



USER INTERFACE CONFIGURATIONS FOR 300-mm EQUIPMENT LOAD PORTS

AUX 0010-0304

Foreword

Publication of this document as Auxiliary Information independent of any standards was authorized by a $\frac{2}{3}$ -majority vote of the Japan Physical Interfaces and Carriers (PI&C) Committee at its meeting in Tokyo on July 4, 2003. This action was subsequently approved by the PI&C Global Coordinating Subcommittee by e-mail ballot on July 18, 2003 and by the Japan Regional Standards Committee by ballot on August 20, 2003.

The International Load Port Operations Interface Task Force, chartered under the Japan PI&C Committee and led by Tomoyuki Masui of Selete, originally requested publication of this document. This document was originally published as Aux 006-0201 in 2001. Since the 2 years posting period ended in 2003, this document was reviewed, updated and proposed to extend its posting period. The purpose is to provide examples of manual load port operation interfaces for 300-mm equipment.

This document was developed by combining 300-mm load port user interface specifications from KLA-Tencor and TEL. The information in this document has been furnished by these two companies for informational use only and is subject to change without notice.

The user interface descriptions in both of these company specifications are based on surveys of equipment users' requirements conducted by the two companies. The KLA-Tencor specification defines a software configurable set of load port status indicator lights and the functionality of a manual transfer push button required to support various user-defined load port user interface operating scenarios. This document also provides a summary of four popular 300-mm load port user interface configurations and shows how the company's configurable user interface can support all of these configurations.

The TEL specification describes the load port user interface configuration supplied by the company as "standard." This configuration, which includes the func-

tionality of a manual operator access switch, is a super-set of user-defined functionalities as determined in their survey of user requirements. This specification also describes two additional configurations supported by TEL as options: "switchless-type" and "Selete."

The load port user interface configurations and functionalities presented in the two documents correlate closely with each other. Thus the information presented herein is expected to be useful for 300-mm equipment suppliers and users throughout the industry.

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KLA-TENCOR

STANDARD

300MM LOAD PORT USER INTERFACE

REVISION 2.0

06/23/2003

Revision History

Rev.	Date	Change Description
1.0	06/28/2000	Creation
1.1	09/12/2000	Updated. Minor edits and update to optional button section
1.2	10/06/2000	Updated based upon new requirements. Added section 3.2.4 Minor edits in section 3.2.5 Added item 6, 9, 10 and 11 in section 3.2.6 Added section 3.2.7.4 & 3.2.7.5
1.3	10/28/2000	1. Some minor edits throughout 2. Manual transfer completion timer is now available without push button option. 3. Removed push button internal indicator reliance on reserved for unload state. 4. Added a manual transfer event section (3.3.7)
1.4	10/31/2000	1. Removed 3098 example indicator light configuration table. 2. Changed Flashing to Blinking 3. Broke the transfer complete timer up into placement complete and removal complete timers 4. Removed all references to “reserved for unload”. 5. Specified that any combination of the specified light colors is permitted. 6. Add text which specifies that a second push button event can be used to abort a manual transfer. 7. Added manual load/unload in progress mapping items to address example configuration scenario C.
1.5	11/02/2000	1. Renamed Placement/Removal Complete Timers to Load/Unload Completion timers. 2. Add Customer C example indicator light configuration table back to document.
1.6	11/06/2000	1. Changed “Flash” to “Blink” in configuration example C 2. Removed proposal wording.
1.7	11/09/2000	Removed reference to NFPA79 in paragraph 3.1.2 and used more general wording.
1.8	05/02/2001	Modified for auto manual placement and removal and Load Port Transfer Start /Complete UI button
1.9	06/11/2003	Added two manual transfer scenarios. Removed OutOfService state.
2.0	06/23/2003	Added unclamp manual transfer scenario

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1 SCOPE

The document is intended to introduce the functional requirements of the operator user interface for 300mm FOUP load ports. The document also presents an overview of some key mechanical attributes that are relevant to the operational functionality of the interface.

2 INTRODUCTION

300mm wafer factory requirements for load port indicator lights and push buttons appear to be unique for most every wafer manufacturer. This places an unreasonable burden on load port vendors and equipment suppliers. This document presents a solution to this dilemma. The solution is based upon knowledge of current 300mm wafer manufacturer requirements and has been designed to meet them all.

This document assumes no boundaries with respect to the separation of load port mechanical requirements and S/W functional requirements. All components, both H/W and S/W are discussed for the sake of completeness and understanding. If required these two aspects of the standard may be separated for adoption into the appropriate H/W and S/W specifications.

3 STANDARD INTERFACE

3.1 Optional Indicator Lights

3.1.1 Overview

Many wafer manufactures have expressed interest in indicator lights in order to convey state information to the equipment operators. Some of the commonly requested states are listed below.

1. Material presence and placement.
2. Current transfer state of the load port (manual or auto).
3. Material ready for removal or load port ready to receive material.
4. Load port reservation state (reserved or unreserved).

Item #1 is required by all wafer manufacturers and is a standard feature on all 300mm load ports. Therefore the optional indicator lights discussed within are intended to supplement these existing required lights. This standard is specifying that up to a maximum of four (in addition to presence and placement) appropriately sized optional indicator lights be located on the top panel of the 300mm load port (above the FIMS port or entry port for internal buffers and above the top of the FOUP for visibility by operators). The lights must be arranged horizontally and must be programmable in a manner similar to those on a signal tower. The equipment state to indicator light state mapping will be provided via a user modifiable configuration table or equivalent mechanism. This will allow the user to customize the lights for their own needs. The details of this standard interface are presented in the sections below.

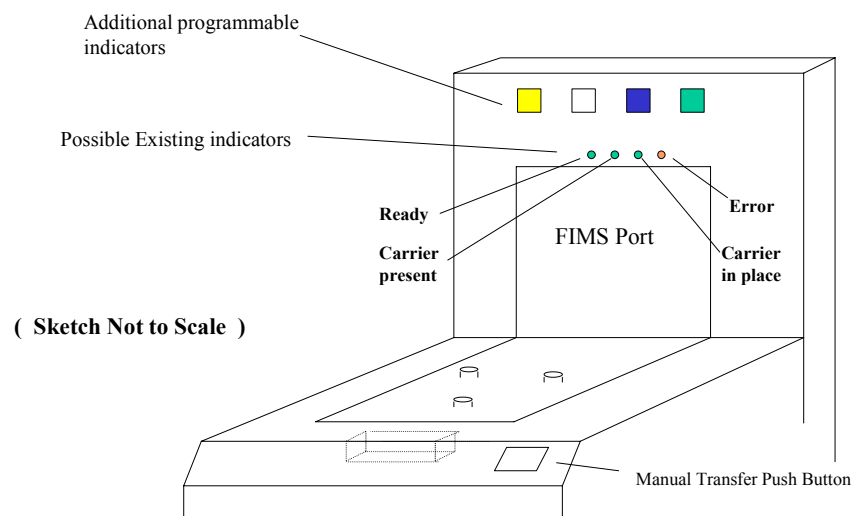
3.1.2 Indicator Colors

Yellow (Amber), white, blue and green lights must be available. Any combination of these colors must be available on the load port. The lights can be turned on, off and must also support blinking. All colored indicator light must be used in a manner consistent with that defined by all relevant safety standards. The use of colored indicator lights may be restricted by the specifications required to obtain S2 and/or CE compliance.

3.1.3 Indicator Location and Size

The lights need to be clearly visible from approximately 50 feet. The size should be somewhere on the order of 3/8 to 1/2 inch. They must be located in a horizontal pattern on the upper vertical panel of the 300mm FOUP load port. This puts them at about eye level and clear of all obstructions. The figure below shows an example load port with four optional indicator lights.

Example 300-mm Load port Status Indicator Light Configuration



3.1.4 Equipment States Available for Mapping

The following equipment states represent the minimum set that must be available for mapping to light states.

1. Material is present but not properly placed.
2. Load port access state model is in the automatic state.
3. Load port access state model is in the manual state.
4. An automatic transfer is in progress.
5. Material is ready for manual removal. Load port transfer state model is in ready to unload state and load port access state model is in manual mode.
6. Load port is ready for manual delivery. Load port transfer state model is in ready to load state and load port access state model is in manual mode.
7. Load port transfer state model is in transfer blocked state.
8. Reservation state model is in reserved state.
9. Reservation state model is in unreserved state.
10. Ready for manual delivery and reserved.
11. Manual load in progress. Load port transfer state model is in the transfer blocked state and load transfer is in progress. Access mode state model is in manual mode.
12. Manual unload in progress. Load port transfer state model is in the transfer blocked state and unload transfer is in progress. Access mode state model is in manual mode
13. Material is queued for processing.

14. Material is currently being processed.
15. Load port is in an alarmed state. This could be a load port operational, access mode violation, transfer error, or carrier present but not placed alarm.

3.1.5 Requirements

The requirements for the indicator lights are as follows.

1. The lights must be optional. Whether the lights are physically present but not visible or simply not present at all is up to the equipment supplier. The semiconductor manufacturer must be able to specify whether the light option is to be provided or not.
2. Configurations utilizing a minimum of 4 lights must be available. Whether all four are physically present but selectively not visible or the exact number of customer desired lights is provided is left to the equipment supplier. The semiconductor manufacturer will specify which lights, by color, are desired.
3. Sufficient space must be provided above or below each light for the attachment of an indicator label. The label will indicate the light's significance. Labels must be provided by the load port manufacturer and must include at a minimum the states listed in section 3.1.4 above.
4. The lights must be programmable based upon the states listed in section 3.1.4 above via a configuration table or other similar mechanism.
5. The light color, location, and size will be as specified in sections 3.1.2 and 3.1.3 above.
6. Low level light control (on, off, blinking) must be provided by the load port manufacturer and must be controlled through the load ports existing communications interface.

3.2 Manual Transfer Completion Timers

In order to avoid conflicts with normal tool operations or premature transition to auto from manual transfer mode, configurable manual transfer completion timers must be provided to conclude manual transfer operations. These timer mechanisms are required to allow an operator ample time to complete any remaining transfer activity required after the successful placement or removal of material from a load port. When using a PGV this extra time may be used for retracting the transfer arm and/or providing the operator with enough time to get clear of the transfer zone. When the timer expires the tool will assume that the manual transfer operation has completed.

Two timers must be defined. One for carrier placement and one for removal. Both timers will function in an identical fashion but are distinct to allow different timer intervals for manual carrier placement and removal. Throughout this document these timers will be referred to as the "Load Completion", and "Unload Completion" timers.

3.2.1 Requirements

1. The manual load and unload completion timers are always required.
2. The timers are operational in manual transfer mode. In auto mode, if a carrier is manually placed or removed, the timers will also be operational.
3. The manual transfer completion timers must be user programmable. A timer value of 0 must indicate that the timer never expires. Under these circumstances the operator is required to press the manual transfer button in order to complete the transfer. Refer to section 3.3 below for a detailed description of the optional manual transfer push button. Otherwise the timer may contain values from 1 to 900 seconds (15 minutes).
4. A manual transfer completion timer value of 0 must only be valid when the optional manual transfer push button is present. This requirement exists to protect the end user from inadvertently locking out a load port when the optional push button is not present.

5. The load completion timer becomes active when material becomes present and properly placed onto the load port. The unload completion timer becomes active when material is removed from the load port.

3.3 Optional Manual Transfer Push Button and Abort Timer

The following subsections define the functionality of an optional operator activated transfer start/completion push button and associated timer mechanisms. Not all semiconductor manufactures will require this functionality.

3.3.1 Overview

Some customers desire an operator activated load port push button to assist with manual delivery and removal. The button must contain a light. The light indicates whether the button is enabled. If the light is not lit the push button is not enabled and will have no effect if pushed. The light within the push button is lit solid only when the load port is in manual mode and in either the “ready for load” or “ready to unload” state. When the button is pushed while lit solid it signifies the start of a manual transfer operation (analogous to an AMHS transfer start) and will then begin to blink. The light will remain blinking until the transfer completes or is aborted. Transfer completion is indicated by a second button push, after carrier arrival/removal, or when the programmable manual transfer completion timer expires. Transfer abort is indicated by a second button push prior to carrier arrival/removal or manual transfer abort timer expiration (See section 3.3.4). Use of the optional push is not required. Button initiated manual carrier load/unload operations are permitted as long as the load port is in manual mode and also in the transfer ready state.

3.3.2 Button Location

The button will be located on the horizontal surface between the back of the carrier and the load face plane. Similar to the hardware push button on the load port, the tool software user interface must provide a button for the operated activated transfer start and completion.

3.3.3 Button Functionality

The button serves two purposes. The first is to signal the start and completion of a manual transfer operation. These button press events are analogous to the E84 transfer start and complete boundaries. Secondly, since the push button contains a light it also serves as an additional indicator. This indicator, when lit solid, reflects the fact that the load port is in manual mode and in the transfer ready state. When blinking it indicates that the load port is in the middle of a manual transfer operation.

3.3.4 Manual Transfer Abort Timer

In order to avoid accidental tool idle time a configurable manual transfer abort timer must be provided to possibly abort manual transfer operations. This mechanism is required since it is possible that an operator will push the load port’s manual transfer button at the beginning of a transfer operation and forget to perform the transfer. In this case the timer can be configured to expire and will signal a transfer abort. This timer starts when the manual transfer button is pressed.

3.3.5 Requirements

The requirements for the optional load port push button and timers are as follows.

1. The push button must be optional. Whether the push button is physically present but selectively not visible is left to the equipment supplier.
2. The push button must contain a white light or appear white in color.
3. The light must be lit solid when the load port is in manual transfer mode and in the transfer ready state.
4. The light must blink when the load port is in manual transfer mode, and a transfer is in progress.
5. Transfer start must be indicated by a button press or carrier arrival/removal.
6. Transfer completion must be indicated by a second button press, after arrival/removal, or expiration of one of the configurable manual transfer completion timers.
7. When the manual transfer button is used to start a transfer the manual transfer abort timer must start. A timer value of 0 must indicate that the timer never expires. Under these circumstances the operator is required to perform the transfer or abort by a second button push. Otherwise the timer may contain values from 1 to 900 seconds (15 minutes).
8. When the manual transfer abort timer expires prior to manual carrier arrival/removal a manual transfer aborted event must occur.
9. When a carrier is removed or arrives the manual transfer abort timer must be stopped in order to avoid the generation of the manual transfer aborted events.
10. A second push of the button prior to carrier arrival/removal must stop the manual transfer abort timer and generate a manual transfer abort event.
11. When the operator uses the manual transfer push button to indicate a transfer completion the manual transfer completion timer must be stopped in order to avoid the generation of two transfer completion events.
12. The manual transfer abort timer is only functional with the manual push button option. If the manual button option is not available on the load port the manual transfer abort timer mechanism must not be functional.
13. The push button must only be enabled when lit solid or blinking. If not enabled a button press will have no effect.
14. The push button must be located on the horizontal surface between the back of the carrier and the load face plane.

3.3.6 Manual Transfer Scenarios

The following manual transfer scenarios are presented for clarity. In all cases the manual transfer completion timers (placement and removal) are set to 5 seconds.

3.3.6.1 The Optional Manual Transfer Button is not Available

This case demonstrates a load/unload transfer without the use of the manual transfer button and timers.

Carrier Load:

1. An operator approaches the tool with material.
2. The operator places material on the tool. The carrier arrival and transfer start events are generated. The load completion timer is started.
3. The load completion timer expires after 5 seconds and the transfer complete event is generated.

Carrier Unload:

1. An operator approaches the tool to retrieve material.
2. The operator removes material from the tool. The carrier removal and transfer start events are generated. The unload completion timer is started.
3. The unload completion timer expires after 5 seconds and the transfer complete event is generated.

3.3.6.2 The Optional Manual Transfer Button is Available but Not Used

This case demonstrates a load/unload transfer on a load port configured with the manual transfer button. In this case the operator chooses not to use the push button.

Carrier Load:

1. An operator approaches the tool with material.
2. The operator places material on the tool. The carrier arrival and transfer start events are generated and the load completion timer is started.
3. The load completion timer expires after 5 seconds and a transfer complete event is generated.

Carrier Unload:

1. An operator approaches the tool to retrieve material.
2. The operator removes material from the tool. The carrier removal and transfer start events are generated and the unload completion timer is started.
3. The unload completion timer expires after 5 seconds and a transfer complete event is generated.

3.3.6.3 The Optional Manual Transfer Button is Used for Transfer Start but not Complete

In this case the optional manual transfer button is used to initiate a load/unload transfer and the manual transfer complete timer is used to conclude it.

Carrier Load:

1. An operator approaches the tool with material.

2. The operator presses the manual transfer button. The button begins to blink, the manual transfer abort timer starts, and the transfer start event is generated.
3. The operator eventually places the material onto the load port. The carrier arrival event is generated, the button continues to blink, the manual transfer abort timer is stopped and the load completion timer is started.
4. The operator forgets to push the manual transfer button, the load completion timer expires after 5 seconds and a transfer complete event is generated.

Carrier Unload:

1. An operator approaches the tool to retrieve material.
2. The operator presses the manual transfer button. The button begins to blink, the manual transfer abort timer starts, and the transfer start event is generated.
3. The operator eventually removes the material from the load port. The carrier removal event is generated, the button continues to blink, the manual transfer abort timer is stopped and the unload completion timer is started.
4. The operator forgets to push the manual transfer button and the unload completion timer expires after 5 seconds and a transfer complete event is generated.

3.3.6.4 The Optional Manual Transfer Button is Used for Transfer Start but Transfer Never Occurs

In this case the optional manual transfer button is used to initiate a load/unload transfer but the operator fails to perform the transfer before the transfer abort timer expires.

Carrier Load:

1. An operator approaches the tool with material.
2. The operator presses the manual transfer button. The button begins to blink, the manual transfer abort timer starts and the transfer start event is generated.
3. The operator fails to place the material onto the load port before the manual transfer abort timer expires.
4. The manual transfer abort event is generated.

Carrier Unload:

1. An operator approaches the tool to retrieve material.
2. The operator presses the manual transfer button. The button begins to blink, the manual transfer abort timer starts, and the transfer start event is generated.
3. The operator fails to remove the material from the load port before the manual transfer abort timer expires.
4. The manual transfer abort event is generated.

3.3.6.5 The Optional Manual Transfer Button is Used for Transfer Start and Transfer Abort

In this case the optional manual transfer button is used to initiate a load/unload transfer but the operator decides to abort the transfer with a second button press.

Carrier Load:

1. An operator approaches the tool with material.
2. The operator presses the manual transfer button. The button begins to blink, the manual transfer abort timer starts and the transfer start event is generated.

3. The operator decides to abort the transfer and presses the manual transfer push button again.
4. The manual transfer abort timer is stopped and the transfer abort event is generated.

Carrier Unload:

1. An operator approaches the tool to retrieve material.
2. The operator presses the manual transfer button. The button begins to blink, the manual transfer abort timer starts, and the transfer start event is generated.
3. The operator decides to abort the transfer and presses the manual transfer push button again.
4. The manual transfer abort timer is stopped and the transfer abort event is generated.

3.3.6.6 The Optional Manual Transfer Button is Used for Transfer Complete

In this case the optional manual transfer button is not used to initiate a load/unload transfer but is used to conclude it.

Carrier Load:

1. An operator approaches the tool with material.
2. The operator eventually places the material onto the load port. The transfer start and carrier arrival events are generated, the push button light begins to blink, and the load completion timer is started.
3. The operator pushes the manual transfer button, the load completion timer is stopped, and a transfer complete event is generated.

Carrier Unload:

1. An operator approaches the tool to retrieve material.
2. The operator eventually removes the material from the load port. The transfer start and carrier removal events are generated, the button light begins to blink, and the unload completion timer is started.
3. The operator pushes the manual transfer button, the unload completion timer is stopped, and a transfer complete event is generated.

3.3.6.7 The Optional Manual Transfer Button is Used for Transfer Start and Complete

In this case the manual transfer button is used to start and complete the transfer.

Carrier Load:

1. An operator approaches the tool with material
2. The operator presses the manual transfer button. The button begins to blink, the manual transfer abort timer starts, and the transfer start event is generated.
3. The operator eventually places the material onto the load port. The carrier arrival event is generated, the button continues to blink, the manual transfer abort timer is stopped and the load completion timer is started.
4. The operator pushes the blinking manual transfer button and the transfer complete event is generated. The load completion timer is stopped at this point.

Carrier Unload:

1. An operator approaches the tool to retrieve material.
2. The operator presses the manual transfer button. The button begins to blink, the manual transfer abort timer starts, and the transfer start event is generated.
3. The operator eventually removes the material from the load port. The carrier removal event is generated, the button continues to blink, the manual transfer abort timer is stopped and the unload completion timer is started.
4. The operator pushes the blinking manual transfer button and the transfer complete event is generated. The unload completion timer is stopped at this point.

3.3.6.8 The Optional Manual Transfer Button is Used when Auto-unclamp is disabled

In this case the manual transfer button is used when Auto-unclamp is disabled.

Carrier Load:

1. An operator approaches the tool with material.
2. The operator eventually places the material onto the load port. The transfer start and carrier arrival events are generated and the push button light begins to blink, and the load completion timer is started.
3. The operator pushes the manual transfer button, the load completion timer is stopped, and a transfer complete event is generated.
4. The loadport clamps the carrier, the Clamped events are generated.

Carrier Unload:

1. An operator approaches the tool to retrieve material.
2. The operator presses the manual transfer button. The loadport unclamps the carrier, the Unclamped events are generated. The button begins to blink, the manual transfer-abort timer starts, and the transfer start event is generated.
3. The operator eventually removes the material from the load port. The carrier removal event is generated, the button continues to blink, the manual transfer abort timer is stopped and the unload completion timer is started.
4. The operator forgets to push the manual transfer button and the unload completion timer expires after 5 seconds and a transfer complete event is generated.

