



SSOHT-300 System

Vehicle Operation Manual

S-NEW02-0029

Revision 0

Apr. 26, 2002

The information furnished herein by SHINKO ELECTRIC CO.,LTD. is proprietary and confidential to SHINKO ELECTRIC CO.,LTD. personnel and is not to be duplicated, published, or disclosed to any third party in whole or in part without permission from SHINKO ELECTRIC CO.,LTD.

Copyright© 1999 SHINKO ELECTRIC CO., LTD. ALL RIGHTS RESERVED.
Unpublished rights reserved under the copyright laws of the United States.

The information contained herein is provided pursuant to the terms of a License, Non-disclosure and/or Confidentiality Agreement and constitutes and contains valuable proprietary information and trade secrets of SHINKO ELECTRIC CO., LTD. embodying substantial creative efforts and confidential information, ideas, and expressions. Accordingly, strict compliance with the terms and conditions of the governing Agreement, including, without limitation, all restrictions on use and disclosure, is required as a condition to the use of the information contained herein. Except as may be permitted in the applicable Agreement, the information herein may not be reproduced or disclosed in whole or in part.

Restricted Rights Legend
Use, duplication, or disclosure by the Government is subject to restrictions as set forth in subparagraph <c> (1) (ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.277-7013

SHINKO ELECTRIC CO., LTD.
100 Takegahana, Ise city,
Mie prefecture,
516-8550, Japan
Telephone: +81-596-36-3180
Facsimile: +81-596-36-3974

Contents

1. SSOHT-300 System and Vehicle Overview	5
1.1. Purpose of the SSOHT-300	5
1.2. SSOHT-300 System	5
1.3. Non-Contact Power Supply.....	8
1.4. FCC (Federal Communications Commission) Regulation (provisional)	8
1.5. Notice and Warning of FCC (provisional).....	9
2. OHT Vehicle	11
2.1. External Appearance of the OHT Vehicle	11
2.2. Parts Name and Function.....	12
2.2.1. Vehicle Body	12
2.2.2. Bumper.....	12
2.2.3. Vehicle Stop Switch	12
2.2.4. Fall Prevention Mechanism	12
2.2.5. Front Monitor Sensor.....	12
2.2.6. Display Panel and Operation Panel.....	13
3. Specifications	15
3.1. General Specifications	15
3.1.1. Wafer Carrier	15
3.1.2. Transport Unit.....	15
3.1.3. Environmental Condition (Needs a review!!).....	15
3.2. Basic Technology Specifications.....	16
4. Emergency Stop Procedures	17
4.1. EMO (Emergency Off).....	17
4.1.1. Location of EMO	17
4.1.2. EMO Operation.....	17
4.2. The Stop Button on the Vehicle	17
4.2.1. The Vehicle Stop (emergency stop) Button on the Vehicle.....	17
5. Operation	19
5.1. Vehicle Operation Mode	19
5.2. Auto mode.....	19
5.3. Local mode	20

6. Teaching	21
6.1. References	21
6.2. Two Types of Teaching.....	21
6.3. Remote Control Box	22
7. Preparation	23
7.1. Preparation of the OHT Vehicle	23
7.2. Preparation of the Remote Control Box	23
7.3. Registration of a Vehicle F Number.....	23
7.3.1. Confirmation of the DIP Switches of the Remote Control Switches	24
7.3.2. Registration of F Number	24
8. Remote Control Box Position	25
9. Remote Control Operation	27
9.1. Remote Control Operation List.....	27
9.2. Status Transition during the Remote Control Operation.....	28
9.3. Basic Button Operation.....	29
9.4. Remote Control Operation Button Assignment.....	29
9.4.1. Function Button	29
9.4.2. Operation Button	29
10. Installation and Removal of the Vehicle	33
10.1. Vehicle Exchange on the Track.....	33
10.1.1. Installation of the Vehicle	33
10.1.2. Removal of the Vehicle	33
11. Error Recovery Procedures	35

1. SSOHT-300 System and Vehicle Overview

1.1. Purpose of the SSOHT-300

SSOHT-300 is an automatic transport system used in semiconductor fabrication plant clean rooms.

1.2. SSOHT-300 System

A floor plan of the typical SSOHT-300 system is shown in Figure 1.2.1.

Figure 1.2.2 shows the example of the Shinko demo system.

The main system equipment is the OHT vehicle (hereinafter OHV). It is suspended from the OHT track and runs along the track. The OHV has a hoisting mechanism and the hoisted FOUP ascends and descends between the process tool ports. Ports are usually called load ports.

A sectional view is shown in Figure 1.2.3. The OHT track is supported from the ceiling of the building, and the OHT is suspended from the track. The OHV runs under linear motor power, and the power is supplied from the track by a non-contact power supply system. The non-contact power supply system is comprised mainly of OHV pickup coils and the power cables within the track.

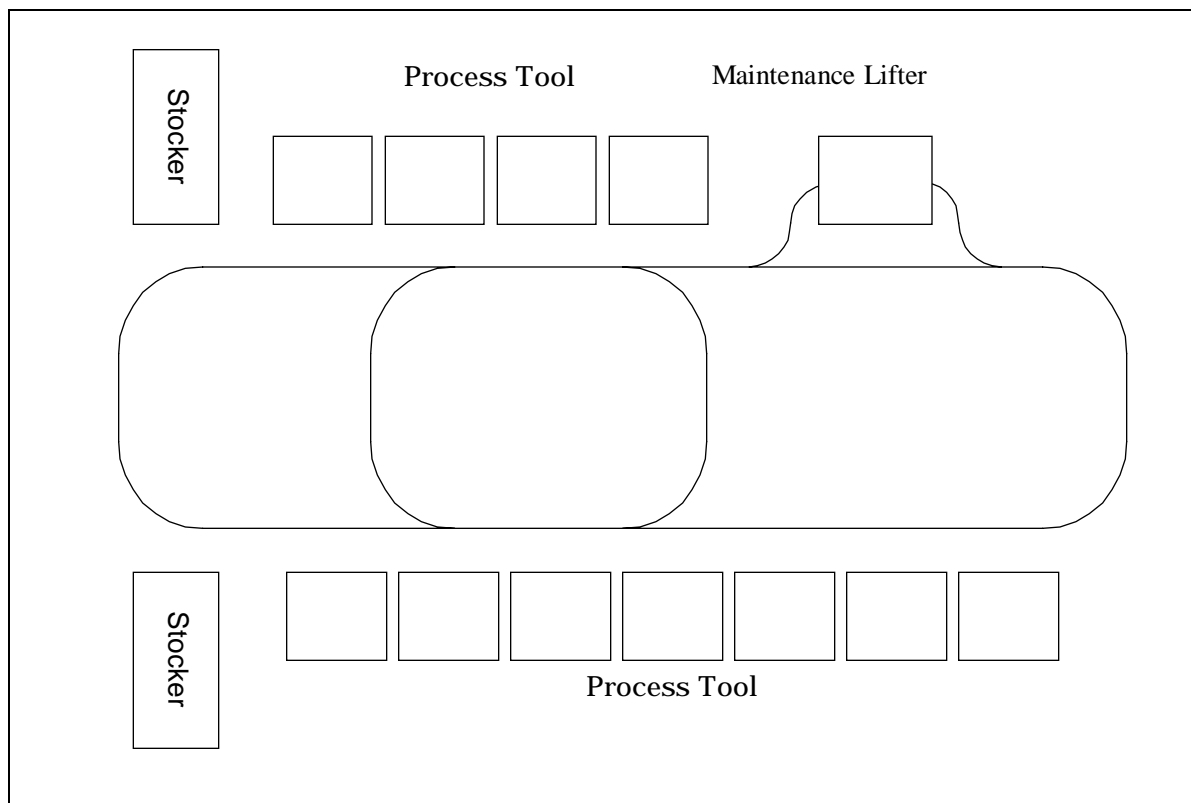
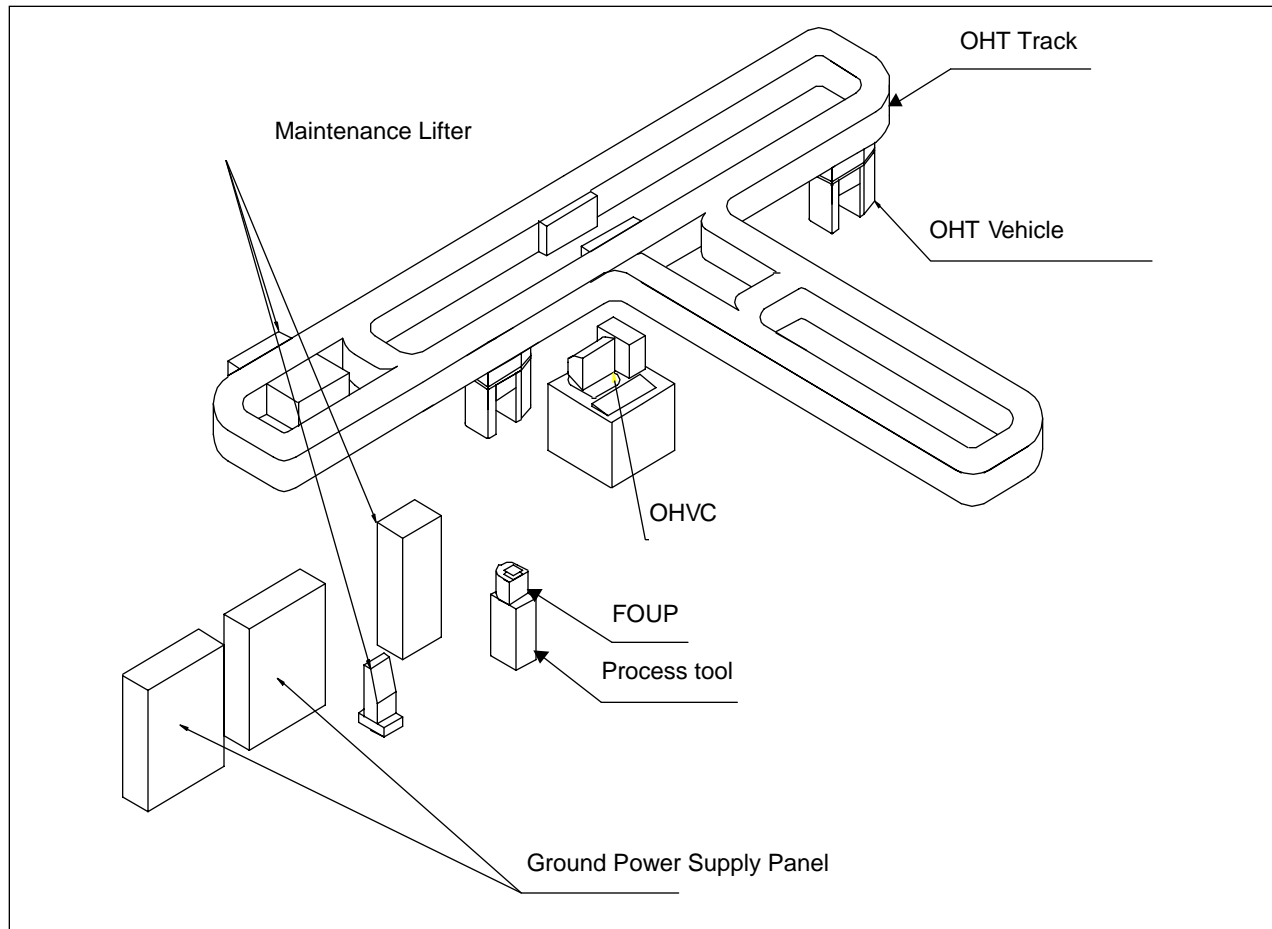


