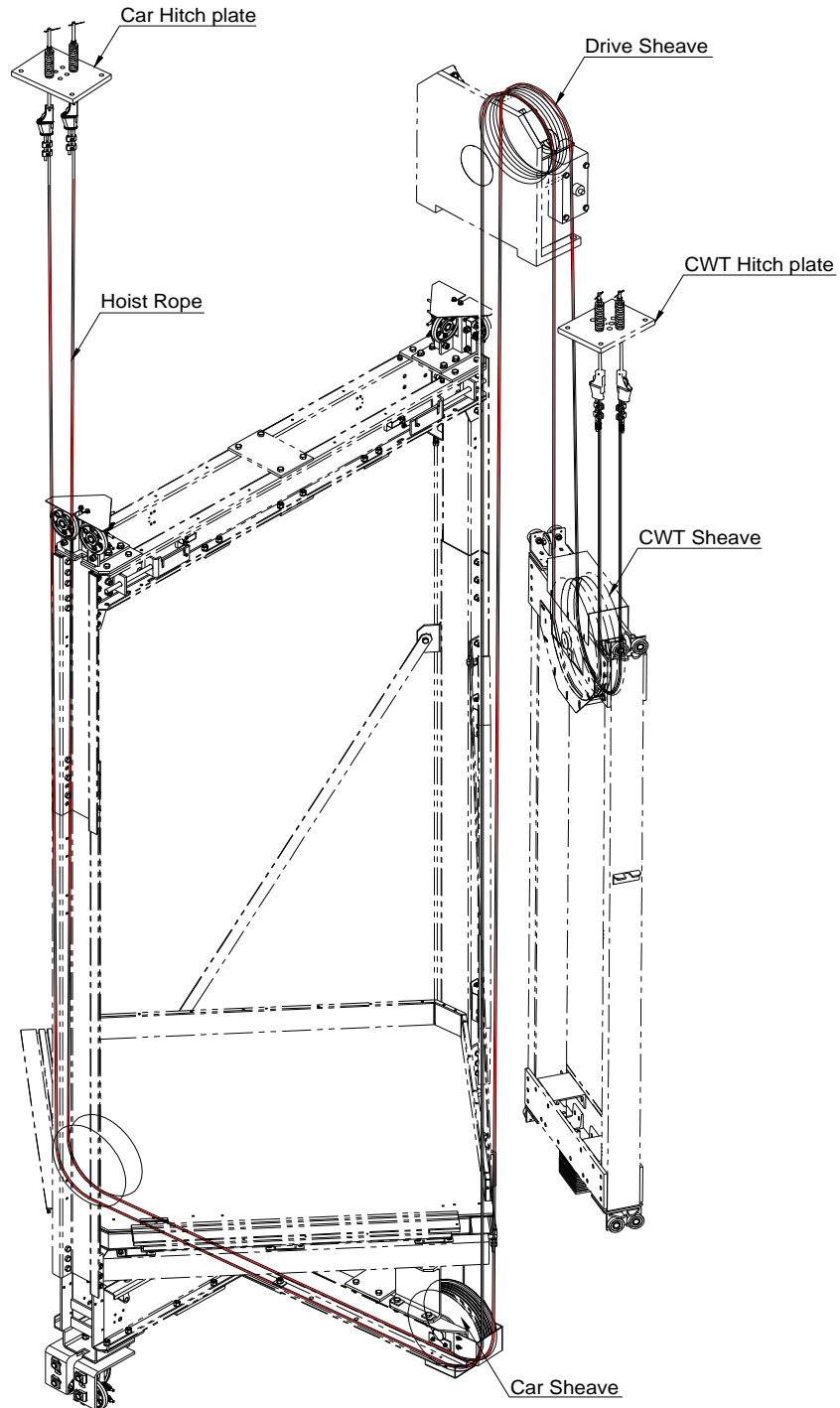


Fig. 4-7-1-E. CAR and COUNTERWEIGHT ROPING (Underslung Corner post type)

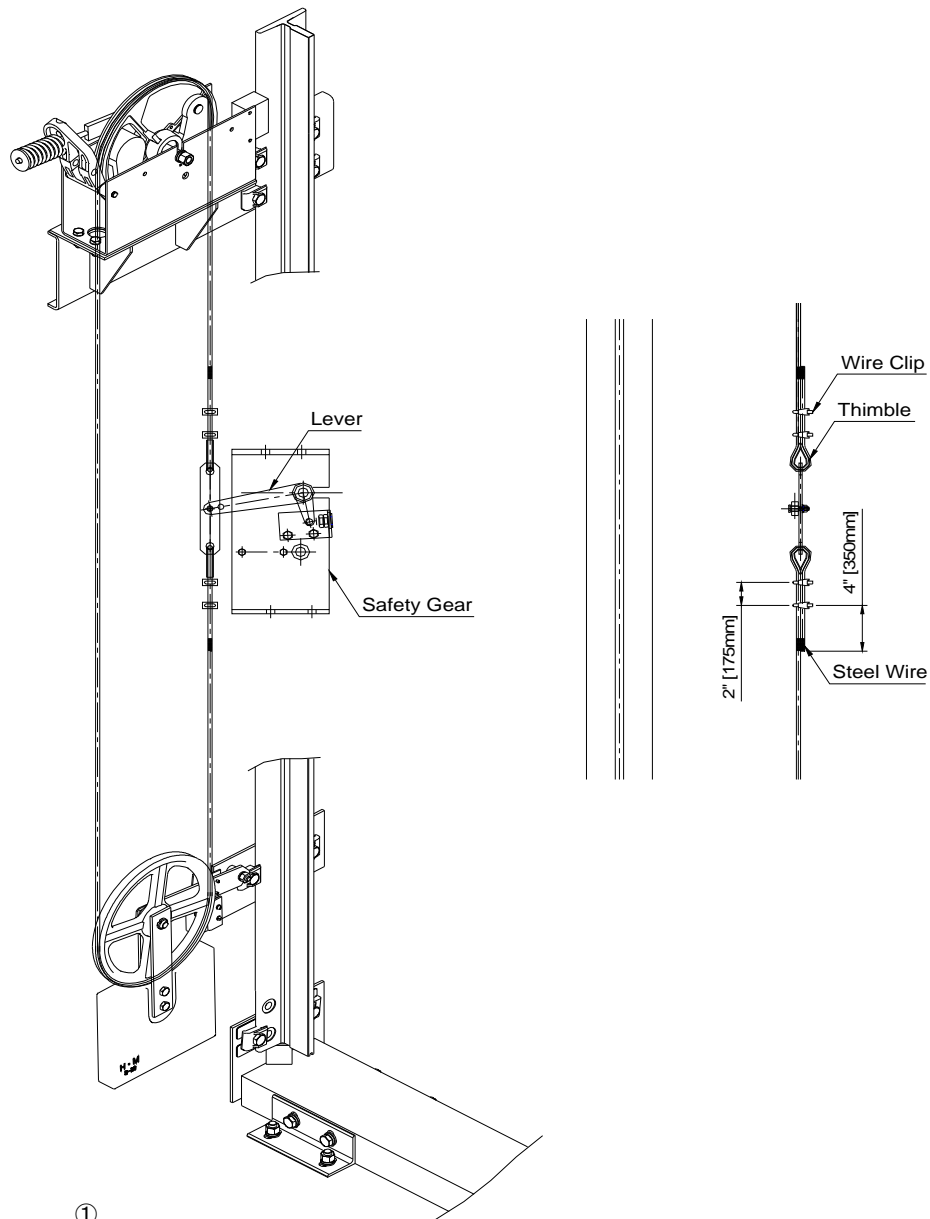
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| HM TEC | INSTALLATION MANUAL       | Document No.: | TN-M01-0001 |
|        |                           | Date:         | 2-Mar-09    |
|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-48        |

③  
4-7-2. Roping (Overspeed Governor)

: After accurate length of Rope is decided, install Overspeed Governor

(1) Overspeed Governor Roping (See Fig. 4-7-2-A.)

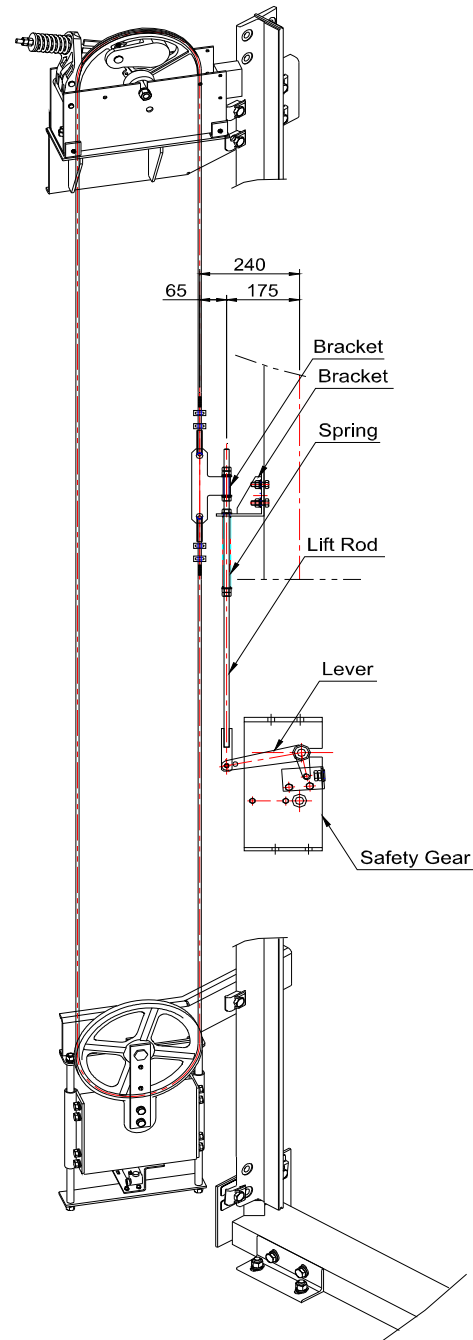
① (2) Overspeed Governor Roping for "Fork type" and "Corner Post" (See Fig. 4-7-2-B.)



①  
**Fig. 4-7-2-A. OVERSPEED GOVERNOR ROPPING (Underslung Skewed type)**

| Rev. no. | Description | Approved by | Date      |  |
|----------|-------------|-------------|-----------|--|
| ①        | WAS 4-3-1-D | DU Seo      | 20-Apr-10 |  |
|          |             |             |           |  |
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| HM TEC | INSTALLATION MANUAL       | Document No.: | TN-M01-0001 |
|        |                           | Date:         | 8-Jan-10    |
|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-49        |



①

**Fig. 4-7-2-B. OVERSPEED GOVERNOR ROPPING (Fork type and Corner Post)**

| Rev. no. | Description | Approved by | Date      |  |
|----------|-------------|-------------|-----------|--|
| ①        | WAS 4-3-1-E | DU Seo      | 20-Apr-10 |  |
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|        |                           | Date:         | 2-Mar-09    |
|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-50        |

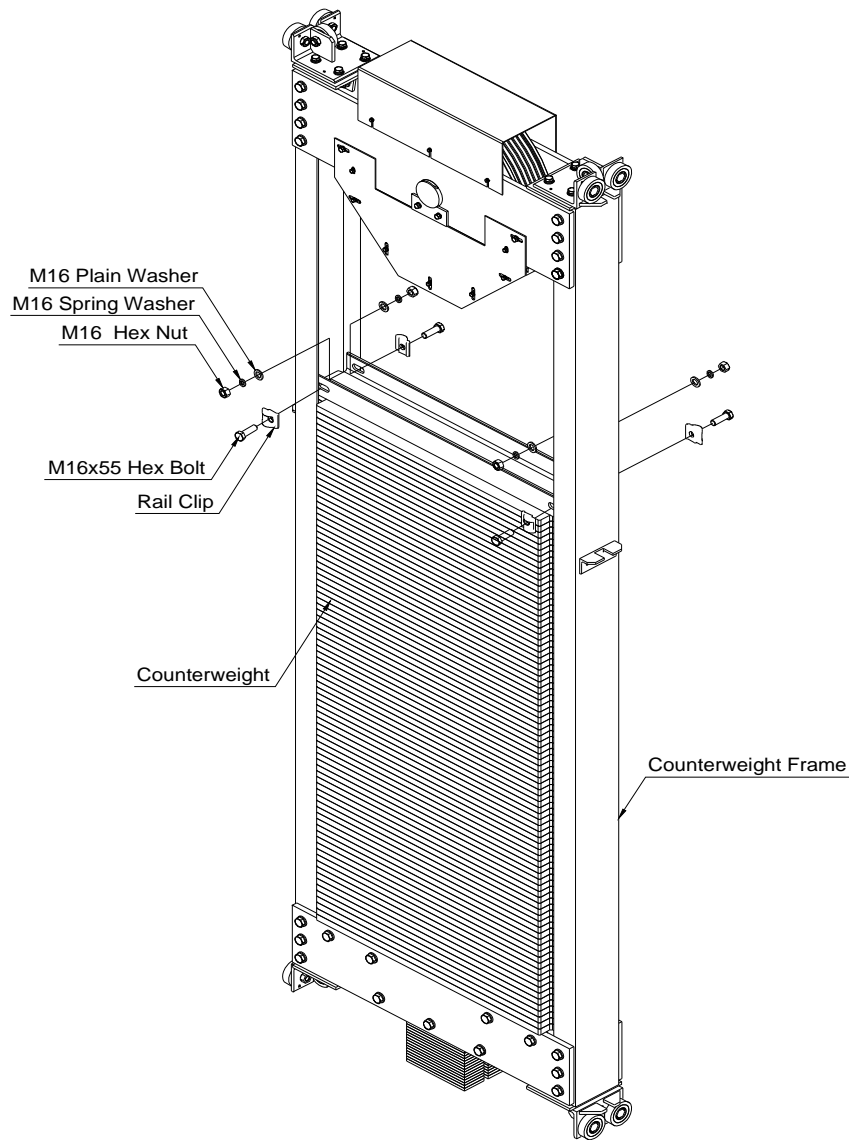
## 4-8. Insert Weight into Counterweight Frame

4-8-1. Insert Weight into CWT. Frame after Roping is done.

① Weight Mounting : Clip Type (See Fig. 4-8-1.)

① Stack/Load 90% of Weight.

② Mount prepared Bracket at the side of CWT. Frame with Rail Clip.



①  
**Fig. 4-8-1. CLIP TYPE WEIGHT FIXING**

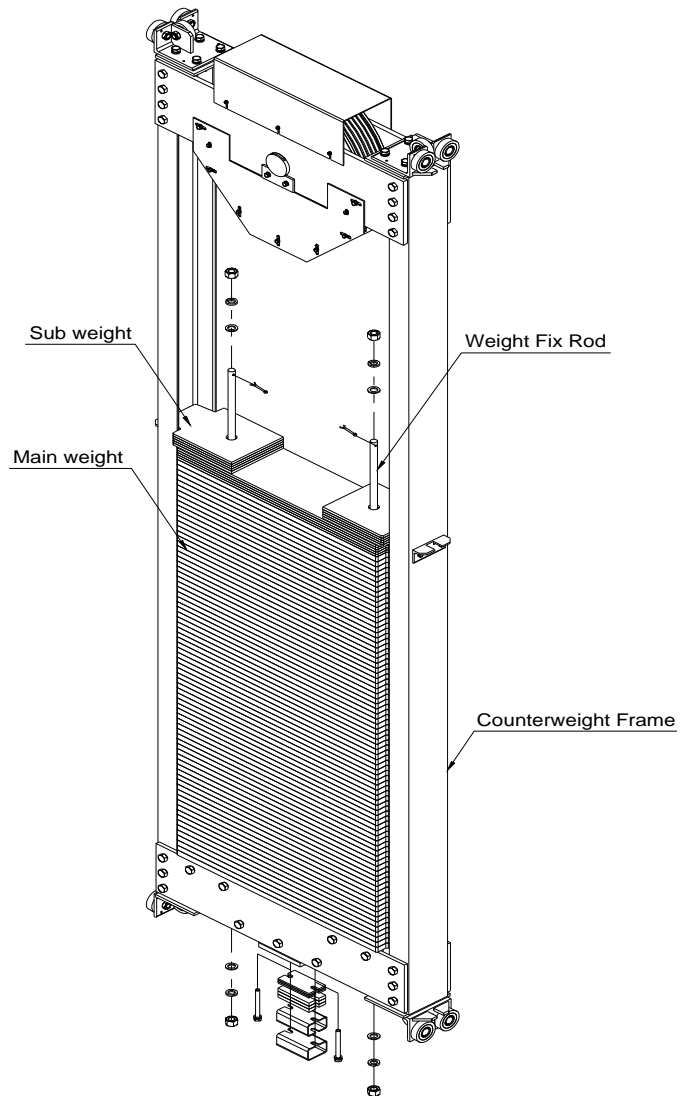
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|        |                           | Date:         | 2-Mar-09    |
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|        |                           | page:         | 4-51        |

①

(2) Weight Mounting : Rod Type (See Fig. 4-8-2.)

- ① Separate split pin, Nut, Washer from Weight Static Rod.
- ② Insert Weight Static Rod into lower Counterweight Frame.
- ③ Load Weight with Static Rod through each Weight's Holes.
- ④ Load 90% of Weight.
- ⑥ Mount upper Static Rod with nut.



①

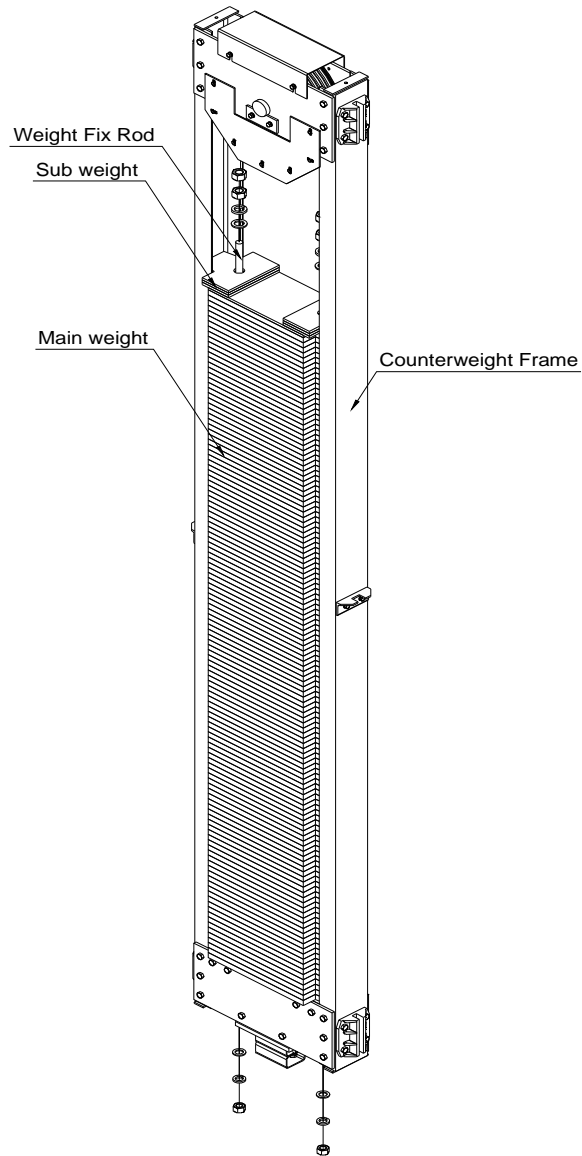
**Fig. 4-8-2. ROD TYPE WEIGHT FIXING**

| Rev. no. | Description | Approved by | Date      |  |
|----------|-------------|-------------|-----------|--|
| ①        | WAS 4-3-2-B | DU Seo      | 20-Apr-10 |  |
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| HM TEC | INSTALLATION MANUAL       | Document No.: | TN-M01-0001 |
|        |                           | Date:         | 26-Apr-10   |
|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-52        |

(3) Weight Mounting : Rod Type (See Fig. 4-8-3.)

- ① Separate split pin, Nut, Washer from Weight Static Rod.
- ② Insert Weight Static Rod into lower Counterweight Frame.
- ③ Load Weight with Static Rod through each Weight's Holes.
- ④ Load 90% of Weight.
- ⑤ Mount upper Static Rod with nut.



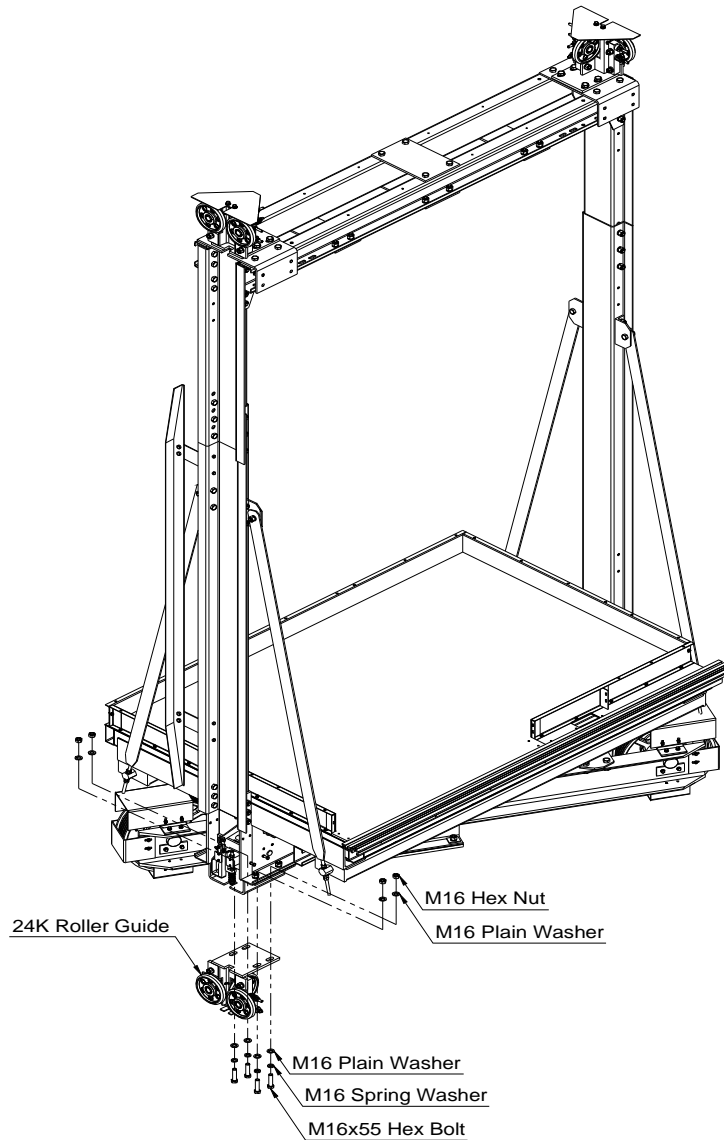
**Fig. 4-8-3. ROD TYPE WEIGHT FIXING (Fork type, only 200 FPM)**

|        |                           |               |             |
|--------|---------------------------|---------------|-------------|
| HM TEC | INSTALLATION MANUAL       | Document No.: | TN-M01-0001 |
|        |                           | Date:         | 2-Mar-09    |
|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-53        |

①

#### 4-9. Bottom Roller Guide Assembly (See Fig. 4-9.)

- 4-9-1. Remove Car lower support after roping is done and CWT Weight is inserted.
- 4-9-2. Assemble Car Guide Roller to Plank.
- 4-9-3. Adjust Compression Spring within Standard Setting Tolerance with double nut.
- 4-9-4. Adjust Stopper within Standard Setting Tolerance with double nut.



①

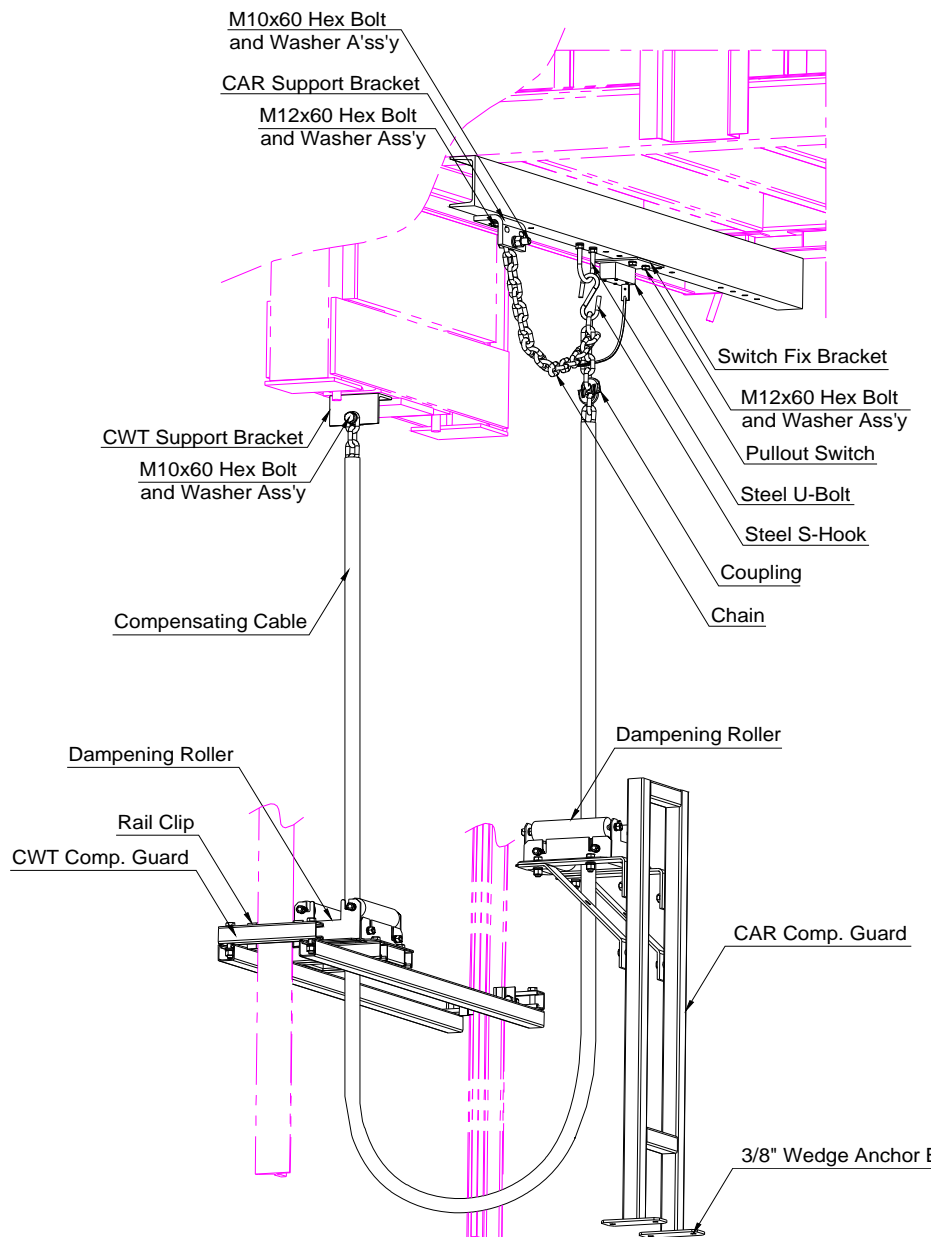
**Fig. 4-9. BOTTOM GUIDE ROLLER INSTALLATION**

| Rev. no. | Description | Approved by | Date      |  |
|----------|-------------|-------------|-----------|--|
| ①        | WAS 4-3-3   | DU Seo      | 20-Apr-10 |  |
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| HM TEC | INSTALLATION MANUAL       | Document No.: | TN-M01-0001 |
|        |                           | Date:         | 16-May-11   |
|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-54        |

## 4-10. Compensation

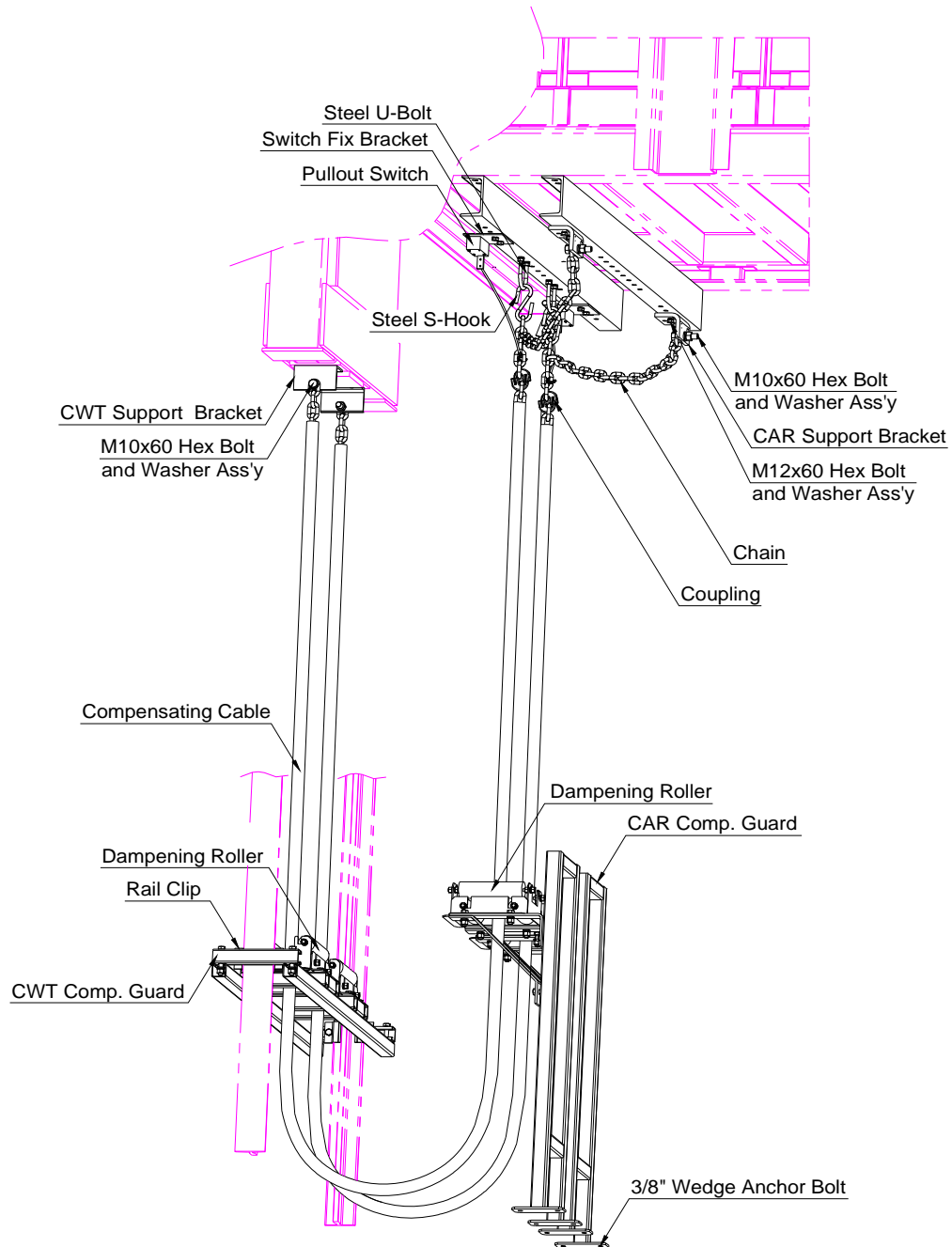
4-10-1. Compensation Chain 1 NOS ( see Fig 4-10-1.)



**Fig 4-10-1. COMPENSATION INSTALLATION**

|        |                           |               |             |
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| HM TEC | INSTALLATION MANUAL       | Document No.: | TN-M01-0001 |
|        |                           | Date:         | 16-May-11   |
|        | MRL - Cage, counterweight | Name:         | N.R.Kim     |
|        |                           | page:         | 4-55        |

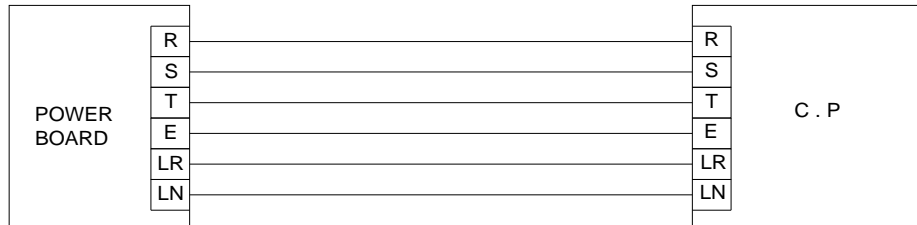
4-10-2. Compensation Chain 2 NOS ( see Fig 4-10-2.)