3.3.6.9 The Operator removes the carrier after it is placed, but before the load transfer is complete. The Optional Manual Transfer Button is Available.

1. An operator approaches the tool with material.
2. The operator places material on the tool. The load transfer start and carrier arrival events are generated, the push button light begins to blink, and the load completion timer is started.
3. The operator removes the carrier before load completion timer expires.
4. The carrier removal and load transfer abort events are generated, the button continues to blink, and the unload completion timer is started.
5. The unload transfer completes when the unload completion timer expires or the operator presses the push button. The unload transfer complete event is generated.

3.3.6.10 The Operator places the carrier after it is removed, but before the unload transfer is complete. The Optional Manual Transfer Button is Available.

1. An operator approaches the tool to retrieve material.
2. The operator eventually removes the material from the load port. The unload transfer start and carrier removal events are generated, the button light begins to blink, and the unload completion timer is started.
3. The operator places the carrier before unload completion timer expires.
4. The unload transfer abort and carrier arrival events are generated, the button continues to blink, and the load completion timer is started.
5. The load transfer completes when the load completion timer expires or the operator presses the push button. The load transfer complete event is generated.

3.3.7 Manual Transfer Events

For completeness this section lists the events required to support the functionality presented within this specification.

Event	Description	When Generated
TransferStart	A transfer operation has started. For the purposes of this document this event refers to a manual transfer start.	Carrier arrival, removal or a transfer button press prior to carrier arrival or removal.
TransferComplete	A transfer operation has completed. For the purposes of this document this event refers to a manual transfer completion.	Manual transfer completion timer expiration, or a transfer button press after carrier arrival or removal.
TransferAborted	A transfer operation has been aborted. For the purposes of this document this event refers to a manual transfer abort.	Manual transfer abort timer expiration.

4 EXAMPLE INDICATOR LIGHT TABLE CONFIGURATIONS

The subsections below present a few of the many possible indicator light control configurations. The following examples were chosen based upon the current understanding of semiconductor manufacturer requirements. Since the control tables are completely configurable by the end user there are many possible variations.

4.1 Customer A Configuration. No Optional Indicator Lights or Button

Some customers may specify that the optional lights and push button functionality defined within this specification are not required. The optional lights are supplied in addition to the required carrier present and placement indicators. Therefore these required indicators will always exist. In the case where no optional indicator lights or buttons are required the load port will be configured such that the optional lights and buttons are not visible. The equipment state to indicator light mapping mechanism will be disabled in this case.

4.2 Customer B Configuration. Two Optional Indicator Lights and No Button

Some customers may specify that two optional indicators are required. These customers may choose the color of the two visible lights from those specified within this interface standard. For the sake of example we will assume that the yellow and green lights are desired. The yellow light will be lit to indicate that the port is in auto transfer mode and not lit to indicate manual mode. The green light will be lit solid to indicate that operator action is permitted at the port and will blink in the case where the carrier should be removed. The equipment state to indicator light mapping is shown in the table below.

State	Yellow light (Xfer mode)	White light (Not visible)	Blue light (Not visible)	Green light (Operator Access)
Material present but not properly placed	X	X	X	X
Auto mode	On	X	X	Off
Manual mode	Off	X	X	X
Auto Transfer in progress	X	X	X	X
Ready for manual removal	X	X	X	Blink
Ready for manual delivery	X	X	X	On
Transfer blocked	X	X	X	Off
Reserved	X	X	X	X
Unreserved	X	X	X	X
Ready for manual delivery and reserved	X	X	X	X
Manual load in progress	X	X	X	X
Manual unload in progress	X	X	X	X
Queued	X	X	X	X
Processing	X	X	X	X
Alarm active	X	X	X	X

Note: “X” indicates a don’t care condition. The light state will not be changed.

4.3 Customer C Configuration. Two Optional Indicator Lights and No Button

Similar to the configuration for customer B shown above, some customers may want to draw attention to an empty load port that has been reserved for a load transfer. The configuration table would be programmed as shown below. The table is identical to that shown for the customer B configuration with the exception of a blinking green light when the load port is ready for manual delivery and reserved.

State	Yellow light (Xfer mode)	White light (Not visible)	Blue light (Not visible)	Green light (Operator activity allowed)
Material present but not properly placed	X	X	X	X
Auto mode	On	X	X	Off
Manual mode	Off	X	X	X
Auto Transfer in progress	X	X	X	X
Ready for manual removal	X	X	X	Blink
Ready for manual delivery	X	X	X	On
Transfer blocked	X	X	X	Off
Reserved	X	X	X	X
Unreserved	X	X	X	X
Ready for manual delivery and reserved	X	X	X	Blink
Manual load in progress	X	X	X	X
Manual unload in progress	X	X	X	X
Queued	X	X	X	X
Processing	X	X	X	X
Alarm active	X	X	X	X

Note: "X" indicates a don't care condition. The light state will not be changed

4.4 Customer D Configuration. Two Optional Indicator Lights and Optional Push Button

Some customers may specify that two optional indicator lights and the push button are required. These customers may choose the color of the two visible lights from those specified within this interface standard. For the sake of example we will assume that the blue and green lights are desired. In manual transfer mode the green light will be lit to indicate that the port is ready to load and will blink when ready to load and the transfer is in progress, otherwise it will be off. In manual transfer mode the blue light will be lit to indicate that the port is ready to unload and will blink when ready to unload and the transfer is in progress, otherwise it will be off. The push button will be present and will function as defined in section 3.3. In the table below please note that unlike all other indicators the lighted push button is not user programmable and is shown in the table for completeness. The functionality of the lighted push button is as defined in section 3.3

State	Yellow light (Not visible)	White light (Not visible)	Blue light (Unload ready)	Green light (Load ready)	Lighted push button (not programmable)
Material present but not properly placed	X	X	X	X	N/A
Auto mode	X	X	Off	Off	N/A
Manual mode	X	X	X	X	N/A
Auto Transfer in progress	X	X	X	X	N/A
Ready for manual removal	X	X	On	Off	On
Ready for manual delivery	X	X	Off	On	On
Transfer blocked	X	X	Off	Off	N/A
Reserved	X	X	X	X	N/A
Unreserved	X	X	X	X	N/A
Ready for manual delivery and reserved	X	X	X	X	N/A
Manual load in progress	X	X	X	Blink	Blinking when transfer is active
Manual unload in progress	X	X	Blink	X	Blinking when transfer is active
Queued	X	X	X	X	N/A
Processing	X	X	X	X	N/A
Alarm active	X	X	X	X	N/A

Note: "X" indicates a don't care condition. The light state will not be changed



TEL 300mm CIM/FA Implementation Guidelines

Volume 4: Functional Guidelines

Volume 4-3: Load Port Operation Interface Guidelines

Rev. 2.03.00.SEMI.AUX

Release for SEMI Auxiliary Document

June 10, 2003

**Factory Integration Promotion Group
Marketing Dept.
Tokyo Electron Limited**



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1 Background

1.1 Requirement of Manual Operation

300mm wafer factories will be highly automated factories because of high productivity requirements and heavy wafer carriers. However, manual operation will still be needed for purposes such as Non-Production-Wafer Operation, AMHS back-up and/or maintenance.

1.2 Survey

TEL has been seeking a standard "Load port Operation Interface" which is acceptable by the majority of TEL's customers in order to suppress cost increases due to unexpected variations.

TEL initiated customer surveys to capture customer requirements. This guideline has been defined based on those surveys.

1.3 Customer Specifications

After TEL's standard definitions were created, some customers groups came up with their requirements.

TEL complies with these requirements as Customer Options.

2 Scope

This document covers the following guidelines and specifications of Load port Operation and Operation Interface at each Load port.

2.1 Functional definition

This document defines functions for following entities at each Load port.

- a Indicators at each Load port
- b Switches at each Load port

2.2 Physical placement

This document defines physical placement guidelines of indicators and switches such as:

- a Position
- b Grouping and Order of indicators

2.3 Operation Scenario definition

This document defines operation scenarios at Load port by equipment type.

- a Fixed Buffer equipment
- b Internal Buffer equipment

3 Basic Requirements

This document is developed based on the following requirements.

3.1 GJG requirements

GJG Version 4.0 Section 2.5 Carrier Sensors at E15.1 Load port requires the following indicators at the load port. Colors for these indicators are not defined in GJG.

- a PRESENCE Indicator
- b PLACEMENT Indicator

3.2 SEMI Standard requirement



SEMI E87-1000 CMS Section 12.1 ASSOCIATED state indication requires the following indicator at the Load port. Color for this indicator is not defined in SEMI E87. RESERVE Indicator is not required by Switchless-Type nor SELETE specifications.

- a RESERVE Indicator

3.3 General requirements

The following requirements are generally recognized.

- a No placement/protrusion of Load port operation interface components in OHT chimney.
- b Load port operation interface should be separated from OHT trajectory.
- c No access across OHT trajectory is allowed.
- d Accessibility during PGV operation is a key point.
- e Load/Unload sequences should be distinguishable.
 - Carriers forgotten and left due to operator error during Load/Unload sequence should be distinguished.

4 Basic Rules

Load port operation interface defined in this document is based on the following basic rules.

4.1 Independence of Access Mode and Reserve

Access Mode and Reserve functions are independent. Access Mode can be changed regardless of Reserve state being ON or OFF.

4.2 Access Mode definition

Access Mode has the following definitions.

- a Access Mode should be defined per each Load port
Each Load port has its own Access Mode.
- b Access Mode cannot be changed by using the Load port Operation Interface
Access Mode should be changed by equipment based on higher level requirements such as operator requests through equipment GUI or a Host command.
- c Access Mode can only be frozen by using Load port Operation Interface.
For safe carrier handoff, Access Mode should be FROZEN during handoff.
Load port operation interface may have this FREEZE function under customers' selection.

4.3 Reserve function

- a Reserve state cannot be changed by using Load port Operation Interface
- b Load port can be reserved for:
 - AMHS carrier delivery
 - Internal Buffer carrier delivery
 - Manual carrier delivery

5 Indicator/Switch Color Selection

Load port Indicator Lights must be used in a manner consistent with applicable safety standards. The colors of indicator lights may be restricted by requirements for SEMI S2 and/or CE compliance.

Note: In case indicator color affects wafer processing, the color of indicators will be changed.



SEMI S2 refers to the following standards in “RELATED INFORMATION 2 ADDITIONAL STANDARDS THAT MAY BE HELPFUL”.

- a NFPA79 (National Fire Protection Association, Inc.): USA Standard Electrical Standard for Industrial Machinery
- b EN60204-1: European Standards Safety of Machinery-Electrical equipment of machines, Part 1

6 Functionality Requirements

6.1 Access allowance indication

In order to notify operators and keep operators from colliding with AMHS, including internal equipment transfer mechanism, the load port operation interface has the capability to indicate the states that do not allow operator interaction.

- a Access Mode (is AUTO)
- b Reserved (for AMHS or Internal Equipment Transfer)

6.2 Notification of operator access request

Notify access request to operator such as:

- a Load
- b Unload
- c Manual OK (Load or Unload)

6.3 Carrier sensor states indication

Indicate the states of carrier sensors defined in GJG.

- a Presence
- b Placement

6.4 Notify equipment is in normal operation or not

- a Maintenance
- b Tuning

6.5 “Freeze” Access Mode

Access mode should be frozen prior to handoff.

Switch to freeze Access Mode should be available per customer preference.



7 Physical Placement

This chapter defines the basic rules of the physical placement of indicators and a switch.

7.1 Fixed buffer type equipment with BOLTS interface compliant load ports

Both BOLTS/M type load port and BOLTS/Light type load port use the following placement zones.

7.1.1 Indicators

Indicators are placed above the opening for FOUP docking.

Indicators should not protrude in OHT chimney.

7.1.2 Switch

Switch is placed at the front right of Load port if needed.

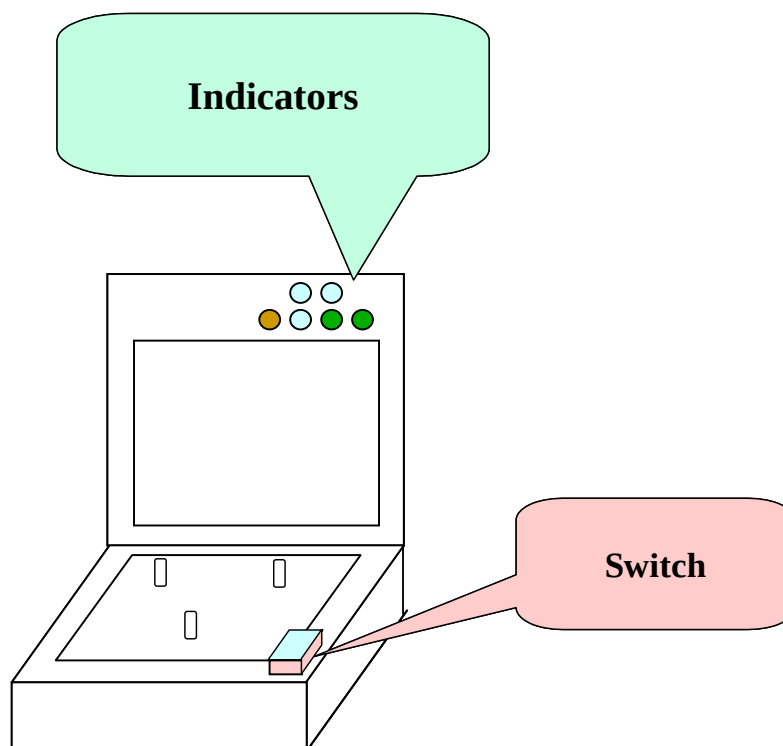


Figure 1: BOLTS/M, BOLTS/Light load port

7.2 Internal buffer type equipment with integrated load ports

Internal buffer type equipment usually has an integrated load port instead of BOLTS/M or BOLTS/Light type Loadport. Internal buffer type equipment uses the following placement zones.



7.2.1 Indicators

Indicators are placed over the opening for FOUP entrance on a front panel at the equipment boundary (D1 from FDP) or the load face plane.

For the equipment with enough width, indicators may also be placed on the side of FOUP entrance at load face plane.

No protrusion toward OHT chimney side (inside).

7.2.2 Switch

Switch is placed at the front right of Load port if needed.

For the equipment with enough width, the switch may also be placed on the side of FOUP entrance at load face plane, under the indicators.

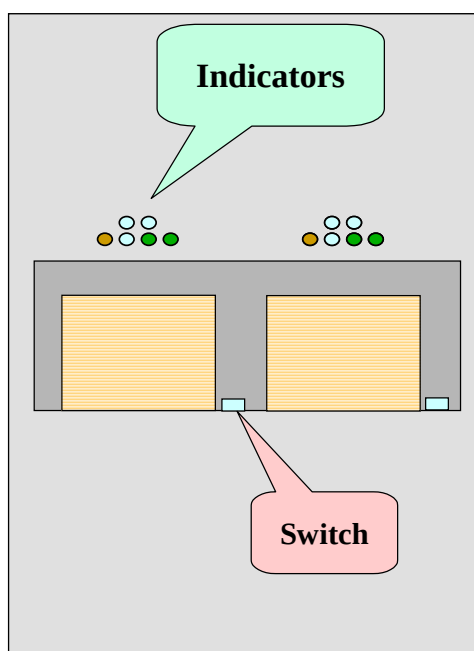


Figure 2: Equipment with narrow width

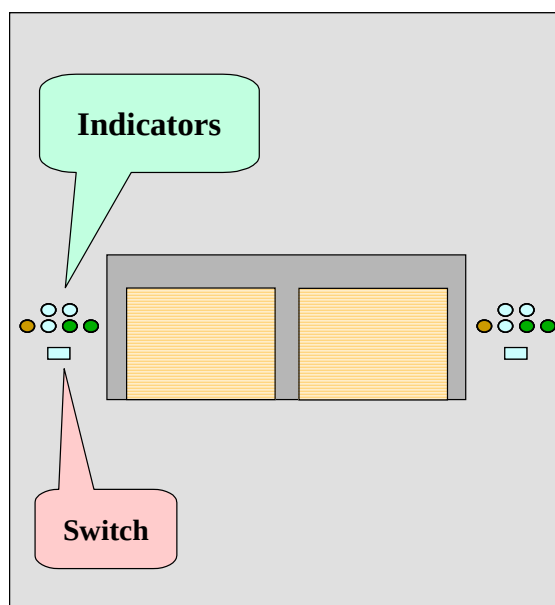


Figure 3: Equipment with enough width

8 Options

This document defines one superset specification based on TEL's customer survey and two customer options as shown in the table below.

"Superset" is Standard, "Switchless" and "Selete" are Standard Options.

Colors in () are also Standard Options.

Table 1 Options

Function	Superset (<u>Standard</u>)	Switchless (<u>Standard Option</u>)	Selete (<u>Standard Option</u>)
PRESENCE	Yellow (White)	Yellow (White)	Yellow
PLACEMENT	Green (White)	Yellow (White)	Green
AUTO	Red (Amber)	-	-
AUTO MODE	-	Orange (Amber/Yellow)	-
RESERVE	Yellow (White)	-	-
LOAD	Green (Green)	-	Green
UNLOAD	Green (Green)	-	Orange
MANUAL OK	-	Green (Green)	-
Operator Access	White (White)	-	White

Note: Colors in () are Standard Options.



9 Superset Specification

9.1 Functional Definitions

This section defines functionality of indicators and switch.

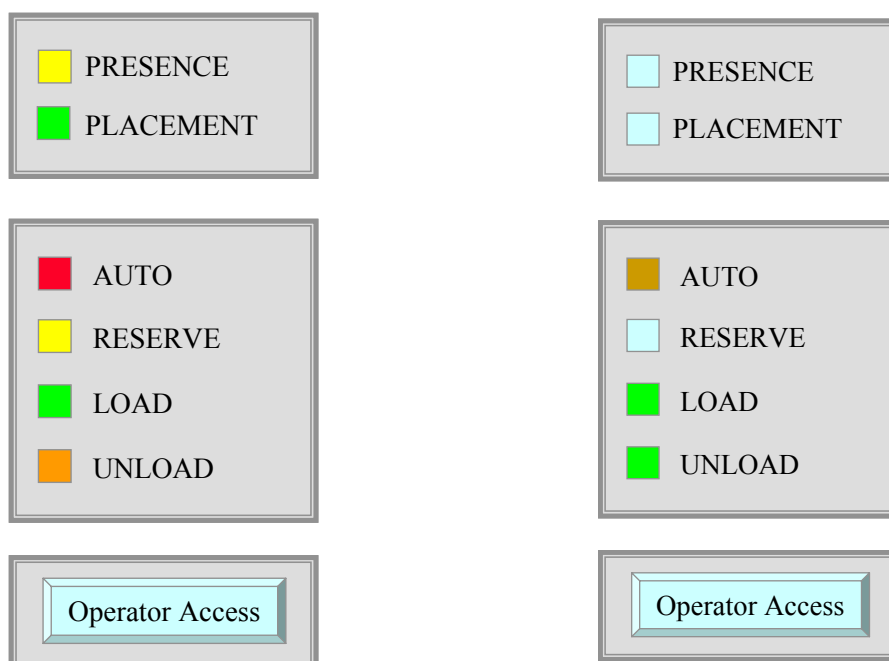


Figure 4: Functional image of indicators and switch for Superset

9.1.1 “PRESENCE” Indicator

- a Function:
 - Indicator which indicates presence of carrier on Load port as required in GJG.
 - “Presence” should also be active during “Placement” indicator is active.
- b Signal source:
 - Hardware level signal from “PRESENCE” sensor.
 - “Presence” signal/indicator may have a bounce (Chattering) during carrier handoff.
- c Color: Yellow (or White) LED (per local safety compliance and customer requirements)
- d States:
 - Off No Carrier is present on Load port.
 - On Carrier is present on Load port.

9.1.2 “PLACEMENT” Indicator

- a Function:
 - Indicator which indicates proper placement of carrier on Load port as required in GJG.



- b Signal source:
 - Hardware level signal from “PLACEMENT” sensor.
 - “Placement” signal/indicator may have a bounce (Chattering) during carrier handoff.
- c Color: Green (or White) LED (per local safety compliance and customer requirements)
- d States:
 - Off Carrier is not properly placed on Load port.
 - On Carrier is properly placed on Load port.

9.1.3 “AUTO” Indicator

- a Function:
 - “AUTO” indicator indicates that Access Mode is “AUTO”.
 - Operator access is not allowed when “AUTO” indicator is ON.
- b Signal source:
 - “Access Mode” flag in equipment.
- c Color: Red (or Amber) LED (per local safety compliance and customer requirements)
- d States:
 - Off Access Mode is not “AUTO” or “Out Of Service”.
 - On Access Mode is “AUTO” and “In Service”.

9.1.4 “RESERVE” Indicator

- a Function:
 - Indicator which indicates “RESERVE” state of E87.
- b Signal source:
 - “RESERVE” flag in equipment.
- c Color: Yellow (or White) LED (per local safety compliance and customer requirements)
- d States:
 - Off “RESERVE” is off.
 - On “RESERVE” initiated by “Bind” or “Reserve At Port” is on.
 - Blink “RESERVE” initiated by “Carrier Out” is on and access by internal equipment transfer mechanism is in progress.
- e Note:
 - “Reserve” state will be cleared after handoff completion.

9.1.5 “LOAD” Indicator

- a Function:
 - Indicator which indicates “Load Ready” and “Loading”.
 - This indicator is active only in Manual mode.
- b Color: Green LED
- c States:
 - Off No manual load is allowed. (Out of Service, Access Mode is AUTO, After LOAD Completion, Carrier Out start, etc.)
 - On Equipment is “Ready to Load”
 - Blink Handoff for “LOAD” is in progress.
Equipment is physically and logically ready for Handoff.