Figure 1.2.1 Typical SSOHT-300 system Floor Plan



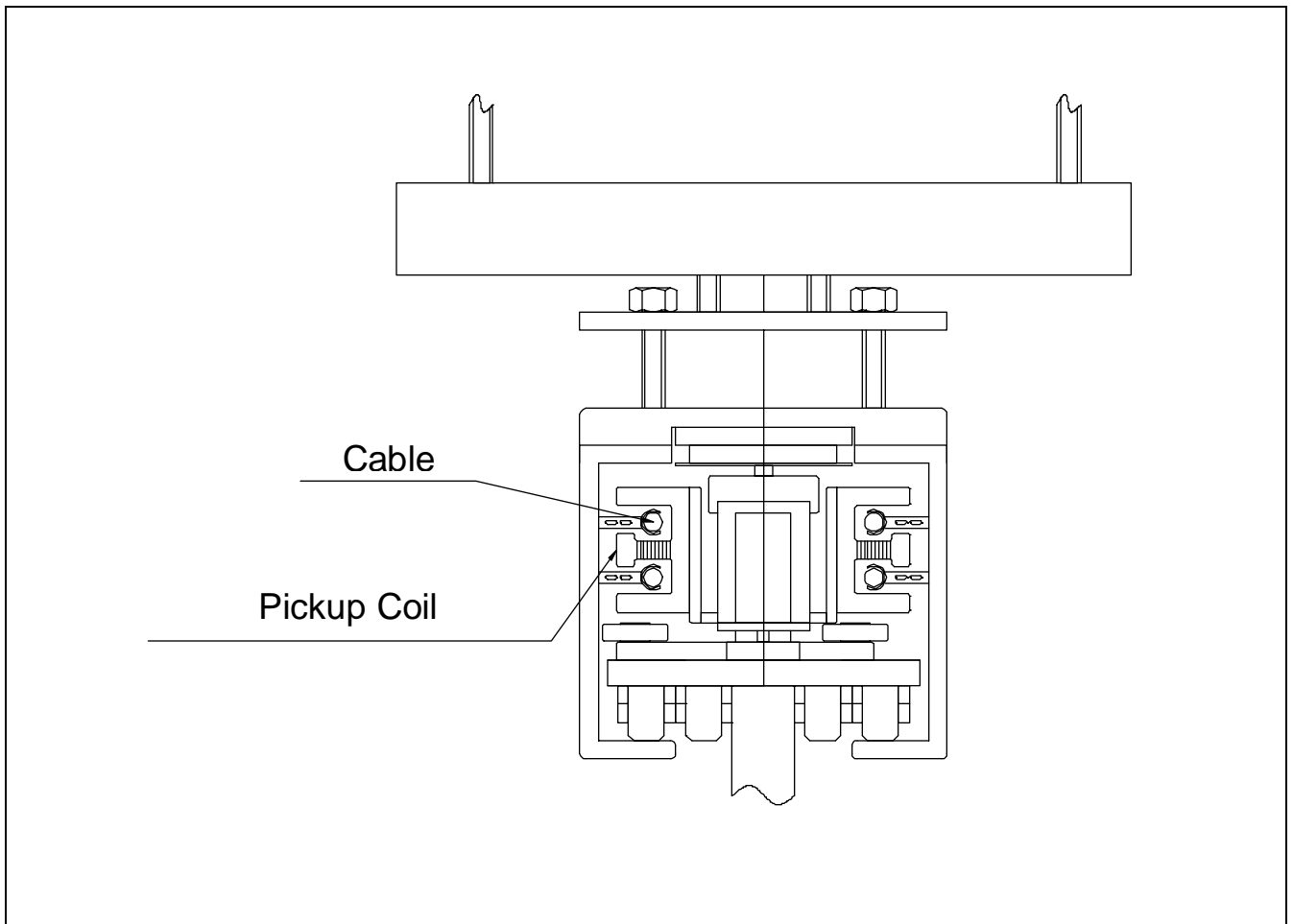


Figure 1.2.3 Sectional View

1.3. Non-Contact Power Supply

The non-contact power supply is an electromagnetic coupling and can be understood as a special type of transformer. It supplies power to the OHV. The track is equipped with power cables, and is constantly supplied with an alternating current from the power supply panel on the ground. Shinko uses an 8.66 kHz alternating current as a main power source.

Signals of approximately 300kHz and 350kHz are used for communication between the OHV and ground controller on top of the 8.66kHz for the main components.

1.4. FCC (Federal Communications Commission) Regulation (provisional)

FCC regulations for the Shinko SSOHT-300 system and the SSOHT-300 system: there are two applicable FCC regulations. Section 15 (c), and the section concerning intentional radiator is applicable.

Section 18 applies to the power supply and relevant component parts (Refer to Figure 1.4.1).