**Fig 4-10-2. COMPENSATION INSTALLATION**

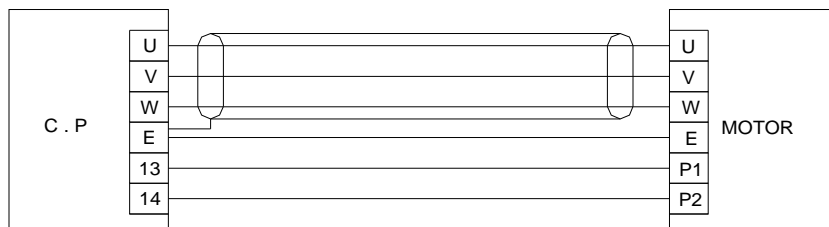


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|        |                     | Date:         | 2-Mar-09    |
|        | MRL - WIRING        | Name:         | N.R.Kim     |
|        |                     | page:         | 5-02        |



| Voltage | Motor(Kw) | Cable(AWG) | Earth(AWG) |
|---------|-----------|------------|------------|
| 208(V)  | 5.5~11    | 6          | 6          |
|         | 15~22     | 4          |            |
|         | 30~37     | 1/0        |            |
| 480(V)  | 5.5~11    | 8          |            |
|         | 15~22     | 6          |            |
|         | 30~37     | 4          |            |

**Fig 5.1-2. MAINE POWER CABLE CONNECTION**



**Fig 5.1-3. MOTOR POWER CABLE**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
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|        |                     | Date:         | 2-Mar-09    |
|        | MRL - WIRING        | Name:         | N.R.Kim     |
|        |                     | page:         | 5-03        |

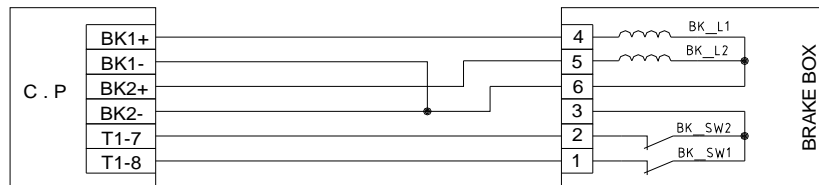


Fig 5.1-4. MOTOR BRAKE CONNECTION DETAIL

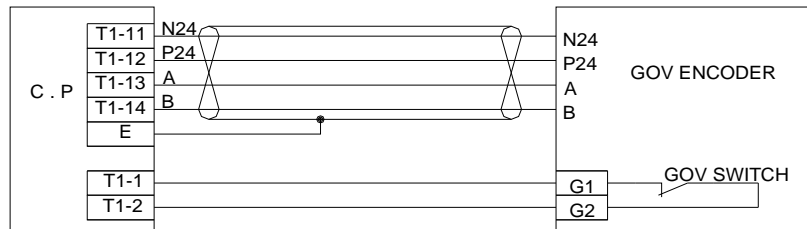


Fig 5.1-5. GOV & ENCODER CONNECTION DETAIL

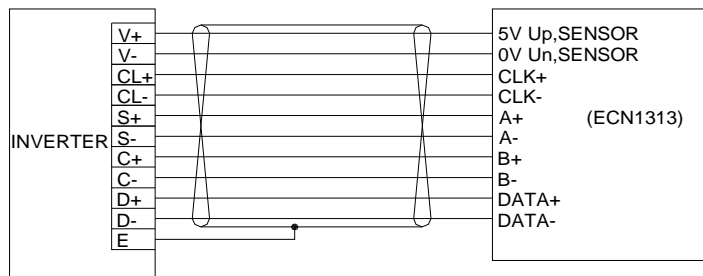


Fig 5.1-5. INVERTER & ENCODER CONNECTION

|        |                     |               |             |
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|        | MRL - WIRING        | Name:         | N.R.Kim     |
|        |                     | page:         | 5-04        |

## 5.2. Traveling Cable and Hoistway Wiring

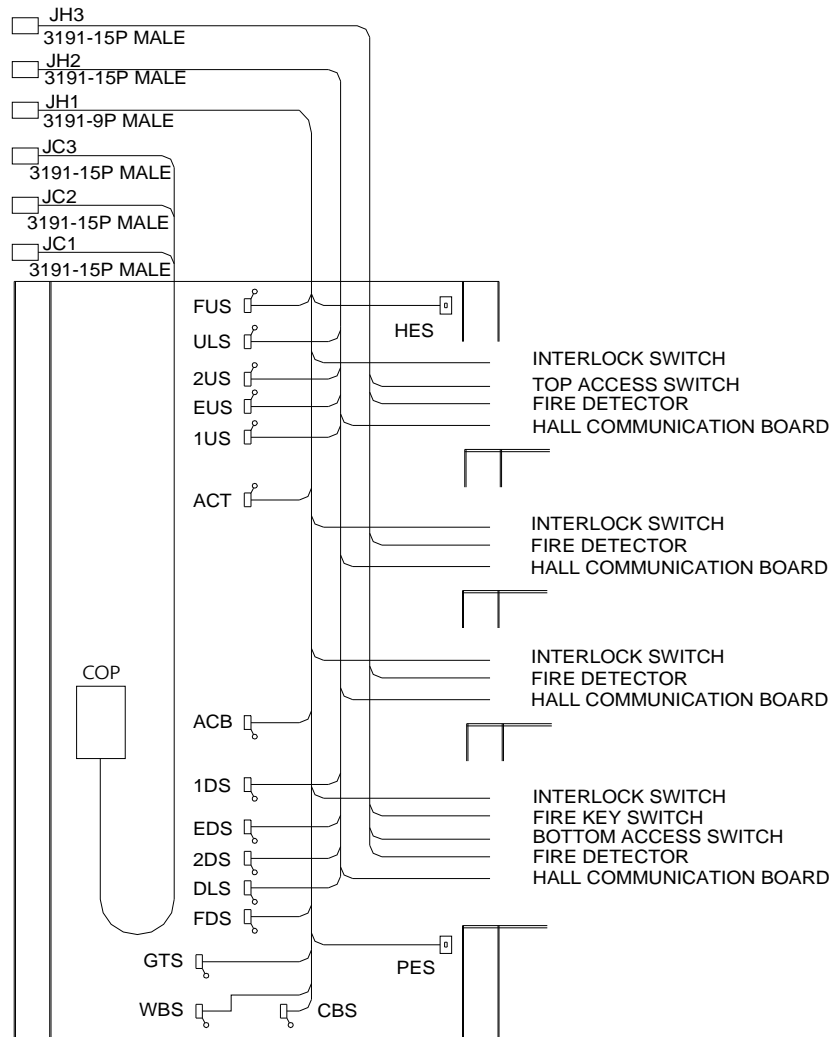


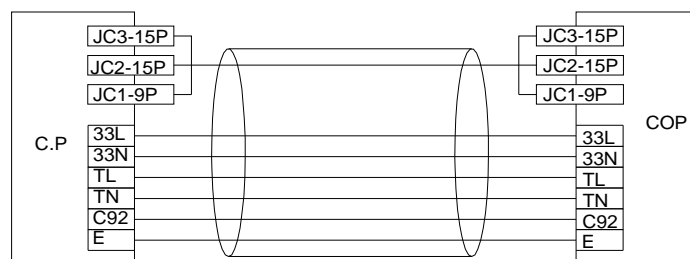
Fig 5.1-5. TRAVELING CABLE AND HOISTWAY WIRING

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|--------|---------------------|---------------|-------------|
| HM TEC | INSTALLATION MANUAL | Document No.: | TN-M01-0001 |
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|        |                     | page:         | 5-05        |

### 5.2.1. Traveling Cable Wiring

#### (1) Traveling cable connection at control panel.

- ① Check the housing of traveling cable per electrical drawing.
- ② Insert the same plug housing and cap housing.



**Fig 5.2.1-1. TRAVELING CABLE WIRING**

#### (2) Installation of traveling cable Hanger (Fig. 5.2.1-2)

- ① Establish the location for the hoistway traveling cable hanger per the shop drawing.
- ② Install traveling cable Hanger for hoistway and car.

#### (3) Traveling cable wiring at the bottom of car (Fig. 5.2.1-3)

- ① Pull down traveling cable straightly to the lower part of pit.
- ② Fit car to the landing sill level of bottom service floor.
- ③ Hang the traveling cable on the cable hanger of car bottom as "U" shape pulling down 16" [400±50mm].
- ④ Fasten the traveling cable with clip or binding wire the loop 12" [300±50mm] above pit floor.
- ⑤ Check that the diameter of the loop is above 21"~23" [520~600mm].

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|        | MRL - WIRING        | Name:         | N.R.Kim     |
| page:  |                     | 5-06          |             |

5.2.2. Installation of Hall Fixtures

(1) Box installation on concrete wall

- ① For box location, refer to shop drawing.
- ② Set the box 1/8"~3/16"[3~5mm] deeper than the finished wall line.

(2) Box installation in dry-wall

- ① Check location of box on shop drawing.
- ② After coinciding the centerline of the box, adjust vertically and horizontally.
- ③ Set the box 1/8"~3/16" [3~5mm] deeper than the finished wall line.

5.2.3 Hoistway Wiring

(1) Installing multi-cable

- ① Check each wire.
- ② From top floor, pull the hoistway wire up to control panel through duct.
- ③ Install wire in duct and fasten with strain bar and cable tie at an interval of 2.4m, and insert cotter pin.
- ④ Similarly, wire the up-and-down limit switch lines.

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|        |                     | Date:         | 2-Mar-09    |
|        | MRL - WIRING        | Name:         | N.R.Kim     |
|        |                     | page:         | 5-07        |

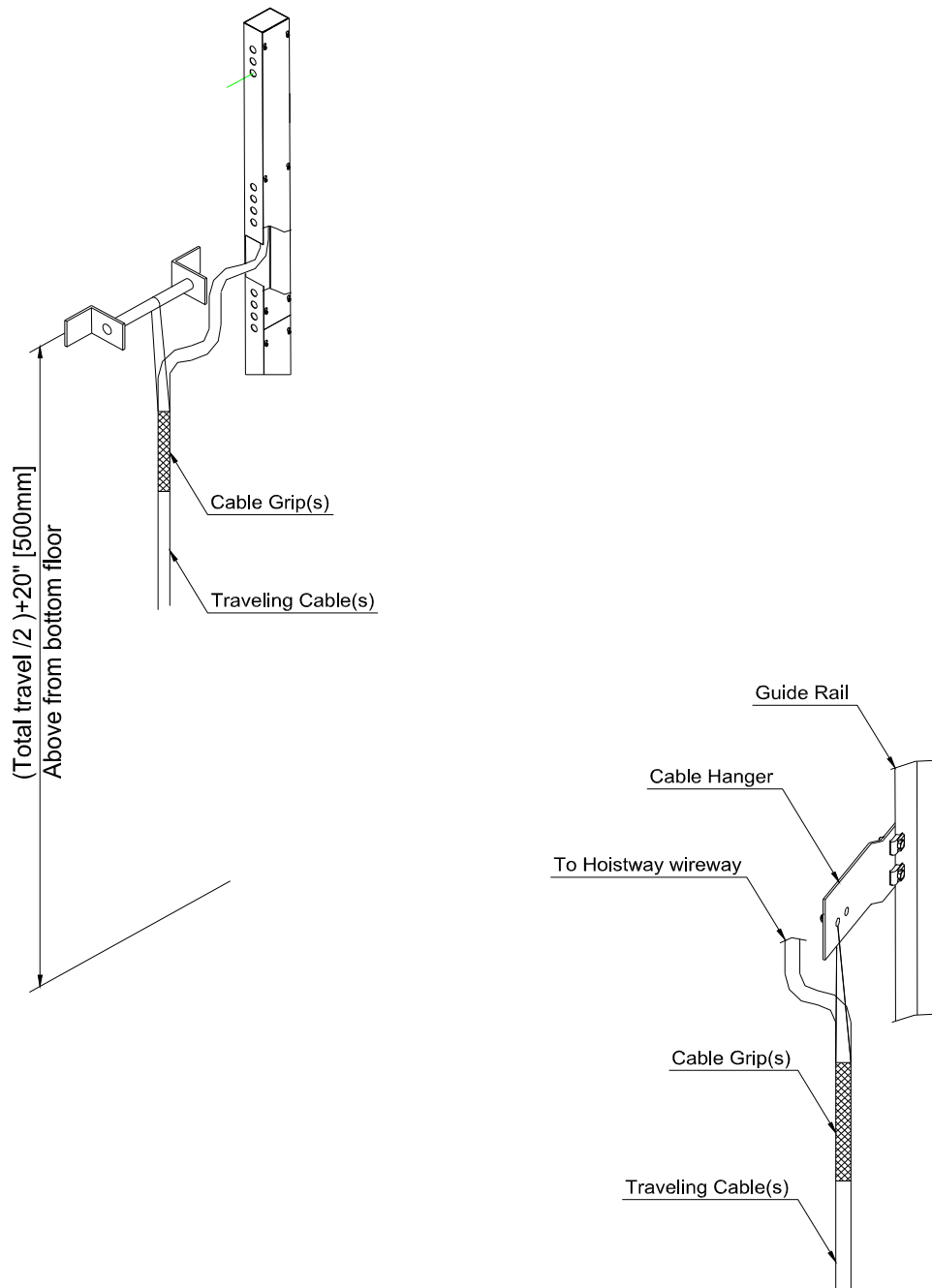
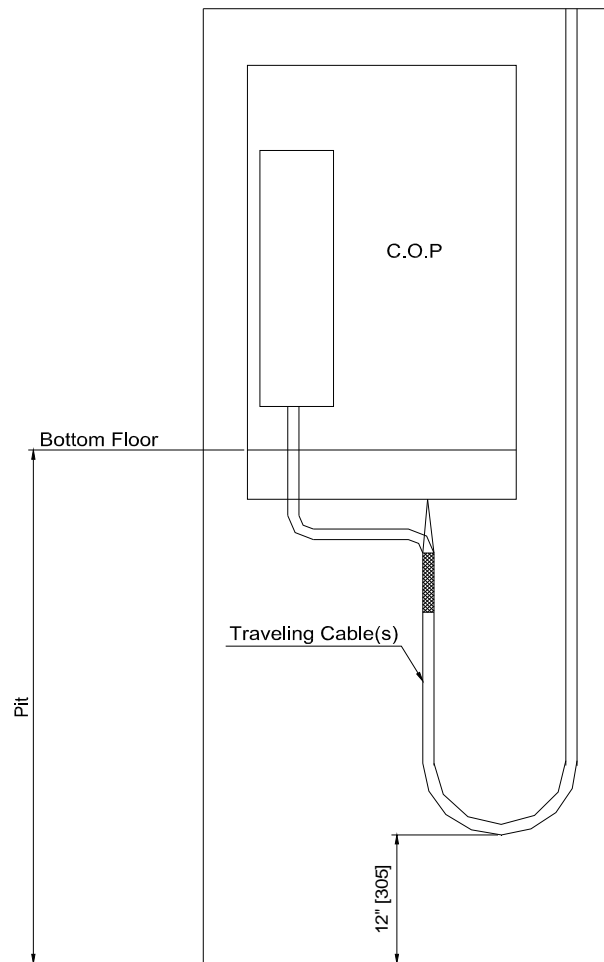
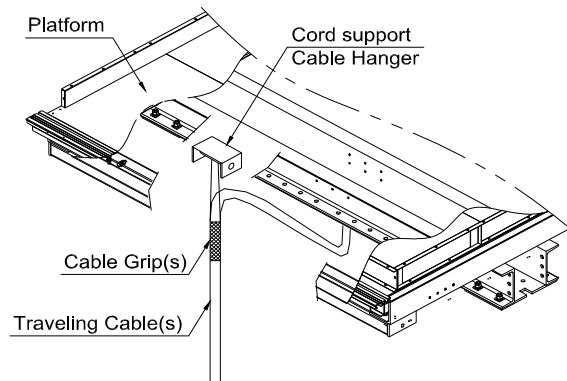


Fig. 5.2.1-2. Traveling cable Hanger

|        |                     |               |             |
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|        |                     | Date:         | 2-Mar-09    |
|        | MRL - WIRING        | Name:         | N.R.Kim     |
|        |                     | page:         | 5-08        |



**Fig. 5.2.1-3. Traveling cable Hanger**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
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|        | MRL - WIRING        | Name:         | N.R.Kim     |
|        |                     | page:         | 5-08        |

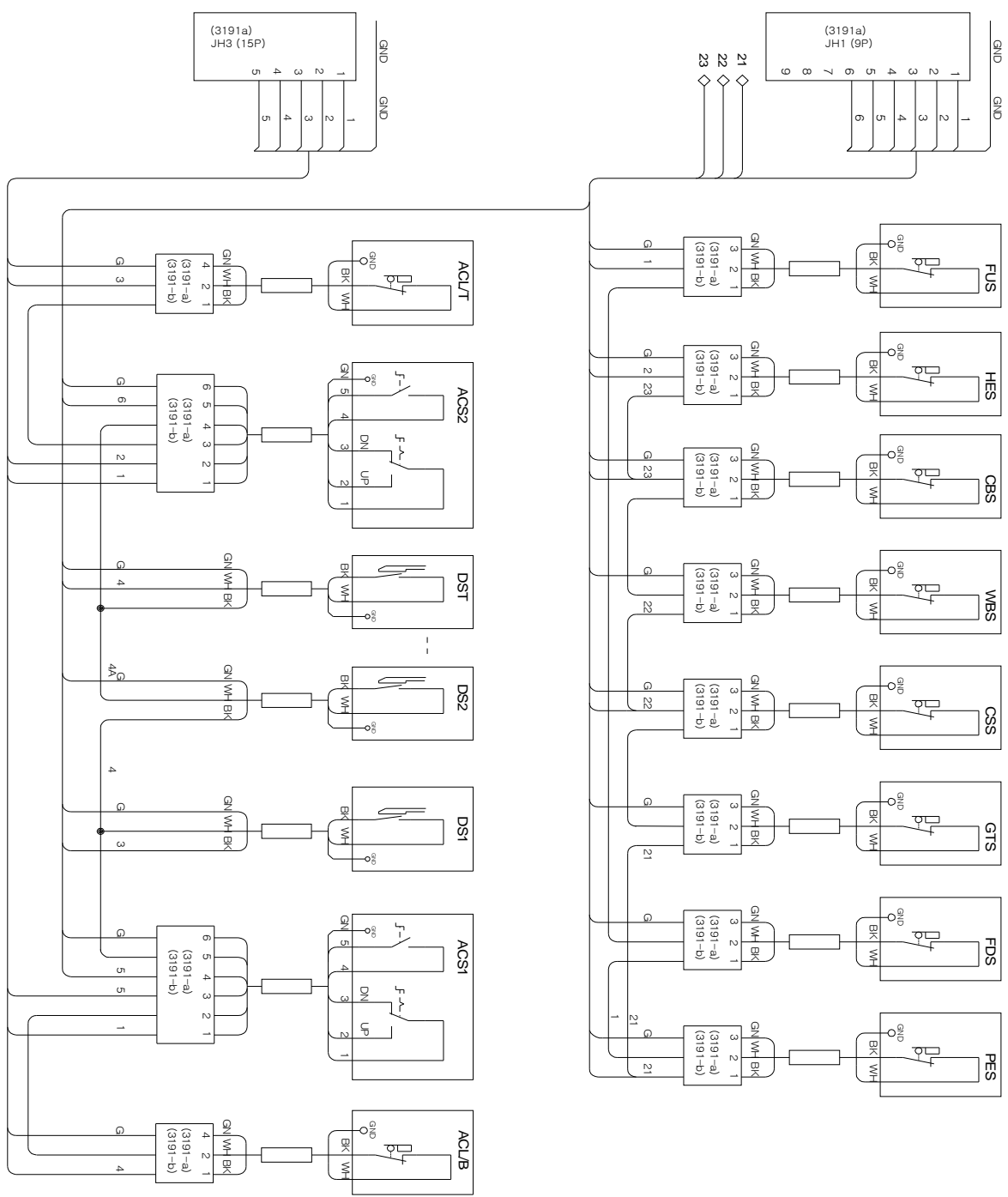


Fig. 5.2.3-1. Hoistway Connection 1.

|        |                     |               |             |
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|        |                     | Date:         | 2-Mar-09    |
|        | MRL - WIRING        | Name:         | N.R.Kim     |
|        |                     | page:         | 5-09        |

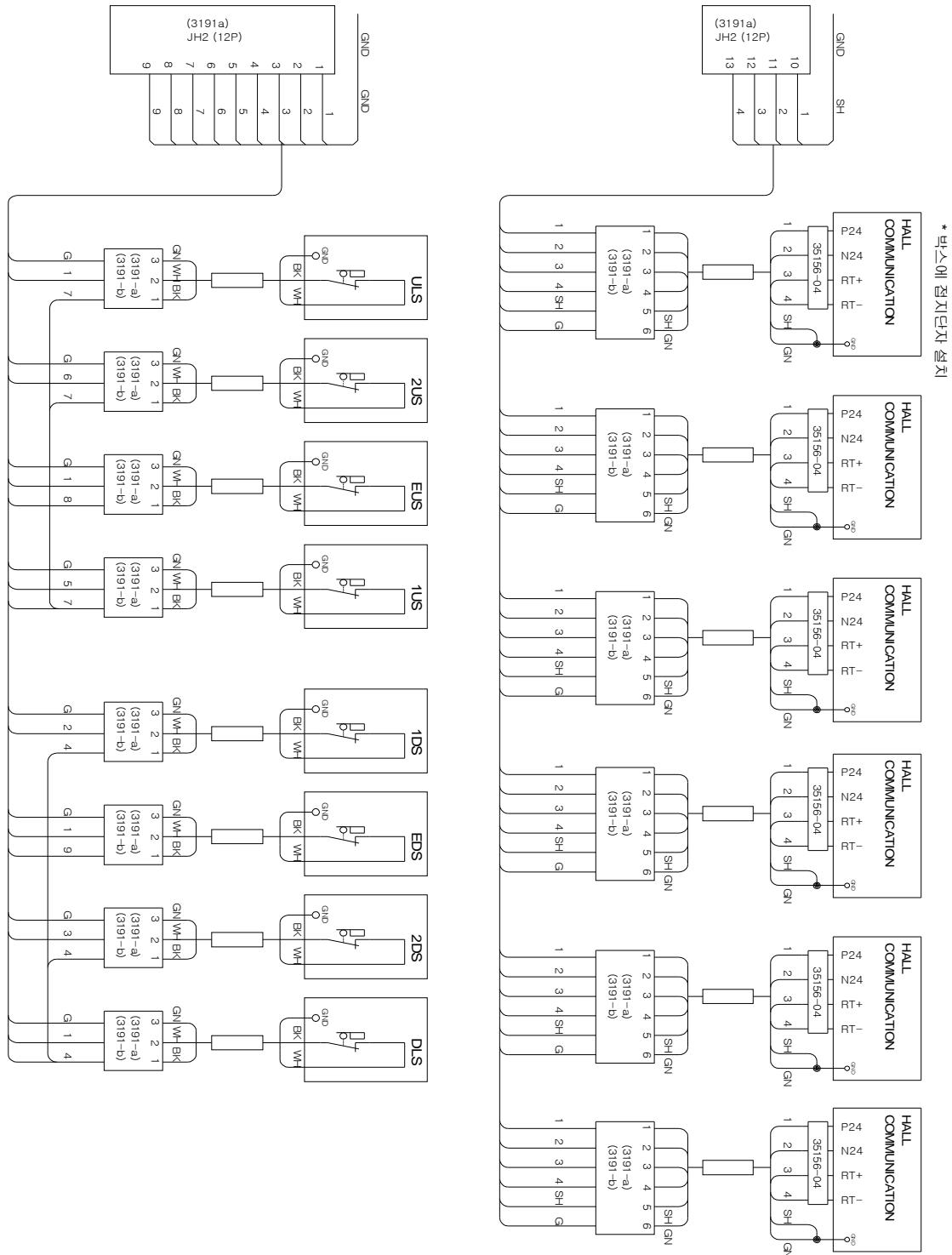


Fig. 5.2.3-1. Hoistway Connection 2.

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
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|        |                     | Date:         | 2-Mar-09    |
|        | MRL - WIRING        | Name:         | N.R.Kim     |
|        |                     | page:         | 5-10        |

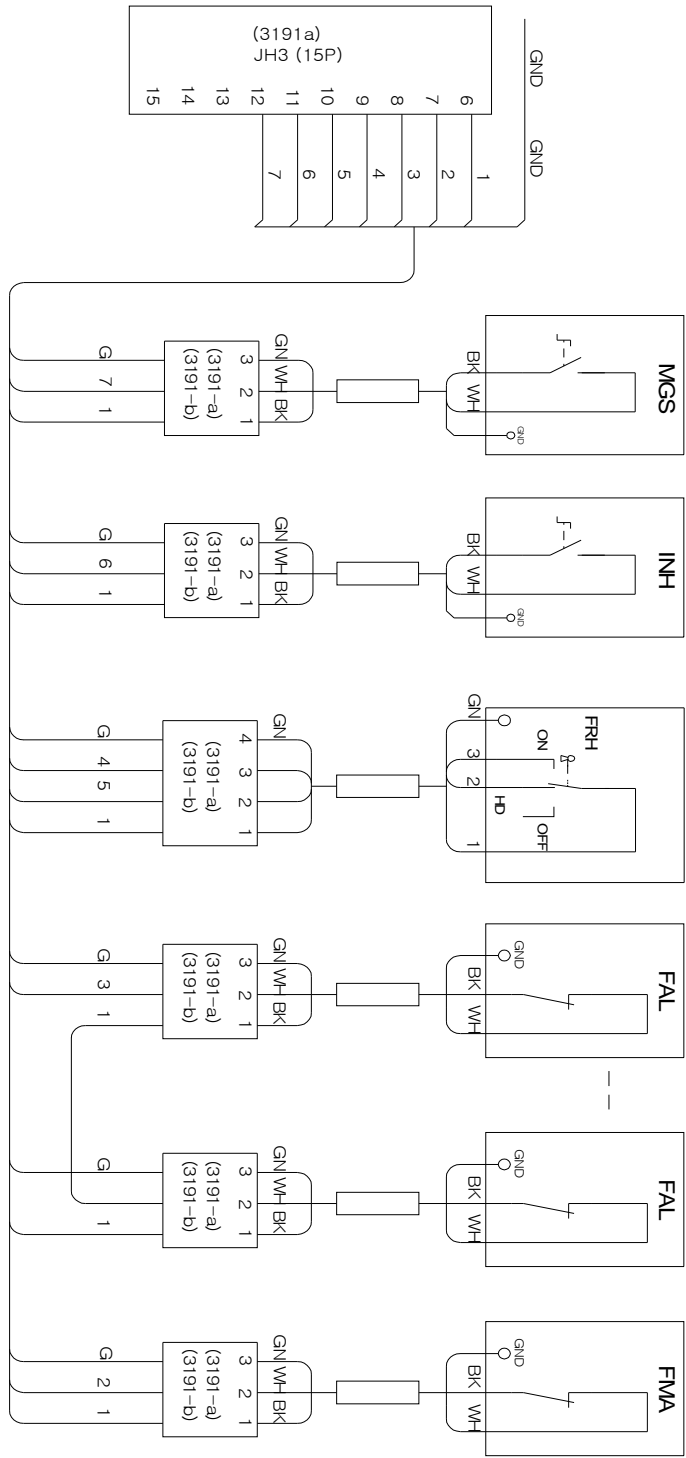


Fig. 5.2.3-1. Hoistway Connection 3.

|        |                         |               |             |
|--------|-------------------------|---------------|-------------|
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|        | MRL - ENTRANCE ASSEMBLY | Name:         | N.R.Kim     |
|        |                         | page:         | 6-01        |

## 6. ENTRANCE ASSEMBLY

### 6-1. Single Speed Side Sliding Door

6-1-1. Entrance Arrangement (See Fig. 6-1-1.)

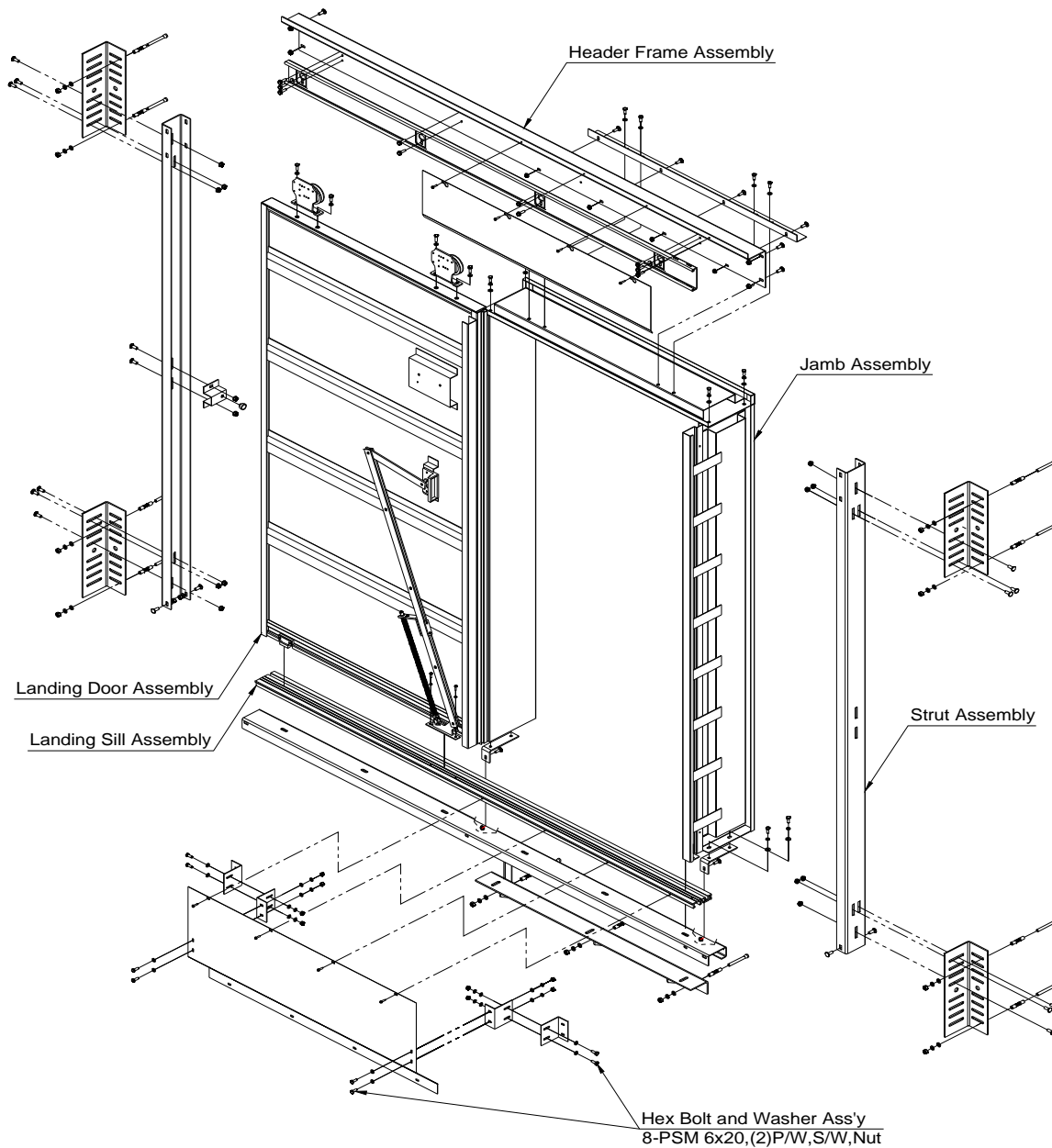


Fig. 6-1-1. ENTRANCE ARRANGEMENT (SS)

|        |                         |               |             |
|--------|-------------------------|---------------|-------------|
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|        | MRL - ENTRANCE ASSEMBLY | Name:         | N.R.Kim     |
|        |                         | page:         | 6-02        |

6-1-2. Landing Sill Assembly (See Fig. 6-1-2.)

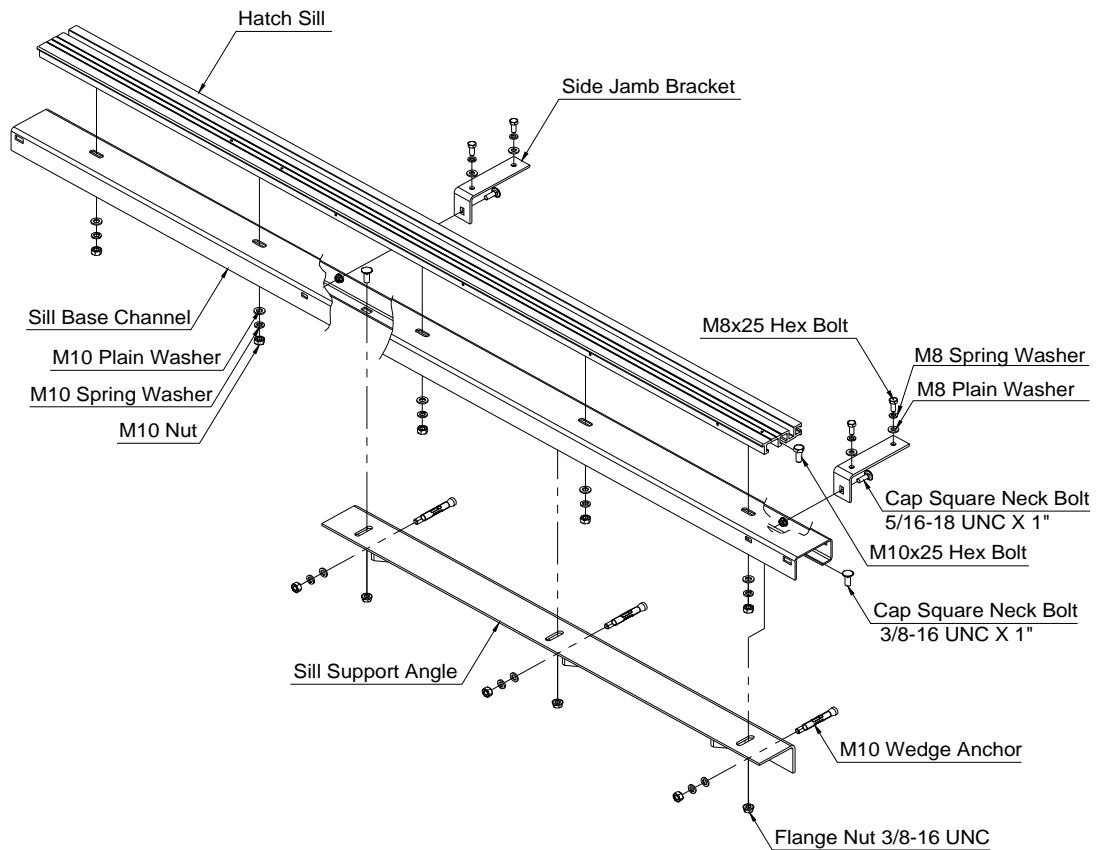


Fig. 6-1-2. LANDING SILL ASSEMBLY (SS)

|        |                         |               |             |
|--------|-------------------------|---------------|-------------|
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|        | MRL - ENTRANCE ASSEMBLY | Name:         | N.R.Kim     |
|        |                         | page:         | 6-03        |

6-1-3. Strut and Header Frame Assembly (See Fig. 6-1-3.)

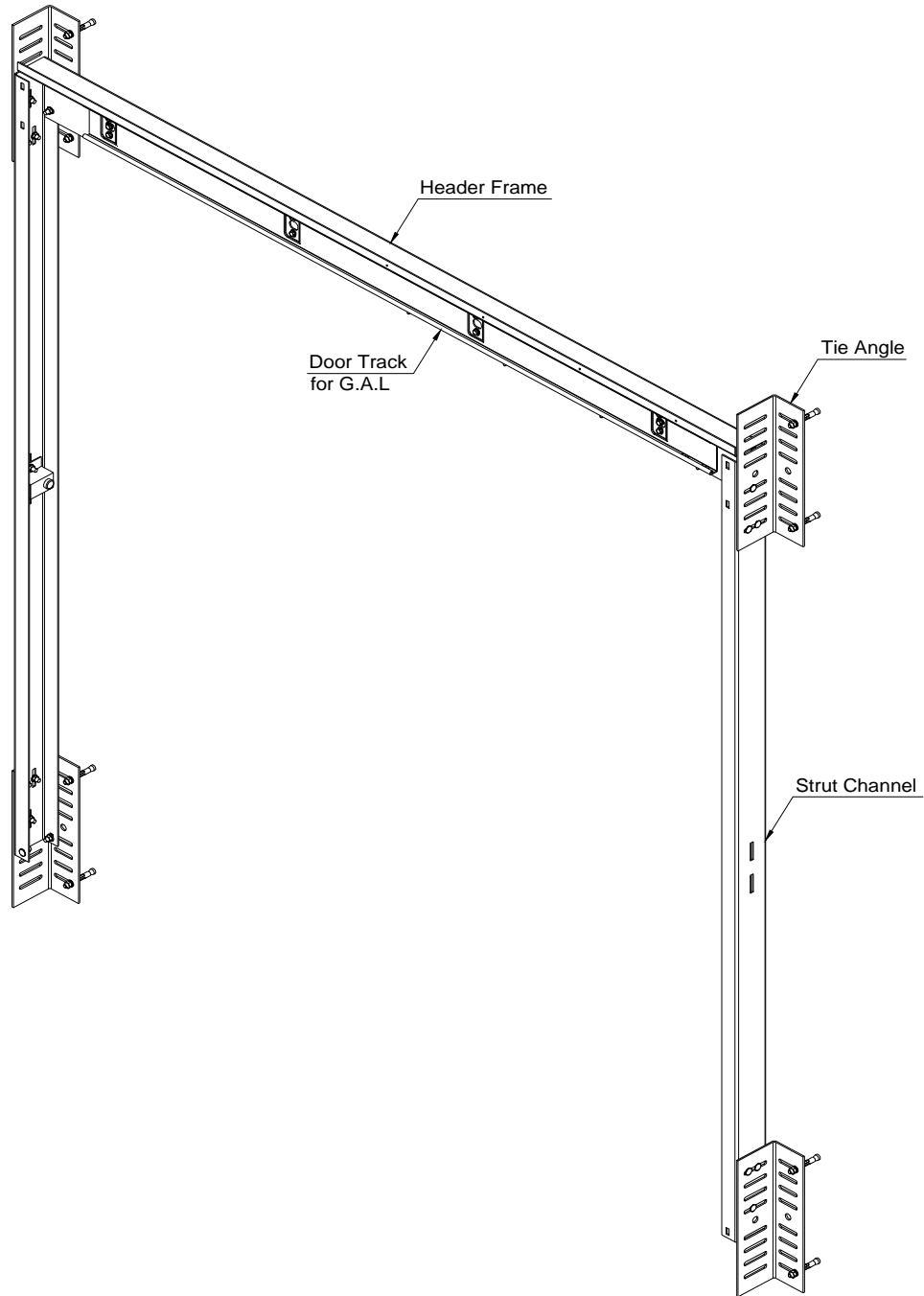


Fig. 6-1-3. STRUT AND HEADER FRAME ASSEMBLY (SS)

|        |                         |               |             |
|--------|-------------------------|---------------|-------------|
| HM TEC | INSTALLATION MANUAL     | Document No.: | TN-M01-0001 |
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|        |                         | page:         | 6-04        |

6-1-4. Strut and Header Frame Detail (See Fig. 6-1-4.)