9.1.6 “UNLOAD” Indicator

a Function:

- Indicator which indicates “Unload Ready” and “Unloading”
- This indicator is active only in Manual mode.

b Color: Green LED

c States:

- Off No manual Unload is allowed. (Out of Service, Access Mode is AUTO, etc.)
- On Equipment is “Ready to Unload”
- Blink Handoff for “UNLOAD” is in progress.
Equipment is physically and logically ready for Handoff.

9.1.7 “Operator Access” Switch and Indicator

a Indicator Function:

- Indicator indicates “Manual Access Permission/Progressing”.

b Indicator Color: White LED (per local safety compliance and customer requirements)

c Indicator States:

- Off Manual access is not granted. Access Mode is not frozen.
- Blink Manual Handoff is in progress. Access Mode is frozen.
Equipment is physically and logically ready for Handoff.

d Switch Function:

- “Request” to start Operator access.
- “End” Operator access

e Switch Type: Momentary

f Switch Option:

- Switch function is inactivated by customer’s request under customer’s responsibility on safety.

9.1.8 Timers

a Load-Completion Timer

A Timer which gives the end of Hand-Off for LOAD in case Operator Access Switch is not pushed in time after PLACEMENT sensor turns on.

This timeout does not cause any error.

The Timer length will be defined by the equipment parameter.

b Unload-Completion Timer

A Timer which gives the end of Hand-Off for UNLOAD in case Operator Access Switch is not pushed in time after PRESENCE sensor turns off.

This timeout does not cause any error.

The Timer length will be defined by the equipment parameter.

c Presence-to-Placement Timer

This timer defines the maximum allowable time between Presence sensor and Placement sensor.

The Timer length will be defined by the equipment parameter.

Alarm will be generated on time out and equipment waits for operator’s instruction.

Operator should replace the FOUP (Placement sensor to be detected), and release the alarm



from GUI.

d Operator Interaction Timer

This timer defines the maximum allowable time between two OPERATOR ACCESS switch actions for handoff start request and handoff complete.

9.2 Scenarios – Fixed Buffer

9.2.1 Detail description for the titles

1. Load

Switch condition

Before: Before FOUP is carried, the switch is pushed.

After: After FOUP is carried, the switch is pushed

Timer: Timer is a trigger for a completion of the Hand Off sequence

No use: Switch is not used

2. Unload

Switch condition

Before: Before FOUP is removed, the switch is pushed.

After: After FOUP is removed, the switch is pushed

Timer: Timer is a trigger for a completion of the Hand Off sequence

No use: Switch is no used

3. Load port position condition

Clamp: Clamped position is necessary for the Unload indicator to be turned on

Unclamp: Unclamped position is necessary for the Unload indicator to be turned on



9.2.2 Total

9.2.2.1 Manual mode Total Load & Unload

Manual mode Total Load&Unload

Operator		Indicator						Switch	Hardware	
1.Loading Sequence Switch > Placement > Switch 2.Unloading Sequence Switch > Removal > Switch		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
		White	White	Green	Green	White	Amber	White		
1					On			On	Idle	LOAD is Normal (Default State) for Load port Idle State
2										
3	Push Operator Access Switch >									
4										
5	Place the FOUP/Carrier >				Blink			Blink	Hand Off	
6										Hand off starts from pushing the switch
7										
8	Push Operator Access Switch >	On	On							
9									FOUP/ Carrier Placed	Load Complete
10										
11										
12		:	:						:	Process Start
13										Process Complete
14										
15				On				On	Unclamped	Ready to Unload
16	Push Operator Access Switch >									
17				Blink				Blink	Hand Off	
18										
19	Remove the FOUP/Carrier >									
20										
21	Push Operator Access Switch >									
22					On			On	Idle	
23										



9.2.2.2 Auto mode Total Load & Unload

Operator		Indicator						Switch	Hardware	
1.Loading Sequence Placement > P-I/O Complete 2.Unloading Sequence Removal > P-I/O Complete		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
		White	White	Green	Green	White	Amber	White		
1					On			On	Idle	LOAD is Normal (Default State) for Load port Idle State
2										Host communicates change to AUTO MODE
3										
4							On			
5										
6	Place the FOUP/Carrier by AMHS									Hand Off (VALID On Received)
7										
8		On	On							P-I/O Complete (VALID Off Received)
9									FOUP/ Carrier Placed	Load Complete
10										
11									:	Process Start
12										
13									:	Process Complete
14										
15									Unclamped	Ready to Unload
16										
17										Hand Off (VALID On Received)
18	Remove the FOUP/Carrier by AMHS									
19										
20										P-I/O Complete (VALID Off Received)
21										
22									Idle	



9.2.3 Load

9.2.3.1 Load (Before & After) Normal case

Load (Before & After) Normal case

Operator		Indicator						Switch	Hardware	
1.Loading Sequence Switch > Placement > Switch		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
		White	White	Green	Green	White	Amber	White		
1					On			On	Idle	LOAD is Normal (Default State) for Load port Idle State
2										
3	Push Operator Access Switch >									
4										
5	Place the FOUP/Carrier >				Blink			Blink	Hand Off	
6										
7										
8	Push Operator Access Switch >	On	On						FOUP /Carrier Placed	Load Complete
9										
10		:	:						:	

9.2.3.2 Load (Before & After) Reserve case

Load (Before & After) Reserve case

Operator		Indicator						Switch	Hardware	
1.Loading Sequence Switch > Placement > Switch		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
		White	White	Green	Green	White	Amber	White		
1					On			On	Idle	LOAD is Normal (Default State) for Load port Idle State
2						On				Host reserves a port
3	Push Operator Access Switch >									
4										
5	Place the FOUP/Carrier >				Blink			Blink	Hand Off	
6										
7										
8	Push Operator Access Switch >	On	On						FOUP /Carrier Placed	Load Complete
9										
10		:	:						:	



9.2.3.3 Load (Before & Timer) Normal case

Operator		Indicator						Switch	Hardware	
1.Loading Sequence Switch > Placement > Timer		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
		White	White	Green	Green	White	Amber	White		
1					On			On	Idle	LOAD is Normal (Default State) for Load port Idle State
2										
3	Push Operator Access Switch									
4										
5	Place the FOUP/Carrier				Blink			Blink	Hand Off	
6										
7										
8		On	On							Load-Completion Timer
9										
10		:	:						FOUP/ Carrier Placed	Load Complete

Load-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.
The Timer period is defined by the equipment parameter.
Load-Completion Timer is begun from the Placement sensor detection.

9.2.3.4 Load (No use the switch & After) Normal case

Operator		Indicator						Switch	Hardware	
1.Loading Sequence Placement > Timer		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
		White	White	Green	Green	White	Amber	White		
1					On			On	Idle	LOAD is Normal (Default State) for Load port Idle State
2										
3	Place the FOUP/Carrier									
4					Blink			Blink	Hand Off	
5										
6	Push Operator Access Switch									
7		On	On							
8		:	:						FOUP/ Carrier Placed	Load Complete



9.2.3.5 Load (No use the switch & Timer) Normal case

Load (No use the switch & Timer) Normal case									
Operator		Indicator						Switch	Hardware
1.Loading Sequence Placement > Timer		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior
		White	White	Green	Green	White	Amber	White	Comment
1					On			On	LOAD is Normal (Default State) for Load port Idle State
2									
3	Place the FOUP/Carrier								
4					Blink			Blink	Hand Off
5									Load-Completion Timer
6		On	On						
7									
8		:	:						FOUP/Carrier Placed
									Load Complete

Load-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Load-Completion Timer is begun from the Placement sensor detection.

9.2.3.6 Load (Before & After) Abort case

Load (Before & After) Abort Case									
Operator		Indicator						Switch	Hardware
1.Loading Sequence Switch > Placement > Removal > Switch		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior
		White	White	Green	Green	White	Amber	White	Comment
1					On			On	LOAD is Normal (Default State) for Load port Idle State
2									
3	Push Operator Access Switch								
4					Blink			Blink	Hand Off
5	Place the FOUP/Carrier								
6		On							
7			On						
8	Remove the FOUP/Carrier								
9									
10									
11	Push Operator Access Switch								
12					On			On	Idle
13									



9.2.3.7 Load (Before & Timer) Abort case

Load (Before & Timer) Abort Case

Operator		Indicator						Switch	Hardware	
1.Loading Sequence Switch > Placement > Removal > Timer		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
		White	White	Green	Green	White	Amber	White		
1					On			On	Idle	LOAD is Normal (Default State) for Load port Idle State
2										
3	Push Operator Access Switch >									
4										
5	Place the FOUP/Carrier >				Blink			Blink		Hand Off
6		On								
7			On							
8	Remove the FOUP/Carrier >									Load-Completion Timer
9										FOUP/Carrier is taken before timer
10										Unload-Completion Timer
11										
12					On			On	Idle	
13										

Load-Completion/Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Load-Completion Timer is begun from the Placement sensor detection.

Unload-Completion Timer is begun from the presence sensor non-detection.



9.2.3.8 Load (Before & After or Timer) FOUP is not correctly put case 1

Load (Before & After or Timer) FOUP is not correctly put case1

Operator		Indicator						Switch	Hardware	
		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
1>Loading Sequence Switch > Placement > Placement again > Alarm clear		White	White	Green	Green	White	Amber	White		
1					On			On	Idle	LOAD is Normal (Default State) for Load port Idle State
2										
3	Push Operator Access Switch >									
4										
5	Place the FOUP/Carrier >				Blink			Blink	Hand Off	
6		On								Presence-to-Placement Timer
7										Timer ends and Alarm is generated
8	Remove the FOUP/Carrier >									Unload-Completion Timer
9										Even if timer ends, LOAD indicator state and switch state are not changed.
10										
11										
12	Place the FOUP/Carrier again >									
13		On								Load-Completion Timer
14			On							Even if timer ends, LOAD indicator state and switch state are not changed.
15										
16	Clear the alarm >									
17									FOUP/Carrier Placed	Load Complete
18		:	:						:	

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The description of Presence-to-Placement timer is omitted in some sheets.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator correctly puts FOUP again(Placement sensor is detected), and releases the alarm on the screen.

Load-Completion/Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Load-Completion Timer is begun from the Placement sensor detection.

Unload-Completion Timer is begun from the presence sensor non-detection.



9.2.3.9 Load (Before & After or Timer) FOUP is not correctly put case 1''

Load (Before & After or Timer) FOUP is not correctly put case1''

Operator		Indicator						Switch	Hardware	
1.Loading Sequence Switch > Placement > Removal > Alarm clear		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
		White	White	Green	Green	White	Amber	White		
1					On			On	Idle	LOAD is Normal (Default State) for Load port Idle State
2										
3	Push Operator Access Switch									
4										
5	Place the FOUP/Carrier				Blink			Blink		Hand Off
6		On								Presence-to-Placement Timer
7										Timer ends and Alarm is generated
8	Remove the FOUP/Carrier									Unload-Completion Timer
9										Even if timer ends, LOAD indicator state and switch state are not changed.
10										
11	Clear the alarm							On	Idle	
12					On					
13										

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The description of Presence-to-Placement timer is omitted in some sheets.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator removes a FOUP which was put incorrectly, and releases the alarm on the screen.

Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Unload-Completion Timer is begun from the Presence sensor non-detection.



9.2.3.10 Load (Before & After) FOUP is not correctly put case 2

Load (Before & After) FOUP is not correctly put case2

Operator		Indicator						Switch	Hardware	
		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
1. Loading Sequence Switch > Placement > Placement again > Switch		White	White	Green	Green	White	Amber	White		
1					On			On	Idle	LOAD is Normal (Default State) for Load port Idle State
2										
3	Push Operator Access Switch									
4										
5	Place the FOUP/Carrier				Blink			Blink	Hand Off	
6										
7		On								Presence-to-Placement Timer
8	Remove the FOUP/Carrier									Timer ends and Alarm is generated. The Alarm notification can be cleared any time.
9										
10	Place the FOUP/Carrier again									
11		On								
12			On							FOUP/Carrier is placed before timer ends
13	Push Operator Access Switch									
14									FOUP/Carrier Placed	
15		:	:							Load Complete

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The description of Presence-to-Placement timer is omitted in some sheets.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator correctly puts FOUP again(Placement sensor is detected), and releases the alarm on the screen.

Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Unload-Completion Timer is begun from the Presence sensor non-detection.



9.2.3.11 Load (Before & After) FOUP is not correctly put case 2''

Table 1-8d Load (Before & After) FOUP is not correctly put case2''

Operator		Indicator						Switch	Hardware	
1.Loading Sequence Switch > Placement > Removal > Switch		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
		White	White	Green	Green	White	Amber	White		
1					On			On	Idle	LOAD is Normal (Default State) for Load port Idle State
2										
3	Push Operator Access Switch >									
4										
5	Place the FOUP/Carrier >				Blink			Blink	Hand Off	
6		On								
7										
8	Remove the FOUP/Carrier >									
9										
10	Push Operator Access Switch >									
11					On			On	Idle	
12										

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The description of Presence-to-Placement timer is omitted in some sheets.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator removes a FOUP which was put incorrectly, and releases the alarm on the screen.



9.2.3.12 Load (Before & Timer) FOUP is not correctly put case 3

Load (Before & Timer) FOUP is not correctly put case3

Operator		Indicator						Switch	Hardware	
		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
1. Loading Sequence Switch > Placement > Placement again > Alarm clear		White	White	Green	Green	White	Amber	White	Idle	LOAD is Normal (Default State) for Load port Idle State
1					On			On		
2										
3	Push Operator Access Switch									
4										
5	Place the FOUP/Carrier				Blink			Blink	Hand Off	
6		On								Presence-to-Placement Timer
7										
8	Remove the FOUP/Carrier									Timer ends and Alarm is generated. The Alarm notification can be cleared any time.
9										
10	Place the FOUP/Carrier again									Unload-Completion Timer
11		On								FOUP /Carrier is placed before timer
12			On							Load-Completion Timer
13										
14									FOUP/Carrier Placed	Load Complete
15		:	:						:	

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The description of Presence-to-Placement timer is omitted in some sheets.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator correctly puts FOUP again(Placement sensor is detected), and releases the alarm on the screen.

Load-Completion/Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Load-Completion Timer is begun from the Placement sensor detection.

Unload-Completion Timer is begun from the presence sensor non-detection.



9.2.3.13 Load (Before & Timer) FOUP is not correctly put case 3"

Load (Before & Timer) FOUP is not correctly put case3"

Operator		Indicator						Switch	Hardware	
1.Loading Sequence Switch > Placement > Removal > Alarm clear		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
		White	White	Green	Green	White	Amber	White	Idle	LOAD is Normal (Default State) for Load port Idle State
1					On			On		
2										
3	Push Operator Access Switch									
4										
5	Place the FOUP/Carrier				Blink			Blink		Hand Off
6		On								Presence-to-Placement Timer
7										
8	Remove the FOUP/Carrier									
9										
10										
11					On			On		
12									Idle	

Timer ends and Alarm is generated.
The Alarm notification can be cleared any

Presence-to-Placement Timer
This timer is a watch timer between Presence sensor and Placement sensor.
The description of Presence-to-Placement timer is omitted in some sheets.
The Timer period is defined by the equipment parameter.
When the timer is end, an Alarm is generated and waits for operator instruction.
The operator removes a FOUP which was put incorrectly, and releases the alarm on the screen.

Unload-Completion Timer
Timer becomes the trigger of the end of HandOff because of the replacement of Switch.
The Timer period is defined by the equipment parameter.
Unload-Completion Timer is begun from the Presence sensor non-detection.



9.2.3.14 Load (Before & Timer) FOUP is put once, then removed, and it is put again case

Load (Before & Timer) FOUP is put once, then removed, and it is put again case

Operator		Indicator						Switch	Hardware	
		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
1. Loading Sequence Switch > Placement > Removal > Placement > Timer		White	White	Green	Green	White	Amber	White		
1					On			On	Idle	LOAD is Normal (Default State) for Load port Idle State
2										
3	Push Operator Access Switch >									
4										
5	Place the FOUP/Carrier >				Blink			Blink		Hand Off
6		On								
7			On							Load-Completion Timer
8	Remove the FOUP/Carrier >									FOUP/Carrier is taken before timer
9										
10										Unload-Completion Timer
11	Place the FOUP/Carrier >									FOUP/Carrier is placed before timer
12										
13		On	On							Load-Completion Timer
14										
15									FOUP/Carrier Placed	
16		:	:							Load Complete

Load-Completion/Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Load-Completion Timer is begun from the Placement sensor detection.

Unload-Completion Timer is begun from the presence sensor non-detection.



9.2.3.15 Load Quit case

Load Quit case		Indicator						Switch	Hardware	
Operator		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
1.Loading Sequence Switch > Switch		White	White	Green	Green	White	Amber	White	Idle	LOAD is Normal (Default State) for Load port Idle State
1					On			On		
2										
3	Push Operator Access Switch >									
4								Blink		Hand Off Operator Interaction Timer
5					Blink					
6	Push Operator Access Switch >									
7								On		
8					On					

Operator Interaction Timer

This timer starts when the Operator Access switch is pushed with Hand Off can shift.
This timer value can be changed by the parameter of the tool.
When a presence sensor or a placement sensor is detected Operator Interaction Timer is canceled.

To exit Hand Off state, either time-out occurs or Operator pushes the Access switch a second time.



9.2.4 Unload

9.2.4.1 Unload (Before & After / Docked & Clamped position) Normal case

Unload (Before & After / Docked & Clamped position) Normal case											
Operator			Indicator						Switch	Hardware	
1.Unloading Sequence Switch > Removal > Switch Unload Indicator lights: Load port is Docked			PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
			White	White	Green	Green	White	Amber	White	:	Process Complete
1			:	:							
2			On	On	On				On	Docked	Ready to Unload
3											
4	Push Operator Access Switch	>									
5											
6											
7											
8	Remove the FOUP/Carrier	>							Blink	Undocked & Clamped	Hand Off
9										Unclamped	
10	Push Operator Access Switch	>									
11									On	Idle	Unload Complete
12											

9.2.4.2 Unload (Before & After / Undocked & Clamped position) Normal case

Unload (Before & After / Undocked & Clamped position) Normal case											
Operator			Indicator						Switch	Hardware	
1.Unloading Sequence Switch > Removal > Switch Unload Indicator lights: Load port is Undocked and Clamped			PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
			White	White	Green	Green	White	Amber	White	:	Process Complete
1			:	:							
2			On	On	On				On	Docked	Ready to Unload
3											
4	Push Operator Access Switch	>									
5											
6											
7	Remove the FOUP/Carrier	>							Blink	Undocked & Clamped	Hand Off
8										Unclamped	
9	Push Operator Access Switch	>									
10									On	Idle	Unload Complete
11											



9.2.4.3 Unload (Before & After / Undocked & Unclamped position) Normal case

Operator		Indicator						Switch	Hardware	
1.Unloading Sequence Switch > Removal > Switch Unload Indicator lights: Load port is Undocked and Unclamped		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
		White	White	Green	Green	White	Amber	White	:	Process Complete
1		:	:							
2		On	On	On				On	Unclamped	Ready to Unload
3										
4	Push Operator Access Switch >									
5										
6				Blink				Blink		Hand Off
7	Remove the FOUP/Carrier >									
8										
9	Push Operator Access Switch >									
10					On			On	Idle	Unload Complete
11										

9.2.4.4 Unload (Before & Timer / Undocked & Clamped position) Normal case

Operator		Indicator						Switch	Hardware	
1.Unloading Sequence Switch > Removal > Timer Unload Indicator lights: Load port is Undocked and Clamped		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
		White	White	Green	Green	White	Amber	White	:	Process Complete
1		:	:							
2		On	On	On				On	Undocked &Clamped	Ready to Unload
3										
4	Push Operator Access Switch >									
5										
6				Blink				Blink	Unclamped	Hand Off
7	Remove the FOUP/Carrier >									
8										
9										
10										
11					On			On	Idle	Unload-Completion Timer
12										Unload Complete

Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.
The Timer period is defined by the equipment parameter.
Unload-Completion Timer is begun from the Presence sensor non-detection.



9.2.4.5 Unload (No use the switch & Timer / Undocked & Unclamped position) Normal case

Operator		Indicator						Switch	Hardware	
1.Unloading Sequence Removal > Timer Unload Indicator lights: Load port is Unclamped		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
		White	White	Green	Green	White	Amber	White	:	Process Complete
		:	:							
1		On	On	On				On	Unclamped	Ready to Unload
2										
3										
4 Remove the FOUP/Carrier				Blink				Blink		Hand Off
5										Unload-Completion Timer
6										
7										
8					On			On	Idle	Unload Complete
9										

Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.
The Timer period is defined by the equipment parameter.
Unload-Completion Timer is begun from the Presence sensor non-detection.

9.2.4.6 Unload (Before & After / Undocked & Clamped position) Abort case

Operator		Indicator						Switch	Hardware	
1.Unloading Sequence Switch > Removal > Placement > Switch Unload Indicator lights: Load port is Undocked and Clamped		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
		White	White	Green	Green	White	Amber	White	:	Process Complete
		:	:							
1		On	On	On				On	Undocked & Clamped	Ready to Unload
2										
3										
4 Push Operator Access Switch				Blink				Blink	Unclamped	Hand Off
5										Unload-Completion Timer
6										
7 Remove the FOUP/Carrier										
8										
9										
10 Place the FOUP/Carrier										
11										
12		On	On							FOUP/Carrier is placed before
13 Push Operator Access Switch				On						
14										
15								On	Unclamped	

Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.
The Timer period is defined by the equipment parameter.
Unload-Completion Timer is begun from the Presence sensor non-detection.