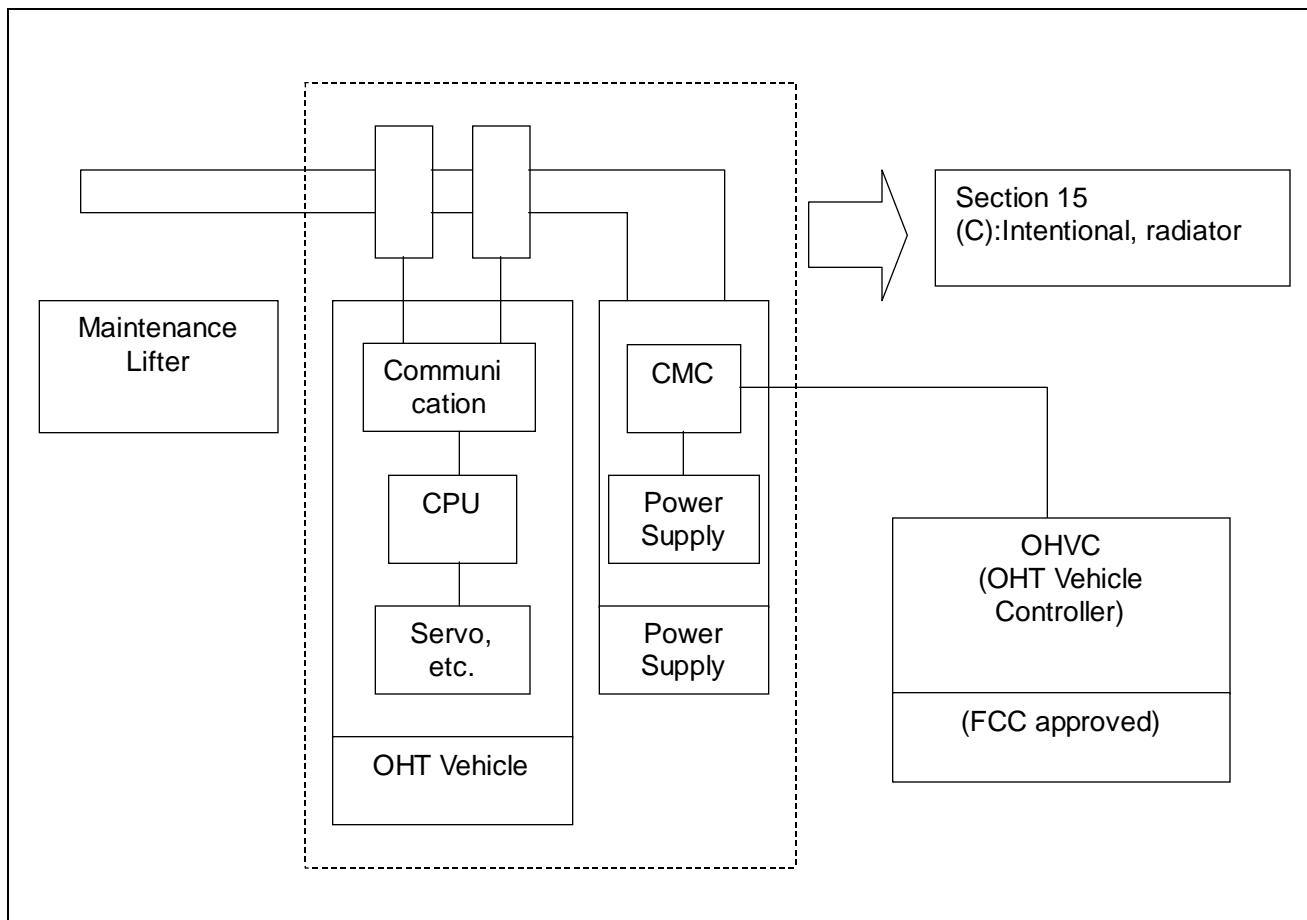


Figure 1.4.1 FCC Regulations and the OHT Configuration

1.5. FCC Notice and Warning (provisional)

Notice

Based on test results, this system was determined to conform to the class A limit for digital devices in accordance with FCC regulation Section 15.

Such a limit has the purpose of sufficiently preventing harmful interference when the equipment is used in a business-operating environment.

This equipment generates, uses, and may radiate high frequency energy. If it is not installed or used according to the instruction manual, it may cause harmful interference to wireless communication.

Use of this equipment in a residential area may cause harmful interference in which case the user is required to correct the interference at their own expense.

FCC Warning

If any changes or modifications are made without explicit approval of the party involved who is responsible for regulatory compliance, the user's right to use the equipment may be revoked.

Intentionally left blank.

2. OHT Vehicle

2.1. External Appearance of the OHT Vehicle

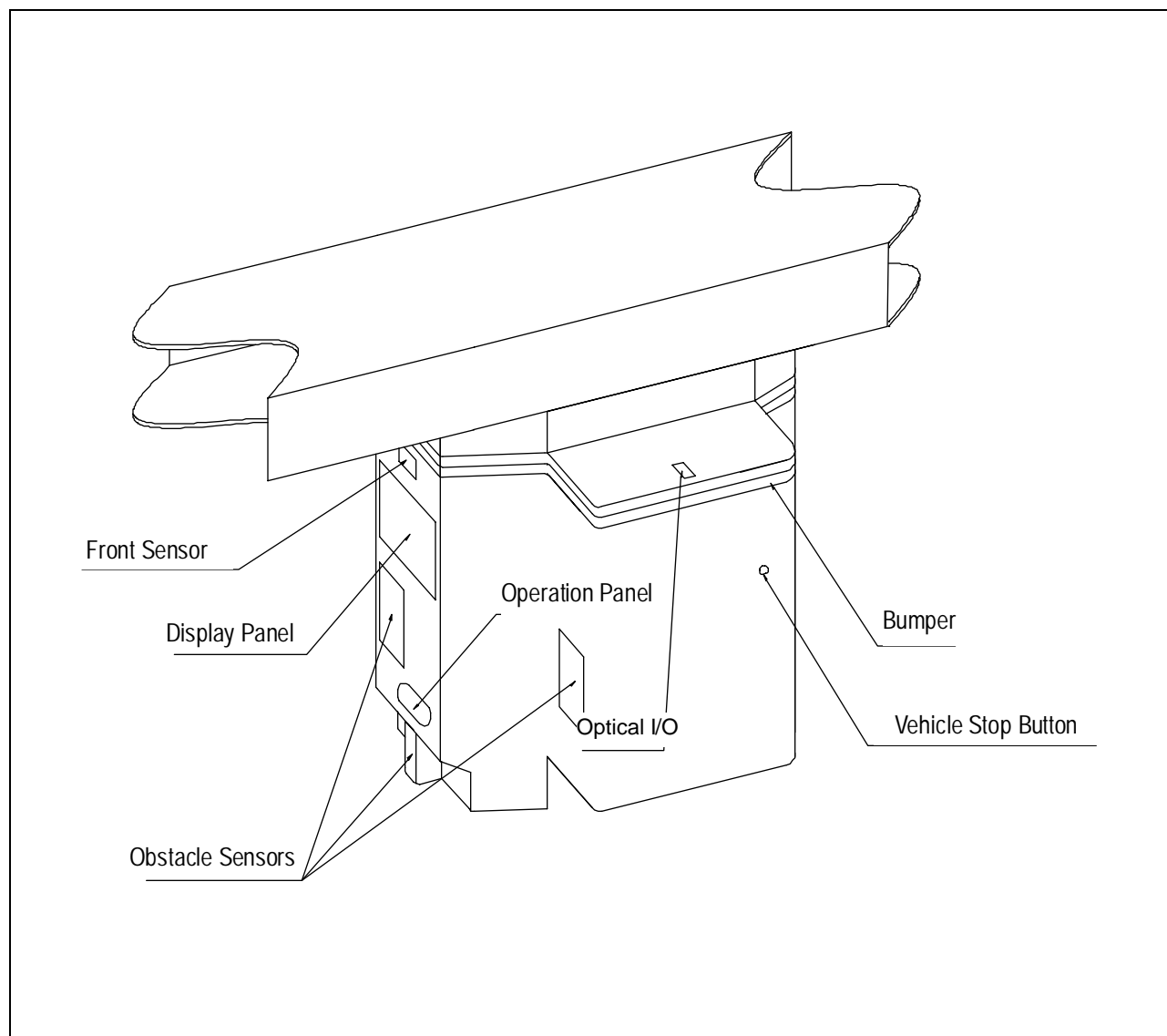


Figure 2.1.1. External View of the OHT Vehicle

The external view of the OHT vehicle is shown in Figure 2.1.1.

2.2. Part Names and Function

2.2.1. Vehicle Body

The vehicle is comprised of X, Y, , and Z axis. The X axis is for moving the vehicle, and the Y- mechanism is comprised of the M1 and M2 axes. Operating the M1 and M2 axes enables movements in the Y direction (horizontal movement of the vehicle body) and the direction (rotation of the vehicle body). The Z axis moves the gripper up and down.