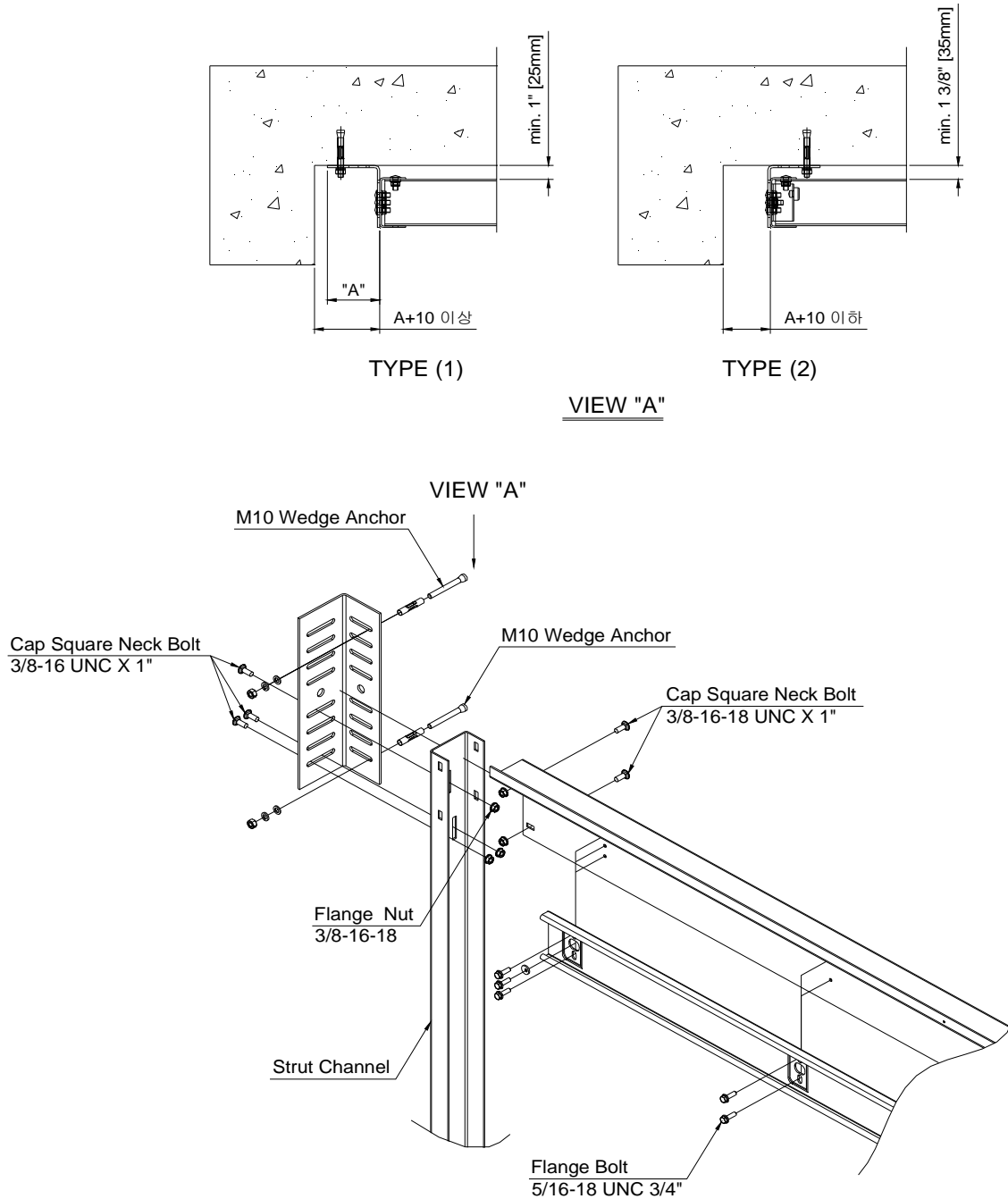
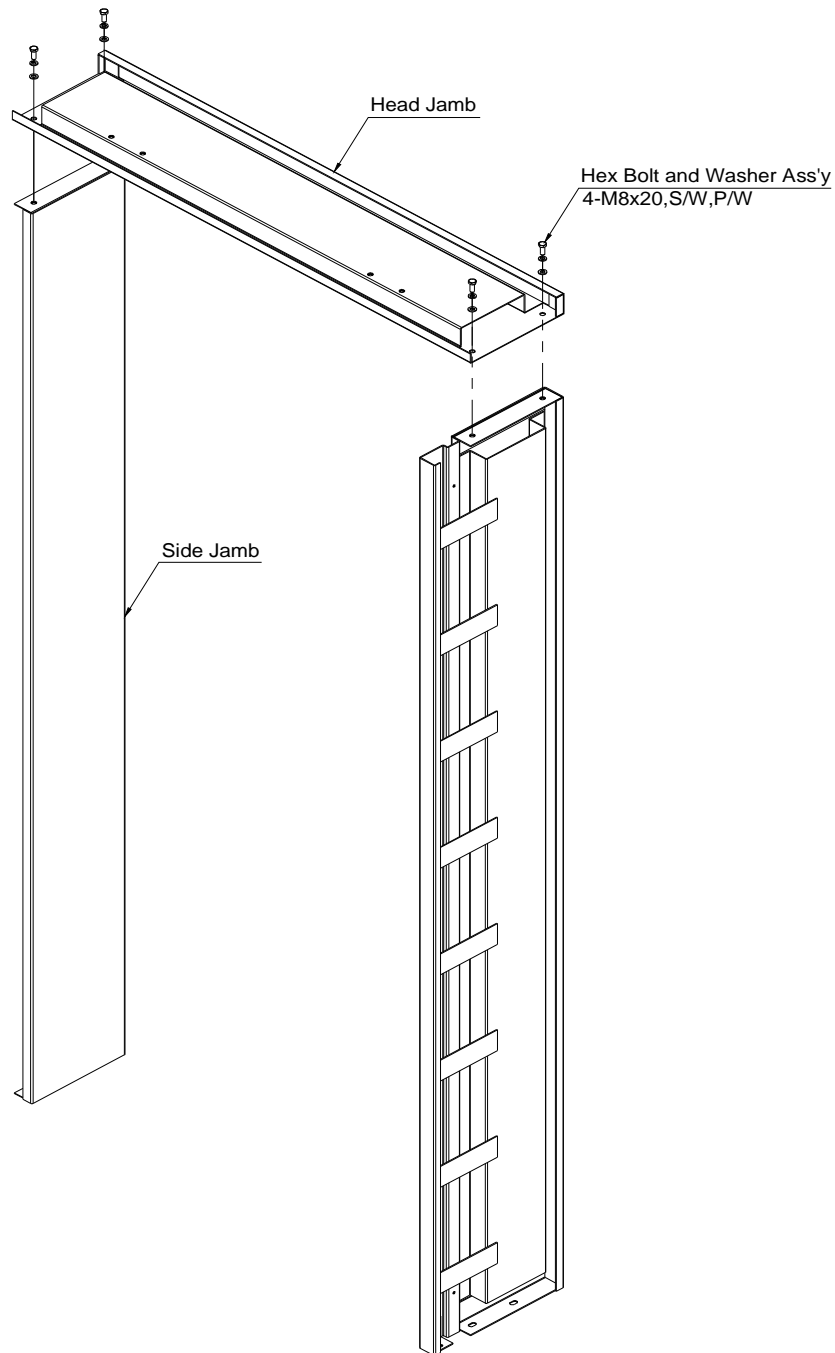


Fig. 6-1-4. STRUT AND HEADER FRAME DETAIL

|        |                         |               |             |
|--------|-------------------------|---------------|-------------|
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|        | MRL - ENTRANCE ASSEMBLY | Name:         | N.R.Kim     |
|        |                         | page:         | 6-05        |

6-1-5. Jamb Assembly (See Fig. 6-1-5.)



**Fig. 6-1-5. JAMB ASSEMBLY (SS)**

|        |                         |               |             |
|--------|-------------------------|---------------|-------------|
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|        | MRL - ENTRANCE ASSEMBLY | Name:         | N.R.Kim     |
|        |                         | page:         | 6-06        |

6-1-6. Header Frame and Jamb Fixing (See Fig. 6-1-6.)

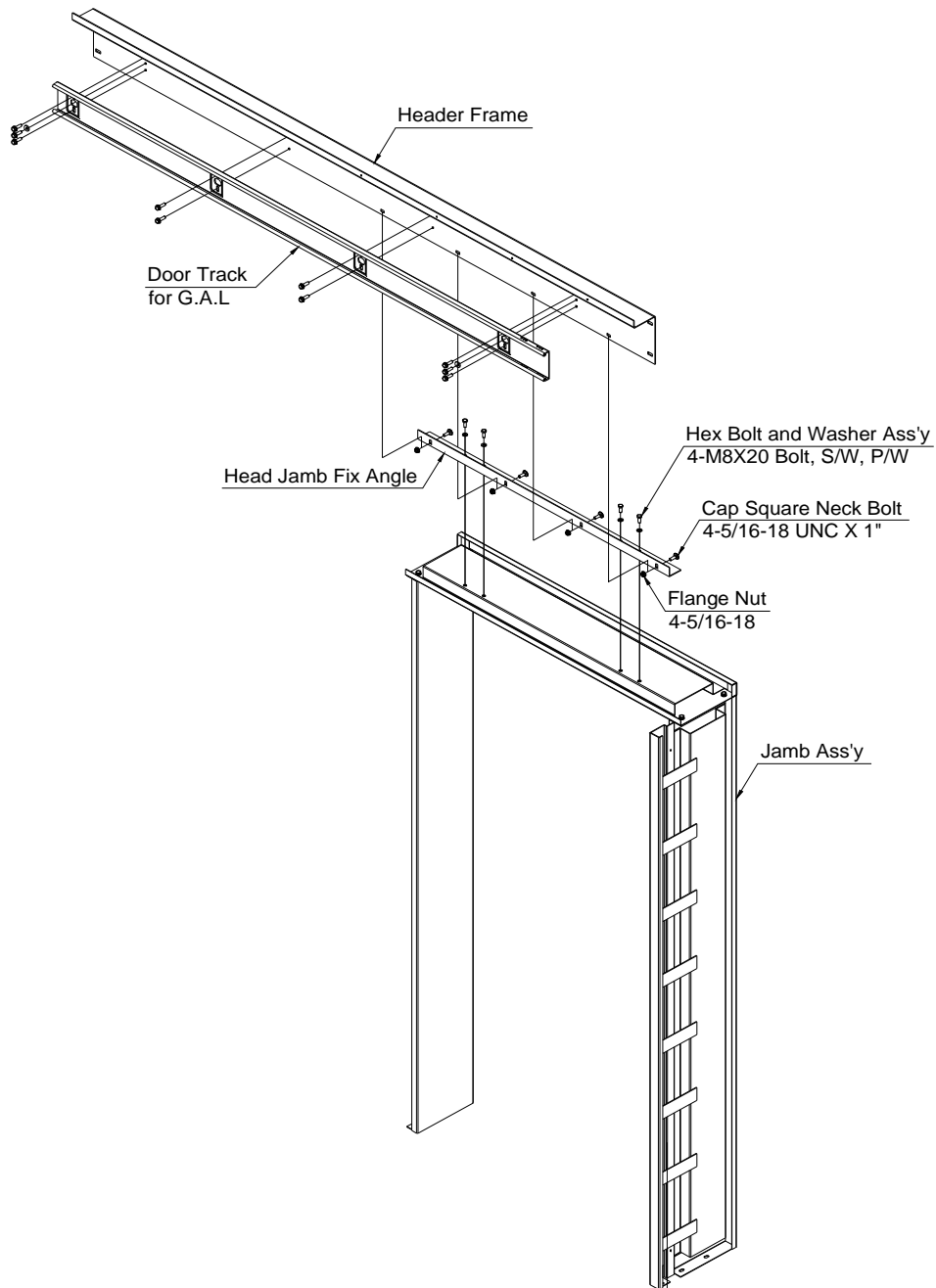
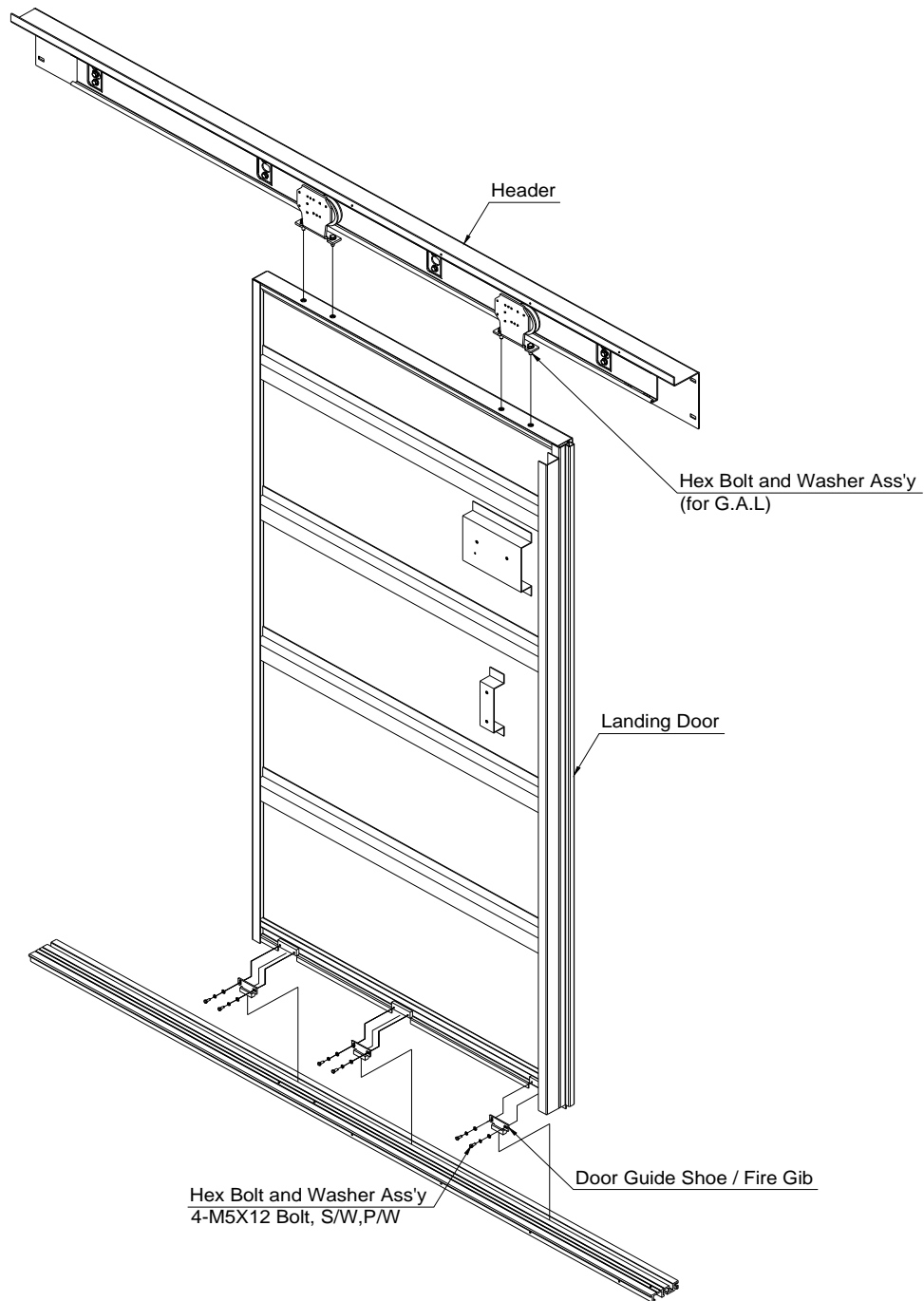


Fig. 6-1-6. HEADER FRAME AND JAMB FIXING (SS)

|        |                         |               |             |
|--------|-------------------------|---------------|-------------|
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|        |                         | page:         | 6-07        |

6-1-7. Landing Door Assembly (See Fig. 6-1-7.)

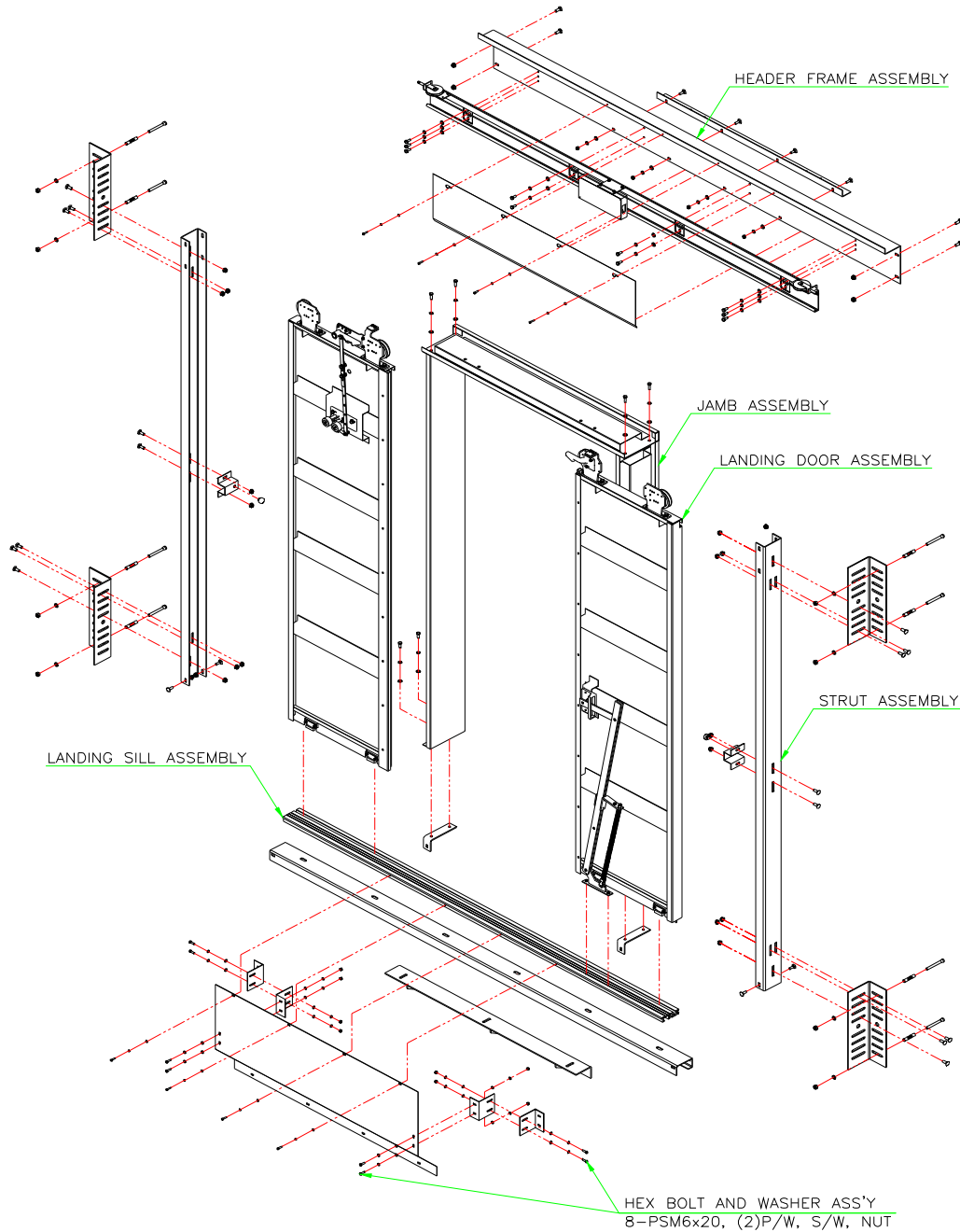


**Fig. 6-1-7. LANDING DOOR ASSEMBLY (SS)**

|        |                         |               |             |
|--------|-------------------------|---------------|-------------|
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|        |                         | page:         | 6-08        |

## 6-2. Center Parting Door

6-2-1. Entrance Arrangement (See Fig. 6-2-1.)



**Fig. 6-2-1. LANDING DOOR ASSEMBLY (C.P)**

|        |                         |               |             |
|--------|-------------------------|---------------|-------------|
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|        |                         | page:         | 6-09        |

6-2-2. Landing Sill Assembly (See Fig. 6-2-2.)

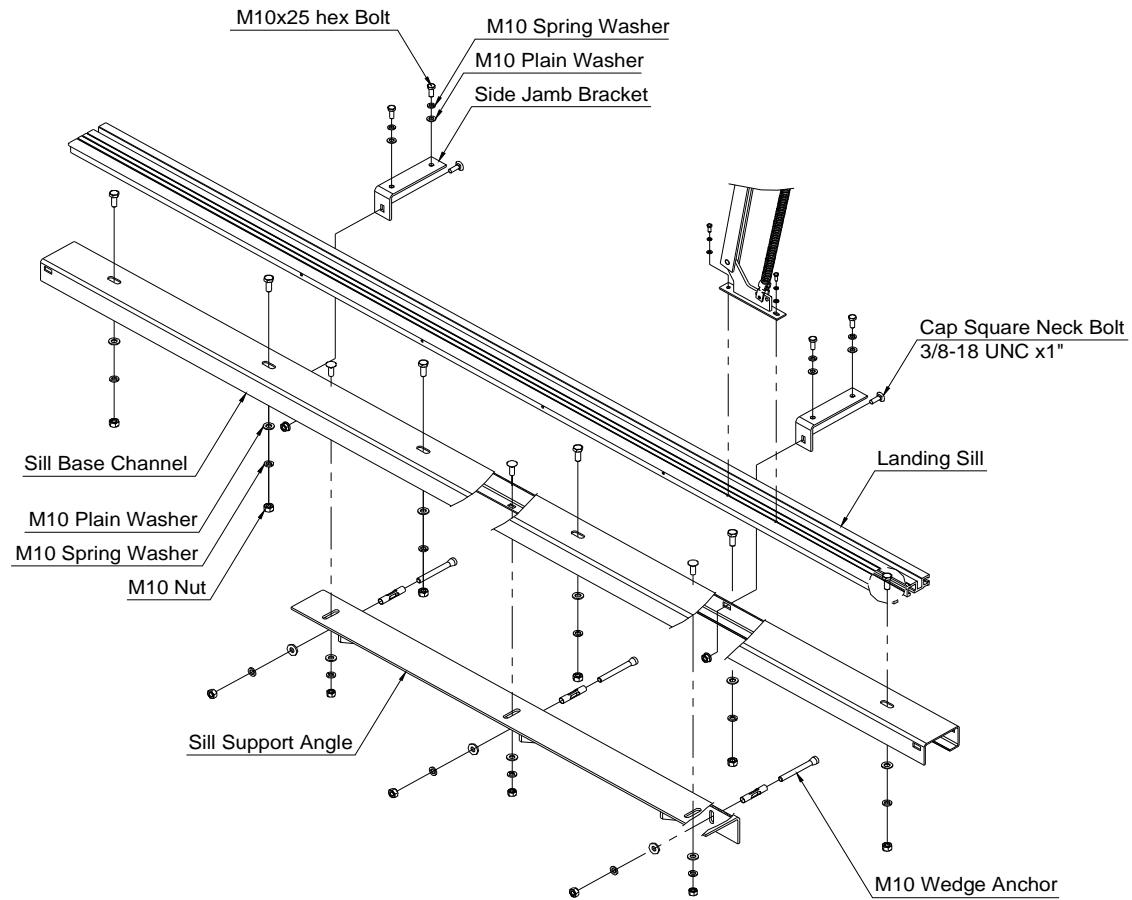


Fig. 6-2-2. LANDING DOOR ASSEMBLY (C.P)

|        |                         |               |             |
|--------|-------------------------|---------------|-------------|
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|        |                         | Date:         | 8-Jan-10    |
|        | MRL - ENTRANCE ASSEMBLY | Name:         | N.R.Kim     |
|        |                         | page:         | 6-10        |

6-2-3. Strut and Header Frame Assembly (See Fig. 6-2-3.)

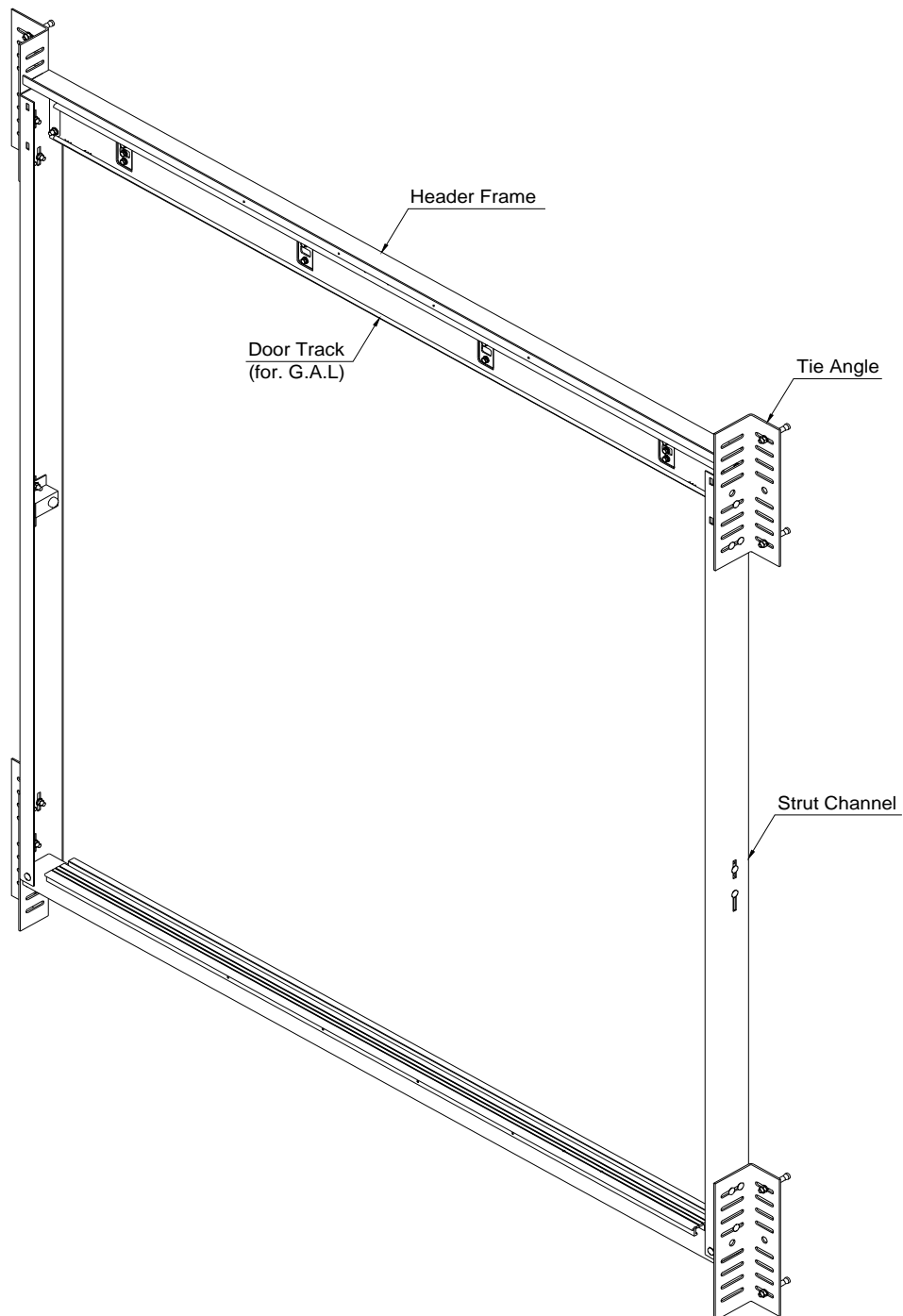


Fig. 6-2-3. STRUT AND HEADER FRAME ASSEMBLY (C.P)

|        |                         |               |             |
|--------|-------------------------|---------------|-------------|
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|        |                         | Date:         | 8-Jan-10    |
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|        |                         | page:         | 6-11        |

6-2-5. Jamb Assembly (See Fig. 6-2-5.)

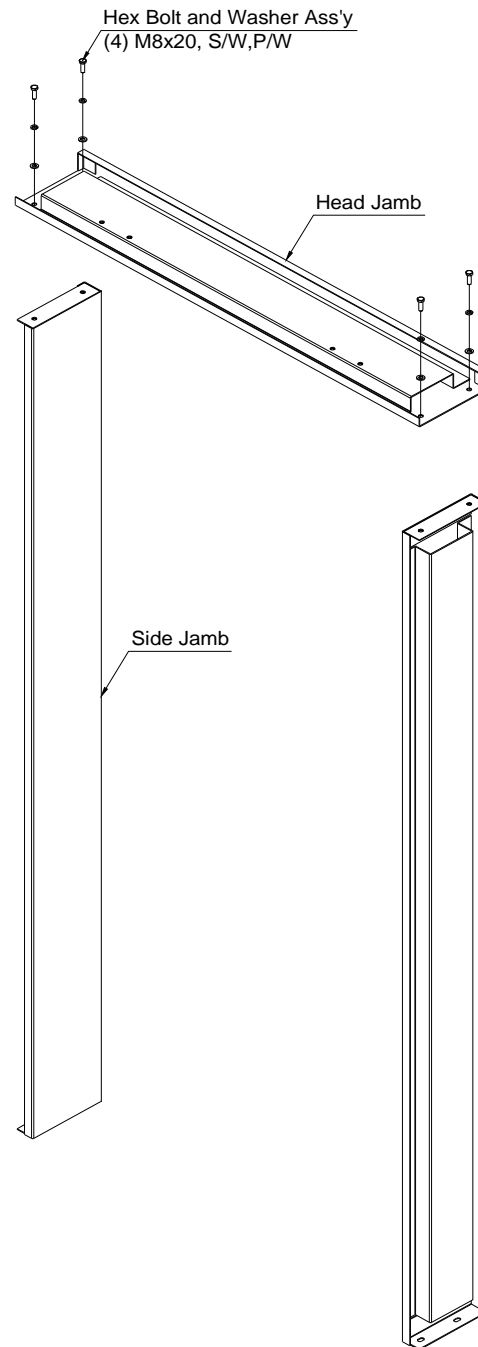


Fig. 6-2-5. JAMB ASSEMBLY (C.P)

|        |                         |               |             |
|--------|-------------------------|---------------|-------------|
| HM TEC | INSTALLATION MANUAL     | Document No.: | TN-M01-0001 |
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|        |                         | page:         | 6-12        |

6-2-6. Header Frame and Jamb Fixing (See Fig. 6-2-6.)

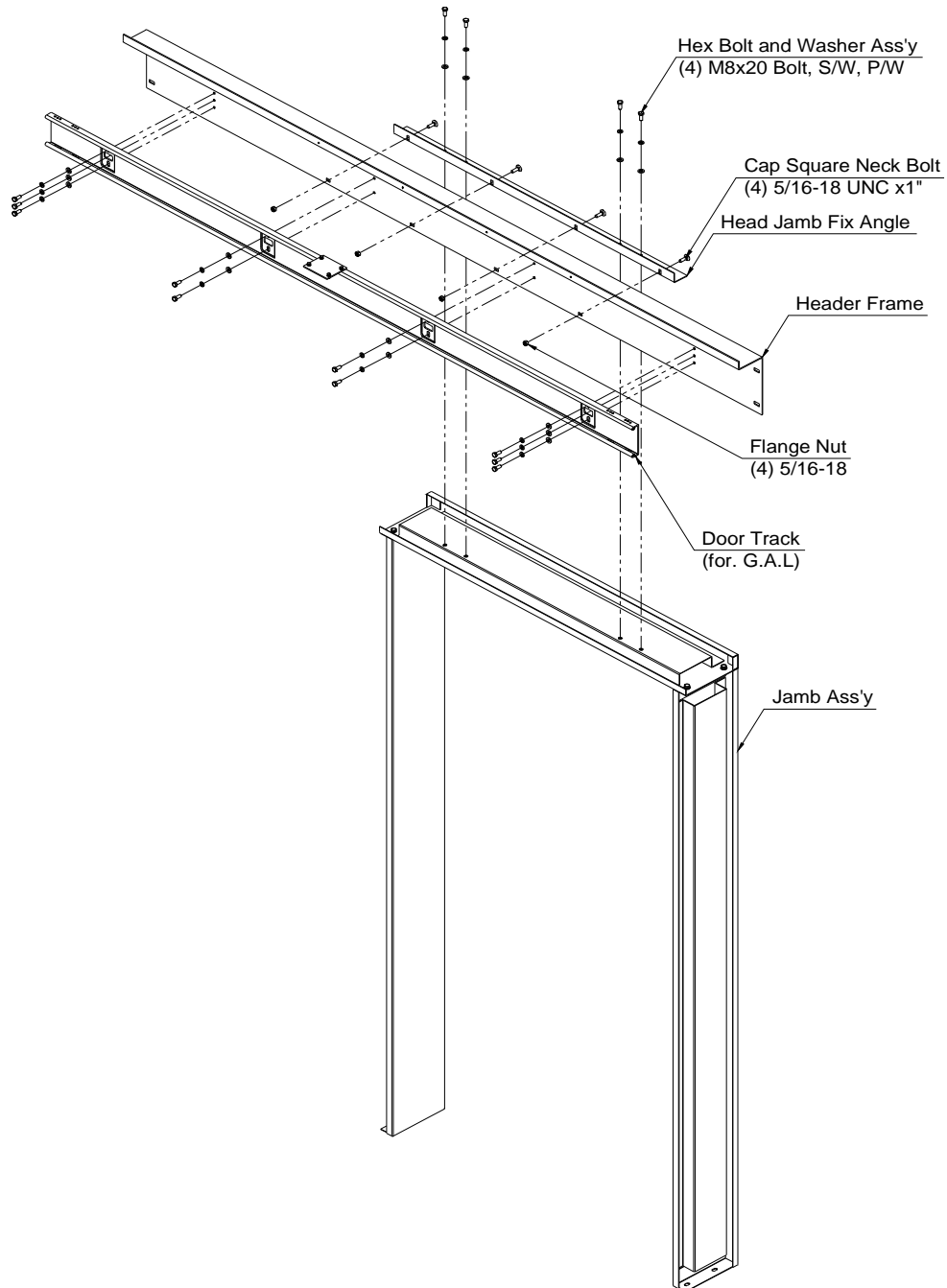
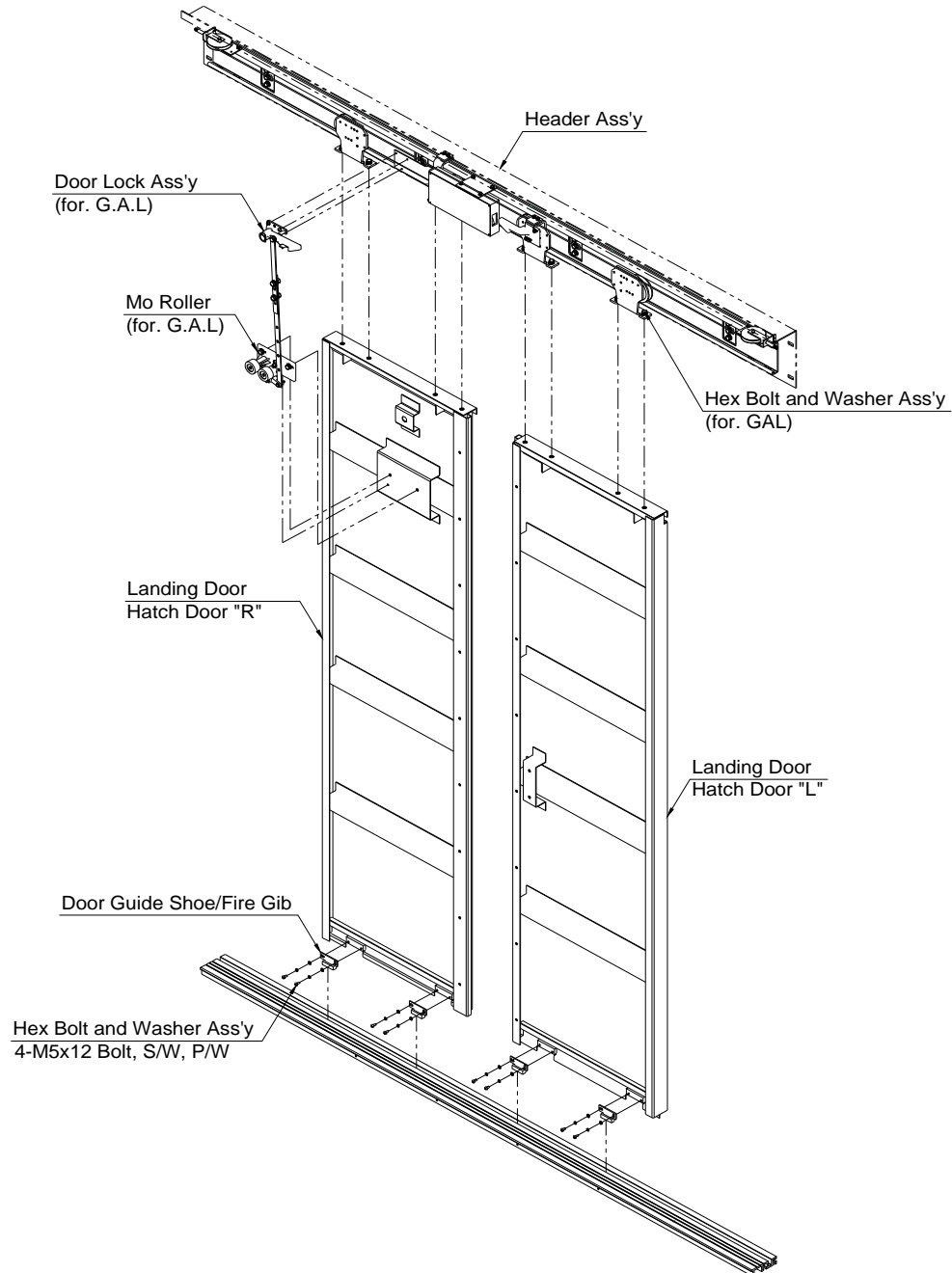


Fig. 6-2-6. HEADER FRAME AND JAMB FIXING (C.P)

|        |                         |               |             |
|--------|-------------------------|---------------|-------------|
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|        |                         | Date:         | 8-Jan-10    |
|        | MRL - ENTRANCE ASSEMBLY | Name:         | N.R.Kim     |
|        |                         | page:         | 6-13        |

6-2-7. Landing Door Assembly (See Fig. 6-2-7.)