9.2.4.7 Unload Quit case

Unload Quit case		Indicator						Switch	Hardware	
Operator		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
1. Unloading Sequence Switch > Switch Unload Indicator lights: Load port is Undocked and Clamped		White	White	Green	Green	White	Amber	White	:	Process Complete
1		:	:							
2										
3		On	On	On				On	Undocked & Clamped	Ready to Unload
4	Push Operator Access Switch >									
5										
6				Blink				Blink	Unclamped	Hand Off Operator Interaction Timer
7	Push Operator Access Switch >									
8				On				On		
9										

Operator Interaction Timer
This timer starts when the Operator Access switch is pushed with Hand Off can shift.
This timer value can be changed by the parameter of the tool.
When a presence sensor or a placement sensor is detected Operator Interaction Timer is canceled.

To exit Hand Off state, either time-out occurs or Operator pushes the Access switch a second time.



9.3 Scenarios - Internal Buffer

9.3.1 Detail description for the titles

1. Load

Switch condition

- Before: Before FOUP is carried, the switch is pushed.
- After: After FOUP is carried, the switch is pushed
- Timer: Timer is a trigger for a completion of the Hand Off sequence
- No use: Switch is not used

2. Unload

Switch condition

- Before: Before FOUP is removed, the switch is pushed.
- After: After FOUP is removed, the switch is pushed
- Timer: Timer is a trigger for a completion of the Hand Off sequence
- No use: Switch is not used

3. Load port position condition

- Clamp: Clamped position is necessary for the Unload indicator to be turned on
- Unclamp: Unclamped position is necessary for the Unload indicator to be turned on



9.3.2 Total

9.3.2.1 Manual mode Total Load & Unload

Manual mode Total Load&Unload

Operator		Indicator						Switch	Hardware	
1.Loading Sequence Switch > Placement > Switch 2.Unloading Sequence Switch > Removal > Switch		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
		White	White	Green	Green	White	Amber	White		
1					On			On	Idle	LOAD is Normal (Default State) for Load port Idle State
2										
3	Push Operator Access Switch >									
4										
5	Place the FOUP/Carrier >				Blink			Blink	Hand Off	Hand off starts from pushing the switch
6										
7										
8	Push Operator Access Switch >	On	On							
9										
10	Proceed With Carrier >					Blink			FOUP/Carrier Placed	Load Complete
11										
12									FOUP/Carrier Move-In	FOUP/Carrier Move-In Start
13										
14					On			On		
15					:			:		
16	Carrier Out >									
17										
18						Blink			FOUP/Carrier Move-Out	FOUP/Carrier Move-Out Start
19										
20				On				On	Unclamped	FOUP/Carrier Move-Out Complete Ready to Unload
21	Push Operator Access Switch >									
22										
23				Blink				Blink	Hand Off	
24	Remove the FOUP/Carrier >									
25										
26	Push Operator Access Switch >									
27					On			On	Idle	
28										

Blink indicates under "Hand Off"



9.3.2.2 Auto mode Total Load & Unload

Operator		Indicator						Switch	Hardware	
1.Loading Sequence Placement > P-I/O Complete 2.Unloading Sequence Removal > P-I/O Complete		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
		White	White	Green	Green	White	Amber	White		
1					On			On	Idle	LOAD is Normal (Default State) for Load port Idle State
2										Host communicates change to AUTO MODE
3										
4							On			
5										
6	Place the FOUP/Carrier by AMHS									Hand Off (VALID On Received)
7										
8		On	On							P-I/O Complete (VALID Off Received)
9										
10	Proceed With Carrier								FOUP/Carrier Placed	Load Complete
11									FOUP/Carrier Move-In	FOUP/Carrier Move-In Start
12										FOUP/Carrier Move-In Complete (Ready to Load)
13										
14										
15										
16	Carrier Out								:	
17									FOUP/Carrier Move-Out	FOUP/Carrier Move-Out Start
18										FOUP/Carrier Move-Out Complete
19									Unclamped	Ready to Unload
20										
21										
22										Hand Off (VALID On Received)
23	Remove the FOUP/Carrier by AMHS									
24										
25										P-I/O Complete (VALID Off Received)
26										
27									Idle	



9.3.3 Load

9.3.3.1 Load (Before & After) Normal case

Operator		Indicator						Switch	Hardware	
1.Loading Sequence Switch > Placement > Switch		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
		White	White	Green	Green	White	Amber	White		
1					On			On	Idle	LOAD is Normal (Default State) for Load port Idle State
2										
3	Push Operator Access Switch >									
4										
5	Place the FOUP/Carrier >				Blink			Blink		Hand Off
6										
7										
8	Push Operator Access Switch >	On	On							
9										
10	Proceed With Carrier >					Blink			FOUP/ Carrier Placed	Load Complete
11										
12									FOUP/ Carrier Move-In	FOUP/Carrier Move-In Start
13										
14					On			On		FOUP/Carrier Move-In Complete
15					:			:	:	

9.3.3.2 Load (Before & After) Reserve case

Operator		Indicator						Switch	Hardware	
1.Loading Sequence Switch > Placement > Switch		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
		White	White	Green	Green	White	Amber	White		
1					On			On	Idle	LOAD is Normal (Default State) for Load port Idle State
2						On				Host reserves a port
3	Push Operator Access Switch >									
4										
5	Place the FOUP/Carrier >				Blink			Blink		Hand Off
6										
7										
8	Push Operator Access Switch >	On	On							
9										
10	Proceed With Carrier >					Blink			FOUP/ Carrier Placed	Load Complete
11										
12									FOUP/ Carrier Move-In	FOUP/Carrier Move-In Start
13										
14					On			On		FOUP/Carrier Move-In Complete
15					:			:	:	



9.3.3.3 Load (Before & Timer) Normal case

Operator		Indicator						Switch	Hardware	
1.Loading Sequence Switch > Placement > Timer		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
		White	White	Green	Green	White	Amber	White		
1					On			On	Idle	LOAD is Normal (Default State) for Load port Idle State
2										
3	Push Operator Access Switch >									
4										
5	Place the FOUP/Carrier >				Blink			Blink		Hand Off
6										
7										Load-Completion Timer
8		On	On							
9										
10	Proceed With Carrier >					Blink			FOUP/ Carrier Placed	Load Complete
11										
12									FOUP/ Carrier Move-In	FOUP/Carrier Move-In Start
13										
14					On			On		FOUP/Carrier Move-In Complete
15					:			:	:	

Load-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Load-Completion Timer is begun from the Placement sensor detection.



9.3.3.4 Load (No use the switch & After) Normal case

Load (No use the switch & After) Normal case												
Operator			Indicator						Switch	Hardware		
1.Loading Sequence Placement > Timer			PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment	
			White	White	Green	Green	White	Amber	White			
1						On			On	Idle	LOAD is Normal (Default State) for Load port Idle State	
2												
3	Place the FOUP/Carrier	>				Blink			Blink		Hand Off	
4												
5												
6	Push Operator Access Switch	>	On	On						FOUP/Carrier Placed	Load Complete	
7							Blink					
8	Proceed With Carrier	>								FOUP/Carrier Move-In	FOUP/Carrier Move-In Start	
9												
10												
11						On			On		FOUP/Carrier Move-In Complete	
12												
13												

9.3.3.5 Load (No use the switch & Timer) Normal case

Load (No use the switch & Timer) Normal case												
Operator			Indicator						Switch	Hardware		
1.Loading Sequence Placement > Timer			PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment	
			White	White	Green	Green	White	Amber	White			
1						On			On	Idle	LOAD is Normal (Default State) for Load port Idle State	
2												
3	Place the FOUP/Carrier	>				Blink			Blink		Hand Off	
4												
5												
6			On	On							Load-Completion Timer	
7							Blink			FOUP/Carrier Placed	Load Complete	
8	Proceed With Carrier	>										
9										FOUP/Carrier Move-In	FOUP/Carrier Move-In Start	
10												
11						On			On		FOUP/Carrier Move-In Complete	
12												
13												

Load-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.
The Timer period is defined by the equipment parameter.
Load-Completion Timer is begun from the Placement sensor detection.



9.3.3.6 Load (Before & After) Abort case

Load (Before & After) Abort Case												
Operator			Indicator						Switch	Hardware		
1.Loading Sequence Switch > Placement > Removal > Switch			PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment	
			White	White	Green	Green	White	Amber	White			
1						On			On	Idle	LOAD is Normal (Default State) for Load port Idle State	
2												
3	Push Operator Access Switch	>										
4												
5	Place the FOUP/Carrier	>				Blink			Blink		Hand Off	
6			On									
7				On								
8	Remove the FOUP/Carrier	>										
9												
10												
11	Push Operator Access Switch	>										
12						On			On	Idle		
13												

9.3.3.7 Load (Before & Timer) Abort case

Load (Before & Timer) Abort Case												
Operator			Indicator						Switch	Hardware		
1.Loading Sequence Switch > Placement > Removal > Timer			PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment	
			White	White	Green	Green	White	Amber	White			
1						On			On	Idle	LOAD is Normal (Default State) for Load port Idle State	
2												
3	Push Operator Access Switch	>										
4												
5	Place the FOUP/Carrier	>				Blink			Blink		Hand Off	
6			On									
7				On								
8	Remove the FOUP/Carrier	>										
9												
10												
11												
12						On			On	Idle		
13												

Load-Completion/Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Load-Completion Timer is begun from the Placement sensor detection.

Unload-Completion Timer is begun from the presence sensor non-detection.



9.3.3.8 Load (Before & After or Timer) FOUP is not correctly put case 1

Load (Before & After or Timer) FOUP is not correctly put case1

Operator		Indicator						Switch	Hardware	
		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
1. Loading Sequence Switch > Placement > Placement again > Alarm clear		White	White	Green	Green	White	Amber	White		
1					On			On	Idle	LOAD is Normal (Default State) for Load port Idle State
2										
3	Push Operator Access Switch >									
4										
5	Place the FOUP/Carrier >				Blink			Blink	Hand Off	
6		On								Presence-to-Placement Timer
7										Timer ends and Alarm is generated
8	Remove the FOUP/Carrier >									Unload-Completion Timer
9										Even if timer ends, LOAD indicator state and switch state are not changed.
10										
11										
12	Place the FOUP/Carrier again >									
13		On								Load-Completion Timer
14			On							Even if timer ends, LOAD indicator state and switch state are not changed.
15										
16	Clear the alarm >									
17						Blink			FOUP/Carrier Placed	Load Complete
18	Proceed With Carrier >									
19									FOUP/Carrier Move-In	FOUP/Carrier Move-In Start
20										
21					On			On		FOUP/Carrier Move-In Complete
22										
23										

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The description of Presence-to-Placement timer is omitted in some sheets.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator correctly puts FOUP/Carrier again(Placement sensor is detected), and releases the alarm on the screen.

Load-Completion/Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Load-Completion Timer is begun from the Placement sensor detection.

Unload-Completion Timer is begun from the presence sensor non-detection.



9.3.3.9 Load (Before & After or Timer) FOUP is not correctly put case1"

Load (Before & After or Timer) FOUP is not correctly put case1"

Operator		Indicator						Switch	Hardware	
1.Loading Sequence Switch > Placement > Removal > Alarm clear		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
		White	White	Green	Green	White	Amber	White		
1					On			On	Idle	LOAD is Normal (Default State) for Load port Idle State
2										
3	Push Operator Access Switch >									
4										
5	Place the FOUP/Carrier >				Blink			Blink	Hand Off	
6		On								Presence-to-Placement Timer
7										Timer ends and Alarm is generated
8	Remove the FOUP/Carrier >									Unload-Completion Timer
9										Even if timer ends, LOAD indicator state and switch state are not changed.
10										
11	Clear the alarm >									
12					On			On	Idle	
13										

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The description of Presence-to-Placement timer is omitted in some sheets.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator removes a FOUP/Carrier which was put incorrectly, and releases the alarm on the screen.

Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Unload-Completion Timer is begun from the Presence sensor non-detection.



9.3.3.10 Load (Before & After) FOUP is not correctly put case 2

Load (Before & After) FOUP is not correctly put case2

Operator		Indicator						Switch	Hardware	
1. Loading Sequence Switch > Placement > Placement again > Switch		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
		White	White	Green	Green	White	Amber	White	Idle	LOAD is Normal (Default State) for Load port Idle State
1					On			On		
2										
3	Push Operator Access Switch									
4										
5	Place the FOUP/Carrier				Blink			Blink	Hand Off	Presence-to-Placement Timer
6		On								Timer ends and Alarm is generated. The Alarm notification can be cleared any time.
7										
8	Remove the FOUP/Carrier									
9										
10	Place the FOUP/Carrier again									
11		On								
12			On							
13	Push Operator Access Switch									
14										
15	Proceed With Carrier					Blink			FOUP/Carrier Placed	Load Complete
16										
17									FOUP/Carrier Move-In	FOUP/Carrier Move-In Start
18					On			On		FOUP/Carrier Move-In Complete
19					:			:	:	
20										

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The description of Presence-to-Placement timer is omitted in some sheets.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator correctly puts FOUP/Carrier again(Placement sensor is detected), and releases the alarm on the screen.

Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Unload-Completion Timer is begun from the Presence sensor non-detection.



9.3.3.11 Load (Before & After) FOUP is not correctly put case2"

Load (Before & After) FOUP is not correctly put case2"

Operator		Indicator						Switch	Hardware	
1.Loading Sequence Switch > Placement > Removal > Switch		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
		White	White	Green	Green	White	Amber	White		
1					On			On	Idle	LOAD is Normal (Default State) for Load port Idle State
2										
3	Push Operator Access Switch >									
4										
5	Place the FOUP/Carrier >				Blink			Blink	Hand Off	
6		On								
7										
8	Remove the FOUP/Carrier >									
9										
10	Push Operator Access Switch >									
11					On			On	Idle	
12										

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The description of Presence-to-Placement timer is omitted in some sheets.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator removes a FOUP/Carrier which was put incorrectly, and releases the alarm on the screen.



9.3.3.12 Load (Before & Timer) FOUP is not correctly put case 3

Load (Before & Timer) FOUP is not correctly put case3

Operator		Indicator						Switch	Hardware	
		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
1. Loading Sequence Switch > Placement > Placement again > Alarm clear		White	White	Green	Green	White	Amber	White	Idle	LOAD is Normal (Default State) for Load port Idle State
1					On			On		
2										
3	Push Operator Access Switch									
4										
5	Place the FOUP/Carrier				Blink			Blink	Hand Off	Presence-to-Placement Timer
6		On								
7										
8	Remove the FOUP/Carrier									Timer ends and Alarm is generated. The Alarm notification can be cleared any time.
9										
10	Place the FOUP/Carrier again									
11		On								
12			On							
13										
14										
15	Proceed With Carrier					Blink			FOUP/Carrier Placed	Load Complete
16										
17									FOUP/Carrier Move-In	FOUP/Carrier Move-In Start
18					On			On		FOUP/Carrier Move-In Complete
19					:			:		
20									:	

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The description of Presence-to-Placement timer is omitted in some sheets.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator correctly puts FOUP/Carrier again(Placement sensor is detected), and releases the alarm on the screen.

Load-Completion/Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Load-Completion Timer is begun from the Placement sensor detection.

Unload-Completion Timer is begun from the presence sensor non-detection.



9.3.3.13 Load (Before & Timer) FOUP is not correctly put case 3"

Load (Before & Timer) FOUP is not correctly put case3"

Operator		Indicator						Switch	Hardware	
		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
1. Loading Sequence Switch > Placement > Removal > Alarm clear		White	White	Green	Green	White	Amber	White		
1					On			On	Idle	LOAD is Normal (Default State) for Load port Idle State
2										
3	Push Operator Access Switch	>								
4										
5	Place the FOUP/Carrier	>			Blink			Blink	Hand Off	
6		On								Presence-to-Placement Timer
7										
8	Remove the FOUP/Carrier	>								Timer ends and Alarm is generated. The Alarm notification can be cleared any
9										
10										
11					On			On	Idle	Unload-Completion Tim
12										

Presence-to-Placement Timer
This timer is a watch timer between Presence sensor and Placement sensor.
The description of Presence-to-Placement timer is omitted in some sheets.
The Timer period is defined by the equipment parameter.
When the timer is end, an Alarm is generated and waits for operator instruction.
The operator removes a FOUP/Carrier which was put incorrectly, and releases the alarm on the screen.

Unload-Completion Timer
Timer becomes the trigger of the end of HandOff because of the replacement of Switch.
The Timer period is defined by the equipment parameter.
Unload-Completion Timer is begun from the Presence sensor non-detection.



9.3.3.14 Load (Before & Timer) FOUP is put once, then removed, and it is put again case

Load (Before & Timer) FOUP is put once, then removed, and it is put again case

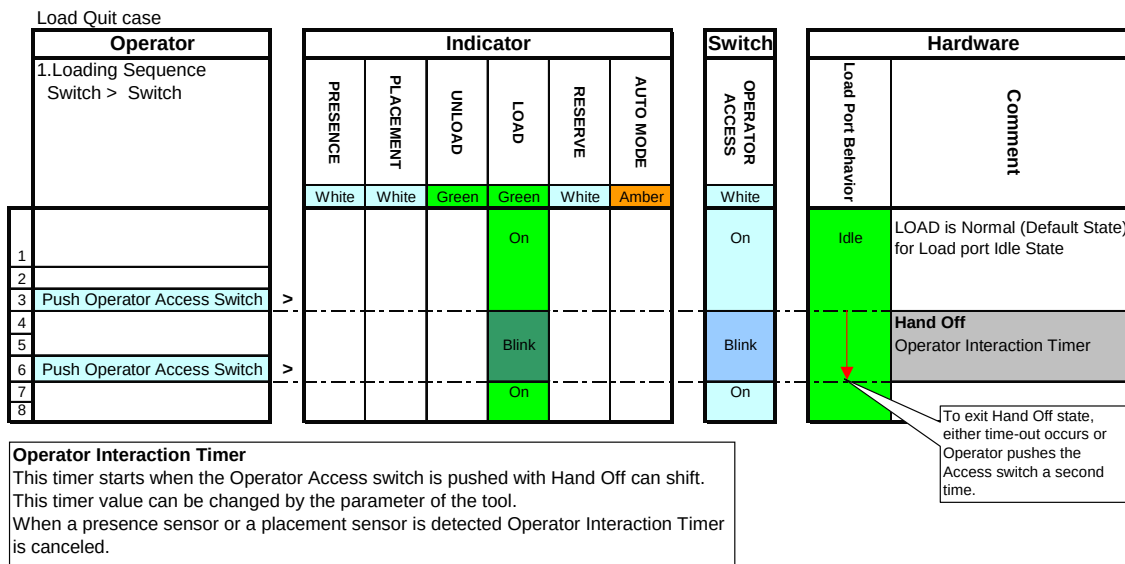
Operator		Indicator						Switch	Hardware	
		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
1>Loading Sequence Switch > Placement > Removal > Placement > Timer		White	White	Green	Green	White	Amber	White		
1					On			On	Idle	LOAD is Normal (Default State) for Load port Idle State
2										
3	Push Operator Access Switch >									
4										
5	Place the FOUP/Carrier >				Blink			Blink		Hand Off
6		On								Load-Completion Timer
7			On							FOUP/Carrier is taken before timer ends
8	Remove the FOUP/Carrier >									Unload-Completion Timer
9										FOUP/Carrier is placed before timer
10										Load-Completion Timer
11	Place the FOUP/Carrier >									
12		On								
13			On							
14										
15									FOUP/Carrier Placed	Load Complete
16	Proceed With Carrier >					Blink				
17									FOUP/Carrier Move-In	FOUP/Carrier Move-In Start
18										
19					On			On		FOUP/Carrier Move-In Complete
20										
21								:	:	

Load-Completion/Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.
 The Timer period is defined by the equipment parameter.
 Load-Completion Timer is begun from the Placement sensor detection.
 Unload-Completion Timer is begun from the presence sensor non-detection.



9.3.3.15 Load Quit case





9.3.4 Unload

9.3.4.1 Unload (Before & After / Clamped position) Normal case

Operator		Indicator						Switch	Hardware	
1.Unloading Sequence Switch > Removal > Switch Unload Indicator lights: Load port is Clamped		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
		White	White	Green	Green	White	Amber	White	:	Process Complete
1	Carrier Out				:			:		
2						Blink			FOUP/Carrier Move-Out	FOUP/Carrier Move-Out Start
3									FOUP/Carrier Move-Out	FOUP/Carrier Move-Out Complete
4									FOUP/Carrier Clamped	Ready to Unload
5										
6										
7										
8	Push Operator Access Switch	On	On	On				On		
9										
10										
11	Remove the FOUP/Carrier			Blink				Blink	Unclamped	Hand Off
12										
13	Push Operator Access Switch									
14					On			On	Idle	Unload Complete
15										

9.3.4.2 Unload (Before & After / Unclamped position) Normal case

Operator		Indicator						Switch	Hardware	
1.Unloading Sequence Switch > Removal > Switch Unload Indicator lights: Load port is Unclamped		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
		White	White	Green	Green	White	Amber	White	:	Process Complete
1	Carrier Out				:			:		
2						Blink			FOUP/Carrier Move-Out	FOUP/Carrier Move-Out Start
3									FOUP/Carrier Move-Out	FOUP/Carrier Move-Out Complete
4									FOUP/Carrier Clamped	Ready to Unload
5										
6										
7										
8										
9										
10	Push Operator Access Switch	On	On	On				On	Unclamped	Ready to Unload
11										
12										
13	Remove the FOUP/Carrier			Blink				Blink		Hand Off
14										
15	Push Operator Access Switch									
16					On			On	Idle	Unload Complete
17										



9.3.4.3 Unload (Before & Timer / Clamped position) Normal case

Unload (Before & Timer / Clamped position) Normal case										
Operator		Indicator						Switch	Hardware	
1.Unloading Sequence Switch > Removal > Timer Unload Indicator lights: Load port is Clamped		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
		White	White	Green	Green	White	Amber	White	:	Process Complete
1					:			:		
2	Carrier Out									
3						Blink			FOUP/Carrier Move-Out	FOUP/Carrier Move-Out Start
4										FOUP/Carrier Move-Out Complete
5									FOUP/Carrier Clamped	
6										
7		On	On	On				On		Ready to Unload
8	Push Operator Access Switch									
9										
10				Blink				Blink	Unclamped	Hand Off
11	Remove the FOUP/Carrier									
12										
13										
14										
15					On			On	Idle	Unload-Completion Timer
16										Unload Complete

Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.
The Timer period is defined by the equipment parameter.
Unload-Completion Timer is begun from the Presence sensor non-detection.