The X axis is driven by a linear motor, the M1 and M2 axes by an AC servomotor, the Z axis by an AC servomotor, and opening/closing of the gripper by a brush-less DC motor.

The gripper is suspended by four belts that are reinforced with steel wires.

2.2.2. Bumper

The bumper is a contact tape switch and is installed around the vehicle. When this comes into contact with any obstacle, the power supply to the drivers for main four axes (X axis, M1 and M2 axes, and Z axis) will be shut off. For safety purposes, two bumper switches are installed in parallel.

2.2.3. Vehicle Stop Switch

The vehicle is equipped with a vehicle stop button. Pressing this button will shut off the power supply to the drivers for the main four axes just like the bumpers do.

2.2.4. Fall Prevention Mechanism

The vehicle is equipped with fall prevention arms. If the FOUP falls while running, the arms prevent the FOUP from falling.

2.2.5. Front Monitor Sensor

At the front of the vehicle, there are obstacle sensors (right, down, and side. **Up and left sensors are optional**), an approaching sensor, a straight travel block sensor, a curve travel block sensor, a dead zone sensor, a front vehicle detection sensor, and a front vehicle confirmation sensor.

The obstacle sensors are adjusted at 2.8m for the slowdown signal output distance and 0.8m for the stop signal output distance.

The approaching sensor is adjusted to send a stop signal when the vehicle comes to 0.3m.

The straight travel block sensor and the curve travel block sensor are attached to the Y- mechanism part, and their receivers are installed on the vehicle. The transmitters are installed on the track (the straight travel block sensor transmitters on the straight area, and the curve travel block sensor transmitters on the curved area), and when beams emitted by the transmitters are received, each sensor sends stop signals.

The dead zone sensor is **optional**. The detection distance is adjusted at 15cm.

The front vehicle detection sensor's receiver and transmitter are installed respectively at the front and back of the vehicle running part bogie and used for detecting a vehicle ahead.

The front vehicle confirmation sensor's receiver and transmitter are also installed respectively at the side front and side back of the vehicle and are used for detecting a vehicle in front when running on the straight track.

2.2.6. Display Panel and Operation Panel

The display panel and the operation panel are shown in Figures 2.2.6.1 and 2.2.6.2, respectively. The meaning of the display panel LED and the operation panel parts are described in Tables 2.2.6.1 and 2.2.6.2.

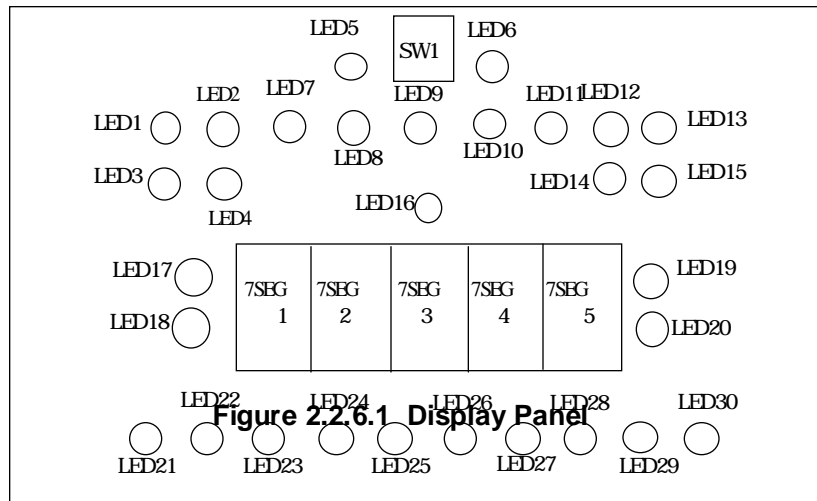


Figure 2.2.6.1 Display Panel

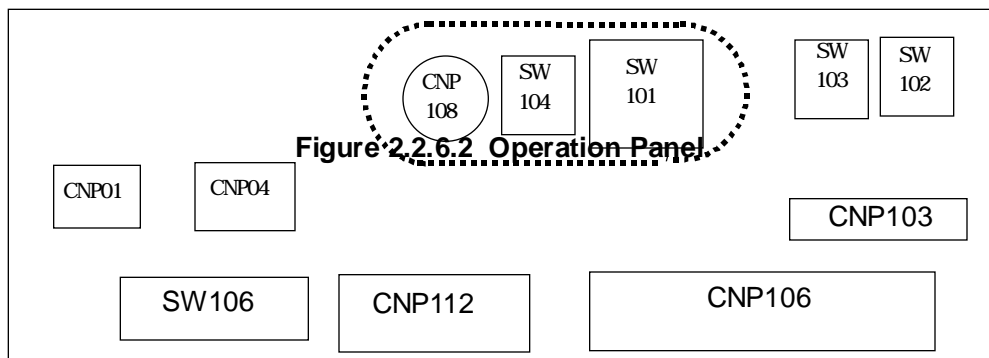


Figure 2.2.6.2 Operation Panel

Figure 2.2.6.1. Meaning of the Indicator LED

LED No	Color	Meaning	LED No	Color	Meaning
1	Green	Illumination controlled by the CPU.	16	Red	Illuminates when error occurs.
2	Green	For monitoring control status (Ex: remote control status).	17	Green	Illuminates at the front M/D roller right (facing the direction of travel) position.
3	Green		18	Green	Illuminates at the back M/D roller right position.
4	Green		19	Green	Illuminates at the front M/D roller left position.
5	Green	Illuminates when detecting a load on the FOUF.	20	Green	Illuminates at the back M/D roller left position.
6	Green	Illuminates when detecting a load on the FOUF.	21	Green	
7	Green	Illuminates when the gripper is closed.	22	Green	The obstacle sensor (or valid sensor) is far.
8	Green	Illuminates when the gripper is open.	23	Green	The obstacle sensor (or valid sensor) is near.
9	Green	Fall prevention	24	Green	Illuminates when the sensor responds.
10	Green	Illuminates when the fall prevention mechanism is closed.	25	Green	Illuminates at detection by the dead zone sensor.
11	Green	FOUF fall is detected.	26	Green	The curve travel block sensor
12	Green	Illuminates when communication is received.	27	Green	The straight travel block sensor.
13	Green	Illuminates when communication is sent.	28	Green	The front vehicle detection sensor (far)
14	Green	Guide rail left status display	29	Green	The front vehicle detection sensor (near)
15	Green	Guide rail right status display	30	Green	Front vehicle check

7SEG1-5:

SW1: Switch for checking lamps. When the switch is on, all LED and 7SEG will light up.

Table 2.2.6.2. Panel - 02 Parts Description

Connector Number	Use	Switch Number	Use
CNP01	24V external input	SW101	Vehicle status selection switch The key can be removed at the AUTO (center) position.
CNP04	Manual break operation input	SW102	E84
CNP103	Gripping, fall prevention, and the M/D roller manual operation	SW103	Error reset
CNP106	Debugging and FDD connection	SW104	CPU reset
CNP108	Teaching communication (option)	SW106	232C input switch 1: PB9-07 (Lookdown sensor) 2: PB-10Z 3: CPU232C
CNP112	232C input		

3. Specifications

3.1. General Specifications

3.1.1. Wafer Carrier

Name	300mm wafer FOUP
Type	
Manufacturer	
Material	SEMI E47.1-0299(1999) compliant
Color	SEMI E47.1-0299(1999) compliant
Weight	8.7kg-f (Max. including 25 wafers)
Dimensions	430mm(width) × 356mm (depth) × 338mm (height)
External Shape	SEMI E47.1-0299(1999) compliant

3.1.2. Transport Unit

One FOUP per one vehicle.