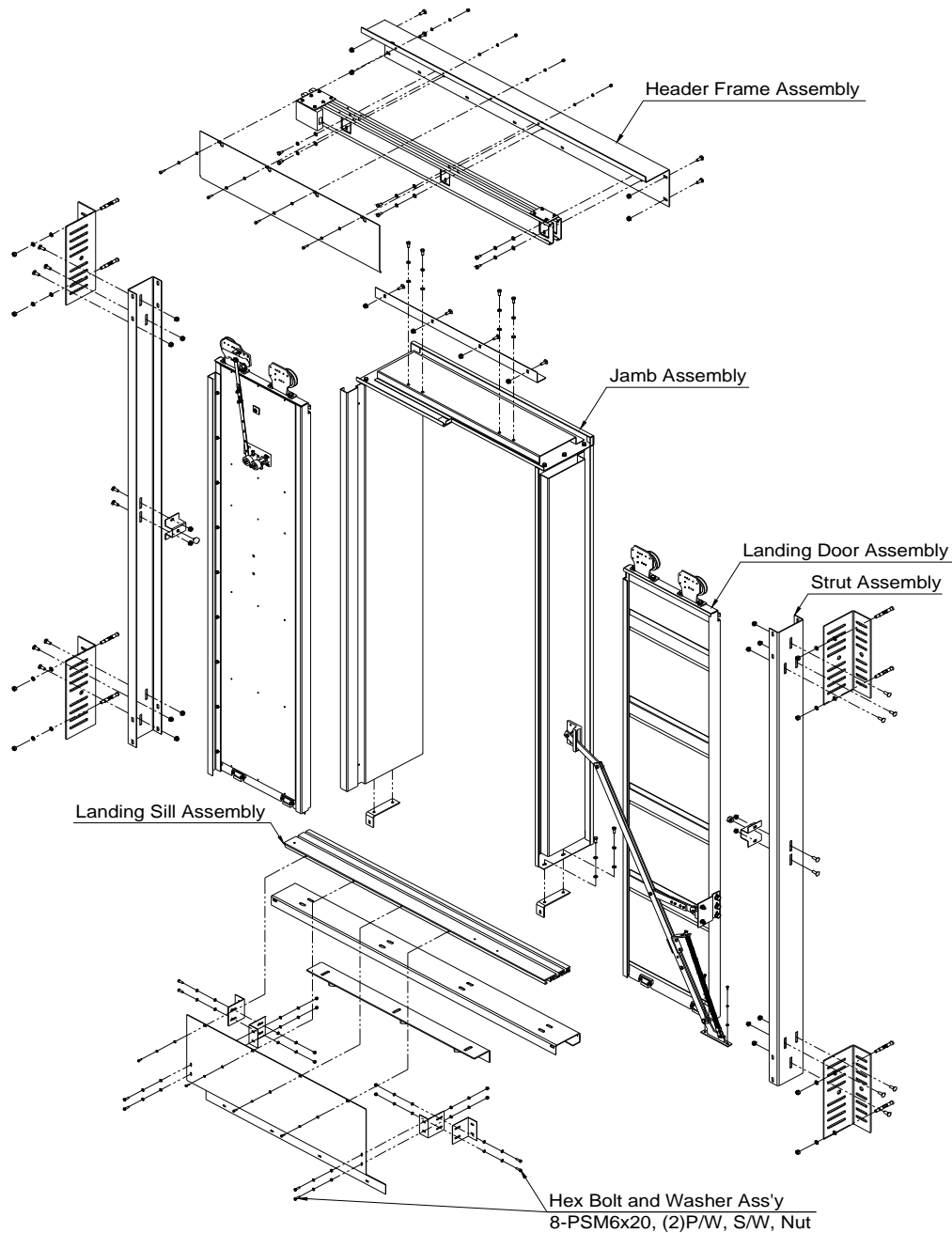


**Fig. 6-2-7. LANDING DOOR ASSEMBLY (C.P)**

|        |                         |               |             |
|--------|-------------------------|---------------|-------------|
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|        |                         | page:         | 6-14        |

### 6-3. Two Speed Side Sliding Door

6-3-1. Entrance Arrangement (See Fig. 6-3-1.)



**Fig. 6-3-1. LANDING DOOR ASSEMBLY (TWO SPEED)**

|        |                         |               |             |
|--------|-------------------------|---------------|-------------|
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|        |                         | page:         | 6-15        |

6-3-2. Landing Sill Assembly (See Fig. 6-3-2.)

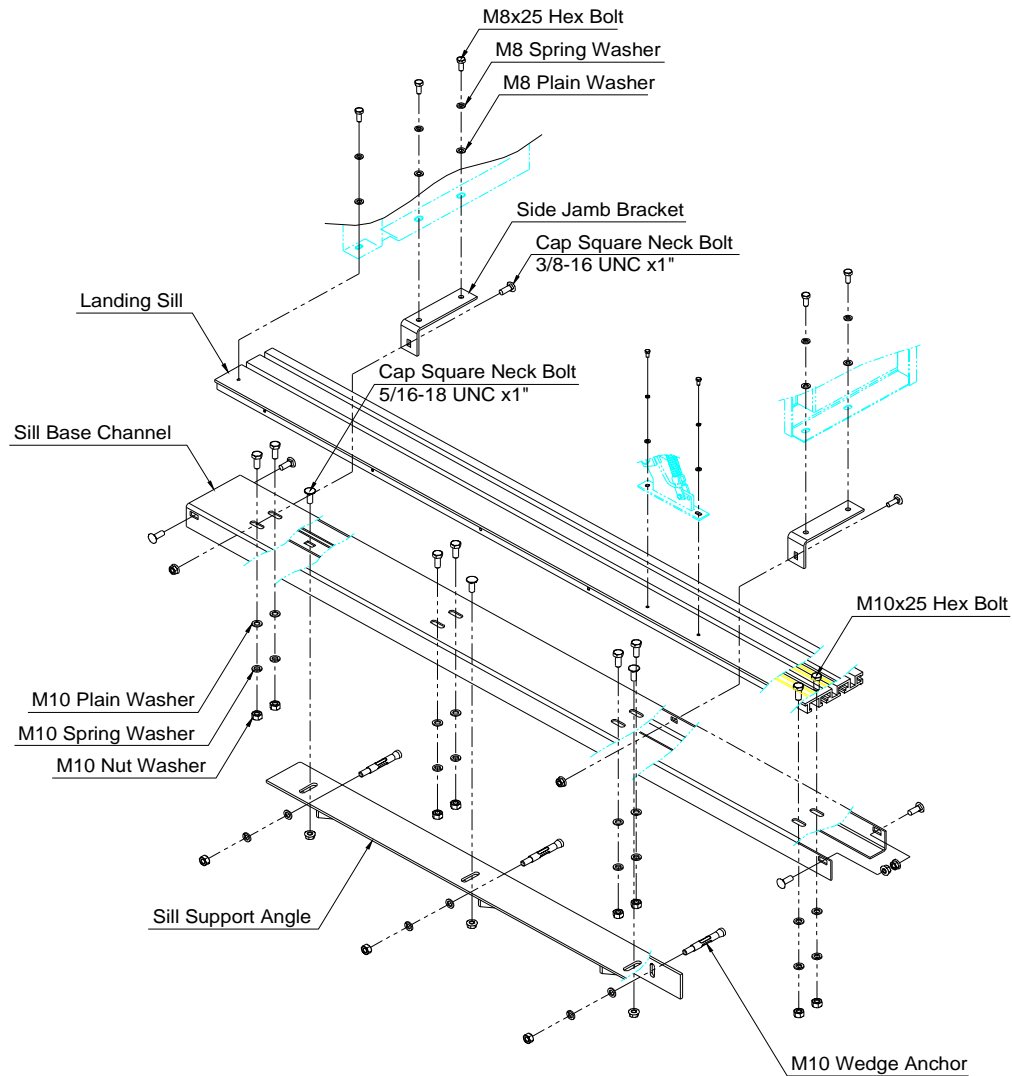
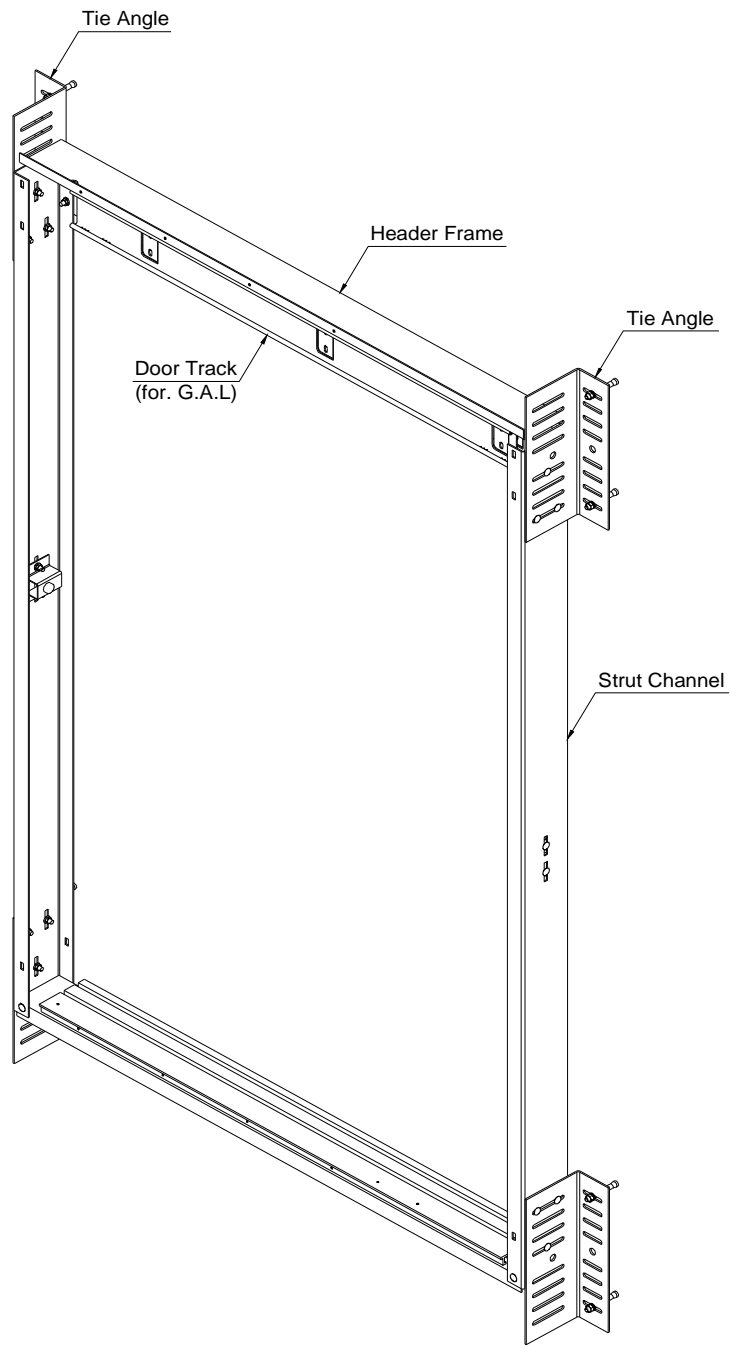


Fig. 6-3-2. LANDING DOOR ASSEMBLY (TWO SPEED)

|        |                         |               |             |
|--------|-------------------------|---------------|-------------|
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|        |                         | page:         | 6-16        |

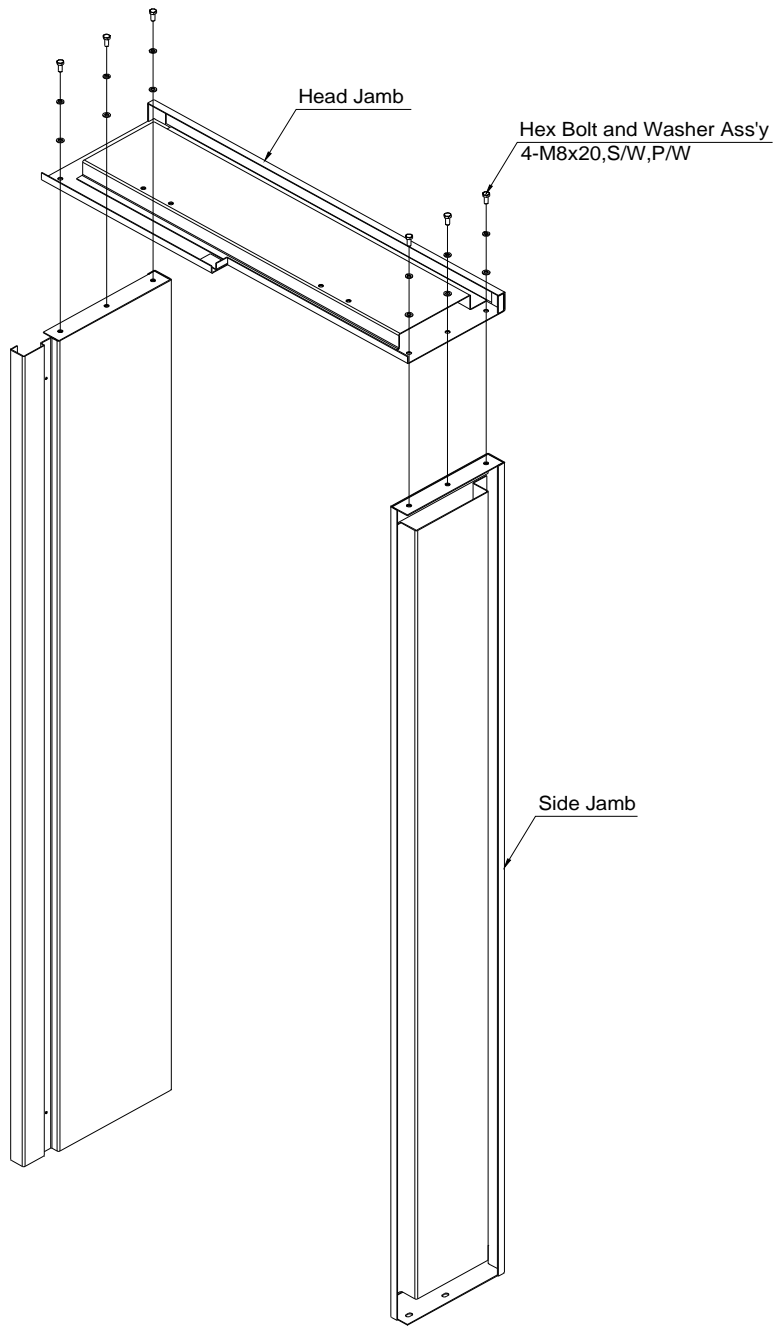
6-3-3. Strut and Header Frame Assembly (See Fig. 6-3-3.)



**Fig. 6-3-3. STRUT AND HEADER FRAME ASSEMBLY  
(TWO SPEED)**

|        |                         |               |             |
|--------|-------------------------|---------------|-------------|
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|        |                         | page:         | 6-17        |

6-3-5. Jamb Assembly (See Fig. 6-3-5.)



**Fig. 6-3-5. JAMB ASSEMBLY (TWO SPEED)**

|        |                         |               |             |
|--------|-------------------------|---------------|-------------|
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|        |                         | page:         | 6-18        |

6-3-6. Header Frame and Jamb Fixing (See Fig. 6-3-6.)

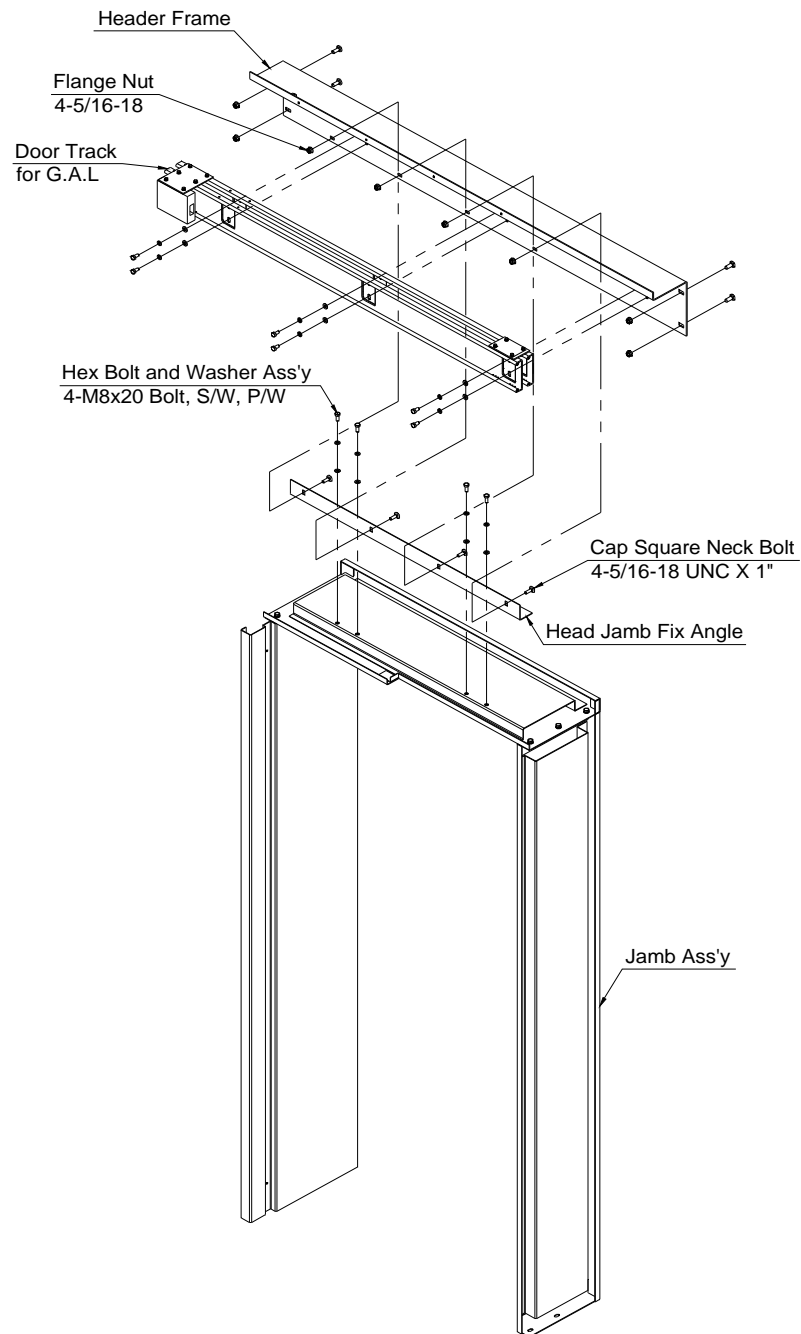


Fig. 6-3-6. HEADER FRAME AND JAMB FIXING (TWO SPEED)

|        |                         |               |             |
|--------|-------------------------|---------------|-------------|
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|        |                         | page:         | 6-19        |

6-3-7. Landing Door Assembly (See Fig. 6-3-7.)

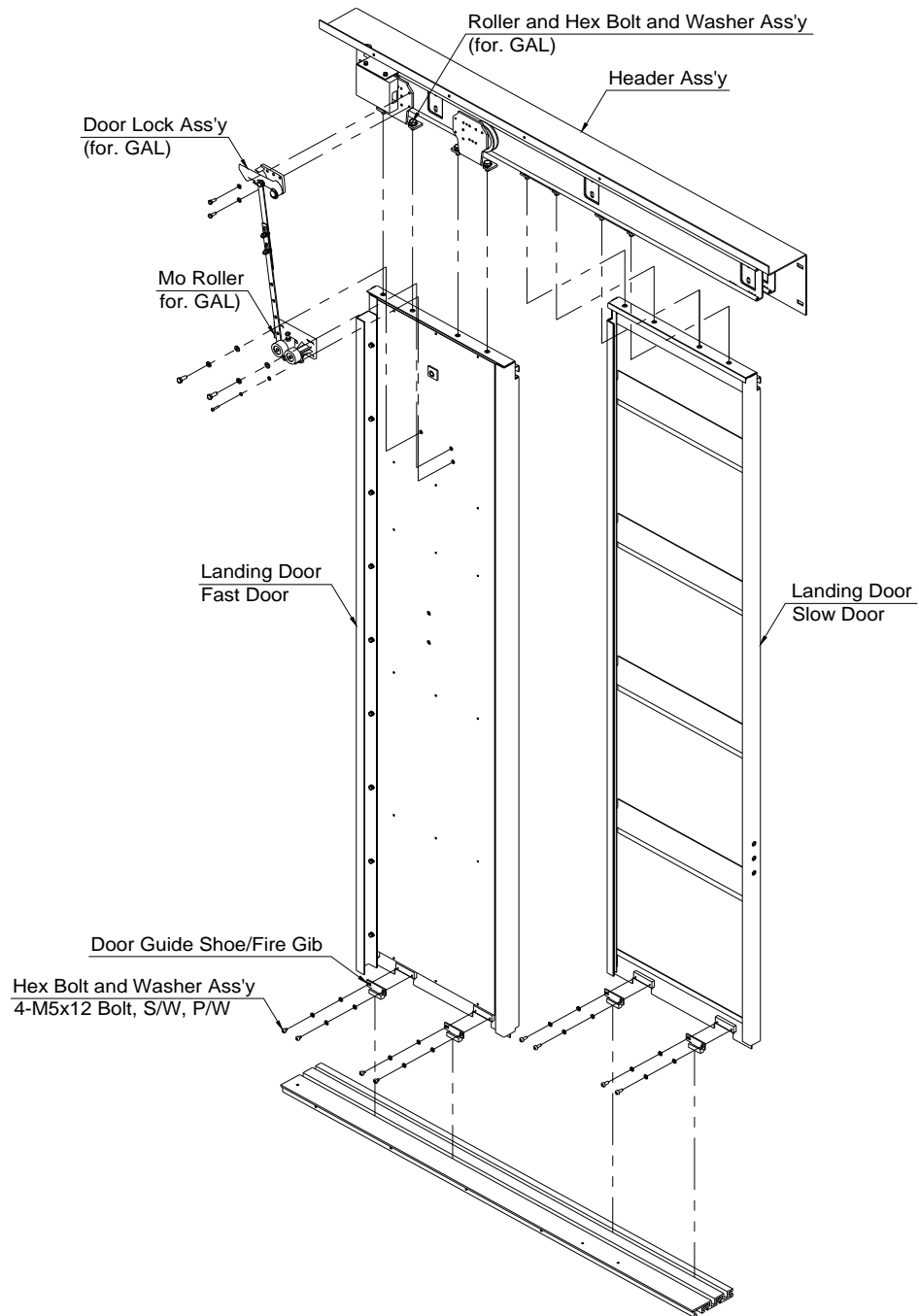


Fig. 6-3-7. LANDING DOOR ASSEMBLY (TWO SPEED)

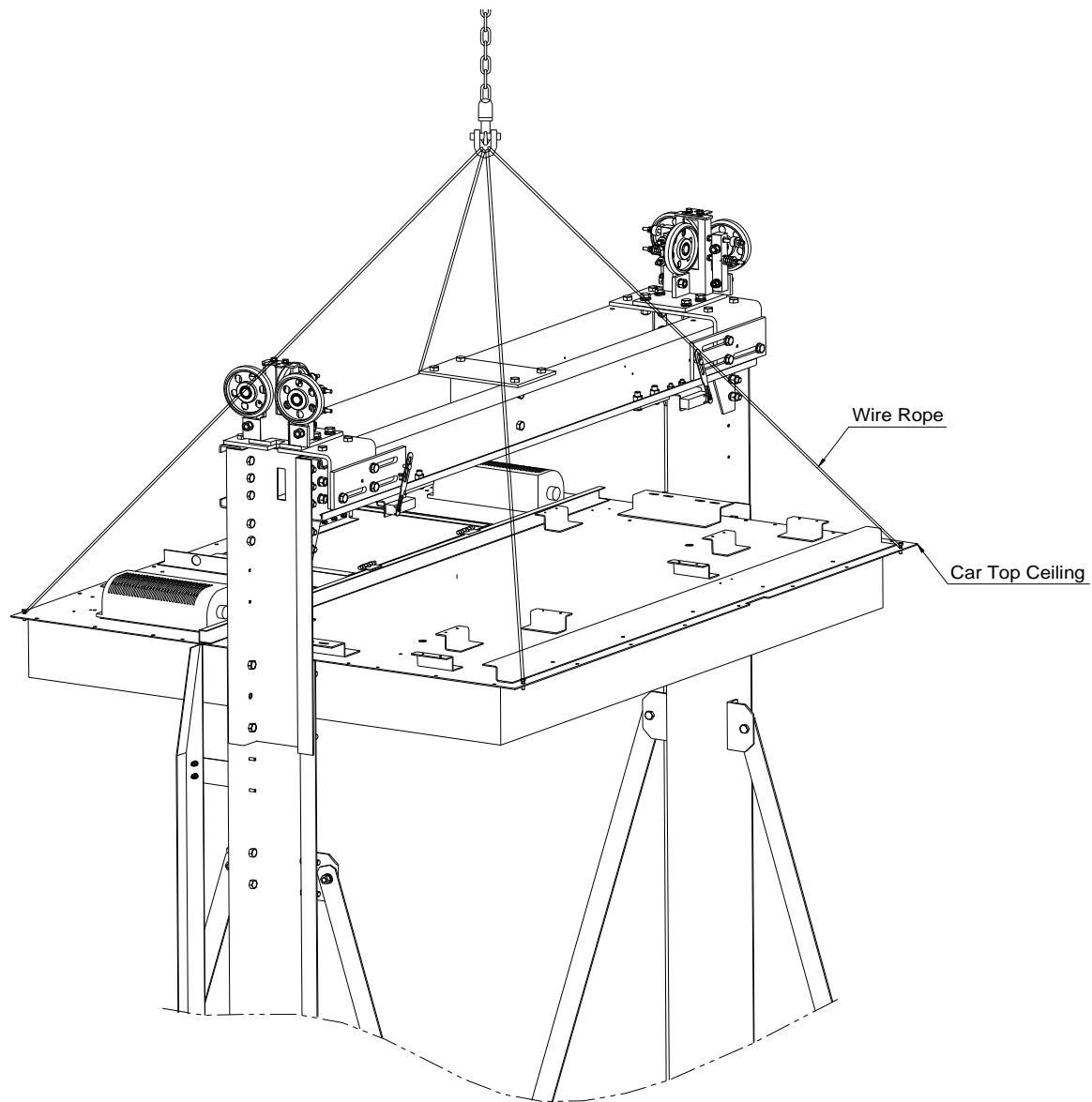
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|--------|---------------------|---------------|-------------|
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|        |                     | page:         | 7-01        |

## 7. CAB ASSEMBLY

### 7-1. Car Panel Assembling preparatory

7-1-1. Mount Car Top Ceiling's 4 corners by using Chain-block hanging on upper Hoist.

(Fig. 7-1-1.)



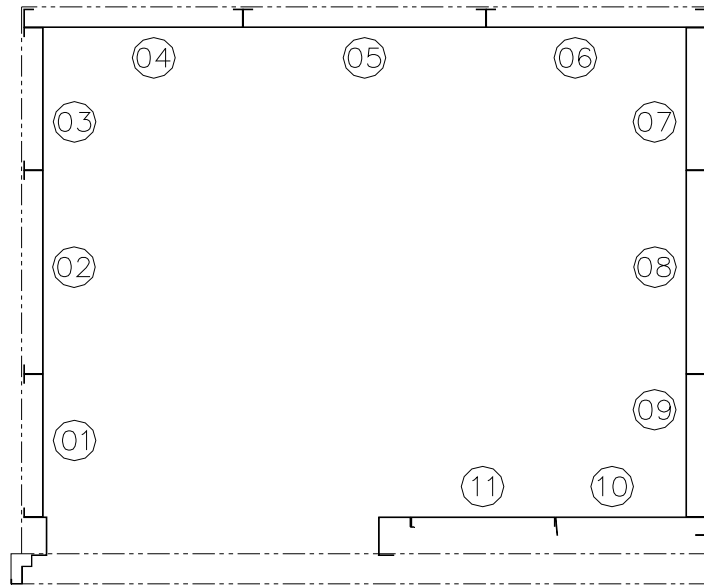
**Fig. 7-1-1. HANGING THE CAR TOP CEILING**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
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|        |                     | page:         | 7-02        |

## 7-2. Car Panel, Ceiling and Entrance Column (Front Entrance)

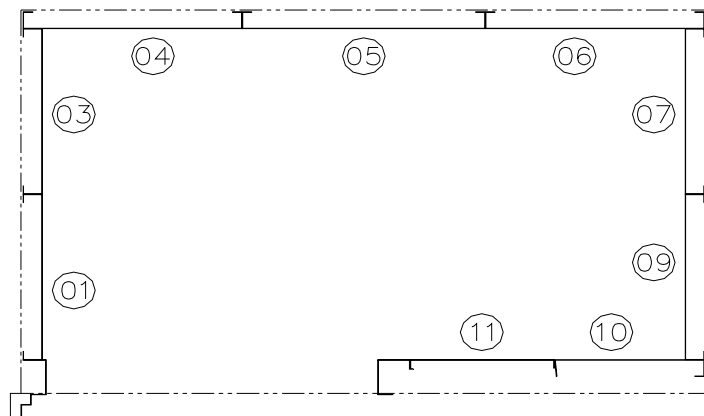
7-2-1. Arrange Car Panel. Front Entrance

(1) 3 Side Panels (Fig. 7-2-1-A.)



**Fig. 7-2-1-A. CAR PANEL AND ENTRANCE COLUMN ASSEMBLY**

(2) 2 Side Panels (Fig. 7-2-1-B.)



**Fig. 7-1-1-B. CAR PANEL AND ENTRANCE COLUMN ASSEMBLY**

| Rev. no. | Added         | Approved by | Date      |  |
|----------|---------------|-------------|-----------|--|
| ①        | FRONT OPENING | DU Seo      | 16-May-11 |  |
|          |               |             |           |  |
|          |               |             |           |  |

|        |                     |               |             |
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## 7-2-2. Car Panel Assembling

### (1) Car Left Side Panel Assembling

: Assemble Car Left Side Panel as shown on Fig 7-2-2-A.

- ① Assemble Left Side Panel "No 01, No 02, No 03" with Bolt..
- ② If there's Handrail on Left Side Panel, assemble it to "No 01, No 02, No 03" Panel
- ③ Assemble Entrance Column and Panel ③ with Bolt.
- ④ Place assembled Entrance Column and Panel on Kick Plate and mount temporarily.

[Attention] At this time, temporarily assembled Left Side Panel should be mounted on Upright with manila rope to prevent fall down.