9.3.4.4 Unload (No use the switch & Timer / Unclamped position) Normal case

Unload (No use the switch & Timer / Unclamped position) Normal case										
Operator		Indicator						Switch	Hardware	
1.Unloading Sequence Removal > Timer Unload Indicator lights: Load port is Unclamped		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
		White	White	Green	Green	White	Amber	White	:	Process Complete
1					:			:		
2	Carrier Out									
3						Blink			FOUP/Carrier Move-Out	FOUP/Carrier Move-Out Start
4										FOUP/Carrier Move-Out Complete
5									FOUP/Carrier Clamped	
6										
7										
8										
9		On	On	On				On	Unclamped	Ready to Unload
10	Remove the FOUP/Carrier									
11				Blink				Blink		Hand Off
12										Unload-Completion Timer
13										
14					On			On	Idle	Unload Complete
15										

Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.
The Timer period is defined by the equipment parameter.
Unload-Completion Timer is begun from the Presence sensor non-detection.



9.3.4.5 Unload (Before & After / Clamped position) Abort case

Unload (Before & After / Clamped position) Abort case											
Operator			Indicator						Switch	Hardware	
1.Unloading Sequence Switch > Removal > Placement > Switch Unload Indicator lights: Load port is Clamped			PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
			White	White	Green	Green	White	Amber	White	:	Process Complete
1						:			:		
2	Carrier Out	>									
3							Blink			FOUP/Carrier Move-Out Start	FOUP/Carrier Move-Out Start
4										FOUP/Carrier Move-Out Complete	FOUP/Carrier Move-Out Complete
5										FOUP/Carrier Clamped	Ready to Unload
6											
7			On	On	On				On		
8	Push Operator Access Switch	>									
9											
10					Blink				Blink	Unclamped	Hand Off
11	Remove the FOUP/Carrier	>									
12											
13											
14	Place the FOUP/Carrier	>									
15											
16			On	On							
17	Push Operator Access Switch	>									
18					On				On		
19										Unclamped	

Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.
The Timer period is defined by the equipment parameter.
Unload-Completion Timer is begun from the Presence sensor non-detection.

Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.
The Timer period is defined by the equipment parameter.
Unload-Completion Timer is begun from the Presence sensor non-detection.



9.3.4.6 Unload Quit case

Unload Quit case												
Operator		Indicator						Switch	Hardware			
1.Unloading Sequence Switch > Switch Unload Indicator lights: Load port is Clamped		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment		
		White	White	Green	Green	White	Amber	White	:	Process Complete		
1					:			:				
2	Carrier Out											
3						Blink			FOUP/ Carrier Move-Out	FOUP/Carrier Move-Out Start		
4												
5									FOUP/ Carrier Move-Out	FOUP/Carrier Move-Out Complete		
6												
7		On	On	On				On	FOUP/ Carrier Clamped	Ready to Unload		
8	Push Operator Access Switch											
9												
10				Blink				Blink	Unclamped	Hand Off Operator Interaction Timer		
11	Push Operator Access Switch											
12				On				On				
13												

Operator Interaction Timer
This timer starts when the Operator Access switch is pushed with Hand Off can shift.
This timer value can be changed by the parameter of the tool.
When a presence sensor or a placement sensor is detected Operator Interaction Timer is canceled.

To exit Hand Off state, either time-out occurs or Operator pushes the Access switch a second

9.3.4.7 Unload + CarrierIn case

Unload + CarrierIn case												
Operator		Indicator						Switch	Hardware			
1.Unloading Sequence Host/Operator CarrierIn Directions Unload Indicator lights: Load port is Clamped		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment		
		White	White	Green	Green	White	Amber	White	:	Process Complete		
1					:			:				
2	Carrier Out											
3						Blink			FOUP/ Carrier Move-Out	FOUP/Carrier Move-Out Start		
4												
5									FOUP/ Carrier Move-Out	FOUP/Carrier Move-Out Complete		
6												
7		On	On	On				On	FOUP/ Carrier Clamped	Ready to Unload		
8												
9	Carrier In								Unclamped	Carrier In Start		
10						Blink			Carrier In	Carrier In Complete (Ready to Load)		
11												
12												
13					On			On	Idle			
14					:			:				
15												



9.3.4.8 Continuation Unload case

Continuation Unload case		Indicator						Switch	Hardware	
Operator		PRESENCE	PLACEMENT	UNLOAD	LOAD	RESERVE	AUTO MODE	OPERATOR ACCESS	Load Port Behavior	Comment
1.Continuation Unloading Sequence Sw. > Removal > Sw. Unload Indicator lights: Load port is Clamped		White	White	Green	Green	White	Amber	White	:	Process Complete
1					:			:		
2	Carrier Out---for 1st FOUP/Carrier									
3	Carrier (this command is queued)					Blink			FOUP/Carrier Move-Out	FOUP/Carrier Move-Out Start
4									FOUP/Carrier Move-Out	FOUP/Carrier Move-Out Complete
5									FOUP/Carrier Clamped	Ready to Unload
6										
7		On	On	On				On		
8	Push Operator Access Switch									
9										
10										
11	Remove the FOUP/Carrier			Blink				Blink	Unclamped	Hand Off
12										
13	Push Operator Access Switch									1st FOUP/Carrier Unload
14									FOUP/Carrier Move-Out	FOUP/Carrier Move-Out Start
15						Blink			FOUP/Carrier Move-Out	FOUP/Carrier Move-Out Complete
16									FOUP/Carrier Clamped	Ready to Unload
17		On	On	On				On		
18	Push Operator Access Switch									
19										
20										
21										
22	Remove the FOUP/Carrier			Blink				Blink	Unclamped	Hand Off
23										
24	Push Operator Access Switch									2nd FOUP/Carrier Unload
25					On			On	Idle	Unload Complete
26					:			:	:	



10 Switchless-Type Option

10.1 Functional Definitions

This section defines functionality of indicators.

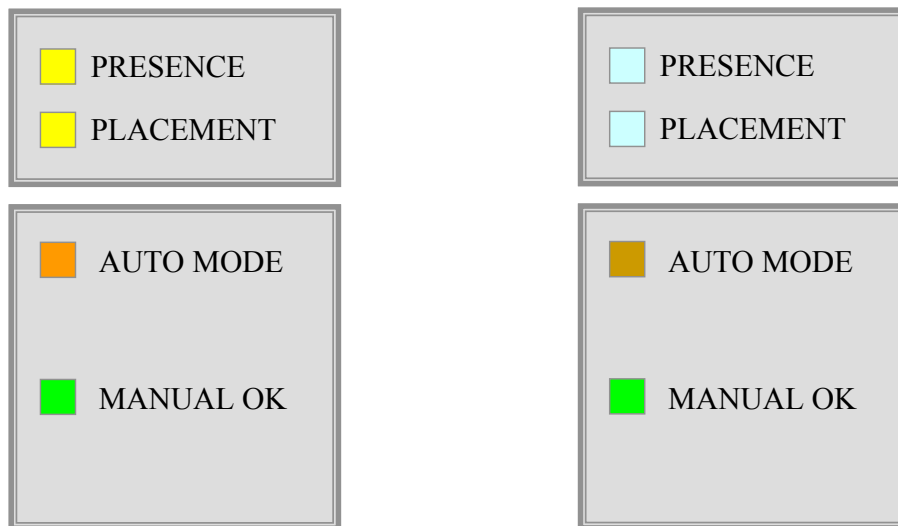


Figure 5: Functional image of indicators for Switch-less type

10.1.1 “PRESENCE” Indicator

- a Function:
 - Indicator which indicates presence of carrier on Load port as required in GJG.
 - “Presence” should also be active during “Placement” indicator is active.
- b Signal source:
 - Hardware level signal from “PRESENCE” sensor.
 - “Presence” signal/indicator may have a bounce (Chattering) during carrier handoff.
- c Color: Yellow (or White) LED (per local safety compliance and customer requirements)
- d States:
 - Off No Carrier is present on Load port.
 - On Carrier is present on Load port.

10.1.2 “PLACEMENT” Indicator

- a Function:
 - Indicator which indicates proper placement of carrier on Load port as required in GJG.
- b Signal source:
 - Hardware level signal from “PLACEMENT” sensor.
 - “Placement” signal/indicator may have a bounce (Chattering) during carrier handoff.



- c Color: Yellow (or White) LED (per local safety compliance and customer requirements)
- d States:
 - Off Carrier is not properly placed on Load port.
 - On Carrier is properly placed on Load port.

10.1.3 “AUTO MODE” Indicator

- a Function:
 - “AUTO MODE” indicator indicates that Access Mode is “AUTO”.
 - Operator access is not allowed when “AUTO” indicator is ON.
- b Signal source:
 - “Access Mode” flag in equipment.
- c Color: Orange (or Amber/Yellow) LED
- d States:
 - Off Access Mode is not “AUTO” or “Out Of Service”.
 - On Access Mode is “AUTO” and “In Service”.
Automatic Delivery Mode. Operator access to load port is not allowed.

10.1.4 “MANUAL OK” Indicator

- a Function:
 - “MANUAL OK” indicator indicates that operator access to load port is required.
- b Color: Green LED
 - Off Operator access is not permitted.
In following cases:
 - * Access Mode is AUTO
 - * Access Mode is MANUAL and
Not ready to Load, not ready to Unload, or under Handoff
 - * Out of Service
 - On Operator access is permitted / okay. (Ready to Load)
 - Blink Operator notification / action is requested or signals that the empty load port is in
“bind” or “reserved” state per factory host command.
Operator access is permitted / okay. (Ready to Unload)

10.1.5 Timers

- a Load-Completion Timer
A Timer which gives the end of Hand-Off time for LOAD operation in Manual Mode.
This timeout does not cause any error.
The Timer length will be defined by the equipment parameter.
- b Unload-Completion Timer
A Timer which gives the end of Hand-Off time for UNLOAD operation in Manual Mode.
This timeout does not cause any error.
The Timer length will be defined by the equipment parameter.
- c Presence-to-Placement Timer
This timer defines the maximum allowable time between Presence sensor and Placement sensor.
The Timer length will be defined by the equipment parameter.



Alarm will be generated on time out and equipment waits for operator's instruction.
Operator should replace the FOUP (Placement sensor to be detected), and release the alarm from GUI.

10.2 Scenarios – Fixed Buffer

10.2.1 Detail description for the titles

1. Load

Switch condition

No use: Switch is not used

2. Unload

Switch condition

No use: Switch is not used

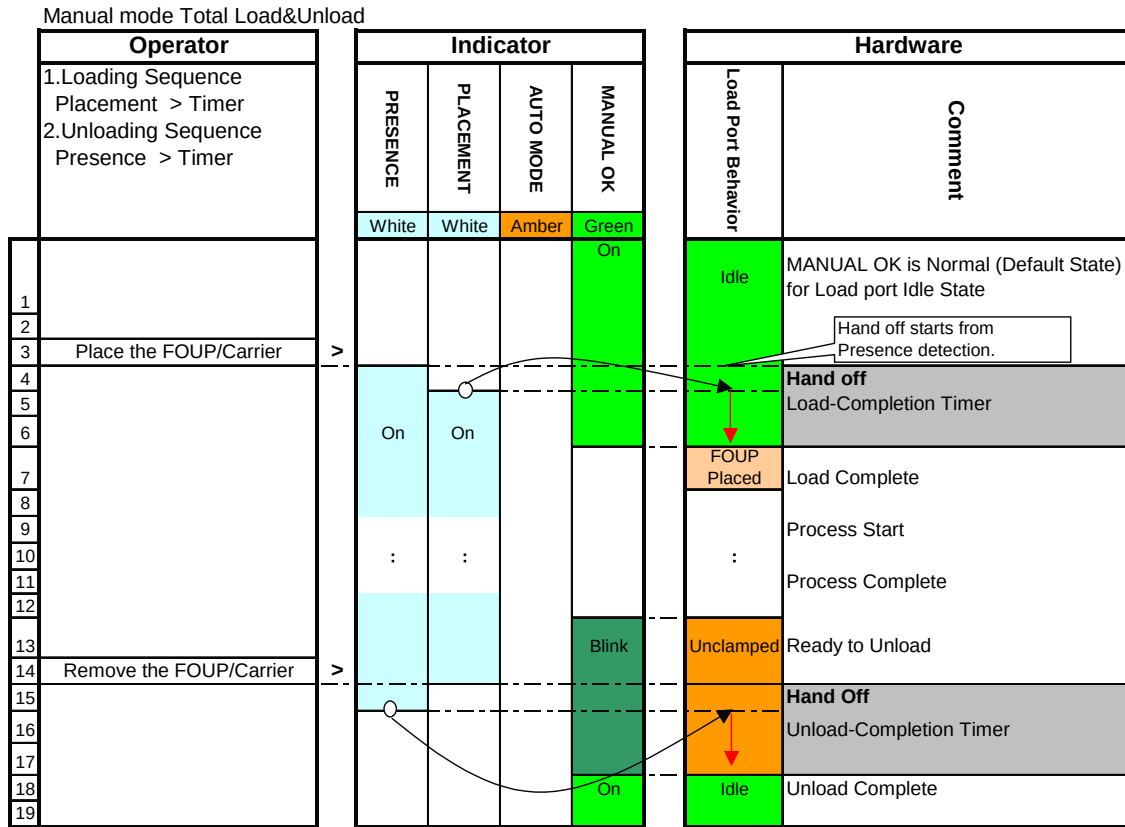
3. Load port position condition

Unclamp: Undocked & Unclamped position is necessary for the Manual Ok indicator to be turned on.



10.2.2 Total

10.2.2.1 Manual mode Total Load & Unload





10.2.2.2 Auto mode Total Load & Unload

Auto mode Total Load&Unload		Indicator				Hardware	
Operator		PRESENCE	PLACEMENT	AUTO MODE	MANUAL OK	Load Port Behavior	Comment
1.Loading Sequence Placement > P-I/O Complete 2.Unloading Sequence Removal > P-I/O Complete		White	White	Amber	Green		
1					On	Idle	MANUAL OK is Normal (Default State) for Load port Idle State
2							Host communicates change to AUTO MODE
3							
4				On			Hand off (VALID On Received)
5	Place the FOUP/Carrier by AMHS						
6							
7		On	On				P-I/O Complete (VALID Off Received)
8							
9						FOUP Placed	Load Complete
10							
11						:	Process Start
12							Process Complete
13							
14							
15						Unclamped	Ready to Unload
16							
17							Hand Off (VALID On Received)
18	Remove the FOUP/Carrier by AMHS						
19							
20							P-I/O Complete (VALID Off Received)
21							
22						Idle	Unload Complete
23							



10.2.3 Load

10.2.3.1 Load Normal case

Load Normal case

Operator		Indicator				Hardware	
1.Loading Sequence Placement > Timer		PRESENCE	PLACEMENT	AUTO MODE	MANUAL OK	Load Port Behavior	Comment
		White	White	Amber	Green		
1					On		
2							
3	Place the FOUP/Carrier						MANUAL OK is Normal (Default State) for Load port Idle State
4							
5							
6		On	On				
7							
8							

Load-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.
The Timer period is defined by the equipment parameter.
Load-Completion Timer is begun from the Placement sensor detection.



10.2.3.2 Load Normal case with Bind or Reserve

Load Normal case with Bind or Reserve							
Operator		Indicator				Hardware	
1.Loading Sequence Placement > Timer		PRESENCE	PLACEMENT	AUTO MODE	MANUAL OK	Load Port Behavior	Comment
		White	White	Amber	Green		
1					On	Idle	MANUAL OK is Normal (Default State) for Load port Idle State
2					Blink		Host issues a Bind or ReserveAtPort command
3	Place the FOUP/Carrier	>			On		
4					On		Hand Off
5							Load-Completion Timer
6		On	On				
7						FOUP Placed	Load Complete
8							

Load-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.
The Timer period is defined by the equipment parameter.
Load-Completion Timer is begun from the Placement sensor detection.



10.2.3.3 Load Abort case

Load Abort Case		Indicator				Hardware	
Operator		PRESENCE	PLACEMENT	AUTO MODE	MANUAL OK	Load Port Behavior	Comment
1.Loading Sequence Placement > Removal > Timer		White	White	Amber	Green		
1					On	Idle	MANUAL OK is Normal (Default State) for Load port Idle State
2							
3	Place the FOUP/Carrier						
4		On					
5			On				
6	Remove the FOUP/Carrier						
7							
8							
9							
10							
11						Idle	

Load-Completion/Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Load-Completion Timer is begun from the Placement sensor detection.

Unload-Completion Timer is begun from the presence sensor non-detection.



10.2.3.4 Load FOUP is not correctly put case 1

Load FOUP is not correctly put case1

Operator		Indicator				Hardware	
		PRESENCE	PLACEMENT	AUTO MODE	MANUAL OK	Load Port Behavior	Comment
1. Loading Sequence Placement > Placement again > Alarm clear		White	White	Amber	Green		
1					On	Idle	MANUAL OK is Normal (Default State) for Load port Idle State
2	Place the FOUP/Carrier	On				Hand Off Presence-to-Placement Timer Unload-Completion Timer Timer ends and Alarm is generated	
3							
4							
5	Remove the FOUP/Carrier						
6							
7							
8							
9	Place the FOUP/Carrier again	On					
10							
11			On				
12							
13	Clear the alarm						
14						FOUP Placed	Load Complete
15							

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The display of this timer is omitted in other sheets.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator correctly puts FOUP again (Placement sensor is detected), and releases the alarm on the screen.

Load-Completion/Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Load-Completion Timer is begun from the Placement sensor detection.

Unload-Completion Timer is begun from the presence sensor non-detection.



10.2.3.5 Load FOUP is not correctly put case 1”

Load FOUP is not correctly put case1”

Operator		Indicator				Hardware	
1.Loading Sequence Placement > Removal > Alarm clear		PRESENCE	PLACEMENT	AUTO MODE	MANUAL OK	Load Port Behavior	Comment
		White	White	Amber	Green		
1					On	Idle	MANUAL OK is Normal (Default State) for Load port Idle State
2	Place the FOUP/Carrier						
3		On					Hand Off Presence-to-Placement Timer
4							
5	Remove the FOUP/Carrier						Unload-Completion Timer
6							
7							
8	Clear the alarm						
9							
10						Idle	
11							

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The display of this timer is omitted in other sheets.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator removes a FOUP which was put incorrectly, and releases the alarm on the screen.

Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Unload-Completion Timer is begun from the presence sensor non-detection.



10.2.3.6 Load FOUP is not correctly put case 2

Load FOUP is not correctly put case2

Operator		Indicator				Load Port Behavior	Comment
		PRESENCE	PLACEMENT	AUTO MODE	MANUAL OK		
1>Loading Sequence Placement > Placement again > Alarm clear		White	White	Amber	Green		
1					On	Idle	MANUAL OK is Normal (Default State) for Load port Idle State
2	Place the FOUP/Carrier						
3		On					
4							
5	Remove the FOUP/Carrier						
6							
7	Place the FOUP/Carrier again						
8		On					
9			On				
10							
11							
12							
						FOUP Placed	Load Complete

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The display of this timer is omitted in other sheets.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator correctly puts FOUP again(Placement sensor is detected), and releases the alarm on the screen.

Load-Completion/Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Load-Completion Timer is begun from the Placement sensor detection.

Unload-Completion Timer is begun from the presence sensor non-detection.



10.2.3.7 Load FOUP is not correctly put case 2"

Load FOUP is not correctly put case2"

Operator		Indicator				Hardware	
1.Loading Sequence Placement > Removal > Alarm clear		PRESENCE	PLACEMENT	AUTO MODE	MANUAL OK	Load Port Behavior	Comment
		White	White	Amber	Green		
1					On	Idle	MANUAL OK is Normal (Default State) for Load port Idle State
2	Place the FOUP/Carrier	>					
3		On					Hand Off
4							
5	Remove the FOUP/Carrier	>					Unload-Completion Timer
6							
7							
8							
9							
10							
11							
12						Idle	Timer ends and Alarm is generated. The Alarm notification can be cleared any time.

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The display of this timer is omitted in other sheets.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator removes a FOUP which was put incorrectly, and releases the alarm on the screen.

Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Unload-Completion Timer is begun from the presence sensor non-detection.