3.1.3. Environmental Condition

Cleanliness	Class 100 (0.1μm)
Temperature	15-25°C
Humidity	↓%
Corrosive Gas	None
Floor Surface	Punching plate
Ceiling Material	ULPA filter
Ceiling Height	12 feet
Desired Strength for the Ceiling Height	↓

3.2. Basic Technology Specifications

Table 3.2.1 Basic Specifications

Item	Specifications	
External Dimensions	440 (W) x 675 (L) x 936 (H: including the track)	
Weight	97Kg (no load)	
Receiving System	Non-contact power supply system (8.6kHz)	
Power Consumption	Max. 500w	
Control System	Transport Control	Ground command by the OHVC
	Running Control	Self-control by barcodes and the front monitor sensor. Merge/diverge control by the guide rail.
Merge/Diverge Method	M/D rollers and M/D guide.	
Communication Method	Power line communication method, 19,200bps (FCC compliant)	
Main Driving Axis	Four axes (X axis, Z axis, M1 and M2 axes)	
	X axis (run)	LSM (Two motors are serially-connected)
	Z axis (up/down)	200w AC servomotor
	M1 and M2 axes (Y- \downarrow)	30w AC servomotor (2 units)
Running Speed	Straight line speed: 2.0, 1.5, 1.0, 0.4, 0.2, 0.05 (m/s)	Acceleration: $\pm 1\text{m/s}^2$
	Curved line speed: 0.4 (m/s)	
	Reverse travel (enabled only in the remote control operation): 0.2m/s	
Minimum Curve Radius	0.5m	
Ascending/Descending Speed	Max. 1.0m/s (adjustable speed 1 m/s ²)	
Loaded Weight	Max. 10kg (one unit of the FOUP fully loaded with 300mm)	
Positioning Resolution (Command resolution)	X direction	0.1mm
	Y direction	0.1mm
	\downarrow direction	0.1°
	Z direction	0.1mm
Position Correction	Y direction: $\pm 30\text{mm}$; \downarrow direction (rotation): $\pm 10^\circ$	
Cleanliness	0.1 μm , Class 100	
Operating Environment	Ambient temperature: 15C-25C; Humidity:	
Ascending/Descending Stroke	Max. 2700mm	
Traveling Direction	Top view counter-clockwise.	
Cover	Flame-retardant material Roa (Tsutsunaka Plastic Industry) (Synthetic material made of V0 class ABS and polycarbonate)	
Distance between the mark sensor and the transfer center point	150mm (The distance between the stop mark (black bar edge) and the transfer center point is 150mm.)	
Optical I/O Position	250mm from the center of the track.	
Complied Standards	JIS, UL, CE, (SEMI S2)	

4. Emergency Stop Procedures

4.1. EMO (Emergency Off)

4.1.1. Location of EMO

The SSOHT-300 system EMO button is located on the front of the power supply panel, which is usually installed on the wall under the track in a clean room.

Note: There is not an EMO button on the vehicle.

4.1.2. EMO Operation

Power to the entire SSOHT-300 system will be shut off when the button is pressed.

Power to the power supply panel, maintenance lifter and the OHVC will be shut off.

The power supply for all of the vehicles in the system is shut off, and the vehicles will coast to a rest.

Exception: The UPS (Un-interruptible Power Supply) for the OHVC will not be cut off at that point.

The UPS will be shut off after processed data is saved.

[For customers considering FAB operation, the location to install the EMO switch needs to be decided.]

4.2. Vehicle Stop Button

4.2.1. The Vehicle Stop (emergency stop) Button on the Vehicle

A vehicle stop button is installed on each vehicle. By pressing this button, the power supply to the drivers for the vehicle's main four axes (X axis, Z axis, M1 and M2 axes) will be cut and the vehicle will stop operation (the X axis will coast to a stop.)

Intentionally left blank.

5. Operation

5.1. Vehicle Operation Mode

The vehicle has three operation modes. The vehicle operation modes are shown in Figure 5.1.1.

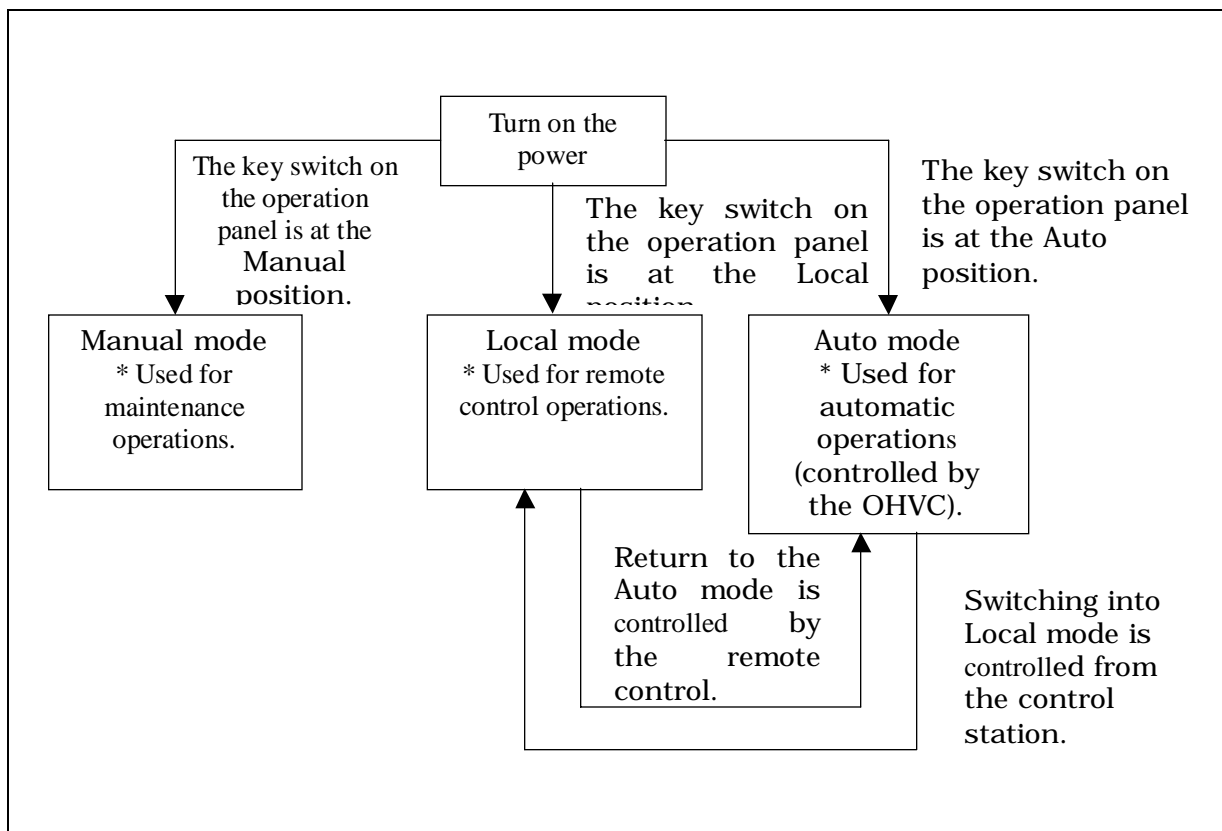


Figure 5.1.1. Explanatory drawing of the Vehicle Operation Modes

5.2. Auto mode

- (1) Turn the key switch on the operation panel of the vehicle to the Auto mode position to move the vehicle onto the track from the maintenance lifter.
- (2) When the maintenance lifter ascends and is ready to place the vehicle onto the track, push the vehicle to the position where the power can be supplied.
- (3) Wait for the power to be supplied by the non-contact power supply and for the vehicle to be initialized.
- (4) Once the vehicle is initialized, track entry is signaled from the OHVC.
- (5) When the vehicle receives a track entry signal from the OHVC, it moves at a slow speed while searching for barcodes pasted on the track.
- (6) When the vehicle finds a barcode, the vehicle is displayed on the OHVC screen, and the track entry operation is complete.
- (7) After the completion of the track entry, the automatic operation will begin according to signals from the OHVC.

5.3. Local mode

In this mode, the vehicle is controlled by the remote control box.

There are two ways to switch into this mode.

(1) Turn the key switch on the control panel to "Local."

(2) Send a signal from the OHVC to change to "Local."

For operating the remote control box, please refer to the "Remote Box Control Instruction Manual."

6. Teaching

6.1. References

- 1 Teaching Instruction Manual
- 2 Remote Control Box Specifications
- 3 Remote Control Box Instruction Manual

6.2. Two Types of Teaching

There are two types of teaching method.

(1) Manual teaching (Standard)

In manual teaching, the operator uses the remote control to teach the equipment.

(2) Semi-automatic teaching (option)

Set the LED for target at the bottom of the gripper, and set the PSD (position sensing device) at the load port.

The gripper comes down to just above the height of FOUP. By looking at the LED, the PSD detects a misalignment of the FOUP center and the load port FOUP center.