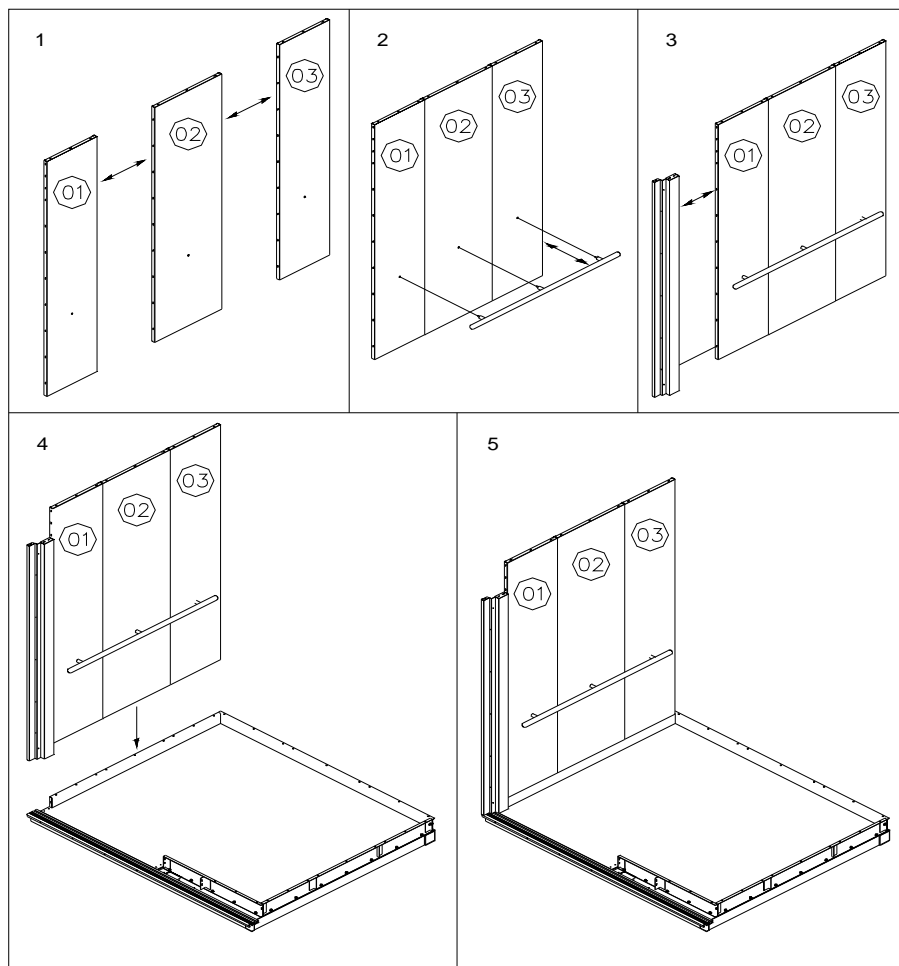


Fig. 7-2-2-A. CAR PANEL(LEFT SIDE) ASSEMBLY

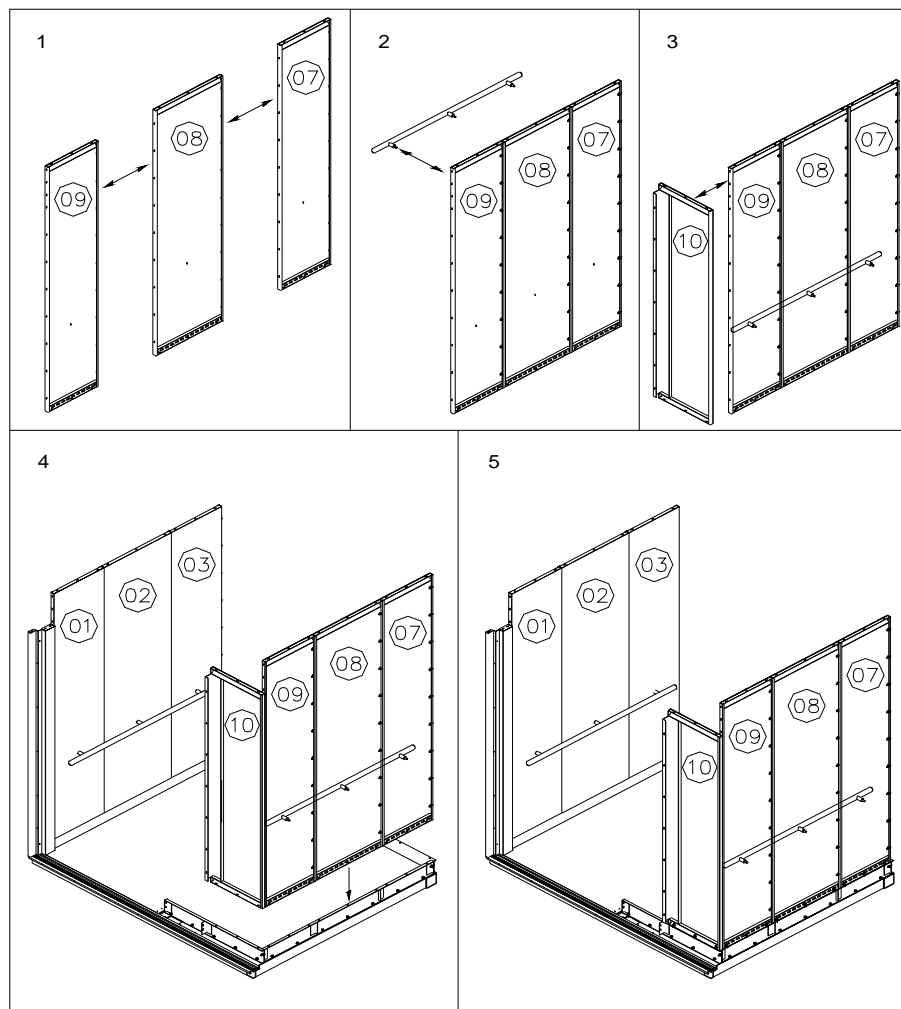
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|--------|---------------------|---------------|-------------|
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|        |                     | page:         | 7-04        |

## (2) Car Right Side Panel Assembling

: Assemble Car Right Side Panel as shown on Fig 7-2-2-B.

- ① Assemble Right Side Panel "No 07, No 08, No 09" with Bolt.
- ② If there's Handrail on Right Side Panel, assemble it to "No 07, No 08, No 09" Panel.
- ③ Assemble Front Panel "No 10" to assembled Side Panel with Bolt.
- ④ Place assembled Front Panel and Right Side Panel on Kick Plate, and mount temporarily..

[Attention] At this time, temporarily assembled Left Side Panel should be mounted on Upright with manila rope to prevent fall down.



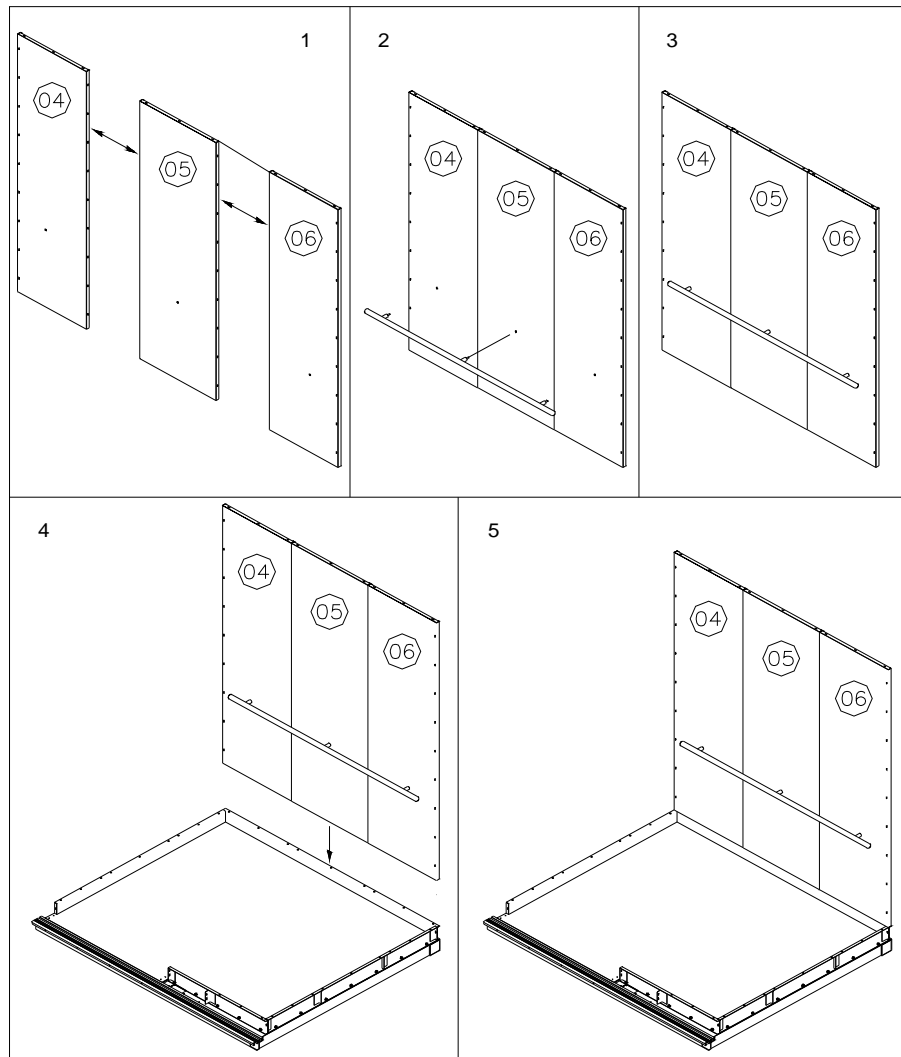
**Fig. 7-2-2-B. CAR PANEL(RIGHT SIDE) ASSEMBLY**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
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|        |                     | page:         | 7-05        |

### (3) Car Rear Panel Assembling

: Assemble Car Rear Panel as shown on Fig 7-2-2-C.

- ① Assemble Rear Panel "No 04, No 05, No 06" with Bolt.
- ② If there's Handrail on Rear Panel, mount it on "No 04, No 05, No 06" Panel.
- ③ Place assembled Rear Panel on Kick Plate, and mount temporarily.
- ④ Assemble combined Left Side Panel and Rear Panel corner.
- ⑤ Assemble combined Right Side Panel and Rear Panel corner.



**Fig. 7-2-2-C. CAR PANEL(REAR) ASSEMBLY**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
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|        |                     | page:         | 7-06        |

(4) Car Panel Assembling

: Assemble Car Panel as shown on Fig 7-2-2-D.

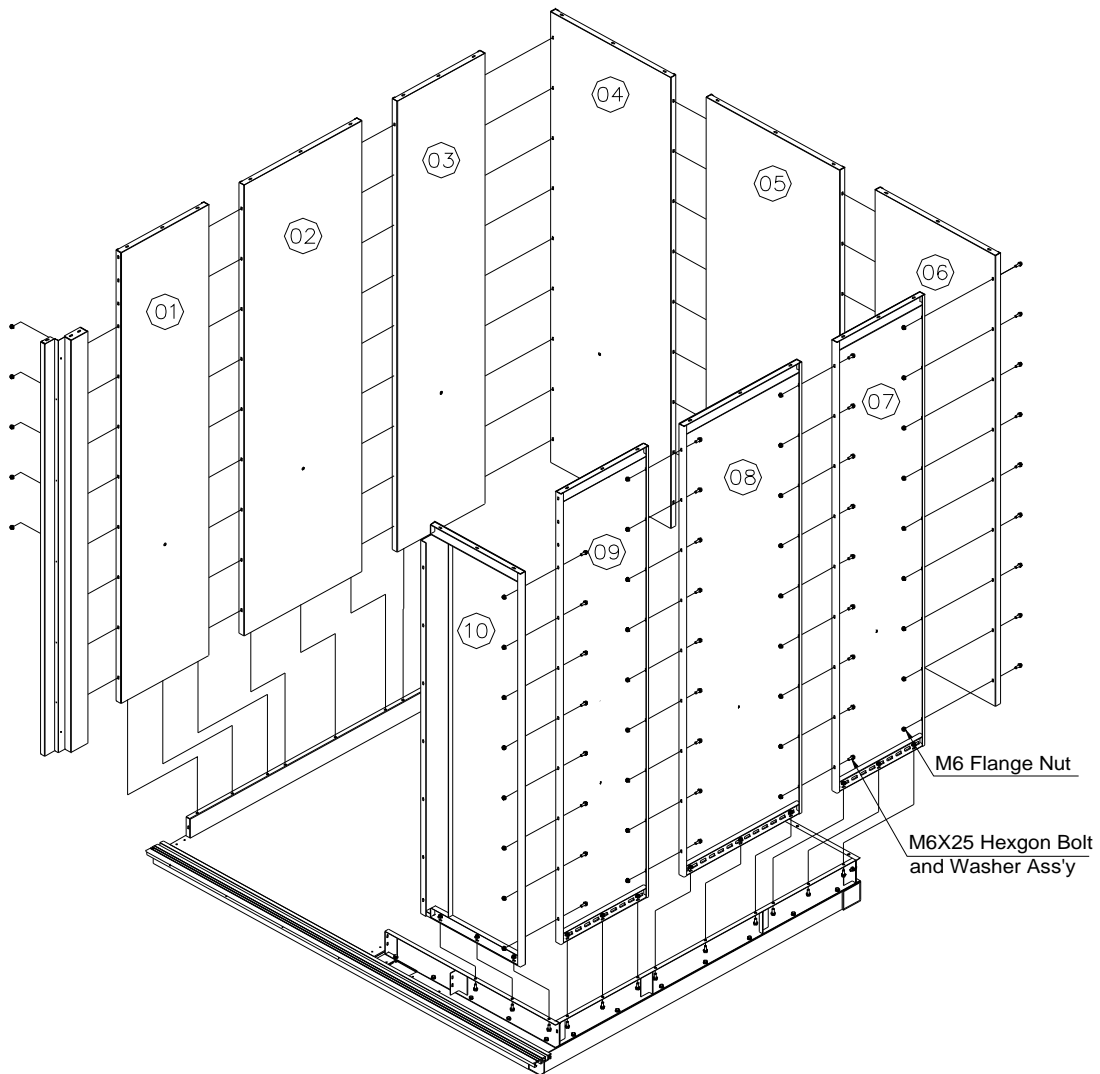


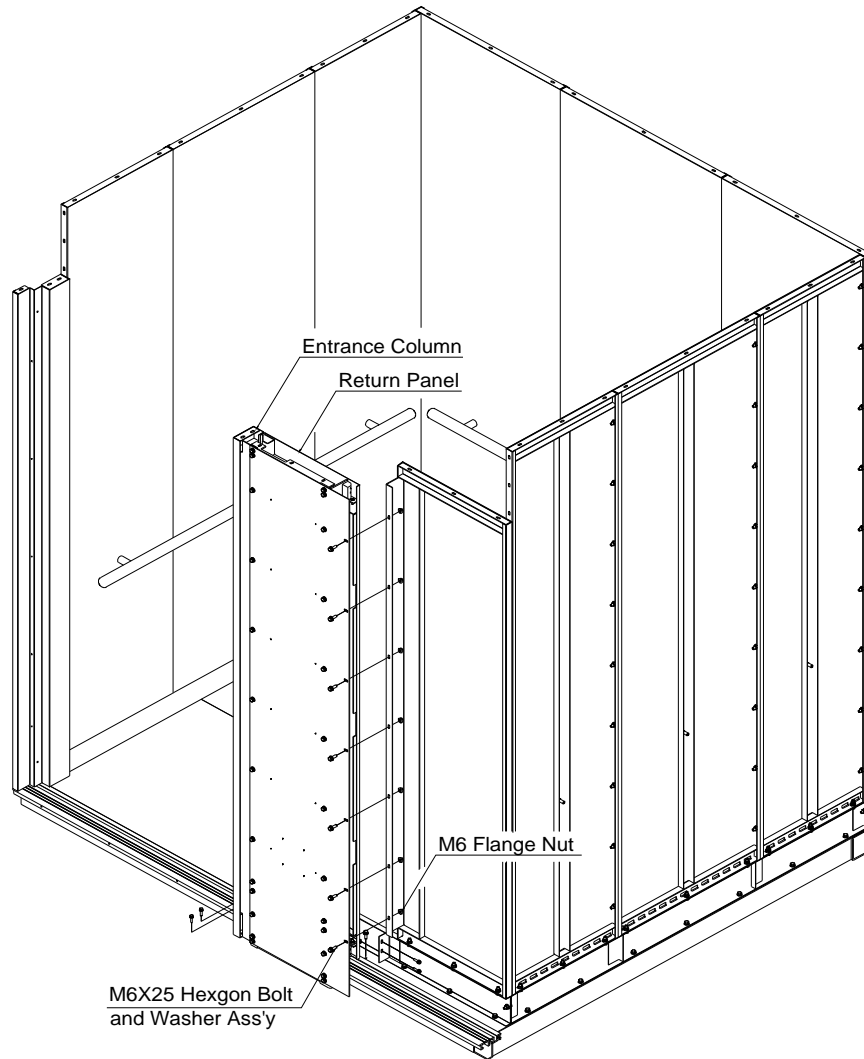
Fig. 7-2-2-D. CAR PANEL ASSEMBLY

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
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|        | MRL - CAB ASSEMBLY  | Name:         | N.R.Kim     |
|        |                     | page:         | 7-07        |

(5) Return Panel "No 11" and Entrance Column Assembling

: Assemble as shown on Fig. 7-2-2-E.

- ① Assemble Return Panel and Entrance Column with Bolt.
- ② Place assembled Return Panel and Entrance Column on Kick Plate, and mount it temporarily.

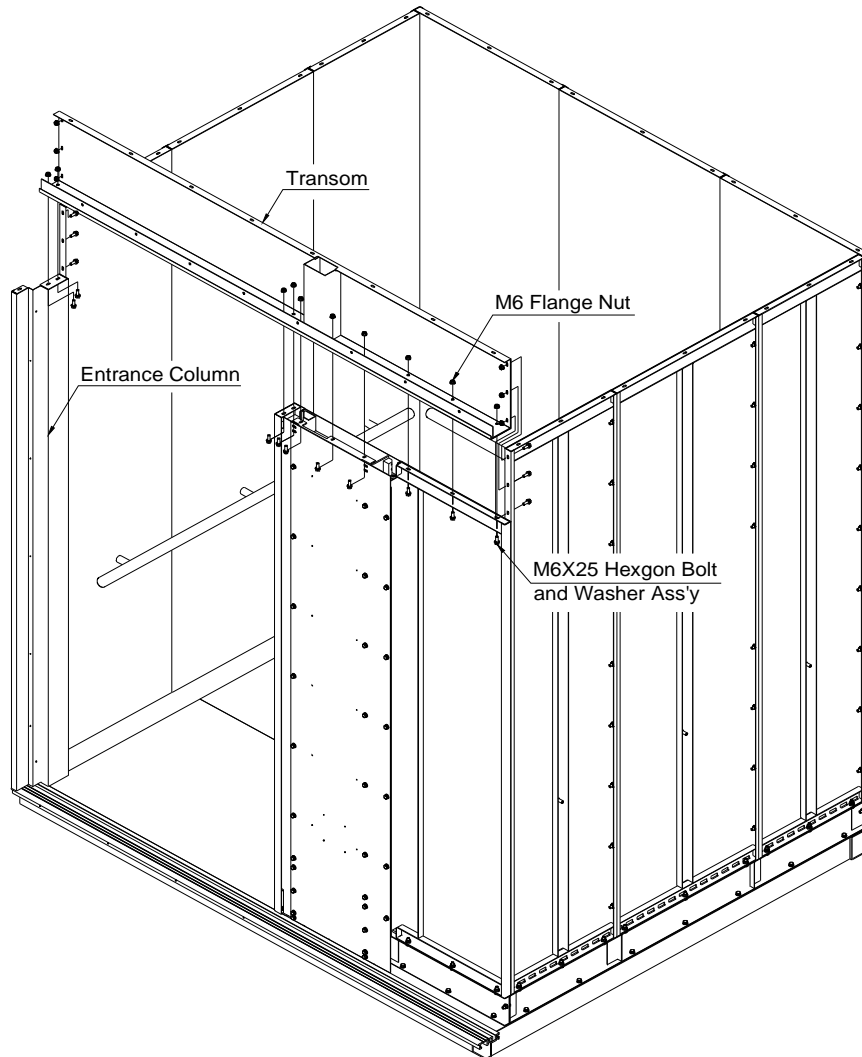


**Fig. 7-2-2-E. RETURN PANEL ASSEMBLY**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
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|        |                     | page:         | 7-08        |

(6) Transom Assembling (Fig. 7-2-2-F.)

: Place Transom on Entrance Column and assemble them with Bolt.

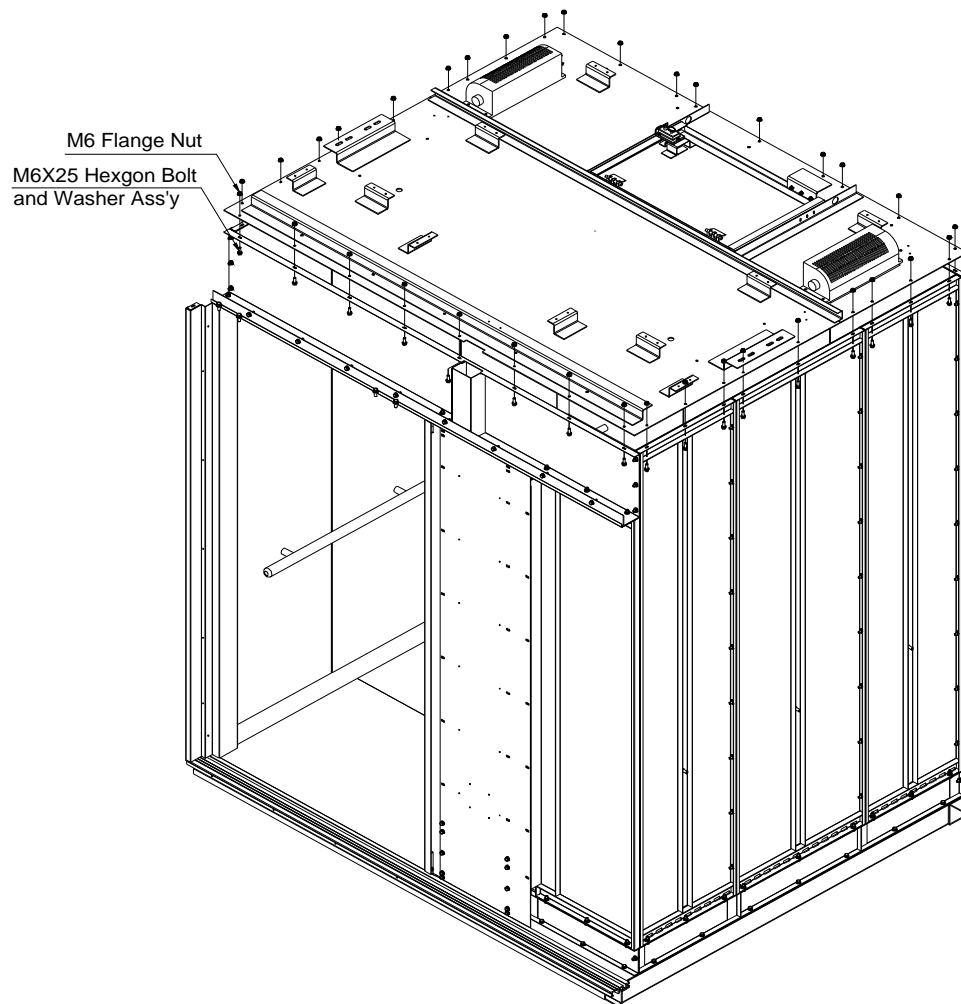


**Fig. 7-2-2-F. TRANSOM ASSEMBLY**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
| HM TEC | INSTALLATION MANUAL | Document No.: | TN-M01-0001 |
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|        | MRL - CAB ASSEMBLY  | Name:         | N.R.Kim     |
|        |                     | page:         | 7-09        |

### 7-2-3. Car Top Ceiling Assembling (Fig. 7-2-3.)

- (1) Slowly down Car Top Ceiling hanging over Car Panel.  
: Adjust Car Panel and Car Top Ceiling Assembling Hole location.
- (2) Assemble Car Panel and Car Top Ceiling with prepared Bolt.
- (3) Check whether it is horizontally or vertically correct, then mount them completely as shown below.
  - ① Mount bolt of lower Car panel and Kick Plate.
  - ② Mount bolt of Car Panel and Car Top Ceiling.

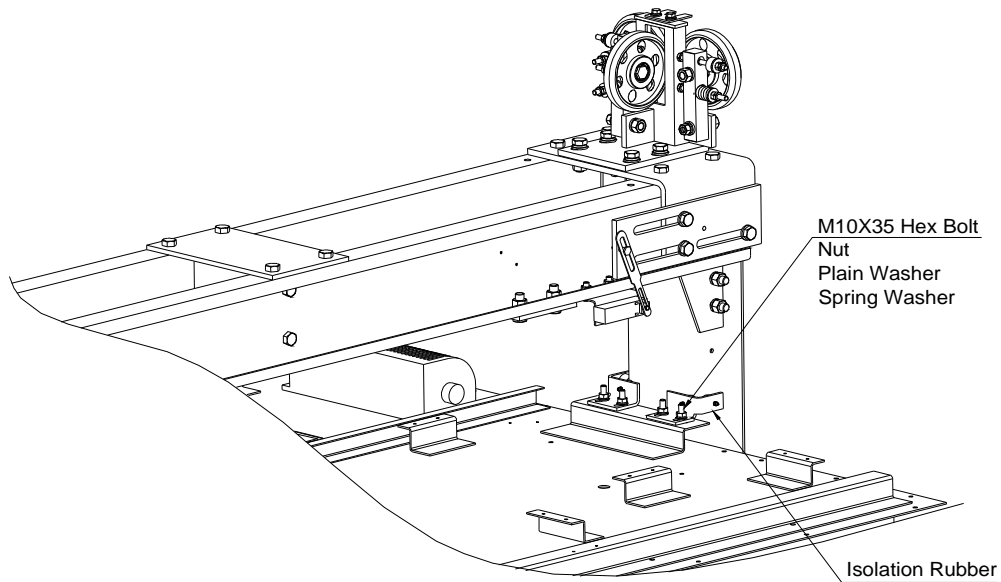


**Fig. 7-2-3. INSTALLATION CAR TOP CEILING**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
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|        |                     | page:         | 7-10        |

7-2-4. Car Top Isolation Rubber Assembling (Fig. 7-2-4.)

- (1) Temporarily assemble Isolation Rubber Assembly to bracket located right and left of Car Top Ceiling.
- (2) Check dimension of Cab's right and left, front and rear, and then mount it.



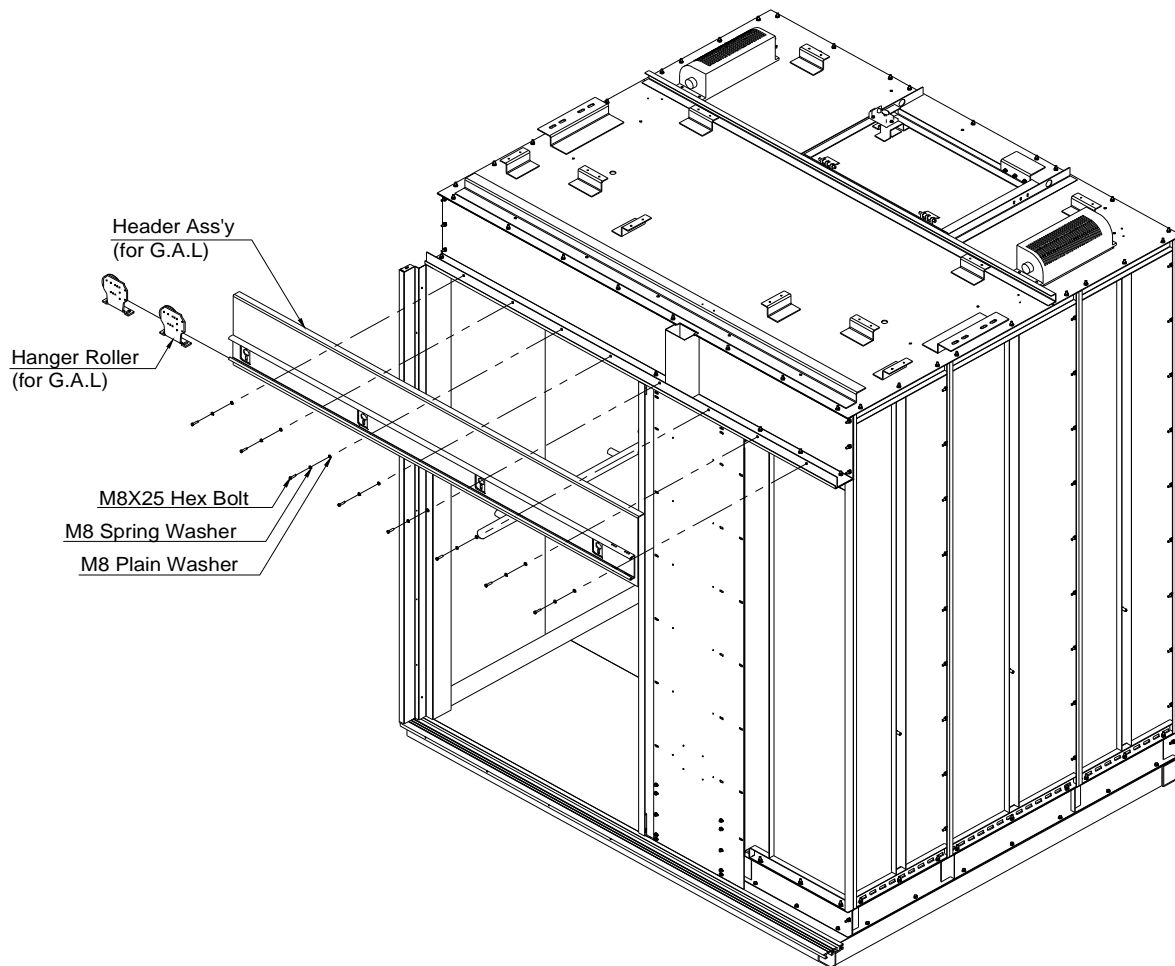
**Fig. 7-2-4. INSTALLATION CAR TOP ISOLATION RUBBER**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
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|        |                     | page:         | 7-11        |

## 7-2-5. Car Door Operator Assembly

### (1) Car Header (Fig. 7-2-5-A.)

- ① Assemble Car Header to Car Transom.



**Fig. 7-2-5-A. INSTALLATION CAR HEADER**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
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|        |                     | page:         | 7-12        |

(2) Car Door Assembling (Fig. 7-2-5-B.)

- ① Adjust Car Door and Hanger Roller, and assemble them.
- ② Refer to G.A.L Door Installation Manual for details.

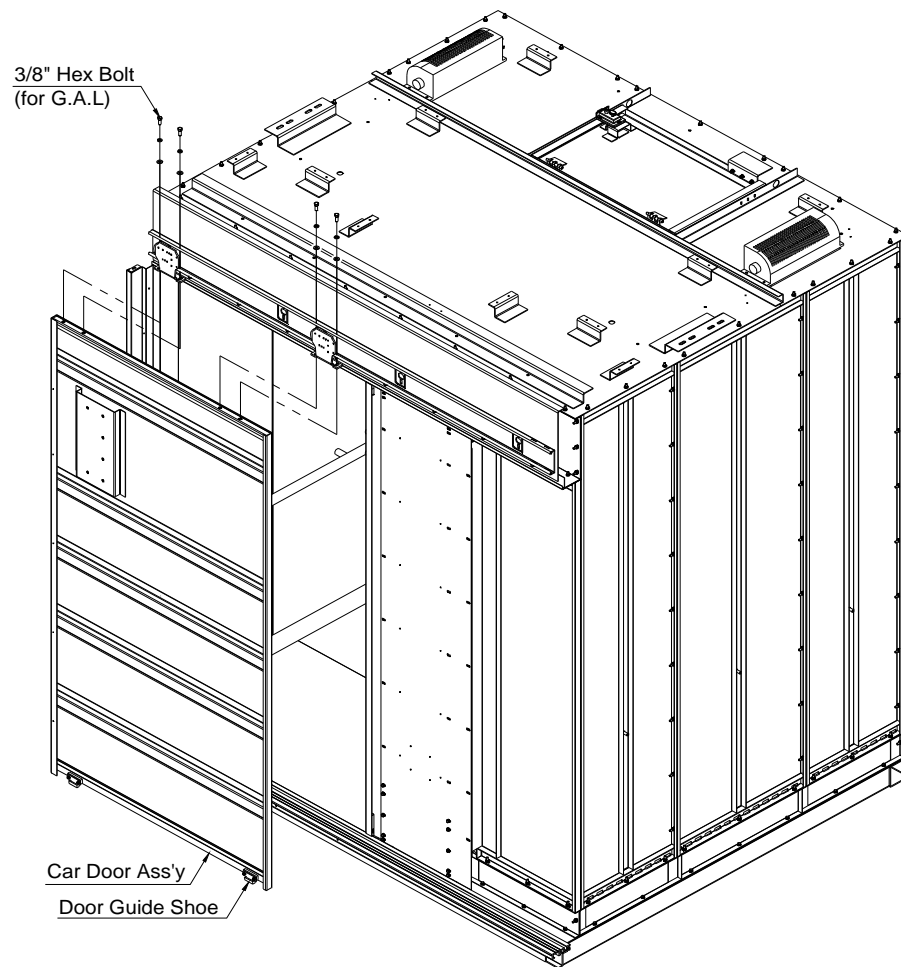


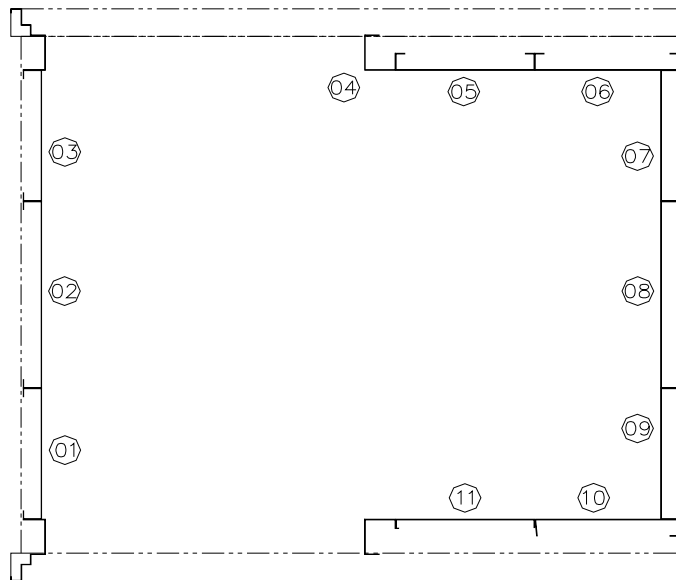
Fig. 7-2-5-B. INSTALLATION OF CAR DOOR

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
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|        |                     | page:         | 7-13        |

### 7-3. Car Panel, Ceiling and Entrance Column (Front & Rear Entrance)

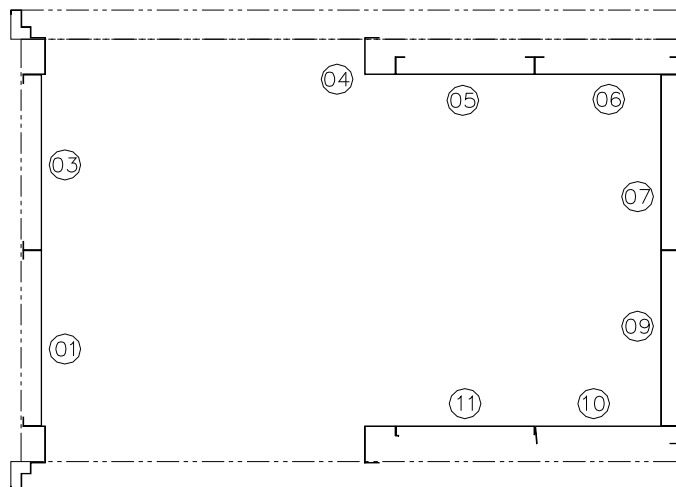
7-3-1. Arrange Car Panel. Front & Rear Entrance

(1) 3 Side Panels (Fig. 7-3-1-A.)



**Fig. 7-3-1-A. CAR PANEL AND ENTRANCE COLUMN ASSEMBLY**

(2) 2 Side Panels (Fig. 7-3-1-B.)