10.2.3.8 Load FOUP is put once, then removed, and it is put again case

Load FOUP is put once, then removed, and it is put again case

Operator		Indicator				Hardware	
		PRESENCE	PLACEMENT	AUTO MODE	MANUAL OK	Load Port Behavior	Comment
1.Loading Sequence Placement > Removal > Placement > Timer		White	White	Amber	Green		
1					On	Idle	MANUAL OK is Normal (Default State) for Load port Idle State
2	Place the FOUP/Carrier	>					
3		On					
4			On				
5	Remove the FOUP/Carrier	>					
6							
7							
8	Place the FOUP/Carrier	>					
9		On	On				
10							
11							
12							
13							

Load-Completion/Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

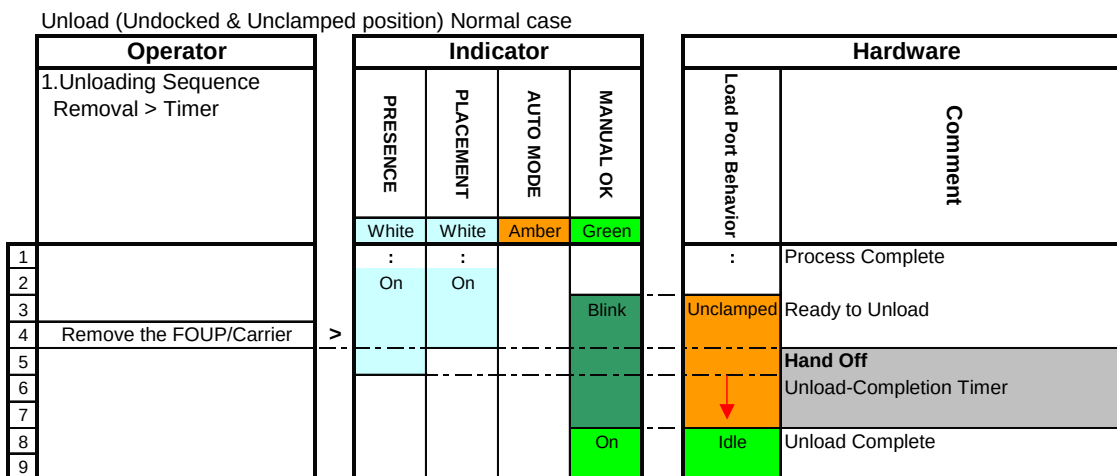
Load-Completion Timer is begun from the Placement sensor detection.

Unload-Completion Timer is begun from the presence sensor non-detection.



10.2.4 Unload

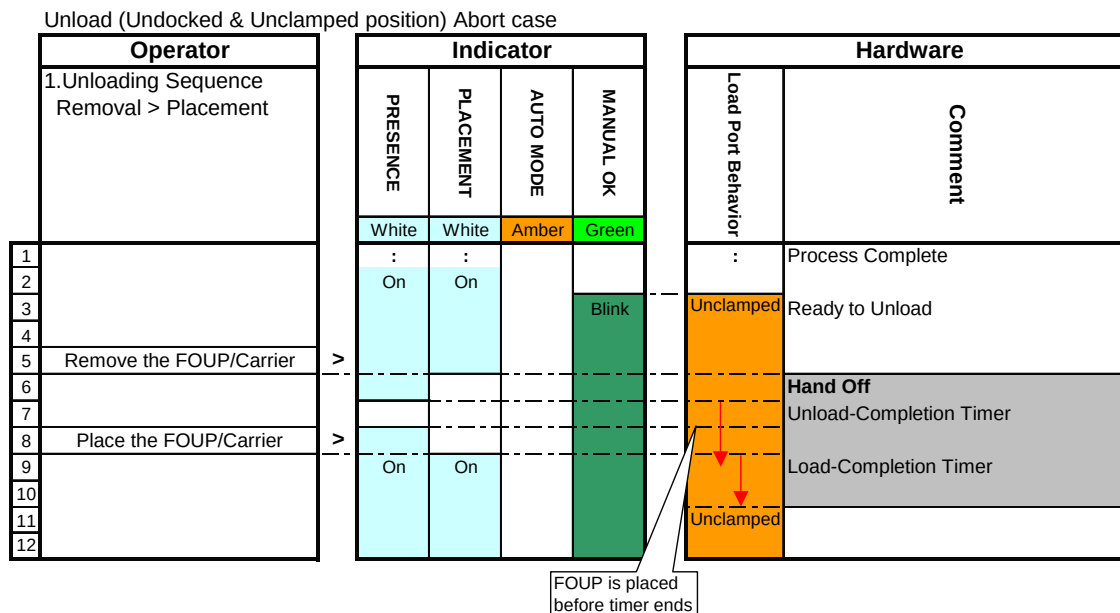
10.2.4.1 Unload (Undocked & Unclamped position) Normal case

**Unload-Completion Timer**

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.
The Timer period is defined by the equipment parameter.
Unload-Completion Timer is begun from the Presence sensor non-detection.



10.2.4.2 Unload (Undocked & Unclamped position) Abort case

**Load-Completion/Unload-Completion Timer**

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Load-Completion Timer is begun from the Placement sensor detection.

Unload-Completion Timer is begun from the presence sensor non-detection.



10.3 Scenarios - Internal Buffer

1. Load

Switch condition

No use: Switch is not used

2. Unload

Switch condition

No use: Switch is not used

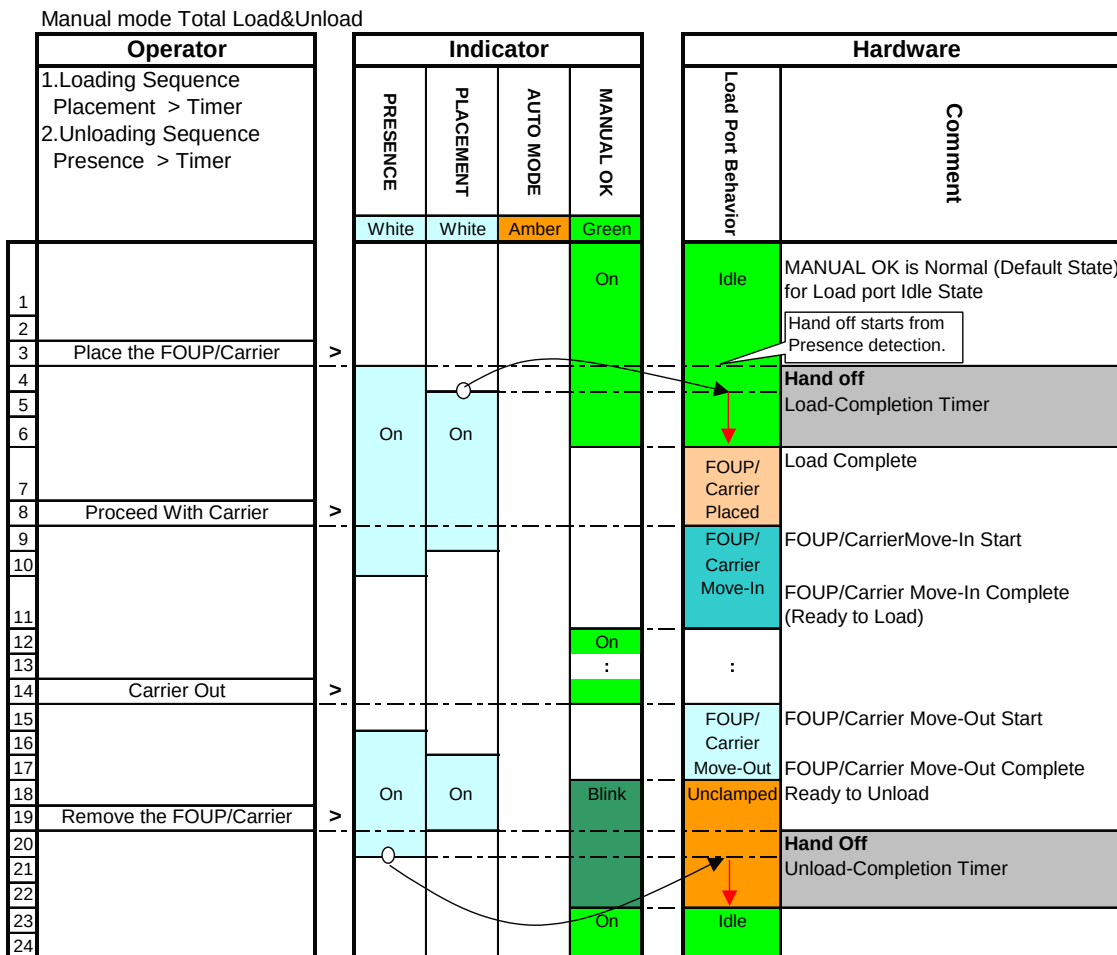
3. Load port position condition

Unclamp: Undocked & Unclamped position is necessary for the Manual Ok indicator to be turned on.



10.3.1 Total

10.3.1.1 Manual mode Total Load & Unload





10.3.1.2 Auto mode Total Load & Unload

Auto mode Total Load&Unload		Indicator				Hardware	
Operator		PRESENCE	PLACEMENT	AUTO MODE	MANUAL OK	Load Port Behavior	Comment
1.Loading Sequence Placement > P-I/O Complete 2.Unloading Sequence Removal > P-I/O Complete		White	White	Amber	Green		
1					On	Idle	MANUAL OK is Normal (Default State) for Load port Idle State
2							Host communicates change to AUTO MODE
3							
4				On			Hand Off (VALID On Received)
5	Place the FOUP/Carrier by AMHS						
6							
7		On	On				P-I/O Complete (VALID Off Received)
8							
9						FOUP/ Carrier Placed	Load Complete
10	Proceed With Carrier						
11						FOUP/ Carrier Move-In	FOUP/Carrier Move-In Start
12							FOUP/Carrier Move-In Complete (Ready to Load)
13							
14						:	
15							
16	Carrier Out						
17						FOUP/ Carrier Move-Out	FOUP/Carrier Move-Out Start
18							FOUP/Carrier Move-Out Complete Ready to Unload
19		On	On			Unclamped	
20							Hand Off (VALID On Received)
21	Remove the FOUP/Carrier by AMHS						
22							
23							P-I/O Complete (VALID Off Received)
24							
25							
26						Idle	Unload Complete
27							



10.3.2 Load

10.3.2.1 Load Normal case

Load Normal case		Indicator				Hardware	
Operator		PRESENCE	PLACEMENT	AUTO MODE	MANUAL OK	Load Port Behavior	Comment
1.Loading Sequence Placement > Timer		White	White	Amber	Green		
1					On	Idle	MANUAL OK is Normal (Default State) for Load port Idle State
2							
3	Place the FOUP/Carrier						
4							
5							
6		On	On				Hand Off Load-Completion Timer
7							
8	Proceed With Carrier					FOUP/ Carrier Placed	Load Complete
9							
10						FOUP/ Carrier Move-In	FOUP/Carrier Move-In Start
11							FOUP/Carrier Move-In Complete (Ready to Load)
12					On		
13					:	:	

Load-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Load-Completion Timer is begun from the Placement sensor detection.



10.3.2.2 Load Normal case with Bind or Reserve

Load Normal case with Bind or Reserve

Operator		Indicator				Hardware	
		PRESENCE	PLACEMENT	AUTO MODE	MANUAL OK	Load Port Behavior	Comment
1.Loading Sequence Placement > Timer		White	White	Amber	Green		
1					On	Idle	MANUAL OK is Normal (Default State) for Load port Idle State
2					Blink		Host issues a Bind or ReserveAtPort command
3	Place the FOUP/Carrier				On		
4							
5							
6		On	On				Hand Off Load-Completion Timer
7							
8	Proceed With Carrier					FOUP/ Carrier Placed	Load Complete
9							
10						FOUP/ Carrier Move-In	FOUP/Carrier Move-In Start
11							FOUP/Carrier Move-In Complete (Ready to Load)
12					On		
13					:	:	

Load-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.
The Timer period is defined by the equipment parameter.
Load-Completion Timer is begun from the Placement sensor detection.



10.3.2.3 Load Abort case

Load Abort case		Indicator				Hardware	
Operator		PRESENCE	PLACEMENT	AUTO MODE	MANUAL OK	Load Port Behavior	Comment
1.Loading Sequence Placement > Removal > Timer		White	White	Amber	Green		
1					On	Idle	MANUAL OK is Normal (Default State) for Load port Idle State
2							
3	Place the FOUP/Carrier	On					
4							
5			On				
6	Remove the FOUP/Carrier						
7							
8							
9							
10							
11						Idle	

Load-Completion/Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Load-Completion Timer is begun from the Placement sensor detection.

Unload-Completion Timer is begun from the presence sensor non-detection.



10.3.2.4 Load FOUP is not correctly put case 1

Load FOUP is not correctly put case1

Operator		Indicator				Hardware	
		PRESENCE	PLACEMENT	AUTO MODE	MANUAL OK	Load Port Behavior	Comment
		White	White	Amber	Green		
1					On	Idle	MANUAL OK is Normal (Default State) for Load port Idle State
2							
3	Place the FOUP/Carrier	>					
4		On					
5							
6	Remove the FOUP/Carrier	>					
7							
8							
9							
10	Place the FOUP/Carrier again	>					
11		On					
12			On				
13							
14	Clear the alarm	>					
15							
16	Proceed With Carrier	>				FOUP/Carrier Placed	Load Complete
17						FOUP/Carrier Move-In	FOUP/Carrier Move-In Start
18							FOUP/Carrier Move-In Complete (Ready to Load)
19					On		
20							
21					:	:	

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The display of this timer is omitted in other seats.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator correctly puts FOUP again(Placement sensor is detected), and releases the alarm on the screen.

Load-Completion/Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Load-Completion Timer is begun from the Placement sensor detection.

Unload-Completion Timer is begun from the presence sensor non-detection.



10.3.2.5 Load FOUP is not correctly put case 1”

Load FOUP is not correctly put case1”

Operator		Indicator				Hardware	
1.Loading Sequence Placement > Removal > Alarm clear		PRESENCE	PLACEMENT	AUTO MODE	MANUAL OK	Load Port Behavior	Comment
		White	White	Amber	Green		
1					On	Idle	MANUAL OK is Normal (Default State) for Load port Idle State
2							
3	Place the FOUP/Carrier	>					
4		On					Hand Off
5							Presence-to-Placement Timer
6	Remove the FOUP/Carrier	>					
7							Unload-Completion Timer
8							
9	Clear the alarm	>					
10							
11						Idle	
12							

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The display of this timer is omitted in other sheets.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator removes a FOUP which was put incorrectly, and releases the alarm on the screen.

Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Unload-Completion Timer is begun from the presence sensor non-detection.



10.3.2.6 Load FOUP is not correctly put case 2

Load FOUP is not correctly put case2

Operator		Indicator				Hardware	
1.Loading Sequence Placement > Placement again > Alarm clear		PRESENCE	PLACEMENT	AUTO MODE	MANUAL OK	Load Port Behavior	Comment
		White	White	Amber	Green		
1					On	Idle	MANUAL OK is Normal (Default State) for Load port Idle State
2							
3	Place the FOUP/Carrier	>					
4							
5		On					
6	Remove the FOUP/Carrier	>					
7							
8	Place the FOUP/Carrier again	>					
9							
10		On					
11			On				
12							
13	Proceed With Carrier	>					
14							
15							
16							
17					On		
18					:		

Hand Off	
Presence-to-Placement Timer	Timer ends and Alarm is generated. The Alarm notification can be cleared any time.
Unload-Completion Timer	
FOUP/Carrier is placed before timer ends	
Load-Completion Timer	
Load Complete	
FOUP/Carrier Placed	
FOUP/Carrier Move-In Start	
FOUP/Carrier Move-In Complete (Ready to Load)	

Presence-to-Placement Timer
This timer is a watch timer between Presence sensor and Placement sensor.
The display of this timer is omitted in other sheets.
The Timer period is defined by the equipment parameter.
When the timer is end, an Alarm is generated and waits for operator instruction.
The operator correctly puts FOUP again(Placement sensor is detected), and releases the alarm on the screen.

Load-Completion/Unload-Completion Timer
Timer becomes the trigger of the end of HandOff because of the replacement of Switch.
The Timer period is defined by the equipment parameter.
Load-Completion Timer is begun from the Placement sensor detection.
Unload-Completion Timer is begun from the presence sensor non-detection.



10.3.2.7 Load FOUP is not correctly put case 2''

Load FOUP is not correctly put case2''

Operator		Indicator				Hardware	
1.Loading Sequence Placement > Removal > Alarm clear		PRESENCE	PLACEMENT	AUTO MODE	MANUAL OK	Load Port Behavior	Comment
1		White	White	Amber	Green	Idle	MANUAL OK is Normal (Default State) for Load port Idle State Hand Off Presence-to-Placement Timer Unload-Completion Timer Timer ends and Alarm is generated. The Alarm notification can be cleared any time.
2					On		
3 Place the FOUP/Carrier		>					
4		On					
5							
6 Remove the FOUP/Carrier		>					
7							
8							
9							
10							
11							
12							
13							

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The display of this timer is omitted in other sheets.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator removes a FOUP which was put incorrectly, and releases the alarm on the screen.

Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Unload-Completion Timer is begun from the presence sensor non-detection.



10.3.2.8 Load FOUP is put once, then removed, and it is put again case

Operator		Indicator				Hardware	
1.Loading Sequence Placement > Removal > Placement > Timer		PRESENCE	PLACEMENT	AUTO MODE	MANUAL OK	Load Port Behavior	Comment
		White	White	Amber	Green		
1					On	Idle	MANUAL OK is Normal (Default State) for Load port Idle State
2							
3	Place the FOUP/Carrier	>					
4		On					
5			On				
6	Remove the FOUP/Carrier	>					
7							
8							
9	Place the FOUP/Carrier	>					
10		On					
11			On				
12							
13							
14							
15	Proceed With Carrier	>					
16							
17							
18							
19					On		
20					:		

Load-Completion/Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Load-Completion Timer is begun from the Placement sensor detection.

Unload-Completion Timer is begun from the presence sensor non-detection.



10.3.3 Unload

10.3.3.1 Unload (Undocked & Unclamped position) Normal case

Unload (Undocked & Unclamped position) Normal case											
Operator			Indicator				Hardware				
1.Unloading Sequence Removal > Timer Unload Indicator lights: Load port is Undocked and Unclamped			PRESENCE	PLACEMENT	AUTO MODE	MANUAL OK	Load Port Behavior	Comment			
			White	White	Amber	Green					
1						:	:	Process Complete			
2	Carrier Out	>				On					
3							FOUP/ Carrier	FOUP/Carrier Move-Out Start			
4							Move-Out	FOUP/Carrier Move-Out Complete			
5							Unclamped	Ready to Unload			
6			On	On		Blink					
7	Remove the FOUP/Carrier	>						Hand Off			
8								Unload-Completion Timer			
9											
10											
11						On					
12							Idle	Unload Complete			

Unload-Completion Timer

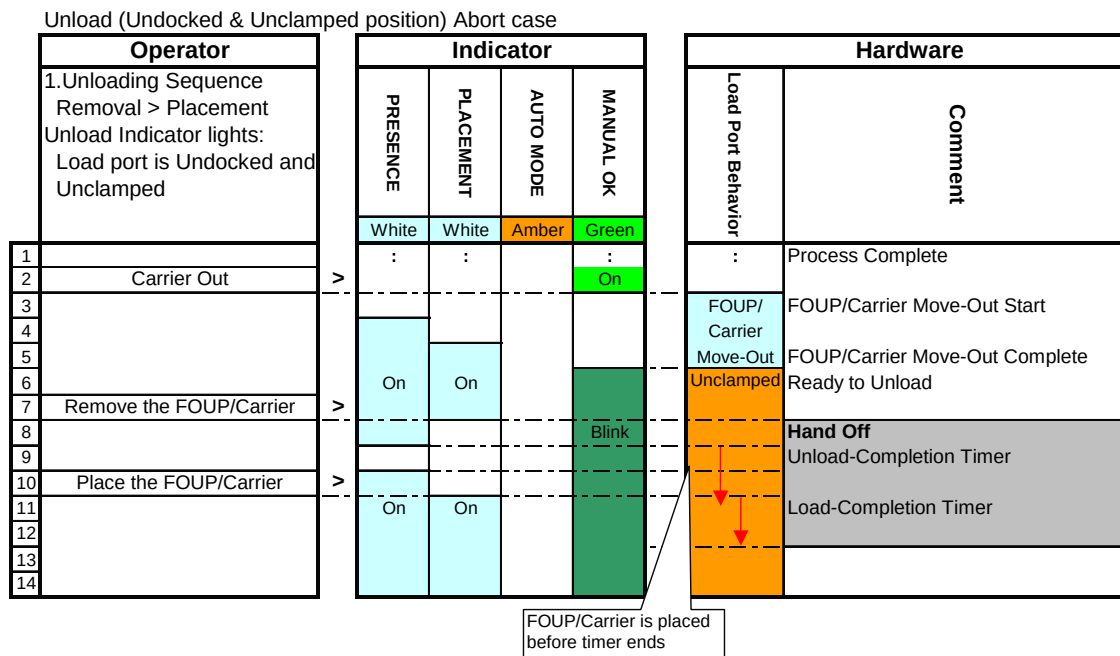
Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Unload-Completion Timer is begun from the Presence sensor non-detection.



10.3.3.2 Unload (Undocked & Unclamped position) Abort case

**Load-Completion/Unload-Completion Timer**

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Load-Completion Timer is begun from the Placement sensor detection.

Unload-Completion Timer is begun from the presence sensor non-detection.



11 Selele Option

This option is based on the Selele requirements.

11.1 Functional Definitions

This section defines functionality of indicators and switch.