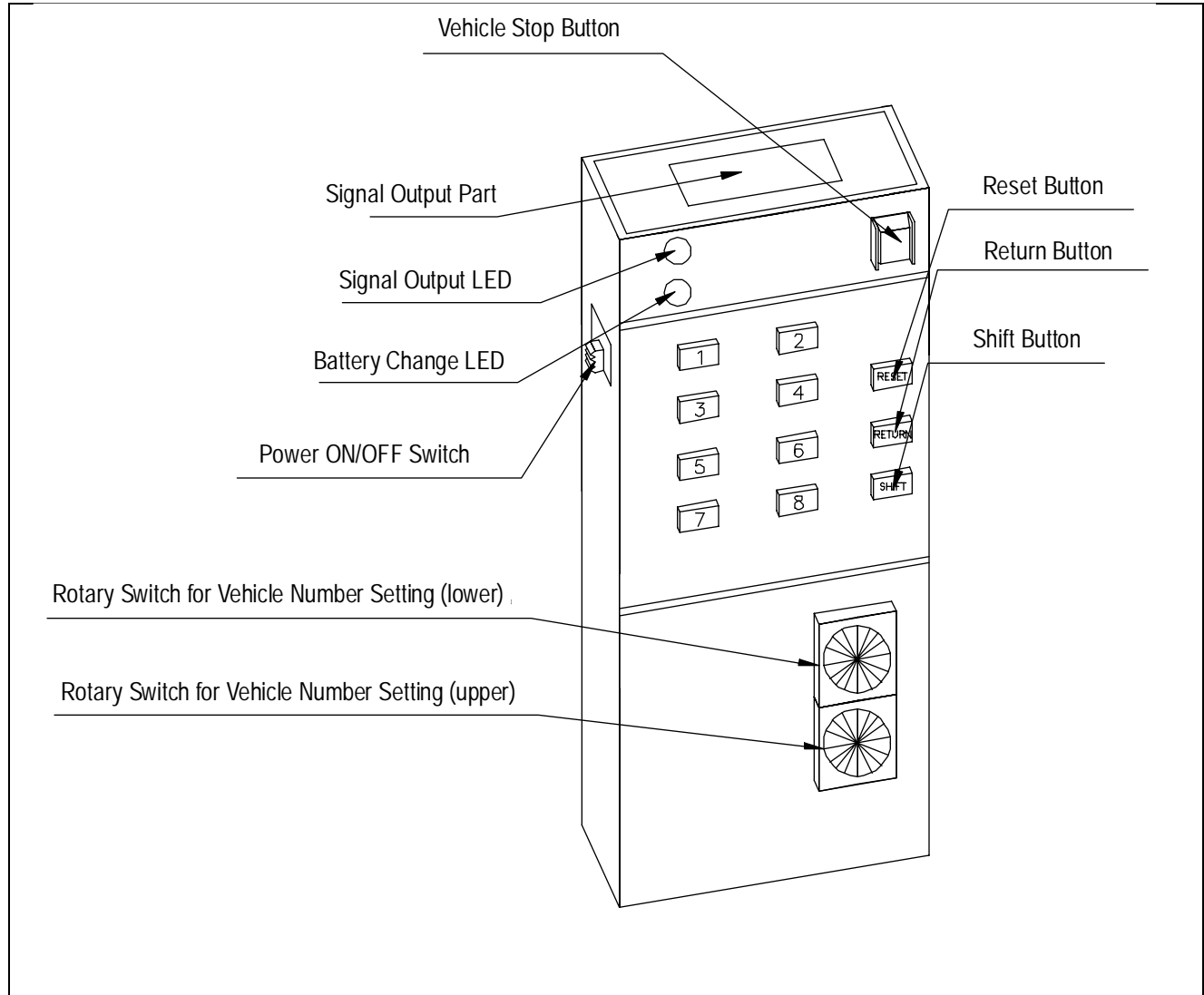
The teaching controller sends a message to tell the vehicle to correct its position. The vehicle moves the X axis and the M1/M2 axes (Y- direction) to reduce the misalignment to 0.

The vehicle stores this teaching information as position data.

6.3. Remote Control Box

The external appearance and part names of the remote control box is shown in Figure 6.3.1.

Figure 6.3.1. External Appearance of the Remote Control Box



7. Preparation

Preparation for remote control operations is described below.

7.1. Preparation of the OHT Vehicle

The OHT vehicle has three modes.

- (1) Manual mode-----Maintenance purposes only
- (2) Auto mode-----Automatic running mode
- (3) Local mode-----Remote control operation mode

Remote control operations are performed in the (3) Local mode.

There are two ways to switch from the Auto mode into the Local mode.

- (1) Turn the key switch on the operation panel to the "Local" position.
- (2) Send a signal from the OHVC to switch to the "Local" mode.

7.2. Preparation of the Remote Control Box

The rotary switch of the remote control box must be set to the same number as the F-number of the remote control receiver on the vehicle side.

The setting must be done, after selecting the selection range of the F-number, according to the following procedures.

- (1) The setting can be done by using the two rotary switches (Refer to Figure 6.3.1).
Setting Range: 01-FF (01-255)
- (2) Turn on the power of the remote control box.

7.3. Registration of a Vehicle F Number



Maintenance and teaching must be performed by personnel who have received maintenance and teaching training.

7.3.1. Confirmation of the DIP Switches of the Remote Control Switches

Remove the back cover of the remote control box and set or confirm the DIPswitches as shown below.

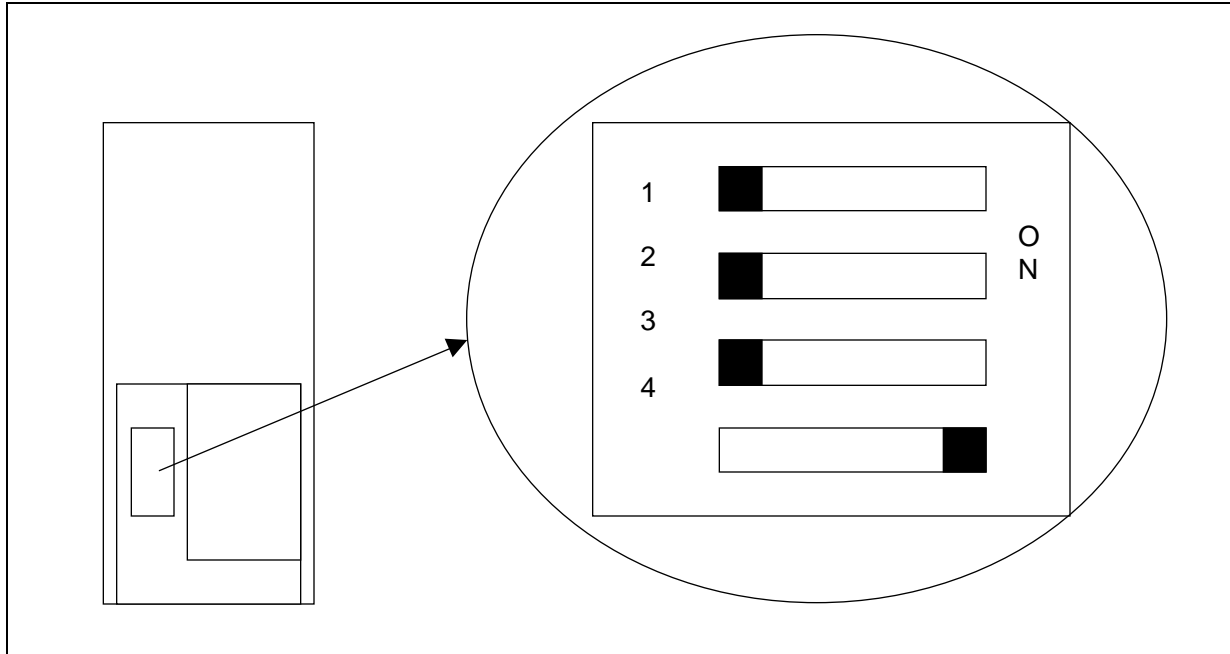


Figure 7.3.1.1. Back View and the DIPSwitch of the Remote Control Box

7.3.2. Registration of F Number

The method for registering the F-number to the remote control receiver on the vehicle side is described below.

- (1) When removing the rubber cap of the remote control box, the mode switch (slide switch) will appear. Set the switch to the left to change to the write mode.
- (2) Registration is done by the transmitter. By pressing the send key for a few seconds, the F-number set by the transmitter will be sent. In this case, the write signal pilot lamp of the receiver (WRT) will change from a flashing to a solid light.
- (3) After it is registered, switch the mode switch to the normal mode and replace the rubber cap.

8. Remote Control Box Position

This remote control box uses infrared light. For remote control operations, the light from the remote control must be facing toward the receiver of the vehicle. The receiver is located under the side cover of the vehicle (Refer to Figure 8.1).