**Fig. 7-3-1-B. CAR PANEL AND ENTRANCE COLUMN ASSEMBLY**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
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|        | MRL - CAB ASSEMBLY  | Name:         | N.R.Kim     |
|        |                     | page:         | 7-14        |

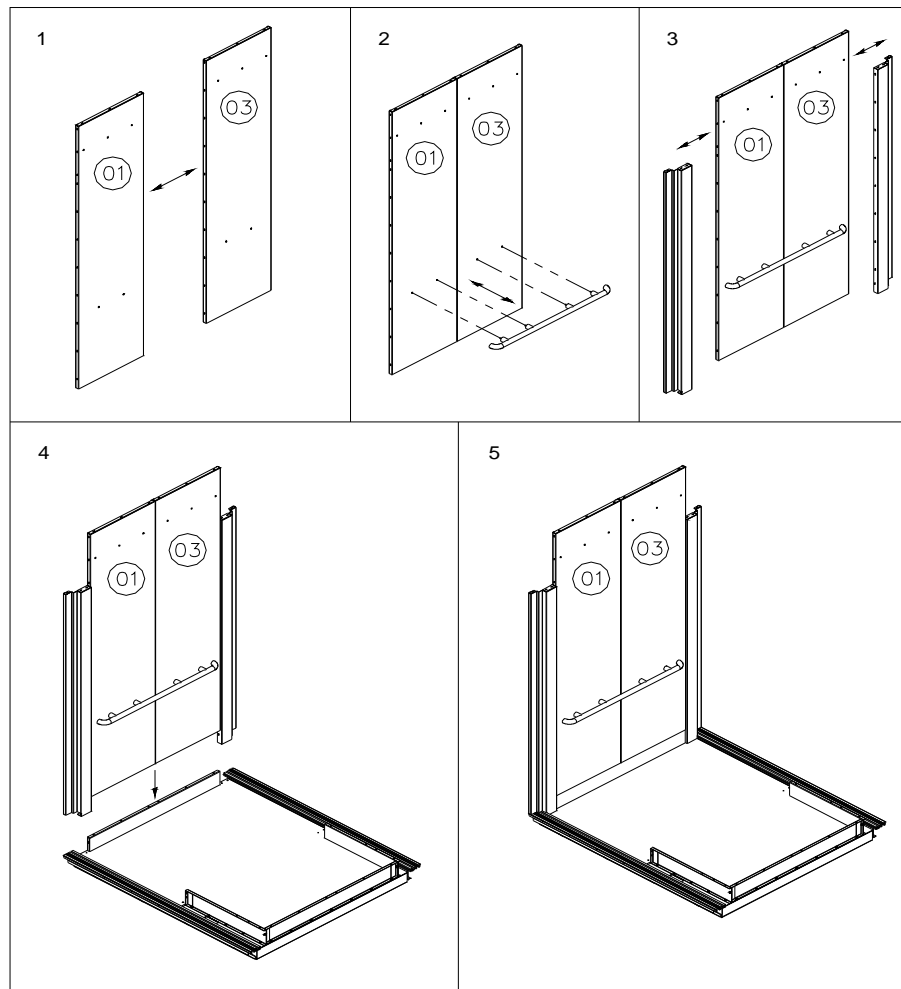
### 7-3-2. Car Panel Assembling for Front and Rear Entrance

#### (1) Car Left Side Panel Assembling

: Assemble Car Left Side Panel as shown on Fig 7-3-2-A.

- ① Assemble Left Side Panel "No 01, No 03" with Bolt..
- ② If there's Handrail on Left Side Panel, assemble it to "No 01, No 03" Panel
- ③ Assemble Entrance Column and Panel ③ with Bolt.
- ④ Place assembled Entrance Column and Panel on Kick Plate and mount temporarily.

[Attention] At this time, temporarily assembled Left Side Panel should be mounted on Upright with manila rope to prevent fall down.



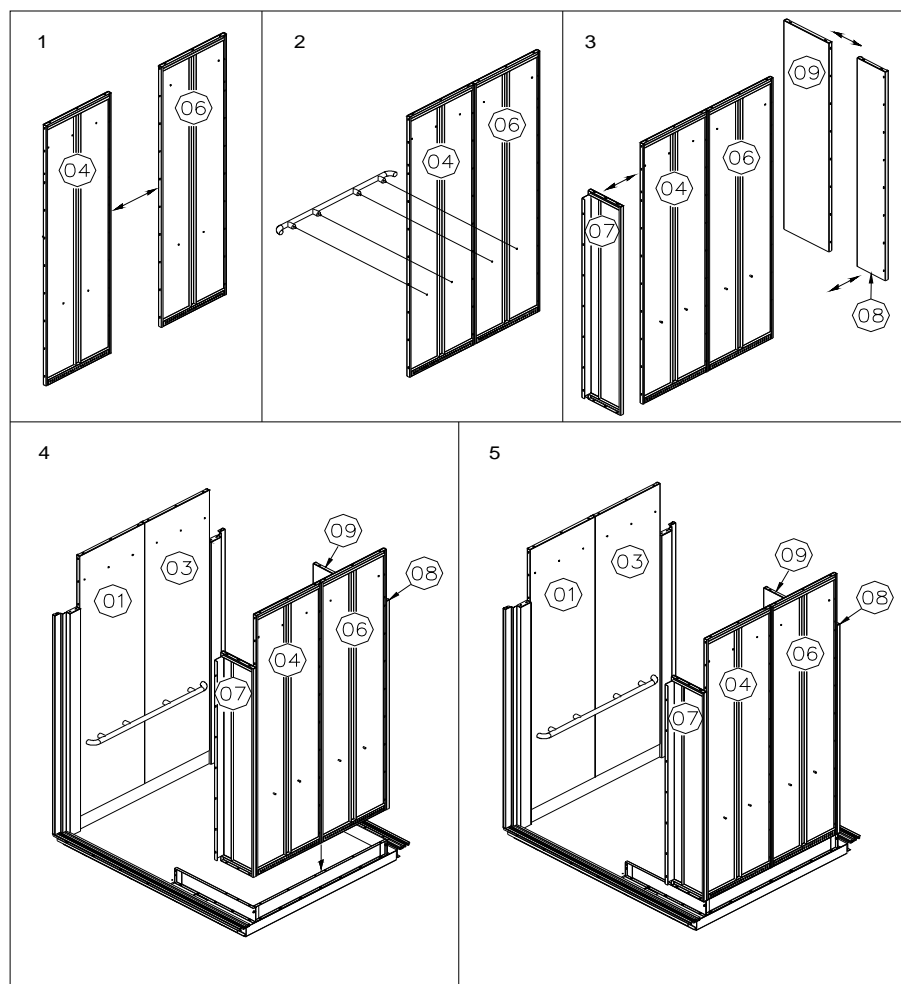
**Fig. 7-3-2-A. CAR PANEL(LEFT SIDE) ASSEMBLY (FRONT and REAR ENTRANCE)**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
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|        |                     | page:         | 7-15        |

(2) Car Right Side Panel Assembling for Front and Rear Entrance

: Assemble Car Right Side Panel as shown on Fig 7-3-2-B.

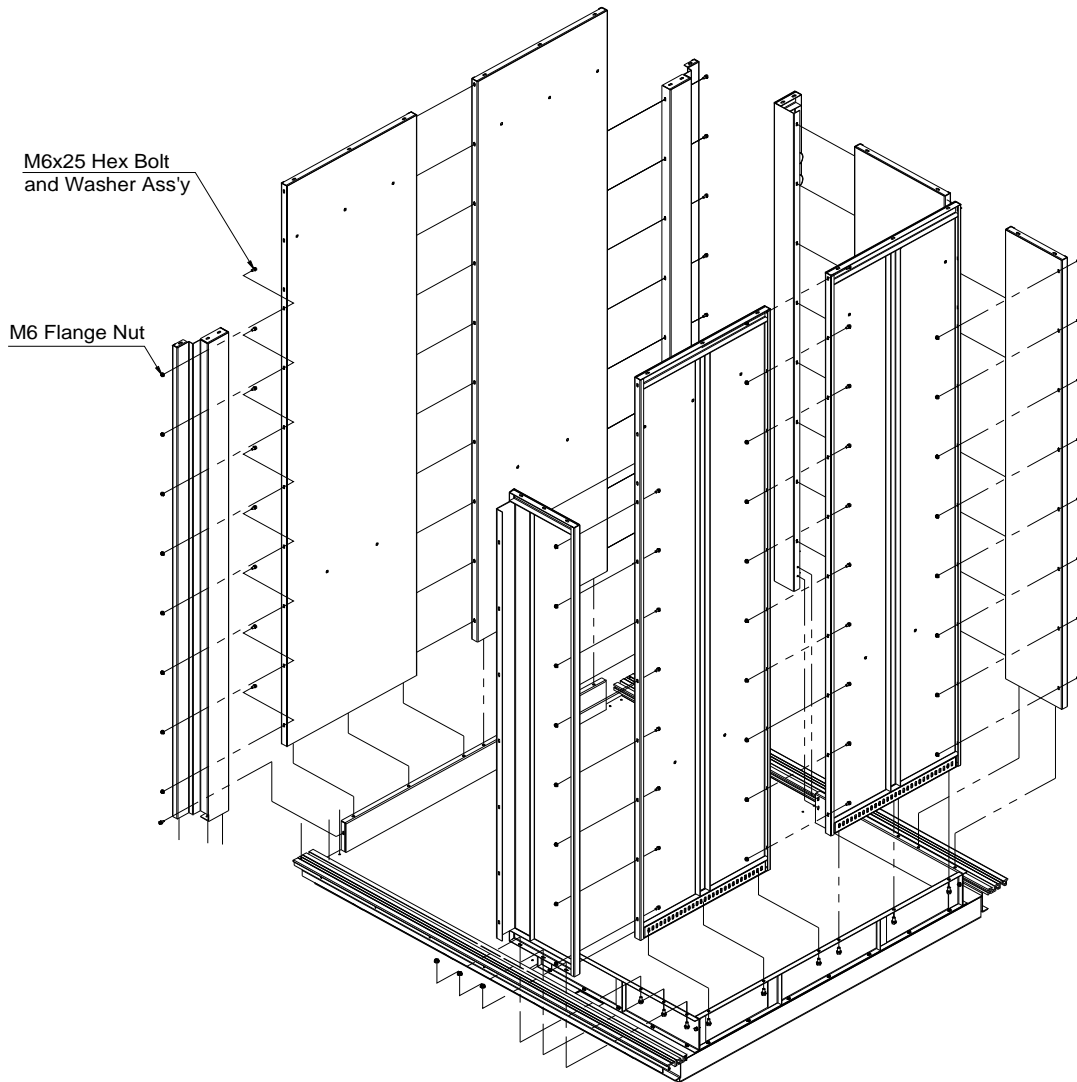
- ① Assemble Right Side Panel "No 04, No 06" with Bolt.
- ② If there's Handrail on Right Side Panel, assemble it to "No 04, No 06" Panel.
- ③ Assemble Front Panel "No 07" and Rear Panel "No 08, No 09" to assembled Side Panel with Bolt.
- ④ Place assembled Front Panel and Right Side Panel and Rear Panel on Kick Plate, and mount temporarily..



**Fig. 7-3-2-B. CAR PANEL(RIGHT and REAR SIDE) ASSEMBLY  
(FRONT and REAR ENTRANCE)**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
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|        |                     | page:         | 7-16        |

(3) Car Panel Assembling for Front and Rear Entrance  
: Assemble Car Panel as shown on Fig 7-3-2-C.



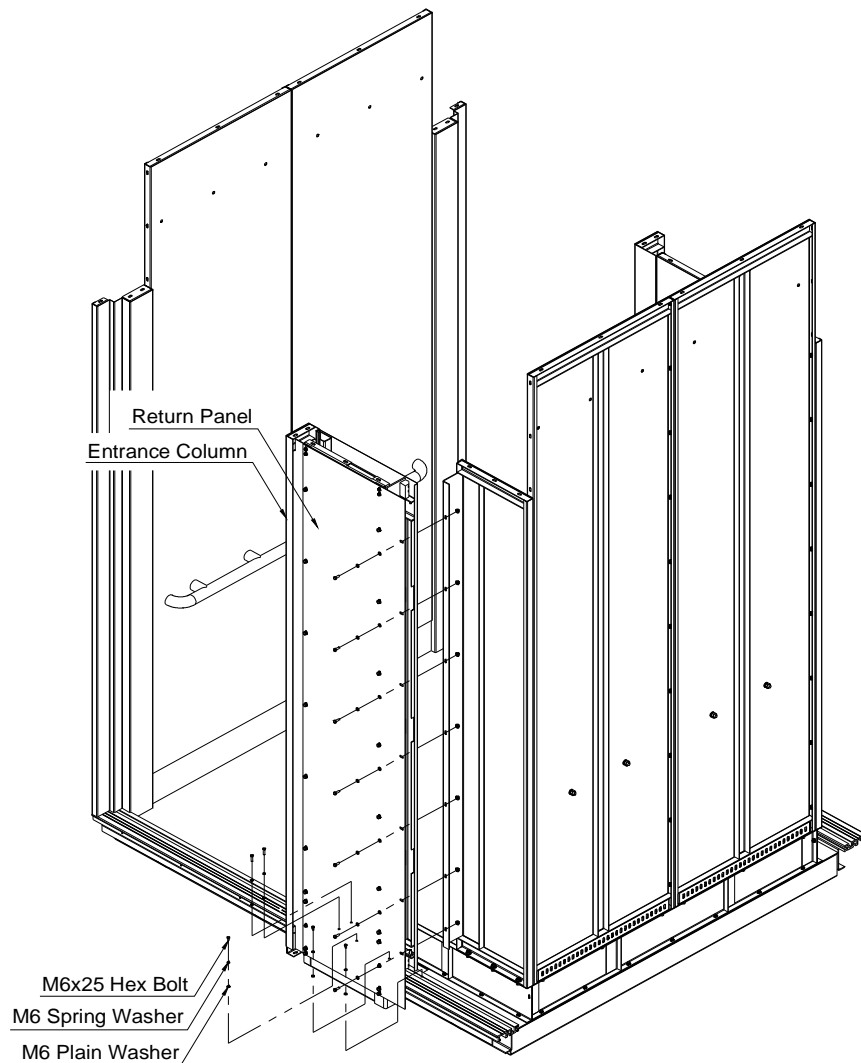
**Fig. 7-3-2-C. CAR PANEL ASSEMBLY (FRONT and REAR ENTRANCE)**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
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|        |                     | page:         | 7-17        |

(4) Return Panel and Entrance Column Assembling for Front and Rear Entrance

: Assemble as shown on Fig. 7-3-2-D.

- ① Assemble Return Panel and Entrance Column with Bolt.
- ② Place assembled Return Panel and Entrance Column on Kick Plate, and mount it temporarily.

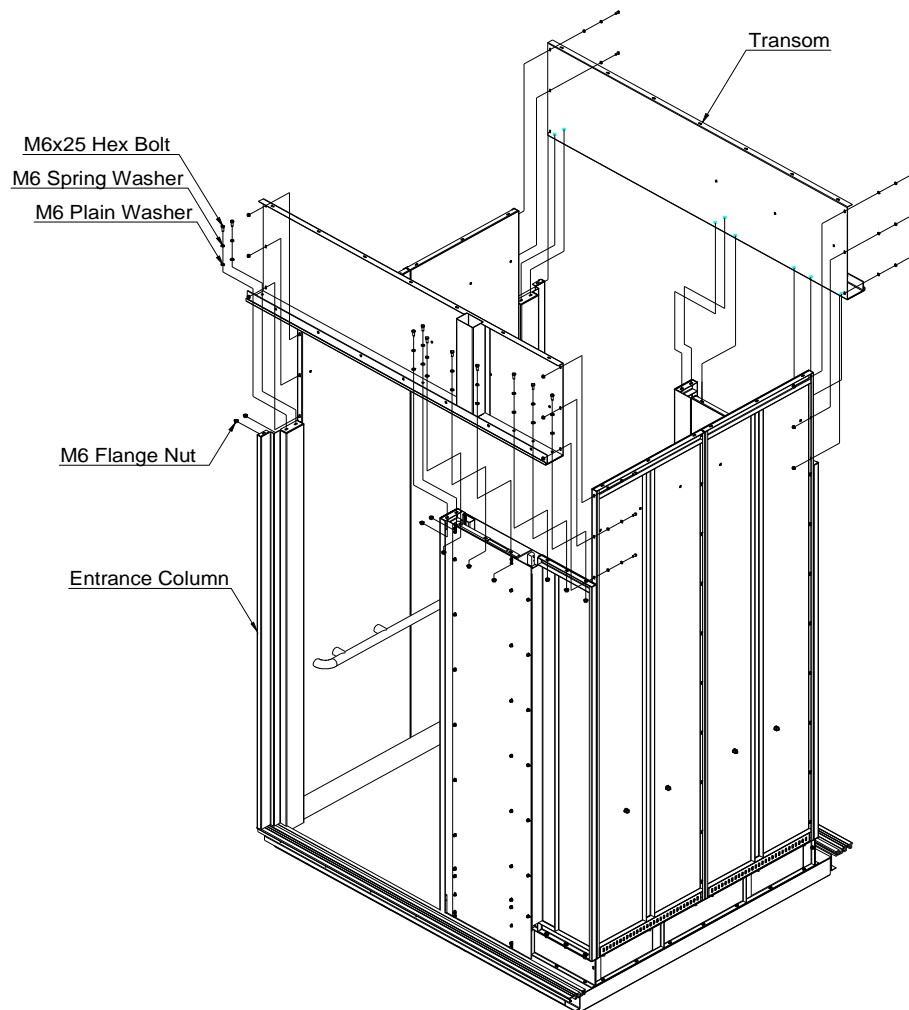


**Fig. 7-3-2-D. RETURN PANEL ASSEMBLY (FRONT and REAR ENTRANCE)**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
| HM TEC | INSTALLATION MANUAL | Document No.: | TN-M01-0001 |
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|        |                     | page:         | 7-18        |

(5) Transom Assembling Front and Rear Entrance (Fig. 7-3-2-E.)

: Place Transom on Entrance Column and assemble them with Bolt.

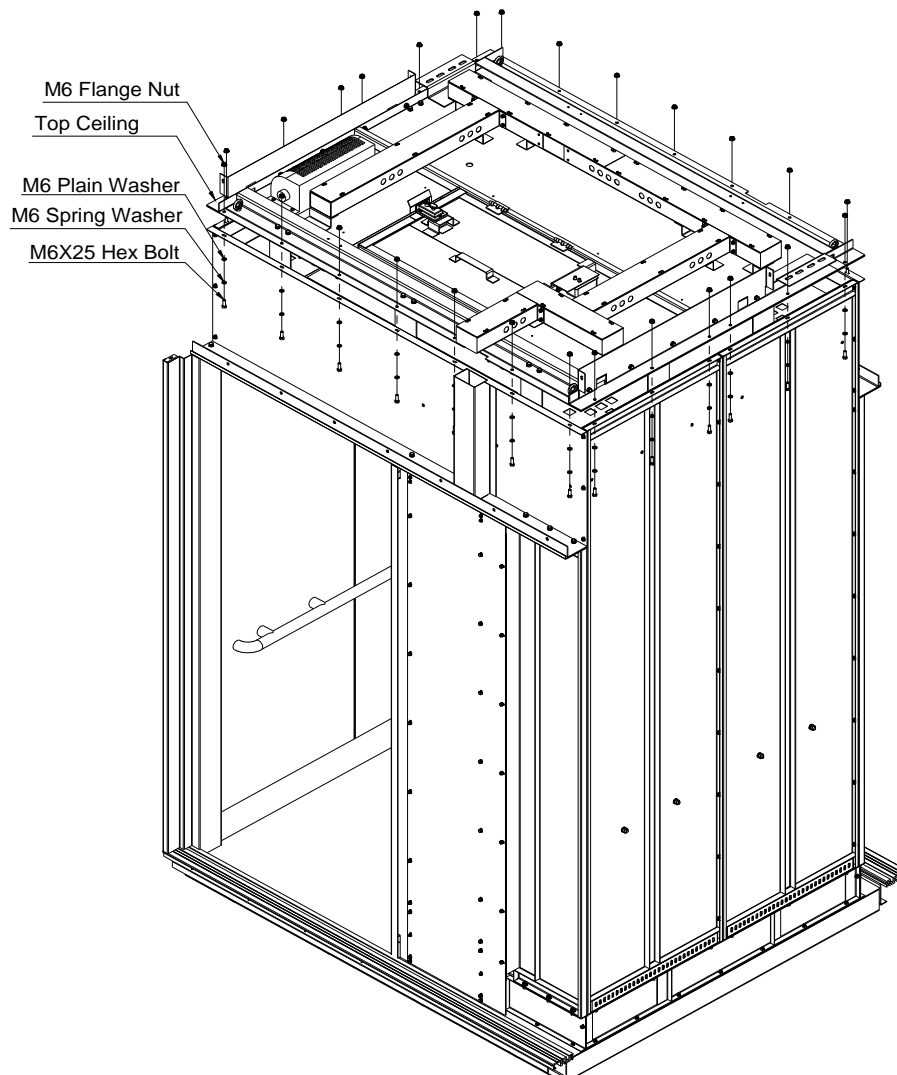


**Fig. 7-3-2-E. TRANSOM ASSEMBLY (FRONT and REAR ENTRANCE)**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
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|        | MRL - CAB ASSEMBLY  | Name:         | N.R.Kim     |
|        |                     | page:         | 7-19        |

### 7-3-3. Car Top Ceiling Assembling for Front and Rear Entrance (Fig. 7-3-3.)

- (1) Slowly down Car Top Ceiling hanging over Car Panel.  
: Adjust Car Panel and Car Top Ceiling Assembling Hole location.
- (2) Assemble Car Panel and Car Top Ceiling with prepared Bolt.
- (3) Check whether it is horizontally or vertically correct, then mount them completely as shown below.
  - ① Mount bolt of lower Car panel and Kick Plate.
  - ② Mount bolt of Car Panel and Car Top Ceiling.

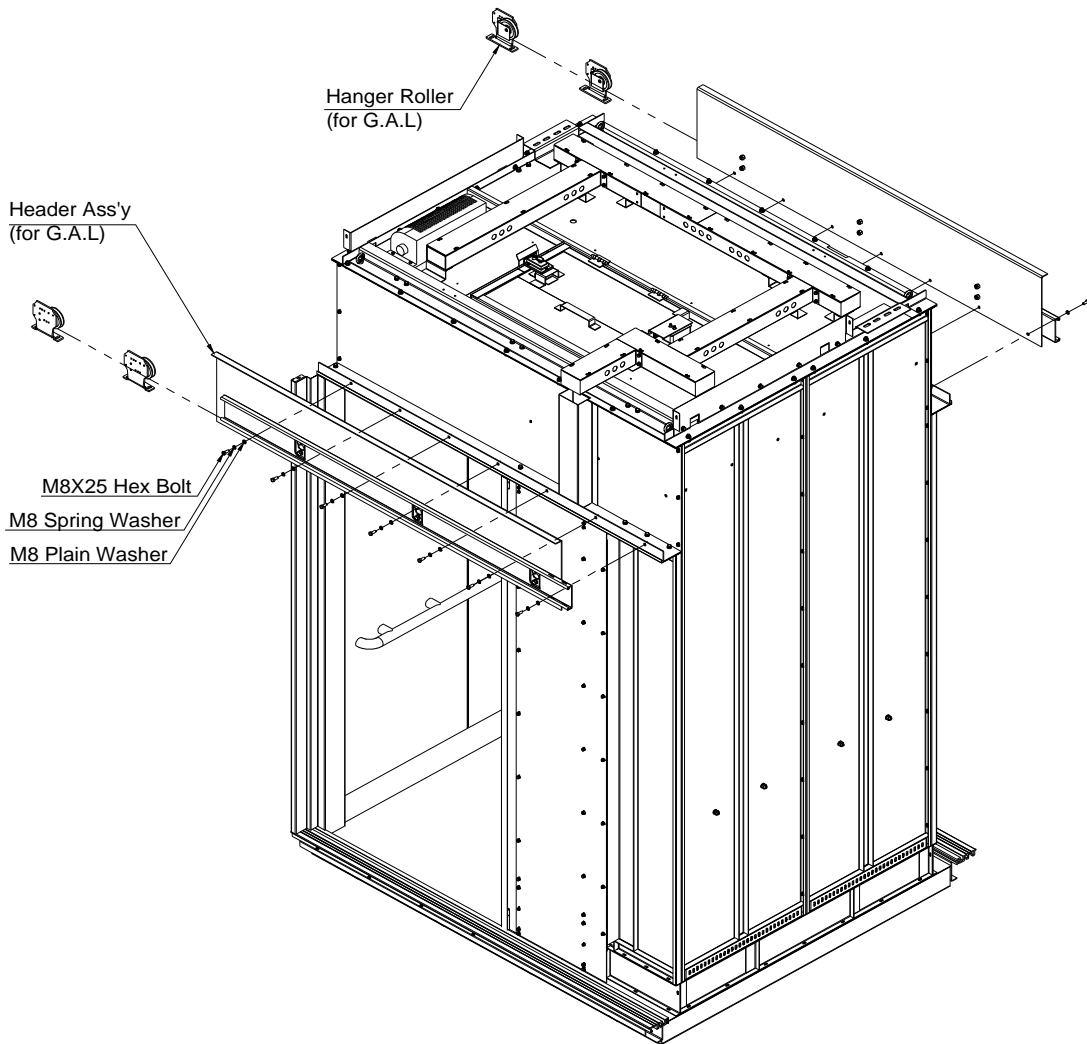


**Fig. 7-3-3. INSTALLATION CAR TOP CEILING (FRONT and REAR ENTRANCE)**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
| HM TEC | INSTALLATION MANUAL | Document No.: | TN-M01-0001 |
|        |                     | Date:         | 25-Aug-10   |
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|        |                     | page:         | 7-20        |

#### 7-3-4. Car Header for Front and Rear Entrance

(1) Assemble Car Header to Car Transom. (Fig. 7-3-4-A.)

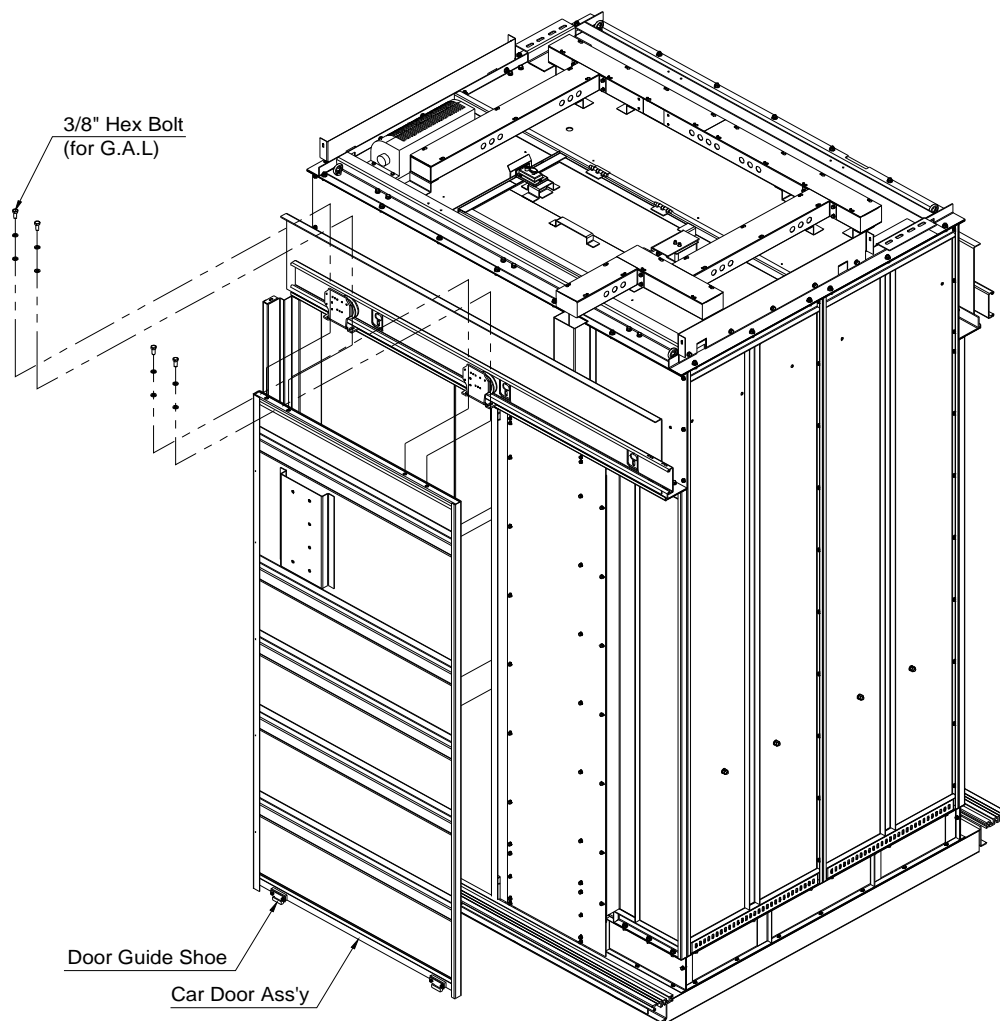


**Fig. 7-3-4-A. INSTALLATION CAR HEADER (FRONT and REAR ENTRANCE)**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
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|        |                     | page:         | 7-21        |

(2) Car Door Assembling for Front and Rear Entrance (Fig. 7-3-4-B.)

- ① Adjust Car Door and Hanger Roller, and assemble them.
- ② Refer to G.A.L Door Installation Manual for details.



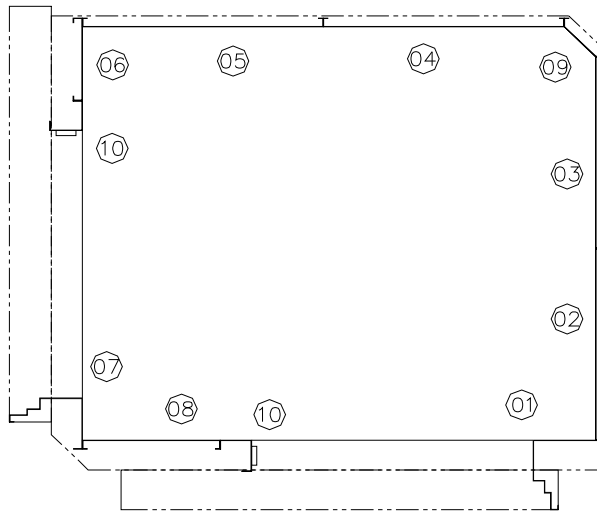
**Fig. 7-3-4-B. INSTALLATION OF CAR DOOR (FRONT and REAR ENTRANCE)**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
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|        |                     | page:         | 7-22        |

## 7-4. Car Panel, Ceiling and Entrance Column (Corner Post)

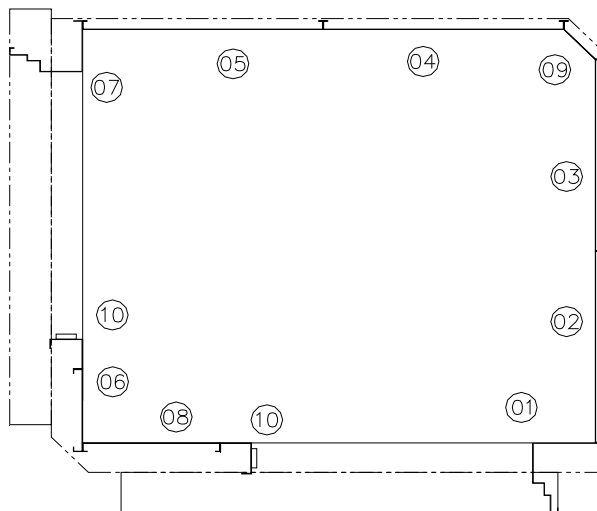
### 7-4-1. Arrange Car Panel for Corner Post

(1) Type "A" (Fig. 7-4-1-A.)



**Fig. 7-4-1-A. CAR PANEL AND ENTRANCE COLUMN ASSEMBLY  
(CORNER POST type "A")**

(2) Type "B" (Fig. 7-4-1-B.)



**Fig. 7-4-1-B. CAR PANEL AND ENTRANCE COLUMN ASSEMBLY  
(CORNER POST type "B")**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
| HM TEC | INSTALLATION MANUAL | Document No.: | TN-M01-0001 |
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|        | MRL - CAB ASSEMBLY  | Name:         | N.R.Kim     |
|        |                     | page:         | 7-23        |

#### 7-4-2. Car Panel Assembling for Corner Post

##### (1) Car Right Side Panel Assembling

: Assemble Car Right Side Panel as shown on Fig 7-4-2-A.

- ① Assemble Right Side "No 02, No 03" with Bolt..
- ② Assemble Column Panel "No 01" and Right Side "No 02, No 03" with Bolt..
- ③ If there's Handrail on Right Side Panel, assemble it to "No 02, No 03" Panel
- ④ Place assembled Entrance Column and Panel on Kick Plate and mount temporarily.

[Attention] At this time, temporarily assembled Right Side Panel should be mounted on Upright with manila rope to prevent fall down.

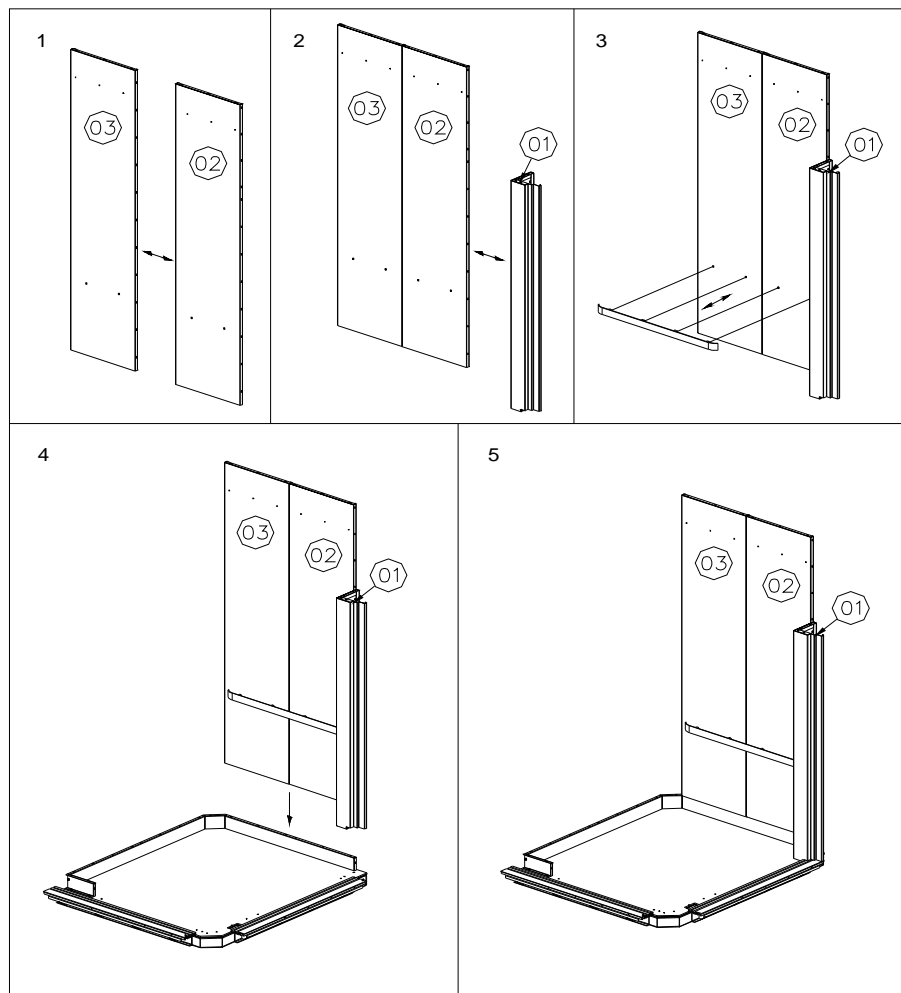


Fig. 7-4-2-A. CAR PANEL(RIGHT SIDE) ASSEMBLY (CORNER POST)

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
| HM TEC | INSTALLATION MANUAL | Document No.: | TN-M01-0001 |
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|        |                     | page:         | 7-24        |

(2) Car Left Side Panel Assembling

: Assemble Car Left Side Panel as shown on Fig 7-4-2-B.

- ① Assemble Left Side Panel "No 04, No 05," with Bolt.
- ② Assemble Front Panel "No 06" to assembled Side Panel with Bolt.
- ③ If there's Handrail on Left Side Panel, assemble it to "No 04, No 05," Panel.
- ④ Place assembled Front Panel and Left Side Panel on Kick Plate, and mount temporarily..

[Attention] At this time, temporarily assembled Left Side Panel should be mounted on Upright with manila rope to prevent fall down.