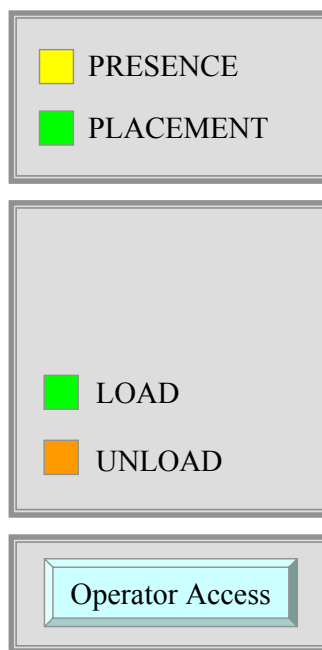


Figure 6: Functional image of indicators and switch for Selele option

11.1.1 “PRESENCE” Indicator

- a Function:
 - Indicator which indicates presence of carrier on Load port as required in GJG.
 - “Presence” should also be active during “Placement” indicator is active.
- b Signal source:
 - Hardware level signal from “PRESENCE” sensor.
 - “Presence” signal/indicator may have a bounce (Chattering) during carrier handoff.
- c Color: Yellow LED
- d States:
 - Off No Carrier is present on Load port.
 - On Carrier is present on Load port.

11.1.2 “PLACEMENT” Indicator

- a Function:
 - Indicator which indicates proper placement of carrier on Load port as required in GJG.



- b Signal source:
 - Hardware level signal from “PLACEMENT” sensor.
 - “Placement” signal/indicator may have a bounce (Chattering) during carrier handoff.
- c Color: Green LED
- d States:
 - Off Carrier is not properly placed on Load port.
 - On Carrier is properly placed on Load port.

11.1.3 “LOAD” Indicator

- a Function:
 - Indicator, which indicates allowance of manual load.
 - This indicator is active only in Manual mode.
- b Color: Green LED
- c States:
 - Off Manual load is not allowed. (Out of Service, Access Mode is AUTO, Load Complete, CarrierOut start, etc.)
 - On Manual load is allowed.

11.1.4 “UNLOAD” Indicator

- a Function:
 - Indicator which indicates allowance of manual unload
 - This indicator is active only in Manual mode.
- b Color: Orange LED
- c States:
 - Off Manual unload is not allowed. (Out of Service, Access Mode is AUTO)
 - On Manual unload is allowed.

11.1.5 “Operator Access” Switch and Indicator

- a Indicator Function:
 - Indicator indicates “Manual Access Permission/Progressing”.
- b Indicator Color: Clear (Yellow) LED
- c Indicator States:
 - Off Manual access is not granted. Access Mode is not frozen.
 - On Ready to Load or Ready to Unload. Access Mode is not frozen.
 - Blink Handoff for Manual access is in progress. Access Mode is frozen.
Equipment is “Physically Ready” to “Handoff”
- d Switch Function:
 - “Request” to start Operator access
 - “End” Operator access
- e Switch Type: Momentary
- f Switch Option:
 - Switch function is inactivated by customer’s request under customer’s responsibility for safety.



11.1.6 Timers

a Load-Completion Timer

A Timer which gives the end of HandOff for LOAD in case Operator Access Switch is not pushed in time after PLACEMENT sensor turns on.

This timeout does not cause any error.

The Timer length will be defined by the equipment parameter.

b Unload-Completion Timer

A Timer which gives the end of HandOff for UNLOAD in case Operator Access Switch is not pushed in time after PLACEMENT sensor turns off.

This timeout does not cause any error.

The Timer length will be defined by the equipment parameter.

c Presence-to-Placement Timer

This timer defines the maximum allowable time between Presence sensor and Placement sensor.

The Timer length will be defined by the equipment parameter.

Alarm will be generated on time out and equipment waits for operator's instruction.

Operator should replace the FOUP (Placement sensor to be detected), and release the alarm from GUI.

d Operator Interaction Timer

This timer defines the maximum allowable time between two OPERATOR ACCESS switch actions for handoff start request and handoff complete.

11.2 Scenarios – Fixed Buffer

11.2.1 Detail description for the titles

1. Load

Switch condition

Before: Before FOUP is carried, the switch is pushed.

After: After FOUP is carried, the switch is pushed

Timer: Timer is a trigger for a completion of the Hand Off sequence

No use: Switch is not used

2. Unload

Switch condition

Before: Before FOUP is removed, the switch is pushed.

After: After FOUP is removed, the switch is pushed

Timer: Timer is a trigger for a completion of the Hand Off sequence

No use: Switch is not used

3. Load port position condition

Unclamp: Undocked & Unclamped position is necessary for the Unload indicator to be turned on



11.2.2 Total

11.2.2.1 Manual mode Total Load & Unload

Manual mode Total Load&Unload

Operator		Indicator				Switch	Hardware	
1.Loading Sequence Switch > Placement > Switch 2.Unloading Sequence Switch > Removal > Switch		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								
3	Push Operator Access Switch	>						
4								
5	Place the FOUP/Carrier	>				Blink		Hand Off
6								Hand off starts from pushing the switch
7								
8	Push Operator Access Switch	>	On	On				
9							FOUP/ Carrier Placed	Load Complete
10								
11								
12		:	:				:	Process Start
13								Process Complete
14								
15				On		On	Unclamped	Ready to Unload
16	Push Operator Access Switch	>						
17								
18								
19	Remove the FOUP/Carrier	>				Blink		Hand Off
20								
21	Push Operator Access Switch	>						
22					On	On	Idle	
23								

Blink indicates under "Hand Off"



11.2.2.2 Auto mode Total Load & Unload

Auto mode Total Load&Unload		Indicator				Switch	Hardware	
Operator		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
1. Loading Sequence Placement > P-I/O Complete 2. Unloading Sequence Removal > P-I/O Complete		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								Host communicates change to AUTO MODE
3								
4								
5								
6	Place the FOUP/Carrier by AMHS	>						Hand Off (VALID On Received)
7								
8		On	On					P-I/O Complete (VALID Off Received)
9							FOUP/Carrier Placed	Load Complete
10								Process Start
11		:	:				:	Process Complete
12								
13								
14							Unclamped	Ready to Unload
15								
16								
17								Hand Off (VALID On Received)
18	Remove the FOUP/Carrier by AMHS	>						
19								
20								P-I/O Complete (VALID Off Received)
21								
22							Idle	



11.2.3 Load

11.2.3.1 Load (Before & After) Normal case

Load (Before & After) Normal case

Operator		Indicator				Switch	Hardware	
		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								
3	Push Operator Access Switch	>						
4								
5	Place the FOUP/Carrier	>				Blink		Hand Off
6								
7								
8	Push Operator Access Switch	>	On	On				
9							FOUP/Carrier Placed	Load Complete
10		:	:				:	

11.2.3.2 Load (Before & Timer) Normal case

Load (Before & Timer) Normal case

Operator		Indicator				Switch	Hardware	
		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								
3	Push Operator Access Switch	>						
4								
5	Place the FOUP/Carrier	>				Blink		Hand Off
6								
7								Load-Completion Timer
8								
9							FOUP/Carrier Placed	Load Complete
10		:	:				:	

Load-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.
The Timer period is defined by the equipment parameter.
Load-Completion Timer is begun from the Placement sensor detection.



11.2.3.3 Load (No use the switch & After) Normal case

Operator		Indicator				Switch	Hardware	
1. Loading Sequence Placement > Timer		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								
3	Place the FOUP/Carrier	>						
4						Blink		Hand Off
5								
6	Push Operator Access Switch	>	On	On			FOUP/ Carrier Placed	Load Complete
7								
8		:	:				:	

11.2.3.4 Load (No use the switch & Timer) Normal case

Operator		Indicator				Switch	Hardware	
1. Loading Sequence Placement > Timer		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								
3	Place the FOUP/Carrier	>						
4						Blink		Hand Off
5								Load-Completion Timer
6		On	On					
7							FOUP/ Carrier Placed	Load Complete
8		:	:				:	

Load-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.
The Timer period is defined by the equipment parameter.
Load-Completion Timer is begun from the Placement sensor detection.



11.2.3.5 Load (Before & After) Abort case

Operator		Indicator				Switch	Hardware	
1. Loading Sequence Switch > Placement > Removal > Switch		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								
3	Push Operator Access Switch	>						
4								
5	Place the FOUP/Carrier	>				Blink		Hand Off
6		On						
7			On					
8	Remove the FOUP/Carrier	>						
9								
10					On			
11	Push Operator Access Switch	>						
12						On	Idle	
13								



11.2.3.6 Load (Before & Timer) Abort case

Load (Before & Timer) Abort Case

Operator		Indicator				Switch	Hardware	
		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
	1. Loading Sequence Switch > Placement > Removal > Timer	Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								
3	Push Operator Access Switch							
4								
5	Place the FOUP/Carrier					Blink		Hand Off
6		On						
7			On					Load-Completion Timer
8	Remove the FOUP/Carrier							FOUP/Carrier is taken before timer ends
9					On			Unload-Completion Timer
10								
11								
12						On	Idle	
13								

Load-Completion/Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Load-Completion Timer is begun from the Placement sensor detection.

Unload-Completion Timer is begun from the presence sensor non-detection.



11.2.3.7 Load (Before & After or Timer) FOUP is not correctly put case 1

Operator		Indicator				Switch	Hardware	
1. Loading Sequence Switch > Placement > Placement again > Alarm clear		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								
3	Push Operator Access Switch	>						
4								
5	Place the FOUP/Carrier	>				Blink		Hand Off
6		On						Presence-to-Placement Timer
7								Timer ends and Alarm is generated
8	Remove the FOUP/Carrier	>						Unload-Completion Timer
9								Even if timer ends, LOAD indicator state and switch state are not changed.
10								
11								
12	Place the FOUP/Carrier again	>						Load-Completion Timer
13		On	On					Even if timer ends, LOAD indicator state and switch state are not changed.
14								
15								
16	Clear the alarm	>						
17							FOUP/Carrier Placed	Load Complete
18		:	:				:	

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The description of Presence-to-Placement timer is omitted in some sheets.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator correctly puts FOUP/Carrier again(Placement sensor is detected), and releases the alarm on the screen.

Load-Completion/Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Load-Completion Timer is begun from the Placement sensor detection.

Unload-Completion Timer is begun from the presence sensor non-detection.



11.2.3.8 Load (Before & After or Timer) FOUP is not correctly put case 1"

Load (Before & After or Timer) FOUP is not correctly put case1"

Operator		Indicator				Switch	Hardware	
		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
1. Loading Sequence Switch > Placement > Removal > Alarm clear		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								
3	Push Operator Access Switch							
4								
5	Place the FOUP/Carrier					Blink		Hand Off
6		On						Presence-to-Placement Timer
7								Timer ends and Alarm is generated
8	Remove the FOUP/Carrier							Unload-Completion Timer
9								Even if timer ends, LOAD indicator state and switch state are not changed.
10								
11	Clear the alarm							
12						On	Idle	
13								

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The description of Presence-to-Placement timer is omitted in some sheets.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator removes a FOUP/Carrier which was put incorrectly, and releases the alarm on the screen.

Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Unload-Completion Timer is begun from the Presence sensor non-detection.



11.2.3.9 Load (Before & After) FOUP is not correctly put case2

Load (Before & After) FOUP is not correctly put case2

Operator		Indicator				Switch	Hardware	
		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
1>Loading Sequence Switch > Placement > Placement again > Switch		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								
3	Push Operator Access Switch							
4								
5	Place the FOUP/Carrier					Blink	Hand Off	
6		On						Presence-to-Placement Timer
7								
8	Remove the FOUP/Carrier							Timer ends and Alarm is generated. The Alarm notification can be cleared any time.
9								
10	Place the FOUP/Carrier again							Unload-Completion Timer
11		On						FOUP/Carrier is placed before timer ends
12			On					
13	Push Operator Access Switch							
14							FOUP/Carrier Placed	Load Complete
15		:	:				:	

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The description of Presence-to-Placement timer is omitted in some sheets.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator correctly puts FOUP/Carrier again(Placement sensor is detected), and releases the alarm on the screen.

Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Unload-Completion Timer is begun from the Presence sensor non-detection.



11.2.3.10 Load (Before & After) FOUP is not correctly put case 2''

Load (Before & After) FOUP is not correctly put case2''

Operator		Indicator				Switch	Hardware	
1. Loading Sequence Switch > Placement > Removal > Switch		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								
3	Push Operator Access Switch	>						
4								
5	Place the FOUP/Carrier	>				Blink		Hand Off
6		On						Presence-to-Placement Timer
7								
8	Remove the FOUP/Carrier	>						
9								
10	Push Operator Access Switch	>						
11						On	Idle	
12								

Timer ends and Alarm is generated.
The Alarm notification can be cleared any time.

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The description of Presence-to-Placement timer is omitted in some sheets.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator removes a FOUP/Carrier which was put incorrectly, and releases the alarm on the screen.



11.2.3.11 Load (Before & Timer) FOUP is not correctly put case 3

Load (Before & Timer) FOUP is not correctly put case3

Operator		Indicator				Switch	Hardware	
		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
1>Loading Sequence Switch > Placement > Placement again > Alarm clear		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								
3	Push Operator Access Switch >							
4								
5	Place the FOUP/Carrier >					Blink	Hand Off	
6		On						Presence-to-Placement Timer
7								
8	Remove the FOUP/Carrier >							Timer ends and Alarm is generated. The Alarm notification can be cleared any time.
9								
10	Place the FOUP/Carrier again >							Unload-Completion Timer
11		On						FOUP/Carrier is placed before timer ends
12			On					Load-Completion Timer
13								
14							FOUP/Carrier Placed	Load Complete
15		:	:				:	

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The description of Presence-to-Placement timer is omitted in some sheets.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator correctly puts FOUP/Carrier again(Placement sensor is detected), and releases the alarm on the screen.

Load-Completion/Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Load-Completion Timer is begun from the Placement sensor detection.

Unload-Completion Timer is begun from the presence sensor non-detection.



11.2.3.12 Load (Before & Timer) FOUP is not correctly put case 3”

Load (Before & Timer) FOUP is not correctly put case3”

Operator		Indicator				Switch	Hardware	
1.Loading Sequence Switch > Placement > Removal > Alarm clear		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								
3	Push Operator Access Switch							
4								
5	Place the FOUP/Carrier					Blink		Hand Off
6		On						Presence-to-Placement Timer
7								
8	Remove the FOUP/Carrier							Timer ends and Alarm is generated. The Alarm notification can be cleared any time.
9								
10								
11								
12						On	Idle	

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The description of Presence-to-Placement timer is omitted in some sheets.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator removes a FOUP/Carrier which was put incorrectly, and releases the alarm on the screen.

Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Unload-Completion Timer is begun from the Presence sensor non-detection.



11.2.3.13 Load (Before & Timer) FOUP is put once, then removed, and it is put again case

Load (Before & Timer) FOUP is put once, then removed, and it is put again case

Operator		Indicator				Switch	Hardware	
		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
1. Loading Sequence Switch > Placement > Removal > Placement > Timer		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								
3	Push Operator Access Switch							
4								
5	Place the FOUP/Carrier					Blink		Hand Off
6		On	On					Load-Completion Timer
7			On					FOUP/Carrier is taken before timer ends
8	Remove the FOUP/Carrier							Unload-Completion Timer
9					On			FOUP/Carrier is placed before timer ends
10								Load-Completion Timer
11	Place the FOUP/Carrier							
12		On	On					
13			On					
14								
15							FOUP/Carrier Placed	Load Complete
16		:	:				:	

Load-Completion/Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

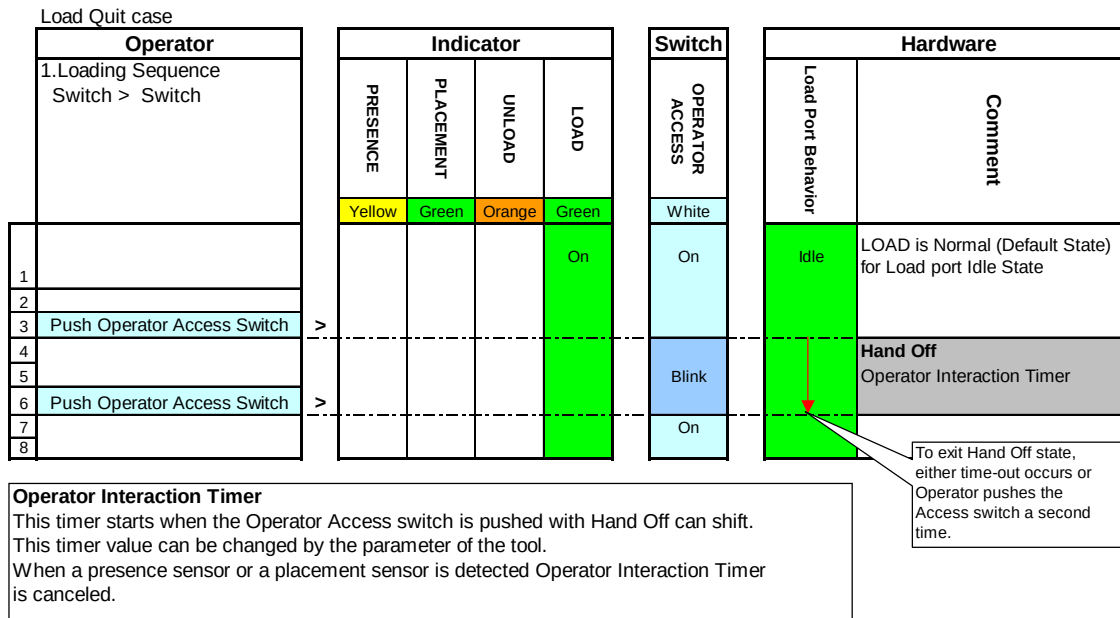
The Timer period is defined by the equipment parameter.

Load-Completion Timer is begun from the Placement sensor detection.

Unload-Completion Timer is begun from the presence sensor non-detection.



11.2.3.14 Load Quit case





11.2.4 Unload

11.2.4.1 Unload (Before & After / Undocked & Unclamped position) Normal case

Unload (Before & After / Undocked & Unclamped position) Normal case

Operator		Indicator				Switch	Hardware	
		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
1. Unloading Sequence Switch > Removal > Switch Unload Indicator lights: Load port is Undocked and Unclamped		Yellow	Green	Orange	Green	White	:	Process Complete
1		:	:					
2		On	On	On		On	Unclamped	Ready to Unload
3								
4	Push Operator Access Switch	>						
5								
6						Blink		Hand Off
7	Remove the FOUP/Carrier	>						
8								
9	Push Operator Access Switch	>						
10					On	On	Idle	Unload Complete
11								

11.2.4.2 Unload (Before & Timer / Undocked & Unclamped position) Normal case

Unload (Before & Timer / Undocked & Unclamped position) Normal case

Operator		Indicator				Switch	Hardware	
		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
1. Unloading Sequence Switch > Removal > Timer Unload Indicator lights: Load port is Undocked and Unclamped		Yellow	Green	Orange	Green	White	:	Process Complete
1		:	:					
2		On	On	On		On	Unclamped	Ready to Unload
3								
4	Push Operator Access Switch	>						
5								
6						Blink		Hand Off
7	Remove the FOUP/Carrier	>						
8								
9								Unload-Completion Timer
10								
11					On	On	Idle	Unload Complete
12								

Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.
The Timer period is defined by the equipment parameter.
Unload-Completion Timer is begun from the Presence sensor non-detection.



11.2.4.3 Unload (Not use the switch & Timer / Undocked & Unclamped position) Normal case

Unload (No use the switch & Timer / Undocked & Unclamped position) Normal case

Operator		Indicator				Switch	Hardware	
		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
1. Unloading Sequence Removal > Timer Unload Indicator lights: Load port is Undocked and Unclamped		Yellow	Green	Orange	Green	White	:	Process Complete
1		:	:					
2								
3								
4	Remove the FOUP/Carrier	On	On	On		On	Unclamped	Ready to Unload
5								
6						Blink	↓	Hand Off Unload-Completion Timer
7								
8					On	On	Idle	Unload Complete
9								

Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.
The Timer period is defined by the equipment parameter.
Unload-Completion Timer is begun from the Presence sensor non-detection.



11.2.4.4 Unload (Before & After / Undocked & Unclamped position) Abort case

Unload (Before & After / Undocked & Unclamped position) Abort case

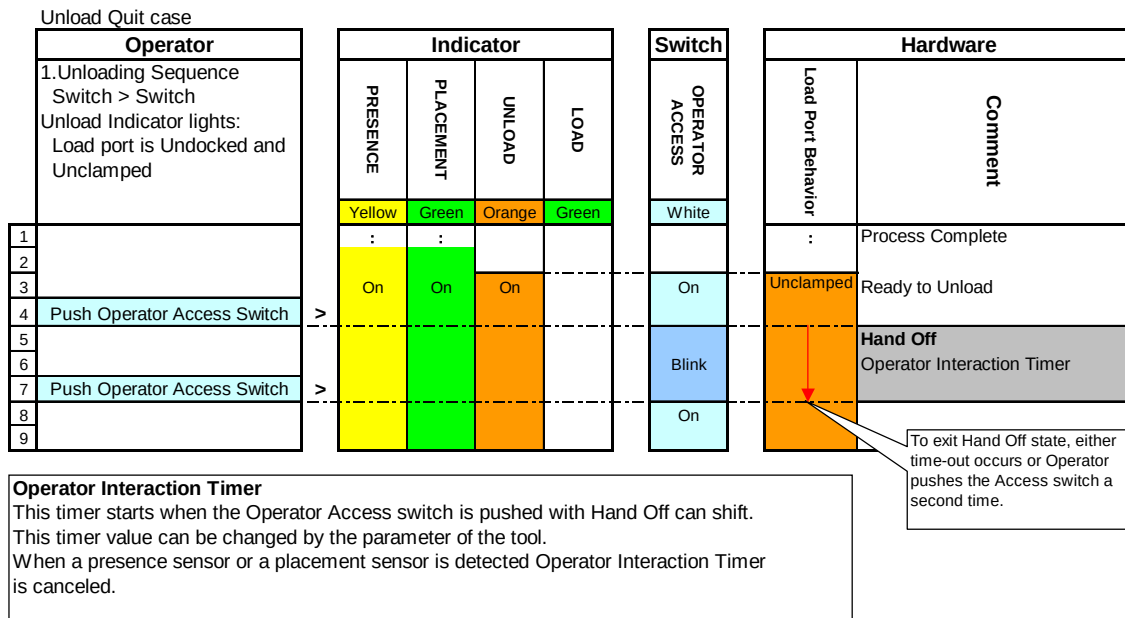
Operator		Indicator				Switch	Hardware	
		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
1. Unloading Sequence Switch > Removal > Placement > Switch Unload Indicator lights: Load port is Undocked and Unclamped		Yellow	Green	Orange	Green	White	:	Process Complete
1		:	:					
2								
3		On	On	On		On	Unclamped	Ready to Unload
4	Push Operator Access Switch	>						
5								
6						Blink		Hand Off
7	Remove the FOU/Carrier	>						
8								
9								
10	Place the FOU/Carrier	>						Unload-Completion Timer
11								
12		On	On	On				FOU/Carrier is placed before timer ends
13	Push Operator Access Switch	>						
14						On	Unclamped	
15								

Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.
The Timer period is defined by the equipment parameter.
Unload-Completion Timer is begun from the Presence sensor non-detection.