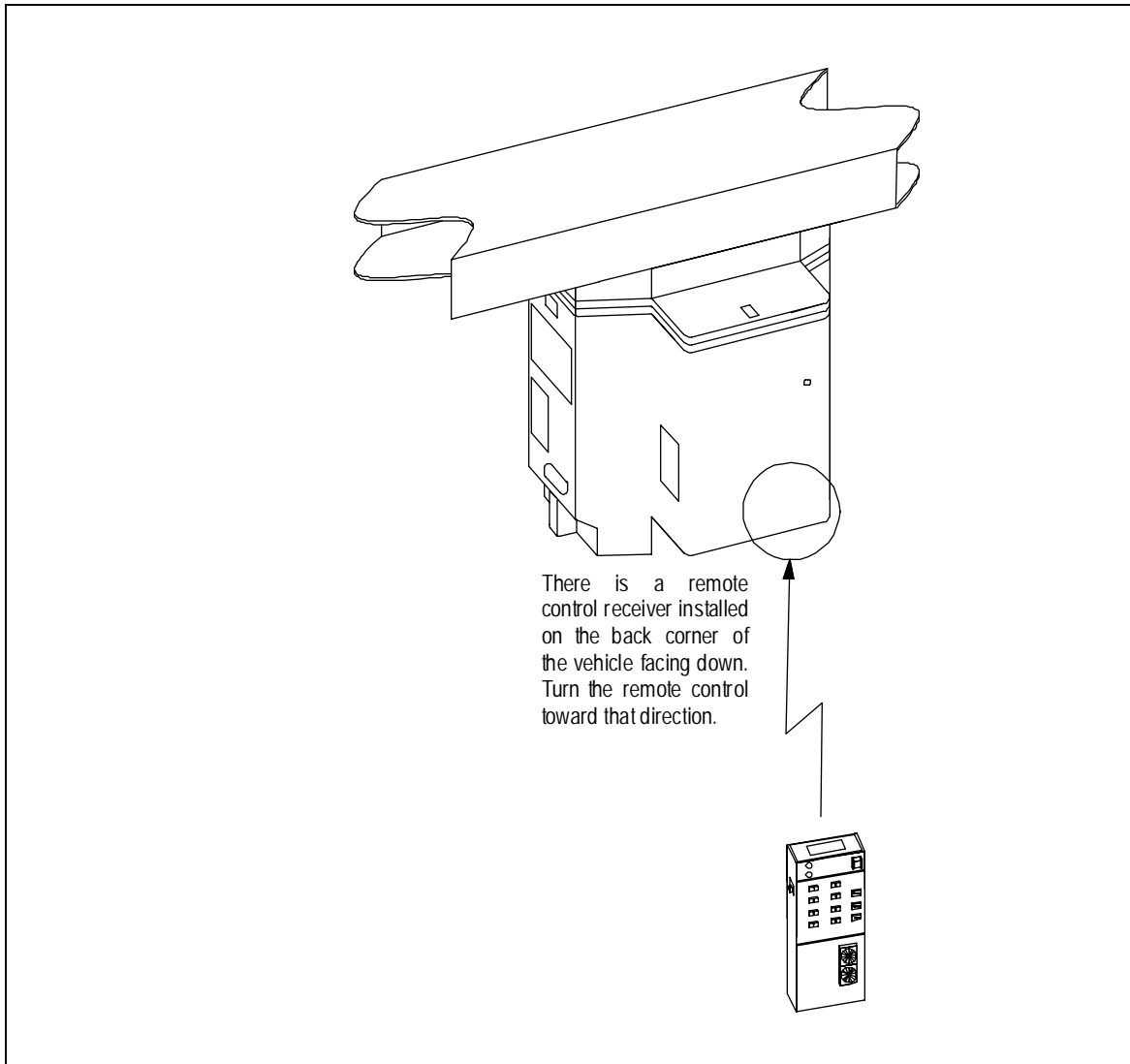


Figure 8.1. Remote Control Box Position

Intentionally left blank.

9. Remote Control Operation

9.1. Remote Control Operation List

Table 9.1. Remote Control Function List

Button	Mode	Button	Shift key OFF	Status	Shift key ON (Note 5)	Status
1	Run Mode	1	M/D roller left	TAP		
		2	M/D roller right	TAP		
		3	Forward creep (0.05m/s)	HOLD		
		4	Reverse travel (-0.2m/s)	↑		
		5	Run forward at the mid speed (0.4m/s)	↑		
		6				
		7				
		8	Obstacle sensor on/off	TAP/ toggle		
2	Positioning mode			HOLD		
3	Playback (loaded) (Note 1)			HOLD		
4	Playback (unloaded) (Note 1)			HOLD		
5	Teaching mode	1	Move the X axis forward	HOLD	Open/close the gripper (Note 2)	TAP/ toggle
		2	Move the X axis backward	↑	Store offset data	3 sec.
		3	Move the Y axis forward	↑	Open/close the fall prevention mechanism	TAP/ toggle
		4	Move the Y axis in the rear direction	↑	Store teaching data	3 sec.
		5	Move the Z axis downward (slow speed)	↑	Move the Z axis to the teaching position	HOLD
		6	Move the Z axis upward (slow speed)	↑	Move the Z axis downward at a high speed	HOLD
		7	Turn the axis clockwise	↑		
		8	Turn the axis counter-clockwise	↑	Return to the home position (Inoperable when the gripper is open)	HOLD
6		Switch to the HOST mode	3 sec.			
7						
8		Shutdown (Note 3)	3 sec.			

TAP: Press the button once to execute the operation.

HOLD: The operation is executed while the button is being pressed. It pauses when the button is released.

3 sec.: The operation is executed when the button is pressed for three seconds.

Note 1: Transfer playback occurs while the button is being pressed. Details are as follows:

- It operates while the button is being pressed, and it pauses when the button is not pressed.
- When pressing the Return (interrupt) button while pausing, the gripper will be closed, and it returns to the main operation after returning to the home position.

Note 2: It opens/closes by a TAP when there is no load.

Note 3: MANU (It switches to manual status: All axes servos off)
Switch to this mode when bringing the vehicle into the maintenance station..

Note 4: Data storage complete buzzer

Note 5: When the Shift key is on, LED1 illuminates on the panel.