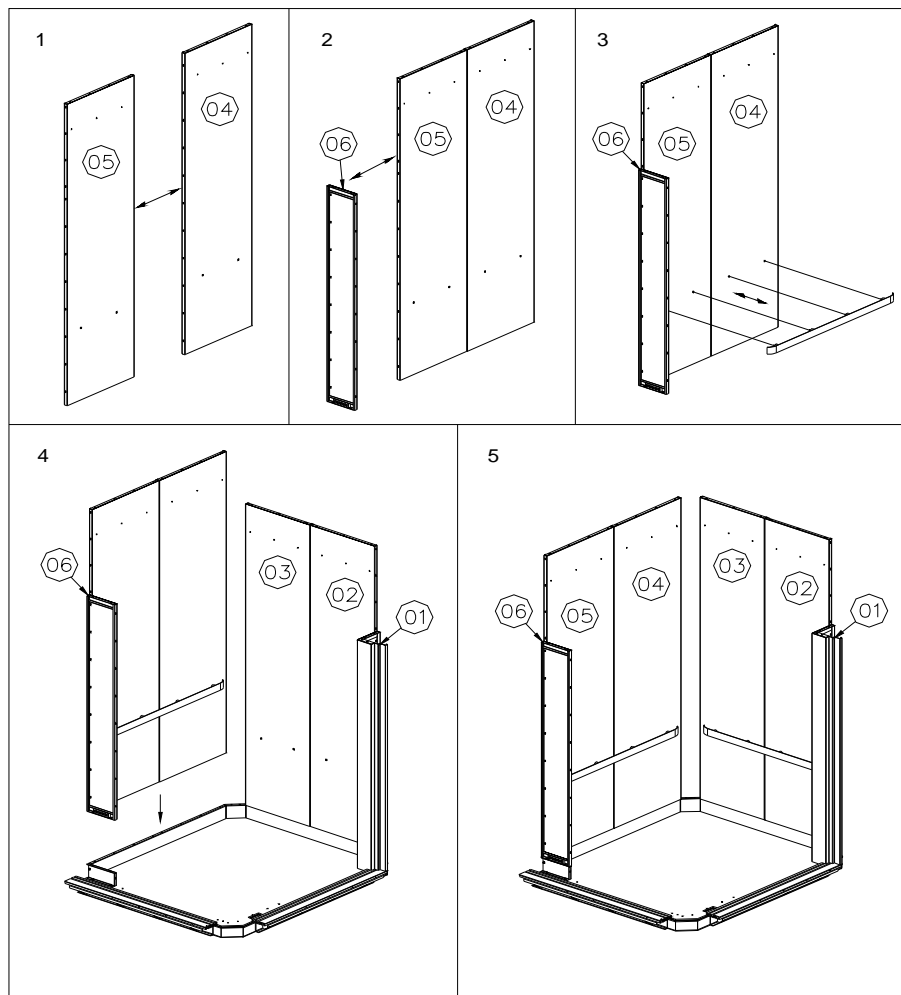


Fig. 7-4-2-B. CAR PANEL(LEFT SIDE) ASSEMBLY (CORNER POST)

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
| HM TEC | INSTALLATION MANUAL | Document No.: | TN-M01-0001 |
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|        |                     | page:         | 7-25        |

### (3) Car Rear Panel Assembling

: Assemble Car Rear Panel as shown on Fig 7-4-2-C.

- ① Assemble Column Panel "No 07" and C.O.P Panel "No 08," with Bolt.
- ② Assemble Entrance Column "No 10" with Bolt.
- ③ Assemble Entrance Column "No 06" and Conner Panel "No 09" with Bolt.
- ④ Place assembled All Panel on Kick Plate, and mount temporarily.

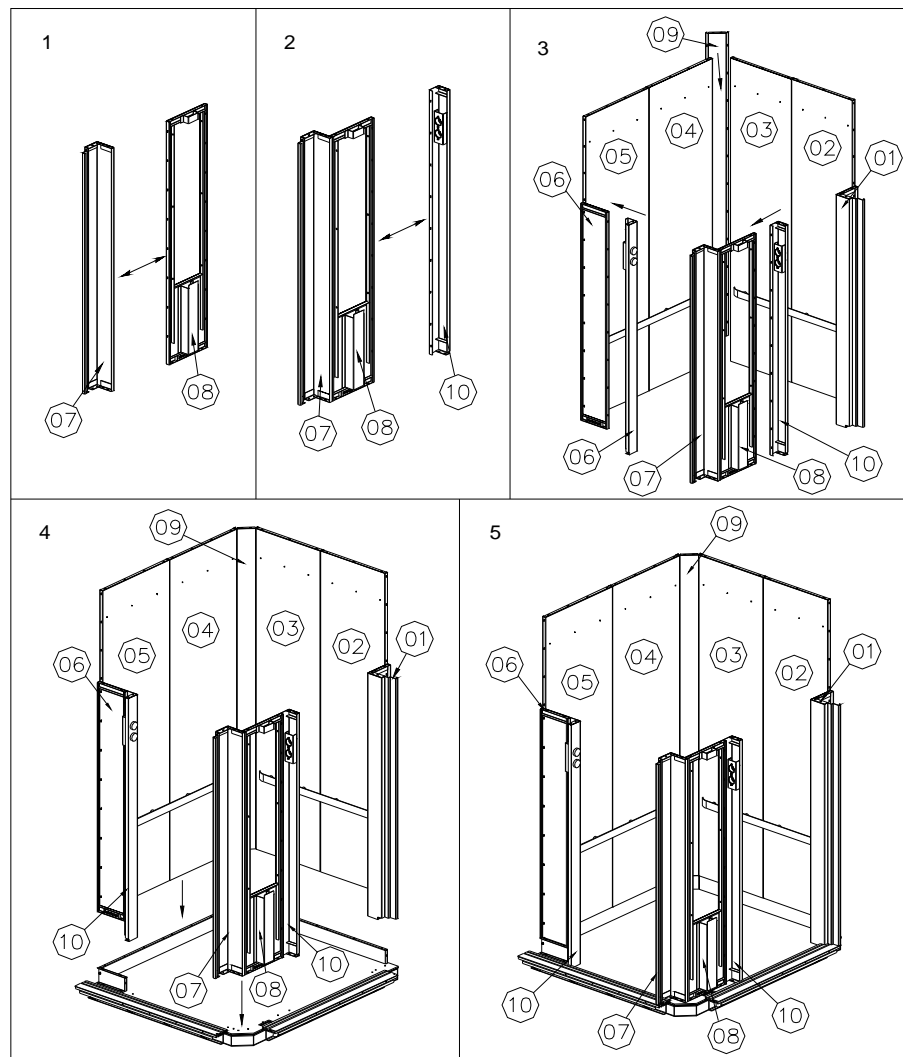
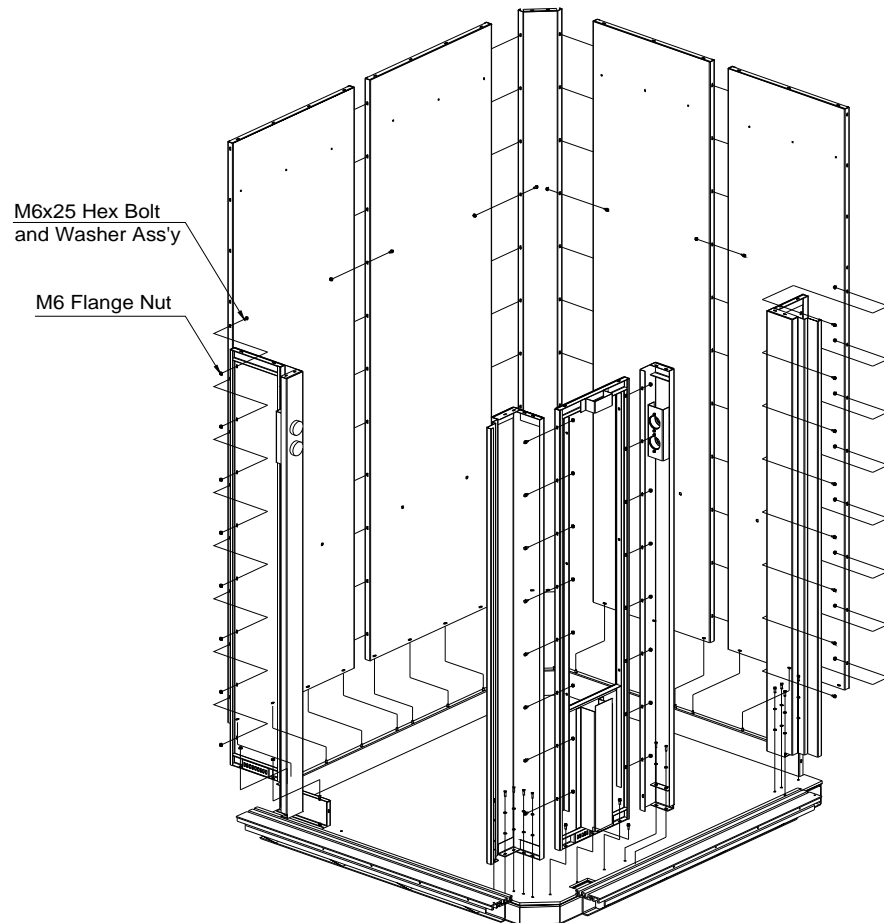


Fig. 7-4-2-C. CAR PANEL(REAR) ASSEMBLY (CORNER POST)

|        |                     |               |             |
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|        |                     | Date:         | 25-Aug-10   |
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|        |                     | page:         | 7-26        |

(4) Car Panel Assembling (Corner post)

: Assemble Car Panel as shown on Fig 7-4-2-D.



**Fig. 7-4-2-D. CAR PANEL ASSEMBLY (CORNER POST)**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
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|        |                     | Date:         | 25-Aug-10   |
|        | MRL - CAB ASSEMBLY  | Name:         | N.R.Kim     |
|        |                     | page:         | 7-27        |

(5) C.O.P BOX and C.O.P. Panel Assembling (Corner post)

: Assemble as shown on Fig. 7-4-2-E.

① Assemble C.O.P BOX and C.O.P Panel with Bolt.

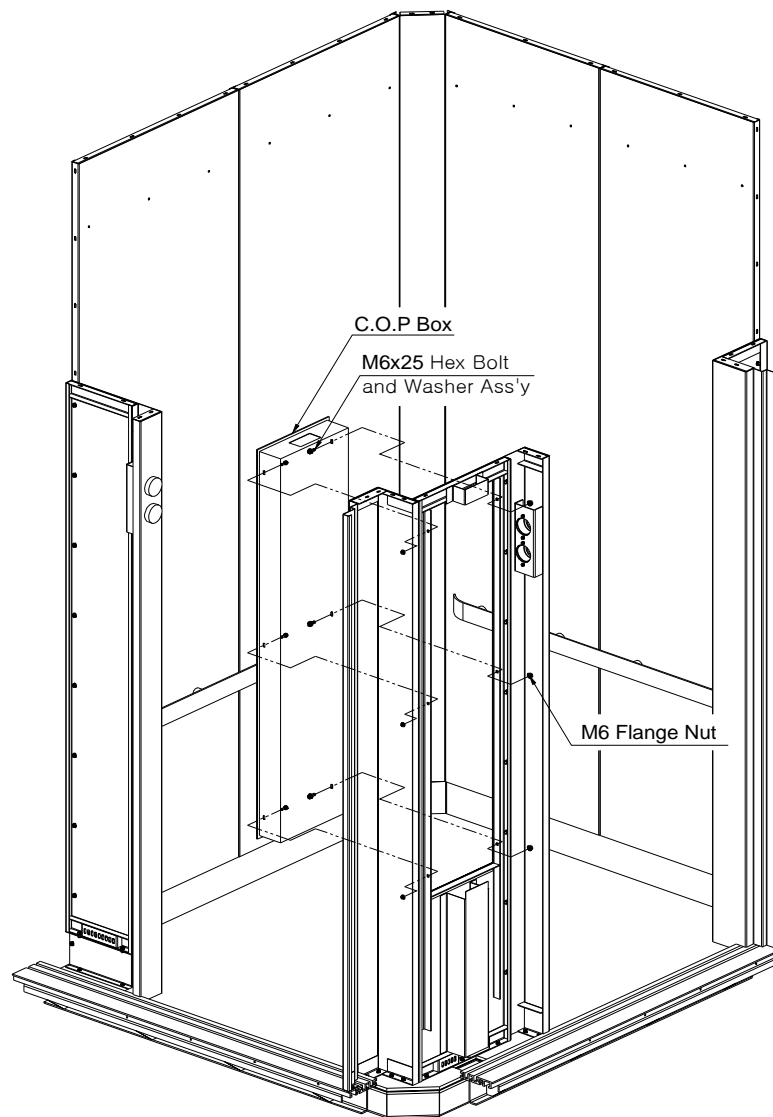
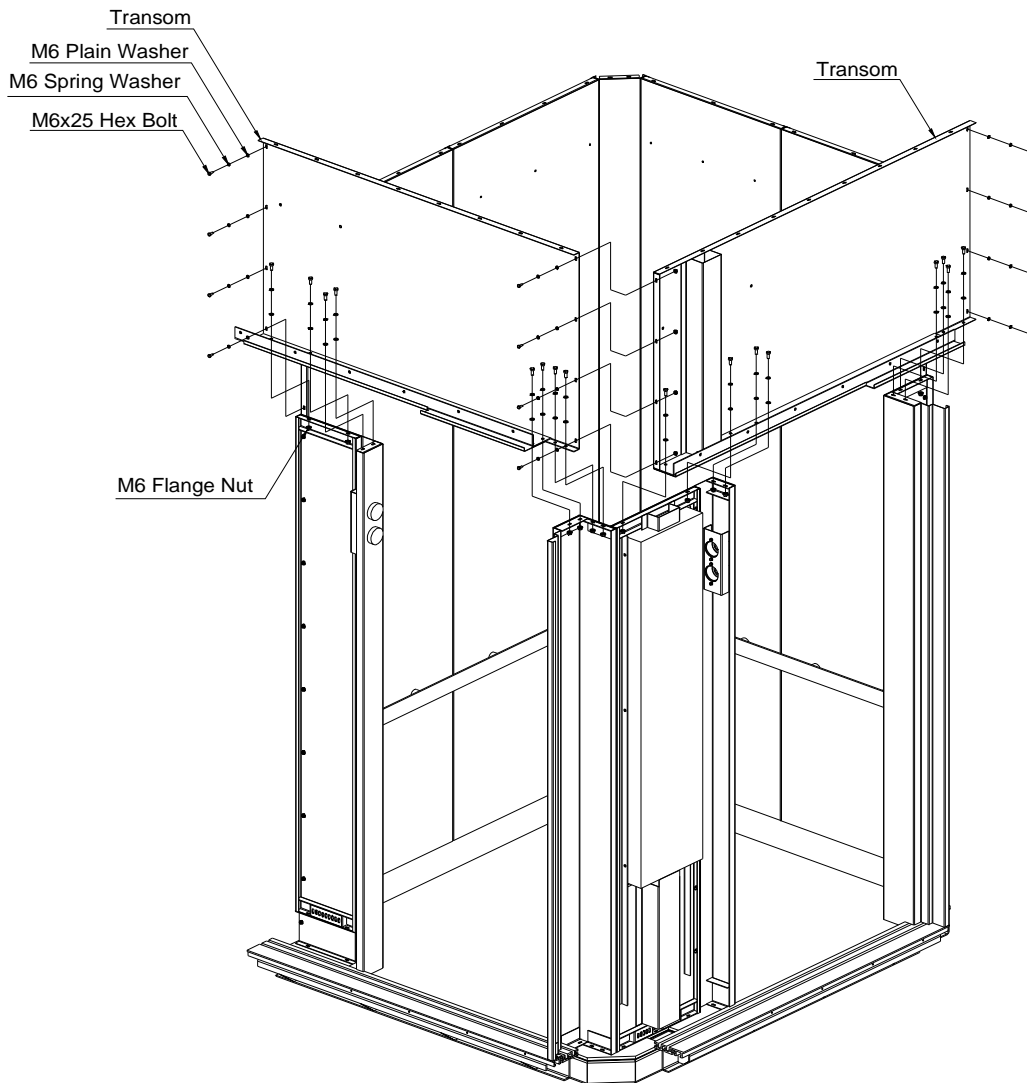


Fig. 7-4-2-E. C.O.P BOX ASSEMBLY (CORNER POST)

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
| HM TEC | INSTALLATION MANUAL | Document No.: | TN-M01-0001 |
|        |                     | Date:         | 25-Aug-10   |
|        | MRL - CAB ASSEMBLY  | Name:         | N.R.Kim     |
|        |                     | page:         | 7-28        |

(6) Transom Assembling for Corner post type (Fig. 7-4-2-F.)

: Place Transom on Entrance Column and assemble them with Bolt.

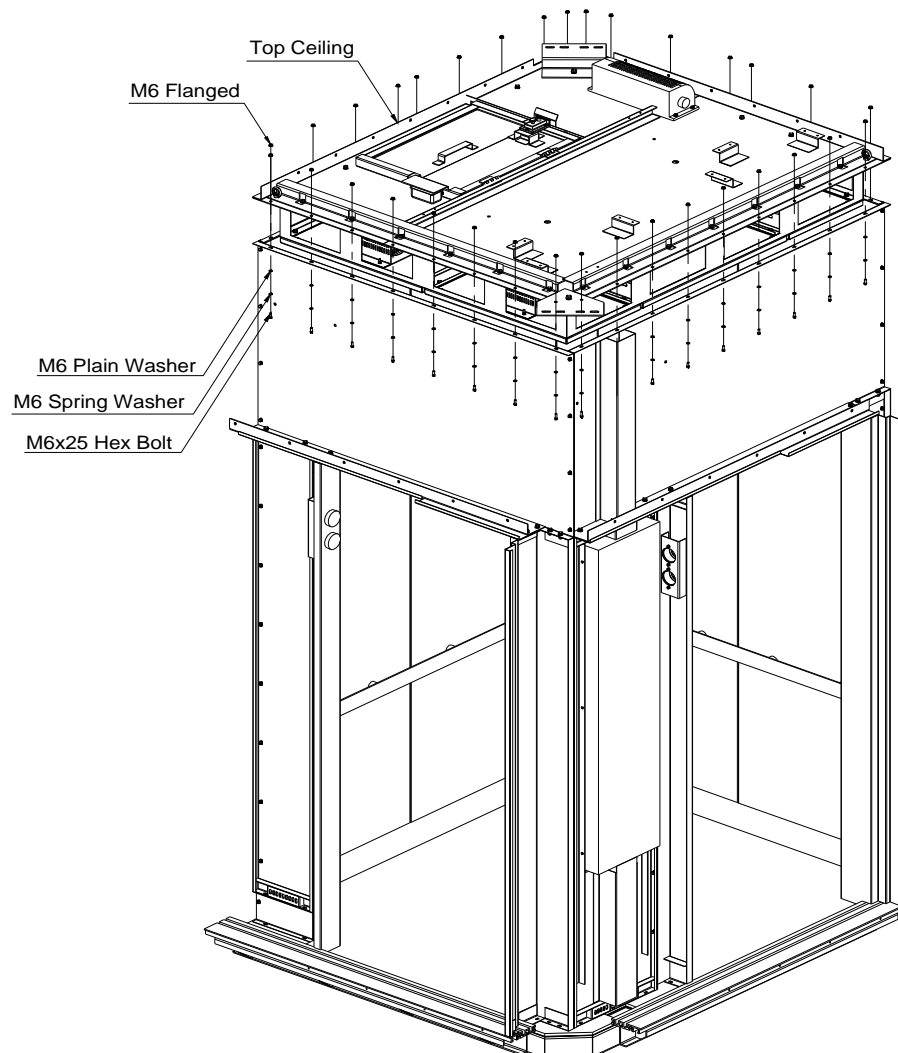


**Fig. 7-4-2-F. TRANSOM ASSEMBLY (CORNER POST)**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
| HM TEC | INSTALLATION MANUAL | Document No.: | TN-M01-0001 |
|        |                     | Date:         | 25-Aug-10   |
|        | MRL - CAB ASSEMBLY  | Name:         | N.R.Kim     |
|        |                     | page:         | 7-29        |

#### 7-4-3. Car Top Ceiling Assembling for Corner Post (Fig. 7-4-3.)

- (1) Slowly down Car Top Ceiling hanging over Car Panel.  
: Adjust Car Panel and Car Top Ceiling Assembling Hole location.
- (2) Assemble Car Panel and Car Top Ceiling with prepared Bolt.
- (3) Check whether it is horizontally or vertically correct, then mount them completely as shown below.
  - ① Mount bolt of lower Car panel and Kick Plate.
  - ② Mount bolt of Car Panel and Car Top Ceiling.

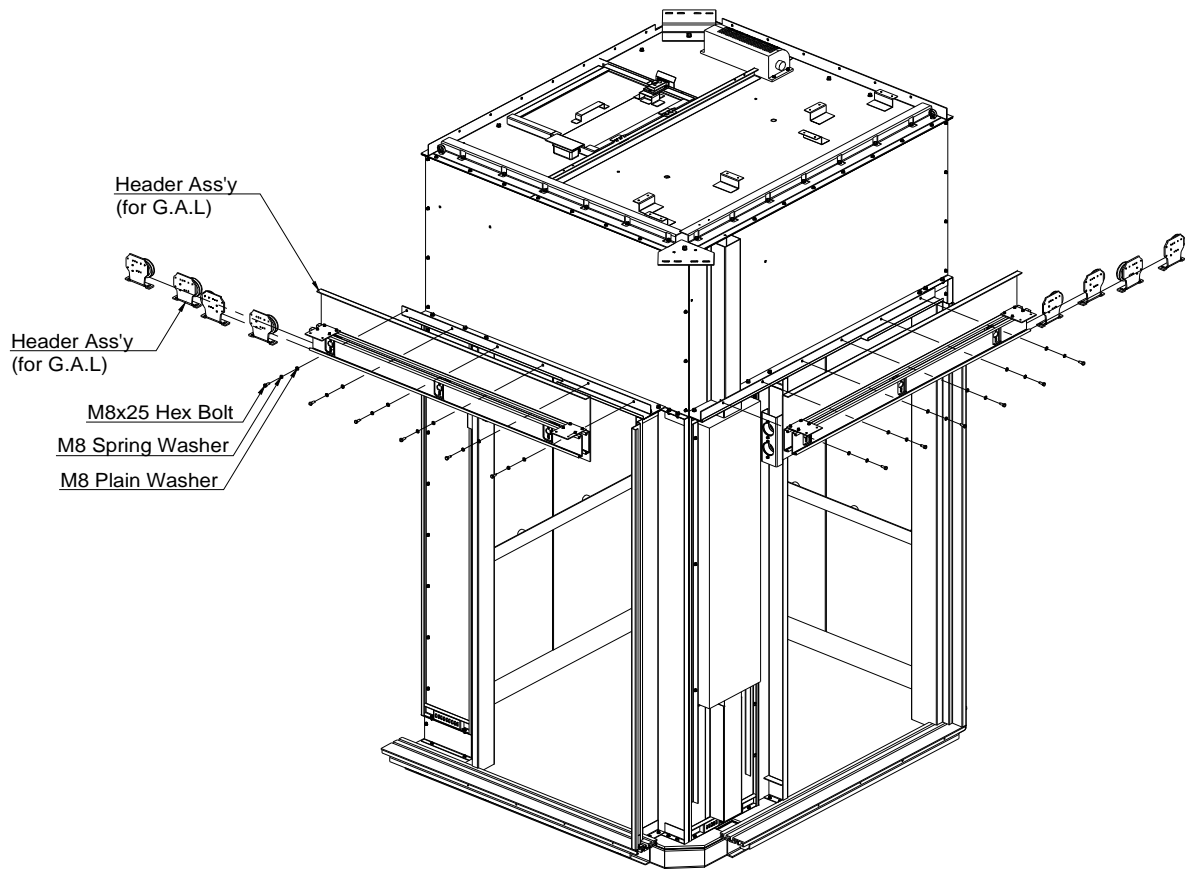


**Fig. 7-4-3. INSTALLATION CAR TOP CEILING (CORNER POST)**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
| HM TEC | INSTALLATION MANUAL | Document No.: | TN-M01-0001 |
|        |                     | Date:         | 25-Aug-10   |
|        | MRL - CAB ASSEMBLY  | Name:         | N.R.Kim     |
|        |                     | page:         | 7-30        |

#### 7-4-4. Car Header for Corner Post (Fig. 7-4-4.)

(1) Assemble Car Header to Car Transom.

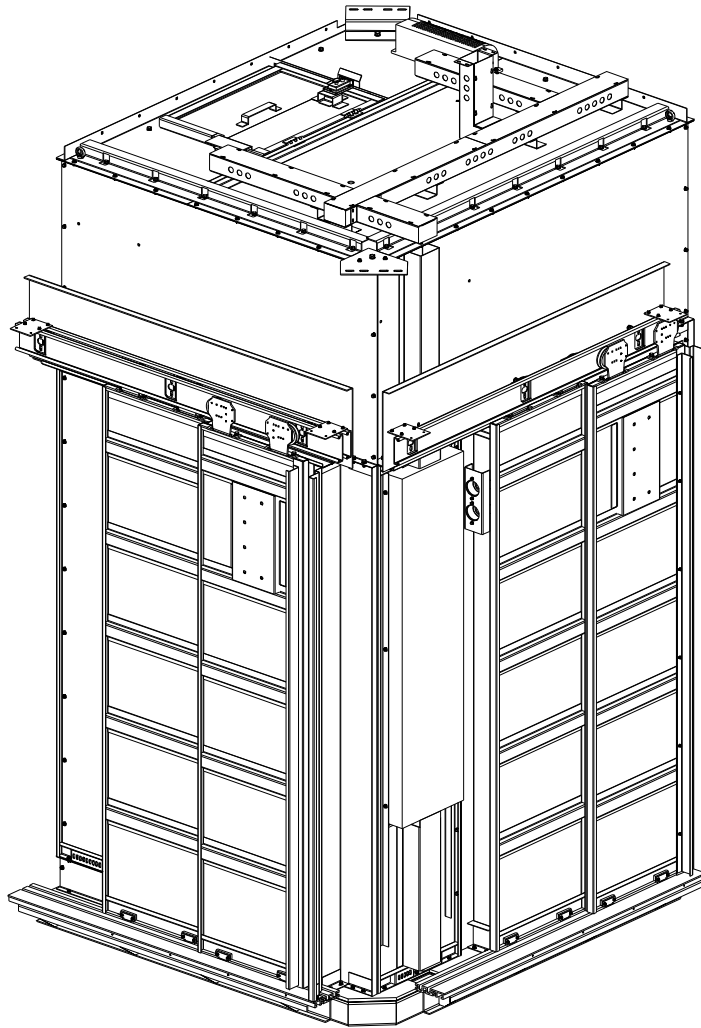


**Fig. 7-4-4. INSTALLATION CAR HEADER (CORNER POST)**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
| HM TEC | INSTALLATION MANUAL | Document No.: | TN-M01-0001 |
|        |                     | Date:         | 25-Aug-10   |
|        | MRL - CAB ASSEMBLY  | Name:         | N.R.Kim     |
|        |                     | page:         | 7-31        |

7-4-5. Car Door Assembling for Corner Post (Fig. 7-4-5.)

- (1) Adjust Car Door and Hanger Roller, and assemble them.
- (2) Refer to G.A.L Door Installation Manual for details.



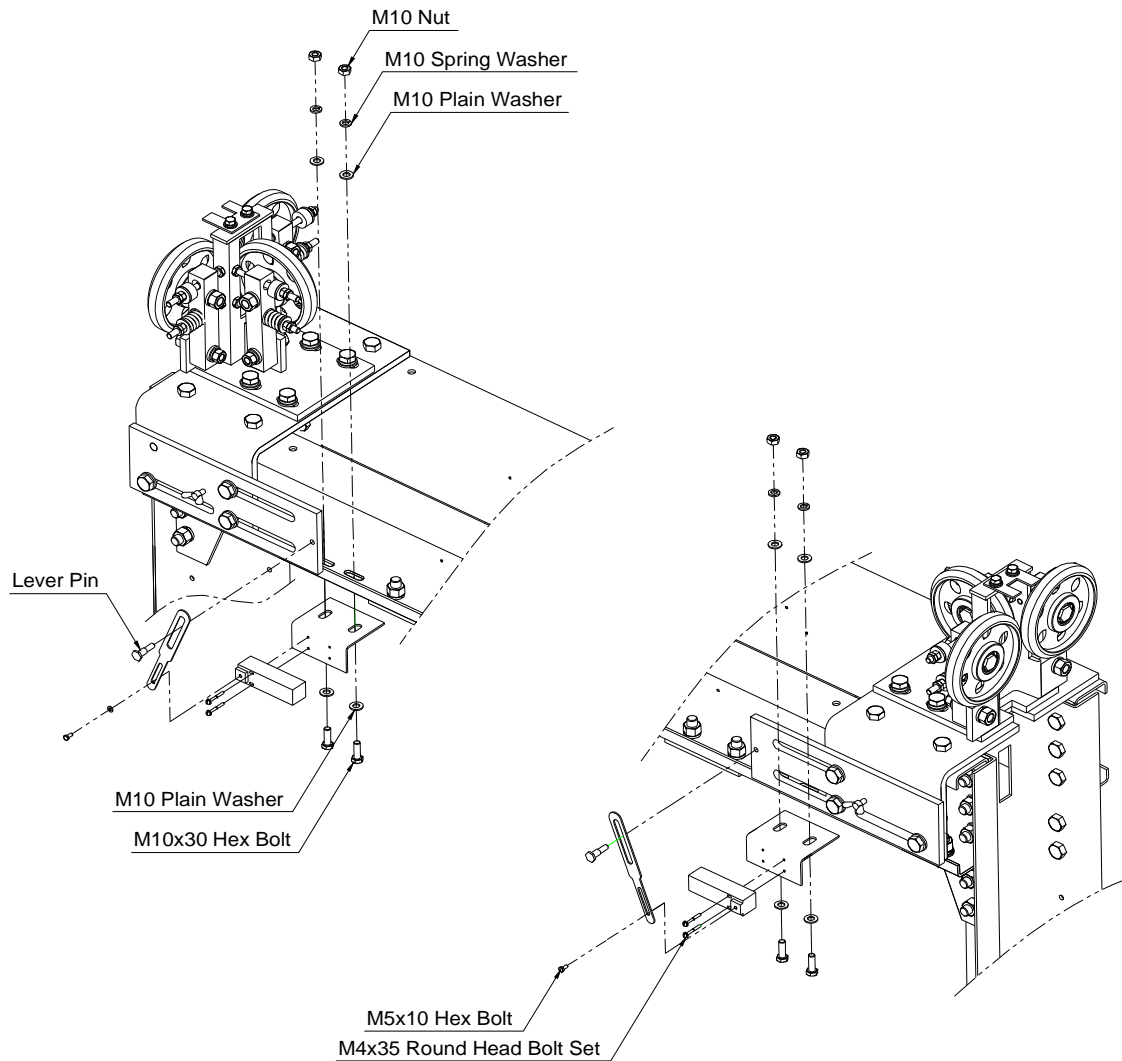
**Fig. 7-4-5. INSTALLATION OF CAR DOOR (CORNER POST)**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
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|        |                     | Date:         | 2-Mar-09    |
|        | MRL - CAB ASSEMBLY  | Name:         | N.R.Kim     |
|        |                     | page:         | 7-32        |

## 7-5. Car Accessory

### 7-5-1. Car Locking Device Assembling (Fig. 7-5-1.)

: Assemble Car Locking Device to right and left side of Cross Head.



**Fig. 7-5-1. INSTALLATION OF CAR LOCKING DEVICE**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
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|        |                     | Date:         | 2-Mar-09    |
|        | MRL - CAB ASSEMBLY  | Name:         | N.R.Kim     |
|        |                     | page:         | 7-33        |

#### 7-5-2. Fan Assembling (Fig. 7-5-2.)

: Assemble Fan to Top Ceiling.

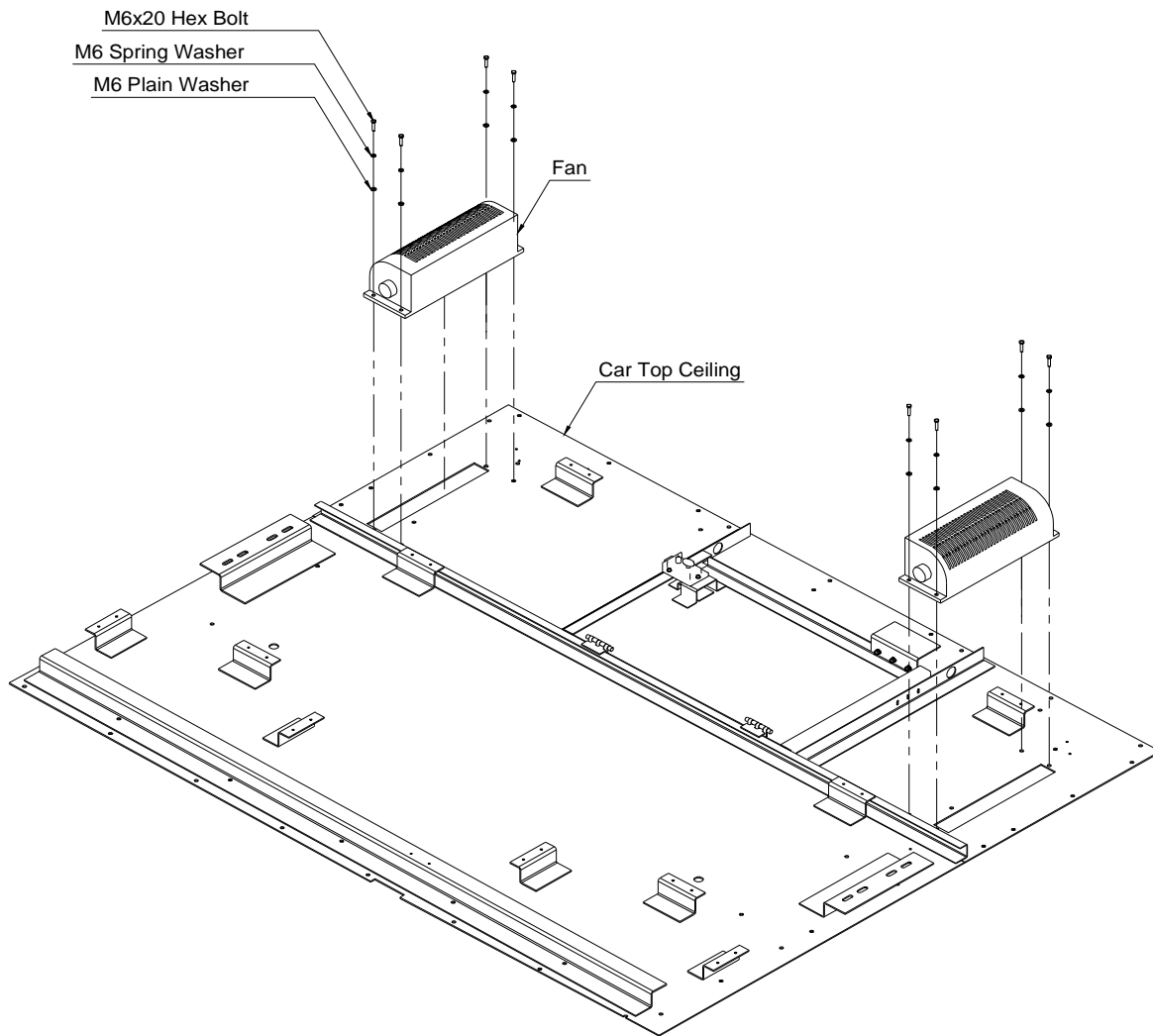
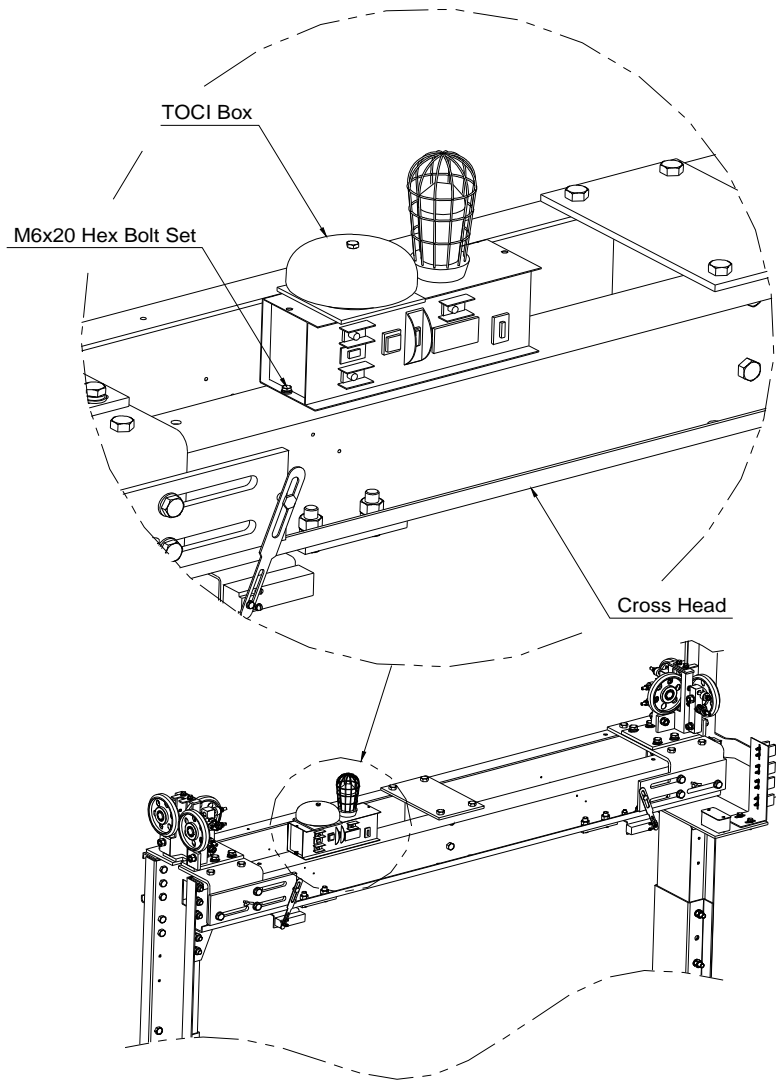


Fig. 7-5-2. INSTALLATION OF FAN

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
| HM TEC | INSTALLATION MANUAL | Document No.: | TN-M01-0001 |
|        |                     | Date:         | 2-Mar-09    |
|        | MRL - CAB ASSEMBLY  | Name:         | N.R.Kim     |
|        |                     | page:         | 7-34        |

7-5-3. TOCI Box Assembling (Fig. 7-5-3.)