9.2. Status Transition during the Remote Control Operation

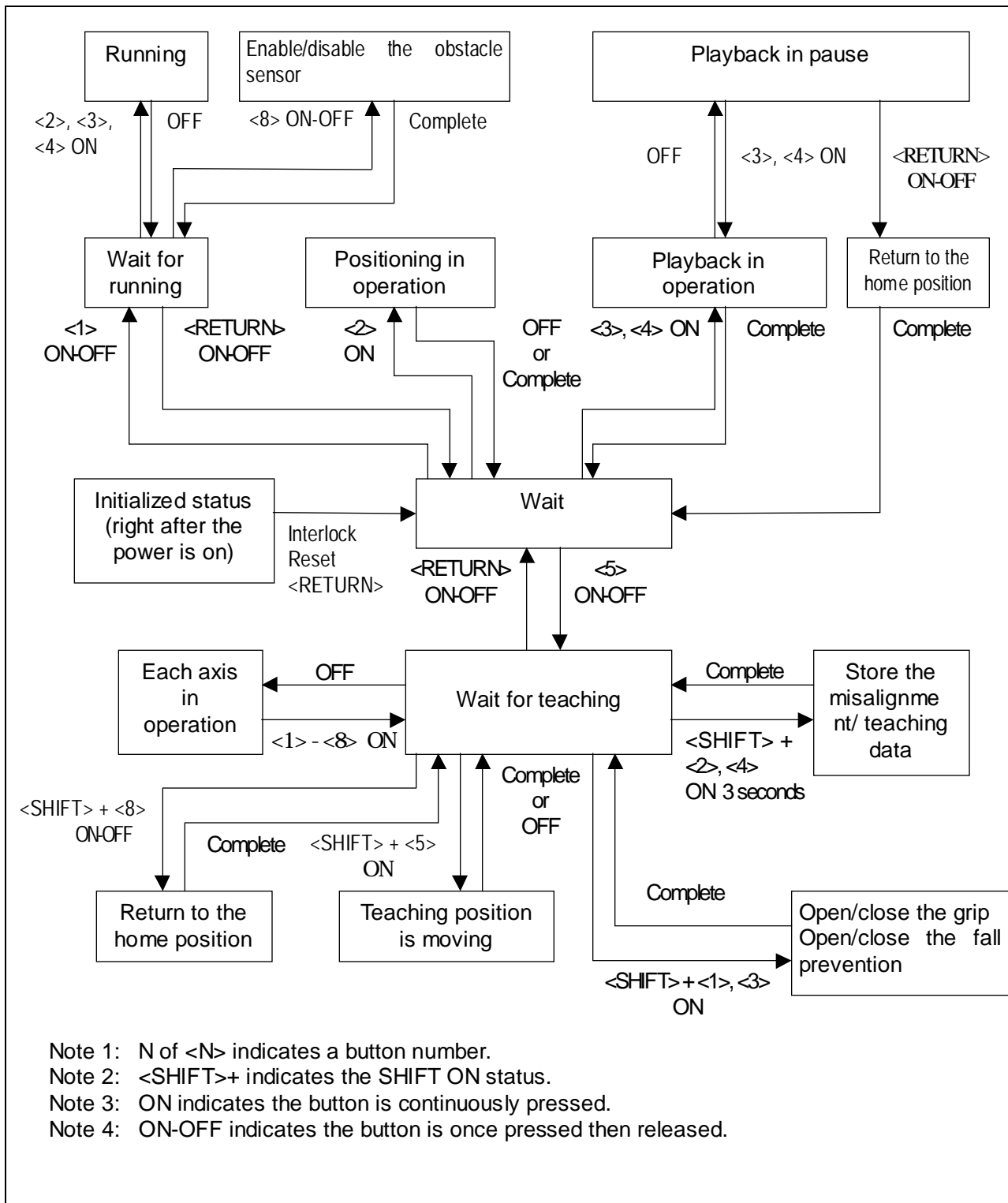


Figure 9.2.1. Status Transition during the Remote Control Operation

9.3. Basic Button Operation

The button operations of the remote control are described below.

- (1) By pressing the function buttons and the operation buttons, the corresponding functions can be performed.
- (2) **Each time the shift button is pressed, it toggles between Shift ON and Shift OFF.**
- (3) When the shift key is on, a different function can be performed by pressing another button.
- (4) Whether the shift key is currently on or off is indicated by LED1 on the panel (When it is on, the LED illuminates).

9.4. Remote Control Operation Button Assignment

9.4.1. Function Button

The function buttons can perform the functions defined in Table 9.4.1.1.

Table 9.4.1.1 Function Button List

Function Button	SHIFT- OFF	SHIFT- ON
Vehicle stop button	Vehicle emergency stop	---
RESET button	Error reset	---
RETURN button	Return (or interrupt)	---

9.4.2. Operation Button

Different functions can be assigned by each remote control operation.

9.4.2.1. When Functions are Selected

The function selection buttons are shown in Table 9.4.2.1.1.

Table 9.4.2.1.1. Button Assignment when Functions are selected

Function Button	SHIFT- OFF	SHIFT- ON
1	Running operation	---
2	Positioning run	---
3	Load playback operation	---
4	Unload playback operation	---
5	Teaching operation	---
6	Switch to the HOST mode	---
7	---	---
8	---	---

9.4.2.2. In Running Operation

Button assignment in the running operation is shown in the table 9.4.2.2.1.

Table 9.4.2.2.1. Button Assignment in the Running Operation

Function Button	SHIFT- OFF	SHIFT- ON
1	M/D roller left	---
2	M/D roller right	---
3	Forward at the first speed (slow speed)	---
4	Backward at the first speed (0.2m/s)	---
5	Forward at the second speed (0.4m/s)	---
6	---	---
7	---	---
8	Obstacle sensor on/off	---

9.4.2.3. In Transfer Teaching

Button assignment in transfer teaching is shown in Table 9.4.2.3.1.

Table 9.4.2.3.1. Button Assignment in Transfer Teaching

Function Button	SHIFT- OFF	SHIFT- ON
1	Move in the X direction (forward)	Open/close the gripper
2	Move in the X direction (backward)	Store offset data
3	Move in the Y direction (front, vehicle left side)	Open/close the fall prevention mechanism
4	Move in the Y direction (rear, vehicle right side)	Store teaching data
5	Move in the Z direction (downward)	Lower the teaching position
6	Move in the Z direction (upward)	---
7	Move in the direction (CW)	---
8	Move in the direction (CCW)	Return to the home position

9.4.2.4. Exceptional Operation Button

Exceptional operation buttons are shown below.

9.4.2.4.1. Before Initial Waiting

Assignment of the interlock reset button when returning to the home position before the initial waiting is shown in Table 9.4.2.4.1.1.

Table 9.4.2.4.1.1. Button Assignment before Initial Waiting

Function Button	SHIFT- OFF	SHIFT- ON
1	Grip open Note 1	---
2	---	---
3	---	---
4	---	---
5	---	---
6	---	---
7	---	---
8	---	---
RETURN	Interlock Reset Note 2	---

Note 1: Opening of the grip is possible when there is no load. When there is a load, it becomes an error.

Note 2: When the gripping part is not at its home position, the interlock will be stopped. This button is used to reset this condition.

9.4.2.4.2. When an Error Occurs

Button assignment when an error has occurred is shown in Table 9.4.2.4.2.1.

Table 9.4.2.4.2.1 Button Assignment when an Error Occurred

Function Buttons	SHIFT- OFF	SHIFT- ON
1	M/D roller left	---
2	M/D roller right	---
3	---	---
4	---	---
5	---	---
6	---	---
7	---	---
8	---	---
RESET	Error Reset	---

Intentionally left blank.

10. Installation and Removal of the Vehicle

Install and remove the vehicle onto/from the OHT track using the maintenance lifter.

10.1. Vehicle Exchange on the Track

10.1.1. Installation of the Vehicle

- (1) A backup vehicle is loaded onto the vehicle cart. Move this backup vehicle to the maintenance lifter.
- (2) Connect the lifter operation panel to the connector on the ground.
- (3) Turn on the key switch on the lifter operation panel to turn on the power to the operation panel.
- (4) When the operation panel menu screen is displayed, press Manual and perform the following operations.
- (5) Lower the lifter rail and connect it to the vehicle cart.
- (6) Move the vehicle manually from the vehicle cart onto the lifter. When doing this, make sure that you press the vehicle stopper on the lifter to release it.
- (7) Bring the lifter up with the backup vehicle loaded.
- (8) When the lifter reaches the top, the UP button will illuminate. Lock the lifter stopper and release the vehicle stopper.
- (9) Use the push bar to move the vehicle manually to the position on the track where non-contact power can be supplied.
- (10) Once a series of operations is completed, turn off the key switch on the operation panel and disconnect the connector.

10.1.2. Vehicle Removal

- (1) Move the vehicle on the lifter rail manually using the push bar.
- (2) Connect the lifter operation panel connector and the connector on the ground. After connecting them, turn the key switch on the operation panel on, and wait for the menu screen to be displayed.
- (3) When the menu screen is displayed, lower the lift and connect the vehicle cart and the lifter.
- (4) Move the vehicle manually from the lifter onto the vehicle cart.
- (5) Bring up the lifter.
- (6) When the lifter reaches the top, lock the lifter stopper and release the vehicle stopper, then turn off the key switch on the operation panel and disconnect the connector.

Warning

Do not install/remove the vehicle when the FOUP is loaded on.
Do not go into the operation area of the maintenance shifter/lifter.

Intentionally left blank.

11. Error Recovery Procedures

Recovery procedures when an error has occurred are described below.

- (1) An error has occurred.
- (2) Check the error condition.
- (3) **Make sure that you keep the vehicle log with more than 2000 entries and the OHVC communication log with more than 1000 entries.**.....Note 1
- (4) Refer to **the troubleshooting section of the "Maintenance Manual"** for the error condition and perform an error recovery.
- (5) If an immediate recovery is difficult, move the vehicle to the maintenance lifter by remote control and the push bar to remove it from the track (also remove from the OHVC registration), then investigate the cause and perform a recovery.
- (6) The running route where the error occurred will be closed due to the error. Once the error has been recovered, (or after removing the problem vehicle from the track), release the closed route from the OHVC.
- (7) Switch the OHVC to automatic mode, and automatic operations will be resumed.

Note 1: For the log file name, choose a name that is easy to understand.

Example) Vehicle Log: V(vehicle number)-(error number)-(date)-(serial number 01-)

Communication Log: H(vehicle number)-(error number)-(date)-(serial number 01-)



Danger

Recovery from an error can be performed only by personnel who have received training in maintenance and teaching.

Intentionally left blank.