: Assemble TOCI Box to Cross Head.

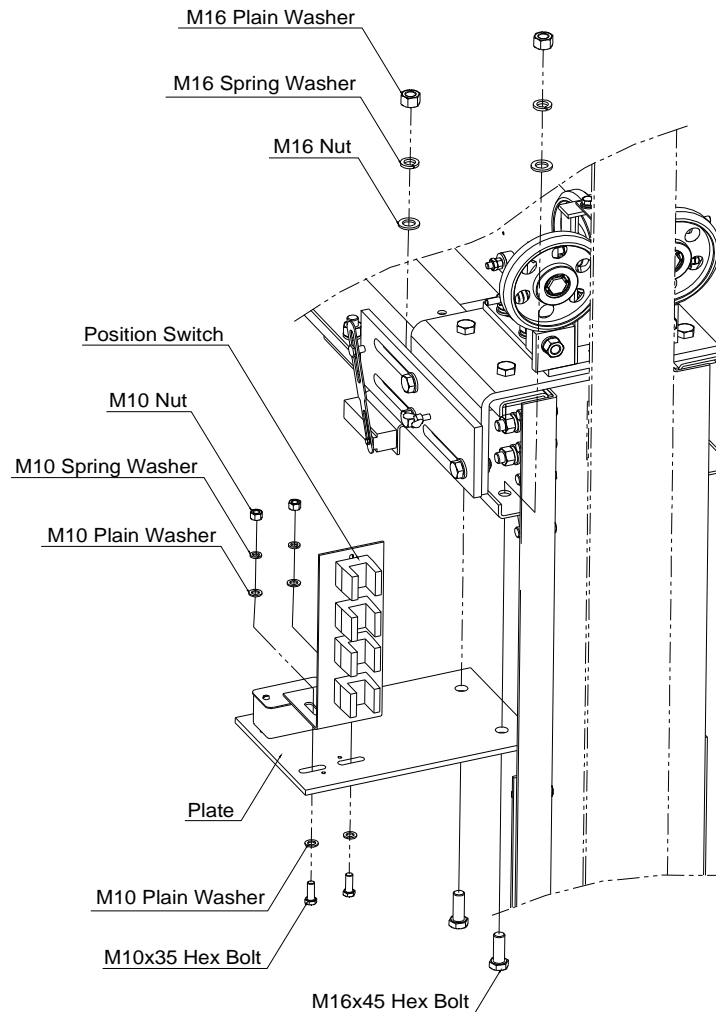


**Fig. 7-5-3. INSTALLATION OF TOCI BOX**

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
| HM TEC | INSTALLATION MANUAL | Document No.: | TN-M01-0001 |
|        |                     | Date:         | 2-Mar-09    |
|        | MRL - CAB ASSEMBLY  | Name:         | N.R.Kim     |
|        |                     | page:         | 7-35        |

#### 7-5-4. Leveling Device Assembling (Fig. 7-5-4.)

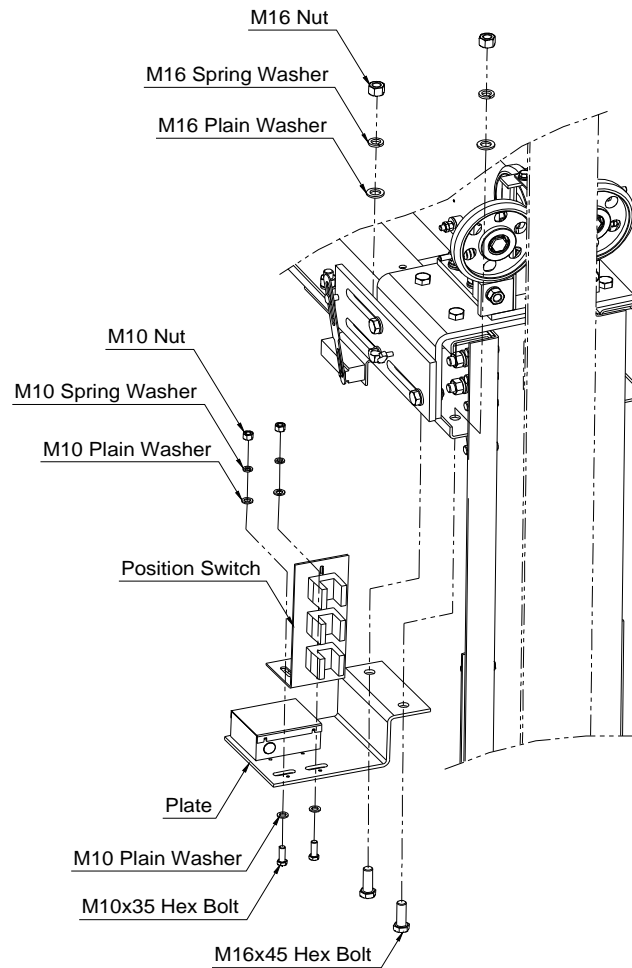
- (1) Check the location where you will install. (refer to Layout)
- (2) Bracket attached with Leveling Device should be attached to the side of Cross Head.
- (3) Sensor should be installed as vertical, and Installation tolerance should be within  $\pm 0.078$ " [2mm] in Car Guide Rail.



**Fig. 7-5-4-A. INSTALLATION OF LEVELING DEVICE (TYPE "A")**

| Rev. no. | Description | Approved by | Date      |  |
|----------|-------------|-------------|-----------|--|
| ①        | ADDED       | DU Seo      | 23-Dec-09 |  |
|          |             |             |           |  |
|          |             |             |           |  |

|        |                     |               |             |
|--------|---------------------|---------------|-------------|
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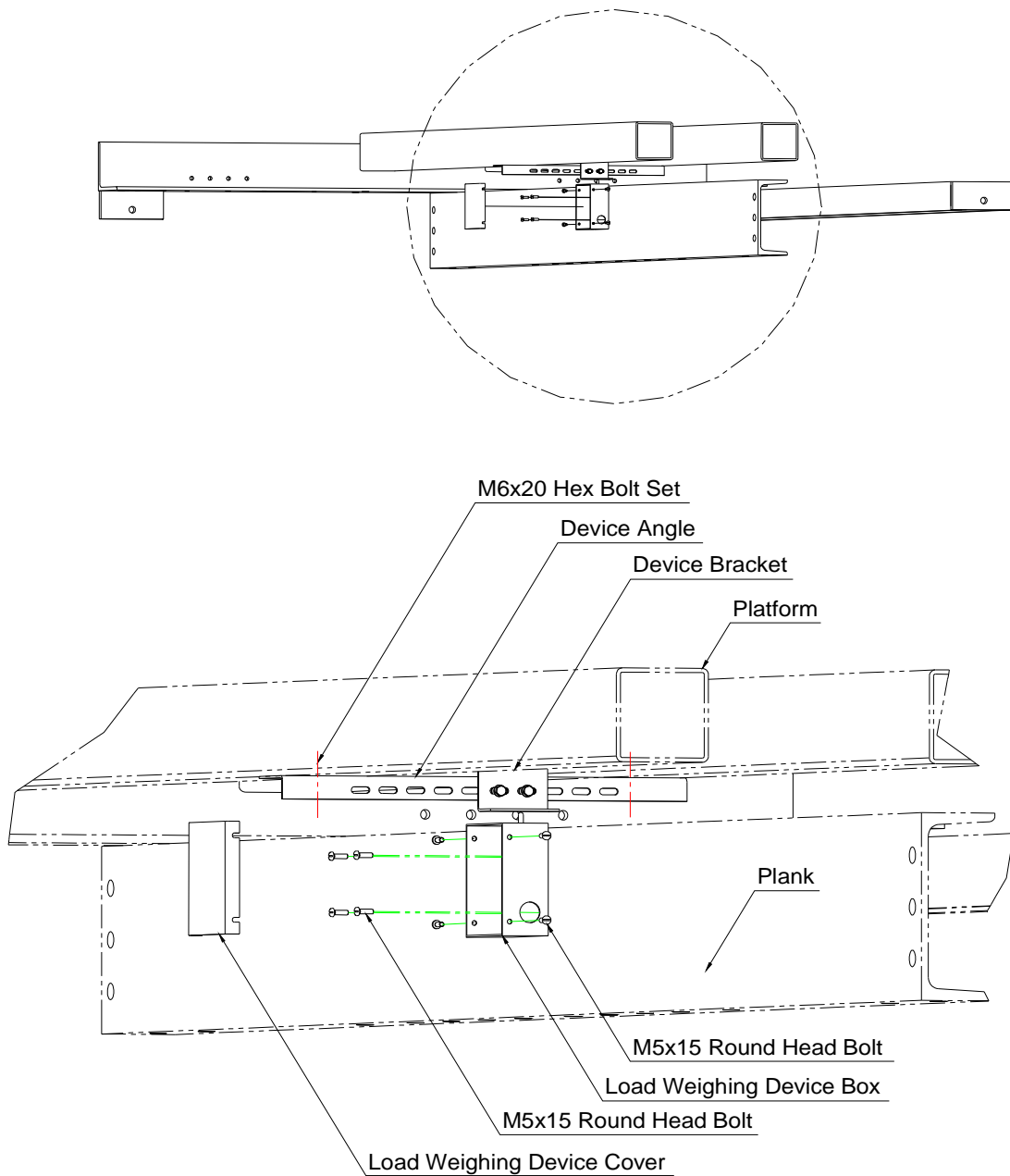


**Fig. 7-5-4-B. INSTALLATION OF LEVELING DEVICE (TYPE "B")**

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#### 7-5-5. Load Weighing Device Assembling (Fig. 7-3-5.)

- (1) Install Bracket on lower Platform.
- (2) Install Load Weighing Device Body on Plank.

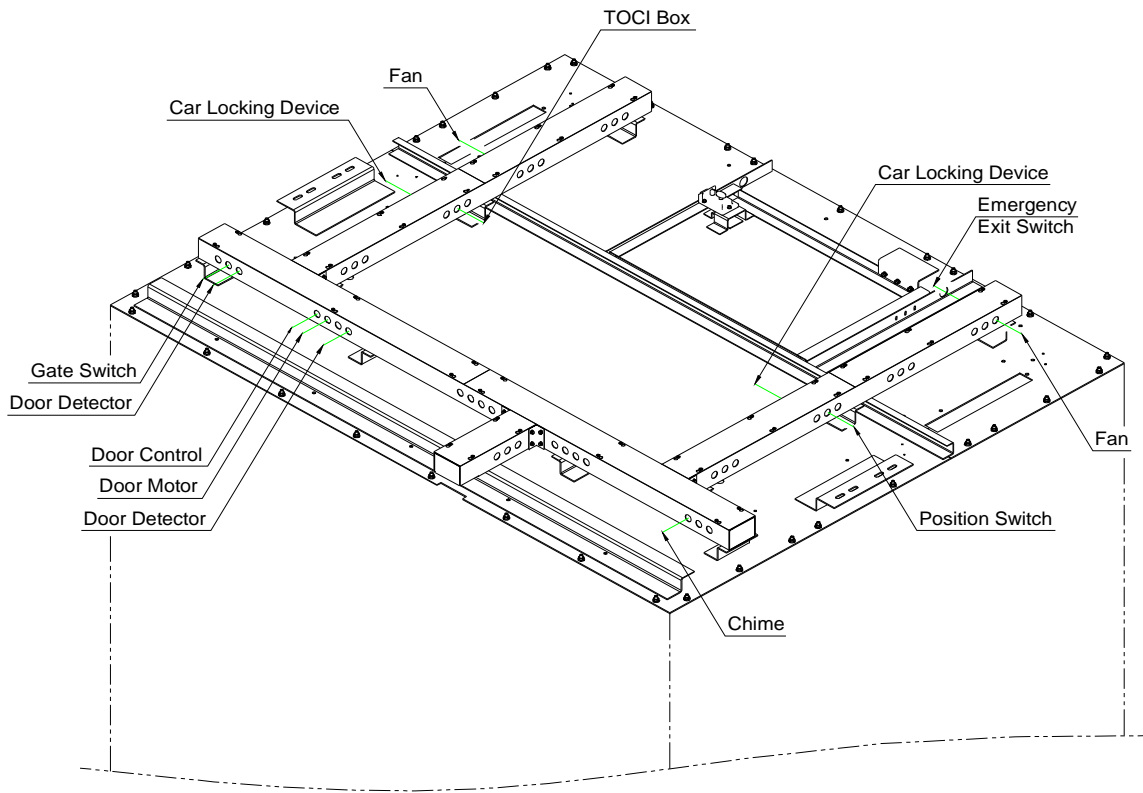


**Fig. 7-5-5. INSTALLATION OF LOAD WEIGHING**

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#### 7-5-6. Car Top Ceiling Duct Assembling (Fig. 7-5-6.)

- (1) Install Duct fixed/unremovable Bracket on Car Top Ceiling.
- (2) Adjust and place Duct on Bracket.
- (3) Mount with prepared bolt.
- (4) Assemble Duct Cover after Car 전장품 Wiring.



**Fig. 7-5-6. INSTALLATION OF CAR TOP CEILING DUCT**

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7-6. Car Electrical Wiring

7-6-1. Attention

(1) Check Emergency Stop Switch in TOCI Box is OFF(STOP).

(2) Check all wirings are correspondence with electrical/wire drawings.

|               |                                    |               |             |
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## 8. OPERATION PREPARATORY

### 8-1. Adjust Car Balance

#### 8-1-1. Preparatory

- (1) Arrange Balance Weight or its components in Pit.
- (2) Prepare performance scaffold that fit into Pit interior.
- (3) Turn Emergency Stop Switch ON.
- (4) Remove Guide Roller Stopper and Compression Spring.
- (5) Close Car Door.
- (6) Limit Switch and Car Cam should not be interrupted.

#### 8-1-2. Car Balance Weight Installation (Fig. 8-1-2.)

- (1) Insert Balance Weight.
- (2) Assemble with Bracket when Car Balance is Set.

#### 8-1-3. Guide Roller Adjustment

- (1) Readjust Guide Roller Stopper and Compression Spring.
- (2) Measure compressed distance by using Gauge.
- (3) Adjust and fasten Guide Roller's Stopper and double nut.

#### 8-1-4. Balance Weight Finish

- (1) Completely mount Weight fixed/unremovable Bracket.
- (2) Return 8-1-1. preparatory to the normal condition for operation.

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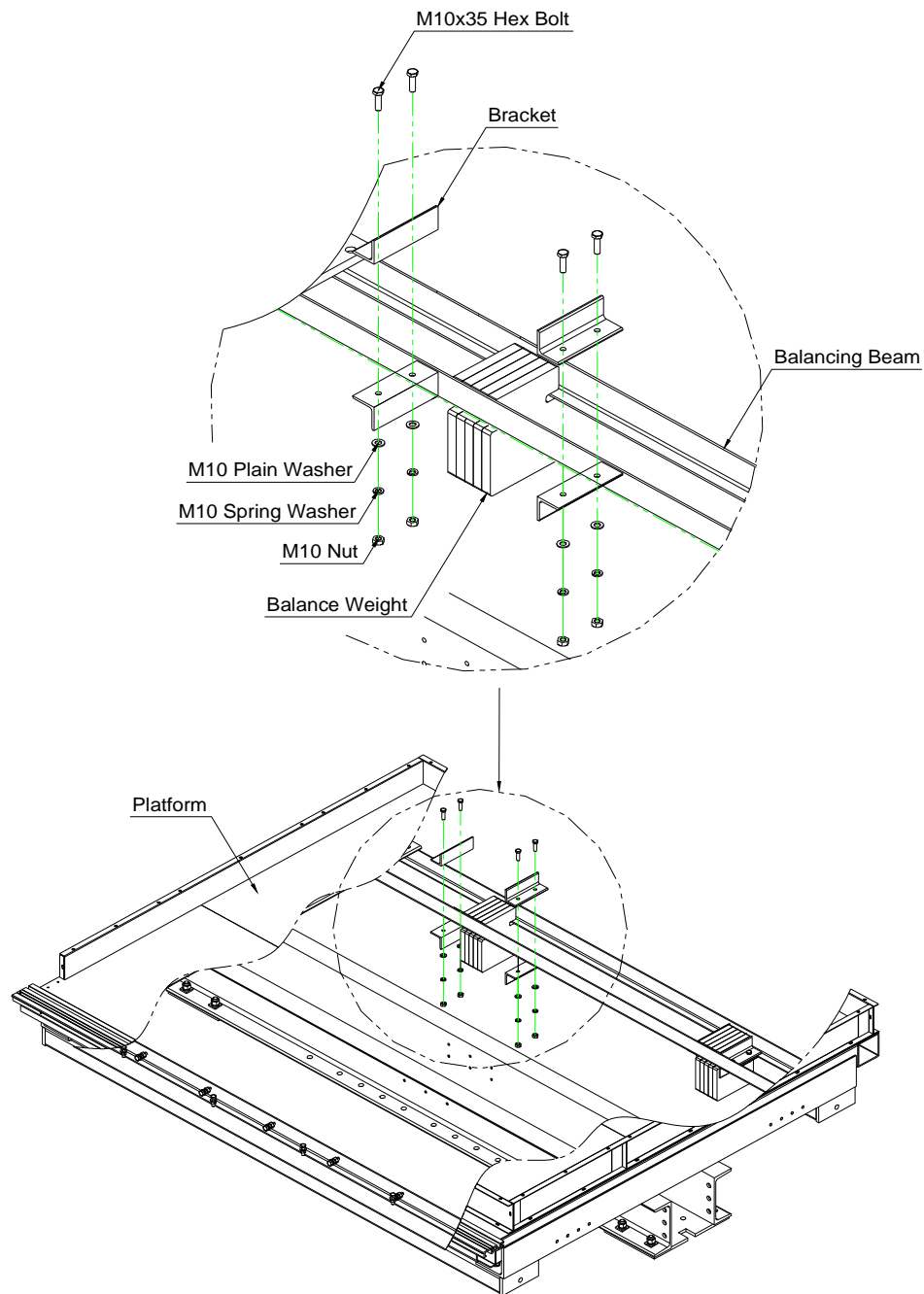


Fig. 8-1-2. INSTALLATION OF CAR BALANCE WEIGHT

|        |                             |               |             |
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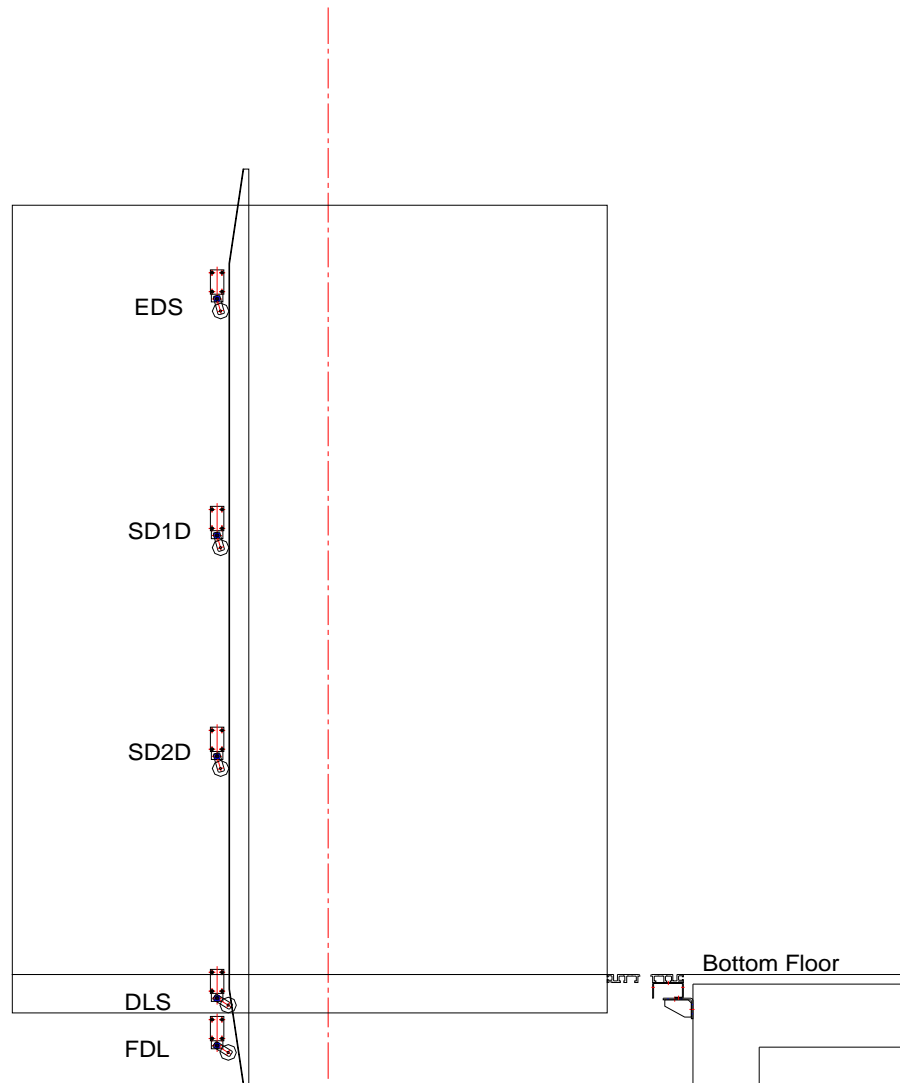
## 8-2. Limit Switch Assembling or Adjustment.

8-2-1. Move Car up and down to adjust gap between Cam and Limit Switch.

8-2-2. Adjust Up and Down Limit Switch to place the same position as shown on

Fig. 8-2-1. & Fig. 8-2-2.

Bottom  
Access



**Fig. 8-2-1. INSTALLATION OF LOWER LIMIT SWITCH**

|        |                             |               |             |
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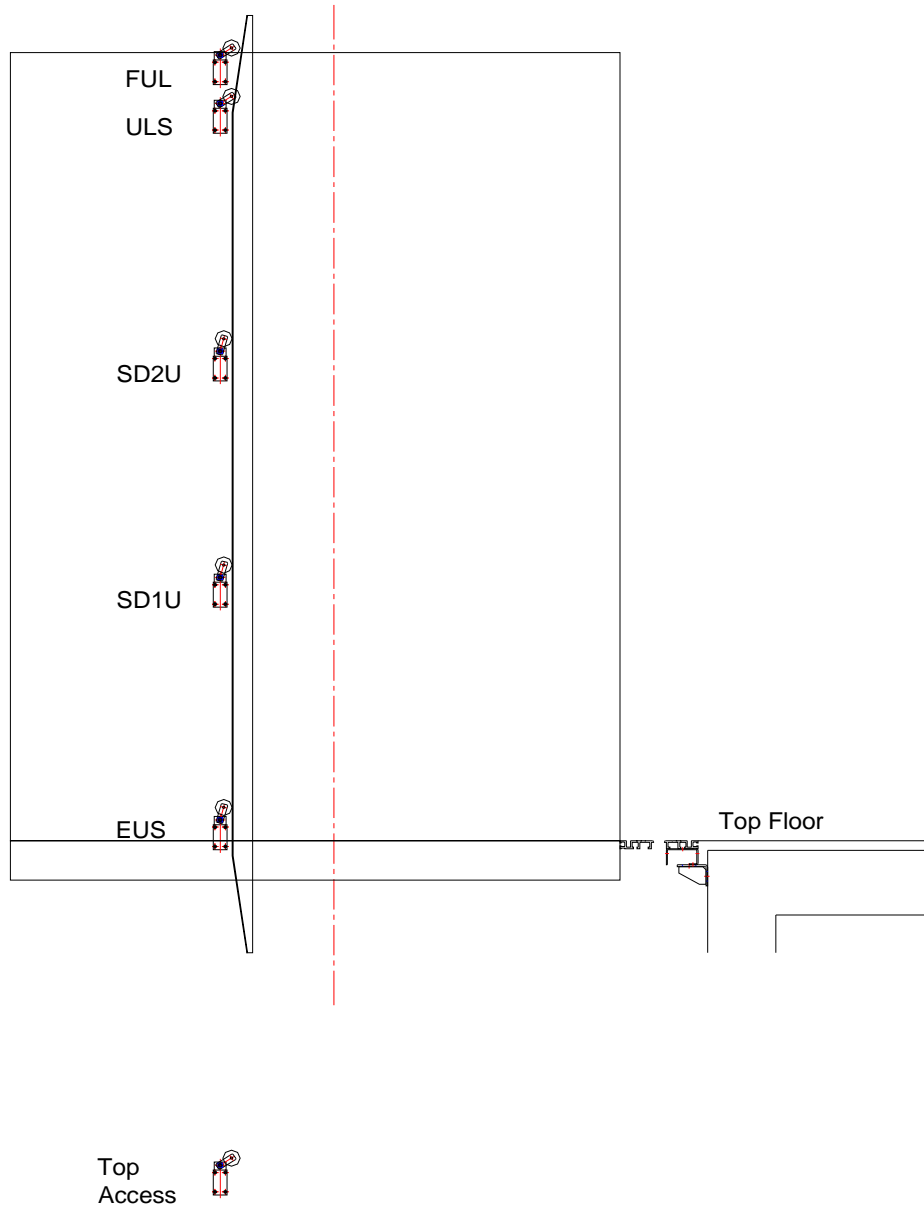


Fig. 8-2-2. INSTALLATION OF UPPER LIMIT SWITCH

|        |                             |               |             |
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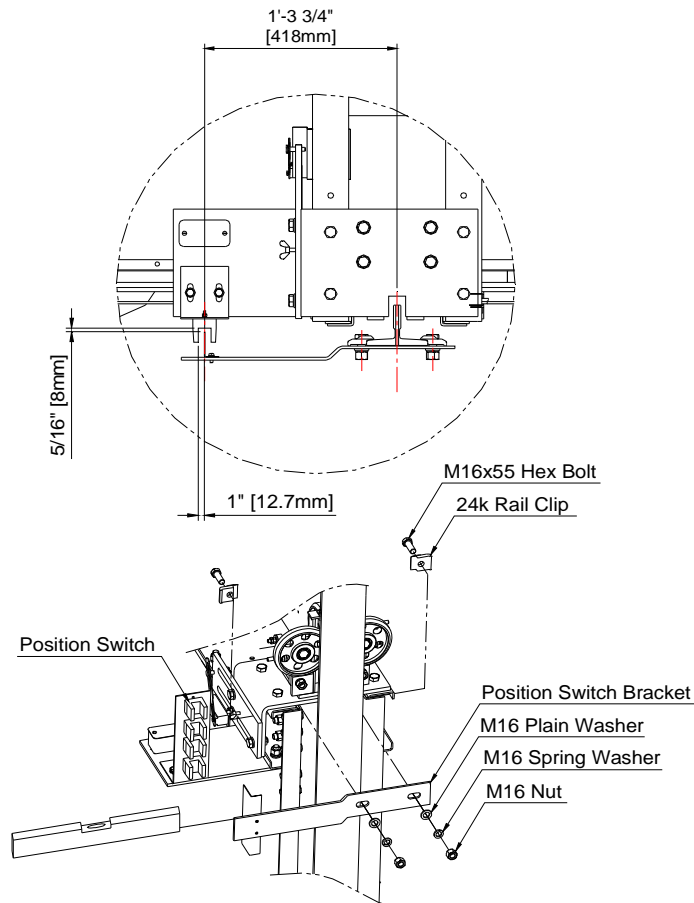
### 8-3. Position Switch Assembling and Adjustment

#### 8-3-1. Position Switch Guard Assembling

- (1) Assemble Position Switch Bracket and Plate in each Floor.
- (2) Attach Position Switch Bracket to Car Guide Rail within Standard dimension

#### 8-3-2. Position Switch Guard Adjustment (Fig. 8-3-2.)

- (1) Check whether Car Sill and Landing Sill are completely correspondence.
- (2) Stand Leveling Devices vertically.
- (3) Adjust Guide Plate to vertical centerline of Sensor.



**Fig. 8-3-2. INSTALLATION OF POSITION SWITCH**

|        |                             |               |             |
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## 8-4. Counter Balance Adjustment

### 8-4-1. Preparatory

- (1) Remove all unnecessary equipment's in Car interior or upper car.
- (2) Load 45% of rated load weight on the center of Platform.

### 8-4-2. Balance Check

- (1) Record current value when car is traveling Upward or Downward
- (2) Increase Weight if current value is high when car is going UP.  
Or Decrease Weight if current value is high when car going Down.
- (3) Repeat 1 and 2 above to adjust current value as approximate value  
while car is going Up or Down
- (4) Fasten Weight Static bolt completely.

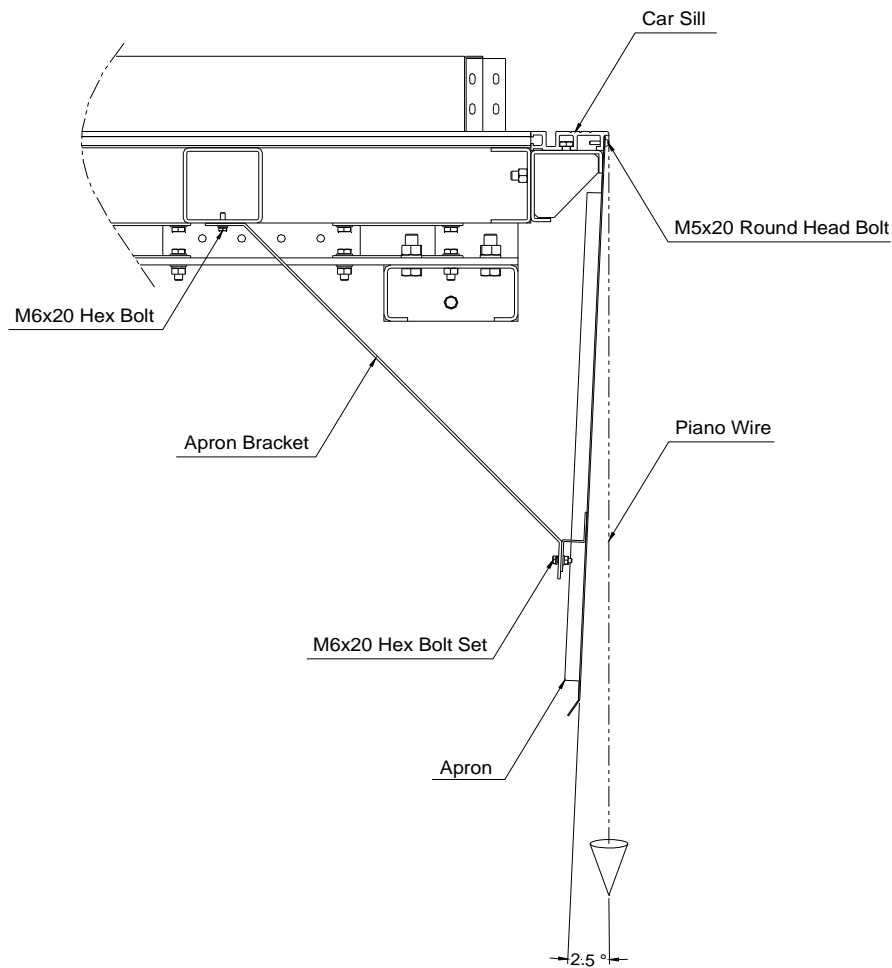
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### 8-5. Apron Assembling (Fig. 8-5.)

8-5-1. Assemble Tap manufactured part of Car sill with M5 round hear screw.

8-5-2. Assemble Apron Bracket to Platform and Apron support.

At this time, Apron should be mounted of inclining approx. 2.5 degree towards Car Rail.



**Fig. 8-5. INSTALLATION OF APRON**

|        |                             |               |             |
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**8-6. Cleaning and Arrangement.**

**8-6-1. Control Room Cleaning**

(1) Turn main power off, and vacuum interior of Control Panel.

(2) Turn power on.

**8-6-2. Exit and Entrance Cleaning**

(1) Remove all protective tapes from Jamb , Door Panel, Sill, Hall Button.

(2) Remove dirt or obstructions between Jamb and Door of each floor.

(3) Vacuum Sill at each floor.

(4) Check the functions of Hall Button or Hall Position Indicator etc.

**8-6-3. Hoistway cleaning and finish**

(1) Cover the all equipment.

(2) Sweep all the equipment ,includingTraction Machine, Rail Bracket, Guide Rail, Header, Car Top

(3) Paint welded parts.

(4) Check and remove any obstruction in Leveling Devices, Traveling Cable.

**8-6-4. In-Car Cleaning**

(1) Clean Light Ceiling interior, and then remove the Car Panel's protective tapes.

(2) Assemble light fixtures, check the light lines, and then assemble Light Ceiling acrylic cover.

(3) Clean Car floor.

**8-6-5. In-Car Inspection.**

(1) Check light fixture and switch in Car.

(2) Check Emergency Lamp Function.

(3) Check functions of all switches and button on Car Operation Panel.