11.2.4.5 Unload Quit case





11.3 Scenario - Internal Buffer

11.3.1 Detail description for the titles

1. Load

Switch condition

- Before: Before FOUP is carried, the switch is pushed.
After: After FOUP is carried, the switch is pushed
Timer: Timer is a trigger for a completion of the Hand Off sequence
No use: Switch is not used

2. Unload

Switch condition

- Before: Before FOUP is removed, the switch is pushed.
After: After FOUP is removed, the switch is pushed
Timer: Timer is a trigger for a completion of the Hand Off sequence
No use: Switch is not used

3. Load port position condition

- Unclamp: Undocked & Unclamped position is necessary for the Unload indicator to be turned



11.3.2 Total

11.3.2.1 Manual mode Total Load & Unload

Manual mode Total Load&Unload		Indicator				Switch	Hardware	
Operator		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
1. Loading Sequence Switch > Placement > Switch 2. Unloading Sequence Switch > Removal > Switch		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								
3	Push Operator Access Switch							
4								
5	Place the FOUP/Carrier					Blink	Hand Off	
6		On						Hand off starts from pushing the switch
7			On					
8	Push Operator Access Switch							
9							FOUP/Carrier Placed	Load Complete
10	Proceed With Carrier							
11							FOUP/Carrier Move-In	FOUP/Carrier Move-In Start
12								FOUP/Carrier Move-In Complete (Ready to Load)
13					On	On		
14					:	:		
15								
16	Carrier Out							
17		On					FOUP/Carrier Move-Out	FOUP/Carrier Move-Out Start
18			On					FOUP/Carrier Move-Out Complete
19							Unclamped	Ready to Unload
20				On		On		
21	Push Operator Access Switch							
22								
23								
24	Remove the FOUP/Carrier					Blink	Hand Off	
25								
26	Push Operator Access Switch							
27					On	On	Idle	
28								



11.3.2.2 Auto mode Total Load & Unload

Auto mode Total Load&Unload		Indicator				Switch	Hardware	
Operator		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
1. Loading Sequence Placement > P-I/O Complete 2. Unloading Sequence Removal > P-I/O Complete		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								Host communicates change to AUTO MODE
3								
4								
5								Hand Off (VALID On Received)
6	Place the FOUP/Carrier by AMHS	>						
7		On	On					P-I/O Complete (VALID Off Received)
8								
9								
10	Proceed With Carrier	>					FOUP/Carrier Placed	Load Complete
11							FOUP/Carrier Move-In	FOUP/Carrier Move-In Start
12								FOUP/Carrier Move-In Complete (Ready to Load)
13								
14							:	
15								
16	Carrier Out	>						
17		On	On				FOUP/Carrier Move-Out	FOUP/Carrier Move-Out Start
18								FOUP/Carrier Move-Out Complete
19							Unclamped	Ready to Unload
20								
21								
22								Hand Off (VALID On Received)
23	Remove the FOUP/Carrier by AMHS	>						
24								P-I/O Complete (VALID Off Received)
25								
26							Idle	
27								



11.3.3 Load

11.3.3.1 Load (Before & After) Normal case

Load (Before & After) Normal case		Indicator				Switch	Hardware	
Operator		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
1. Loading Sequence Switch > Placement > Switch		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								
3	Push Operator Access Switch							
4								
5	Place the FOUP/Carrier					Blink		Hand Off
6								
7								
8	Push Operator Access Switch	On	On					
9							FOUP/ Carrier Placed	Load Complete
10	Proceed With Carrier						FOUP/ Carrier Move-In	FOUP/Carrier Move-In Start
11								FOUP/Carrier Move-In Complete (Ready to Load)
12								
13					On	On		
14								
15					:	:	:	



11.3.3.2 Load (Before & Timer) Normal case

Operator		Indicator				Switch	Hardware	
1. Loading Sequence Switch > Placement > Timer		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								
3	Push Operator Access Switch	>						
4								
5	Place the FOUP/Carrier	>				Blink		Hand Off
6								
7								Load-Completion Timer
8		On	On					
9								
10	Proceed With Carrier	>					FOUP/ Carrier Placed	Load Complete
11								
12							FOUP/ Carrier Move-In	FOUP/Carrier Move-In Start
13								
14					On	On		FOUP/Carrier Move-In Complete (Ready to Load)
15					:	:	:	

Load-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Load-Completion Timer is begun from the Placement sensor detection.



11.3.3.3 Load (Not use the switch & After) Normal case

Operator		Indicator				Switch	Hardware	
1. Loading Sequence Placement > Timer		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								
3	Place the FOUP/Carrier	>						
4								
5						Blink		Hand Off
6	Push Operator Access Switch	>	On	On				
7							FOUP/ Carrier Placed	Load Complete
8	Proceed With Carrier	>					FOUP/ Carrier Move-In	FOUP/Carrier Move-In Start
9								FOUP/Carrier Move-In Complete (Ready to Load)
10								
11					On	On		
12					:	:		
13							:	



11.3.3.4 Load (Not use the switch & Timer) Normal case

Load (No use the switch & Timer) Normal case

Operator		Indicator				Switch	Hardware	
1.Loading Sequence Placement > Timer		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								
3	Place the FOUP/Carrier	>						
4						Blink		
5								
6		On	On					
7								
8	Proceed With Carrier	>						
9								
10								
11								
12					On	On		
13					:	:		

Load-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.
The Timer period is defined by the equipment parameter.
Load-Completion Timer is begun from the Placement sensor detection.



11.3.3.5 Load (Before & After) Abort case

Load (Before & After) Abort Case					
Operator		Indicator			
1.Loading Sequence Switch > Placement > Removal > Switch		PRESENCE	PLACEMENT	UNLOAD	LOAD
		Yellow	Green	Orange	Green
1					On
2					
3	Push Operator Access Switch >				
4					
5	Place the FOUP/Carrier >				
6		On			
7			On		
8	Remove the FOUP/Carrier >				
9					On
10					
11	Push Operator Access Switch >				
12					
13					

Switch	Hardware	
OPERATOR ACCESS	Load Port Behavior	Comment
White		
On	Idle	LOAD is Normal (Default State) for Load port Idle State
Blink		Hand Off
On	Idle	



11.3.3.6 Load (Before & Timer) Abort case

Load (Before & Timer) Abort Case

Operator		Indicator				Switch	Hardware	
1. Loading Sequence Switch > Placement > Removal > Timer		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								
3	Push Operator Access Switch							
4								
5	Place the FOUP/Carrier					Blink		Hand Off
6		On						
7			On					Load-Completion Timer
8	Remove the FOUP/Carrier							FOUP/Carrier is taken before timer ends
9								Unload-Completion Timer
10					On			
11								
12						On	Idle	
13								

Load-Completion/Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Load-Completion Timer is begun from the Placement sensor detection.

Unload-Completion Timer is begun from the presence sensor non-detection.



11.3.3.7 Load (Before & After or Timer) FOUP is not correctly put case 1

Load (Before & After or Timer) FOUP is not correctly put case1

	Operator	Indicator				Switch	Hardware	
	1. Loading Sequence Switch > Placement > Placement again > Alarm clear	PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								
3	Push Operator Access Switch	>						
4								
5	Place the FOUP/Carrier	>				Blink		Hand Off
6		On						Presence-to-Placement Timer
7								Timer ends and Alarm is generated
8	Remove the FOUP/Carrier	>						Unload-Completion Timer
9								Even if timer ends, LOAD indicator state and switch state are not changed.
10								
11								
12	Place the FOUP/Carrier again	>						
13		On						Load-Completion Timer
14			On					Even if timer ends, LOAD indicator state and switch state are not changed.
15								
16	Clear the alarm	>						
17							FOUP/Carrier Placed	Load Complete
18	Proceed With Carrier	>					FOUP/Carrier Move-In	FOUP/Carrier Move-In Start
19								FOUP/Carrier Move-In Complete (Ready to Load)
20								
21					On	On		
22								
23					:	:	:	

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The description of Presence-to-Placement timer is omitted in some sheets.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator correctly puts FOUP/Carrier again(Placement sensor is detected), and releases the alarm on the screen.

Load-Completion/Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Load-Completion Timer is begun from the Placement sensor detection.

Unload-Completion Timer is begun from the presence sensor non-detection.



11.3.3.8 Load (Before & After or Timer) FOUP is not correctly put case 1”

Load (Before & After or Timer) FOUP is not correctly put case1”

Operator		Indicator				Switch	Hardware	
		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
1. Loading Sequence Switch > Placement > Removal > Alarm clear		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								
3	Push Operator Access Switch							
4								
5	Place the FOUP/Carrier					Blink		Hand Off
6		On						Presence-to-Placement Timer
7								Timer ends and Alarm is generated
8	Remove the FOUP/Carrier							Unload-Completion Timer
9								Even if timer ends, LOAD indicator state and switch state are not changed.
10								
11	Clear the alarm							
12						On	Idle	
13								

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The description of Presence-to-Placement timer is omitted in some sheets.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator removes a FOUP/Carrier which was put incorrectly, and releases the alarm on the screen.

Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Unload-Completion Timer is begun from the Presence sensor non-detection.



11.3.3.9 Load (Before & After) FOUP is not correctly put case 2

Load (Before & After) FOUP is not correctly put case2

Operator		Indicator				Switch	Hardware	
		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
1. Loading Sequence Switch > Placement > Placement again > Switch		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								
3	Push Operator Access Switch							
4								
5	Place the FOUP/Carrier					Blink	Hand Off	
6		On						Presence-to-Placement Timer
7								
8	Remove the FOUP/Carrier							Timer ends and Alarm is generated. The Alarm notification can be cleared any time.
9								
10	Place the FOUP/Carrier again							Unload-Completion Timer
11		On						FOUP/Carrier is placed before timer ends
12			On					
13	Push Operator Access Switch							
14							FOUP/Carrier Placed	Load Complete
15	Proceed With Carrier							
16							FOUP/Carrier Move-In	FOUP/Carrier Move-In Start
17								
18					On	On		FOUP/Carrier Move-In Complete (Ready to Load)
19								
20								

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The description of Presence-to-Placement timer is omitted in some sheets.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator correctly puts FOUP/Carrier again(Placement sensor is detected), and releases the alarm on the screen.

Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Unload-Completion Timer is begun from the Presence sensor non-detection.



11.3.3.10 Load (Before & After) FOUP is not correctly put case 2"

Load (Before & After) FOUP is not correctly put case2"

Operator		Indicator				Switch	Hardware	
1. Loading Sequence Switch > Placement > Removal > Switch		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								
3	Push Operator Access Switch	>						
4								
5	Place the FOUP/Carrier	>				Blink		Hand Off
6		On						Presence-to-Placement Timer
7								
8	Remove the FOUP/Carrier	>						Timer ends and Alarm is generated. The Alarm notification can be cleared any time.
9								
10	Push Operator Access Switch	>						
11						On	Idle	
12								

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The description of Presence-to-Placement timer is omitted in some sheets.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator removes a FOUP/Carrier which was put incorrectly, and releases the alarm on the screen.



11.3.3.11 Load (Before & Timer) FOUP is not correctly put case 3

Load (Before & Timer) FOUP is not correctly put case3

Operator		Indicator				Switch	Hardware	
		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
1>Loading Sequence Switch > Placement > Placement again > Alarm clear		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								
3	Push Operator Access Switch >							
4								
5	Place the FOUP/Carrier >					Blink	Hand Off	
6		On					Presence-to-Placement Timer	
7								
8	Remove the FOUP/Carrier >						Unload-Completion Timer	Timer ends and Alarm is generated. The Alarm notification can be cleared any time.
9								
10	Place the FOUP/Carrier again >						FOUP/Carrier is placed before timer ends	
11		On					Load-Completion Timer	
12			On					
13								
14							FOUP/Carrier Placed	Load Complete
15	Proceed With Carrier >						FOUP/Carrier Move-In	FOUP/Carrier Move-In Start
16								
17								
18					On	On		FOUP/Carrier Move-In Complete (Ready to Load)
19								
20					:	:	:	

Presence-to-Placement Timer
This timer is a watch timer between Presence sensor and Placement sensor.
The description of Presence-to-Placement timer is omitted in some sheets.
The Timer period is defined by the equipment parameter.
When the timer is end, an Alarm is generated and waits for operator instruction.
The operator correctly puts FOUP/Carrier again(Placement sensor is detected), and releases the alarm on the screen.

Load-Completion/Unload-Completion Timer
Timer becomes the trigger of the end of HandOff because of the replacement of Switch.
The Timer period is defined by the equipment parameter.
Load-Completion Timer is begun from the Placement sensor detection.
Unload-Completion Timer is begun from the presence sensor non-detection.



11.3.3.12 Load (Before & Timer) FOUP is not correctly put case 3"

Load (Before & Timer) FOUP is not correctly put case3"

Operator		Indicator				Switch	Hardware	
1.Loading Sequence Switch > Placement > Removal > Alarm clear		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								
3	Push Operator Access Switch							
4								
5	Place the FOUP/Carrier					Blink	Hand Off	
6		On					Presence-to-Placement Timer	
7								
8	Remove the FOUP/Carrier						Unload-Completion Time	Timer ends and Alarm is generated. The Alarm notification can be cleared any time.
9								
10								
11						On	Idle	
12								

Presence-to-Placement Timer

This timer is a watch timer between Presence sensor and Placement sensor.

The description of Presence-to-Placement timer is omitted in some sheets.

The Timer period is defined by the equipment parameter.

When the timer is end, an Alarm is generated and waits for operator instruction.

The operator removes a FOUP/Carrier which was put incorrectly, and releases the alarm on the screen.

Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

The Timer period is defined by the equipment parameter.

Unload-Completion Timer is begun from the Presence sensor non-detection.



11.3.3.13 Load (Before & Timer) FOUP is put once, then removed, and it is put again case

Load (Before & Timer) FOUP is put once, then removed, and it is put again case

Operator		Indicator				Switch	Hardware	
		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
1. Loading Sequence Switch > Placement > Removal > Placement > Timer		Yellow	Green	Orange	Green	White		
1					On	On	Idle	LOAD is Normal (Default State) for Load port Idle State
2								
3	Push Operator Access Switch							
4								
5	Place the FOUP/Carrier					Blink		Hand Off
6		On	On					Load-Completion Timer
7			On					FOUP/Carrier is taken before timer ends
8	Remove the FOUP/Carrier							Unload-Completion Timer
9					On			FOUP/Carrier is placed before timer ends
10								Load-Completion Timer
11	Place the FOUP/Carrier	On	On					
12								
13								
14								
15							FOUP/Carrier Placed	Load Complete
16	Proceed With Carrier						FOUP/Carrier Move-In	FOUP/Carrier Move-In Start
17								FOUP/Carrier Move-In Complete (Ready to Load)
18					On	On		
19								
20								
21					:	:	:	

Load-Completion/Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.

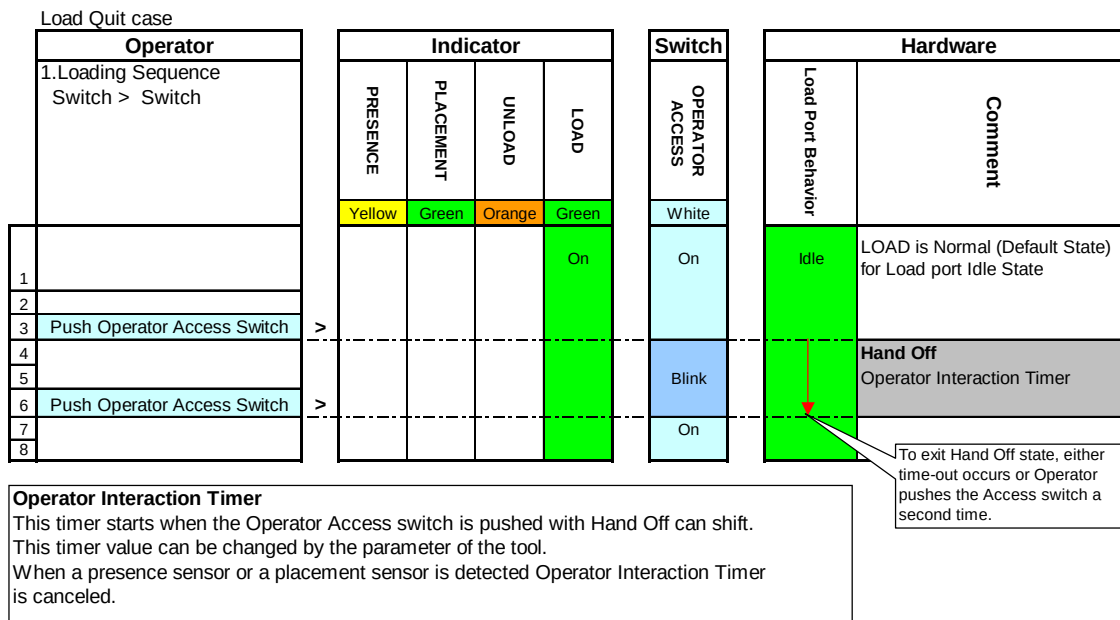
The Timer period is defined by the equipment parameter.

Load-Completion Timer is begun from the Placement sensor detection.

Unload-Completion Timer is begun from the presence sensor non-detection.



11.3.3.14 Load Quit case





11.3.4 Unload

11.3.4.1 Unload (Before & After / Undocked & Unclamped position) Normal case

Unload (Before & After / Undocked & Unclamped position) Normal case

Operator		Indicator				Switch	Hardware	
		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
1. Unloading Sequence Switch > Removal > Switch Unload Indicator lights: Load port is Undocked and Unclamped		Yellow	Green	Orange	Green	White		
1					:	:	:	Process Complete
2	Carrier Out					:		
3							FOUP/ Carrier	FOUP/Carrier Move-Out Start
4							Move-Out	FOUP/Carrier Move-Out Complete
5							Unclamped	Ready to Unload
6		On	On	On		On		
7	Push Operator Access Switch							
8						Blink		Hand Off
9								
10	Remove the FOUP/Carrier							
11								
12	Push Operator Access Switch							
13					On	On	Idle	Unload Complete
14								

11.3.4.2 Unload (Before & Timer / Undocked & Unclamped position) Normal case

Unload (Before & Timer / Undocked & Unclamped position) Normal case

Operator		Indicator				Switch	Hardware	
		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
1. Unloading Sequence Switch > Removal > Timer Unload Indicator lights: Load port is Undocked and Unclamped		Yellow	Green	Orange	Green	White		
1					:	:	:	Process Complete
2	Carrier Out					:		
3							FOUP/ Carrier	FOUP/Carrier Move-Out Start
4							Move-Out	FOUP/Carrier Move-Out Complete
5							Unclamped	Ready to Unload
6		On	On	On		On		
7	Push Operator Access Switch							
8						Blink		Hand Off
9								
10	Remove the FOUP/Carrier							
11								
12								Unload-Completion Timer
13								
14					On	On	Idle	Unload Complete
15								

Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.
The Timer period is defined by the equipment parameter.
Unload-Completion Timer is begun from the Presence sensor non-detection.



11.3.4.3 Unload (Not use the switch & Timer / Undocked & Unclamped position) Normal case

Unload (No use the switch & Timer / Undocked & Unclamped position) Normal case

Operator		Indicator				Switch	Hardware	
1. Unloading Sequence Removal > Timer Unload Indicator lights: Load port is Undocked and Unclamped		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
		Yellow	Green	Orange	Green	White	:	Process Complete
1					:	:	:	
2	Carrier Out				:	:	:	
3							FOUP/ Carrier	FOUP/Carrier Move-Out Start
4							Move-Out	FOUP/Carrier Move-Out Complete
5							Unclamped	Ready to Unload
6		On	On	On		On		
7	Remove the FOUP/Carrier							
8								
9								
10						Blink		Hand Off Unload-Completion Timer
11					On	On		
12							Idle	Unload Complete

Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.
The Timer period is defined by the equipment parameter.
Unload-Completion Timer is begun from the Presence sensor non-detection.



11.3.4.4 Unload (Before & After / Undocked & Unclamped position) Abort case

Unload (Before & After / Undocked & Unclamped position) Abort case

Operator		Indicator				Switch	Hardware	
		PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment
1. Unloading Sequence Switch > Removal > Placement > Switch Unload Indicator lights: Load port is Undocked and Unclamped		Yellow	Green	Orange	Green	White		
1					:	:	:	Process Complete
2	Carrier Out							
3							FOUP/ Carrier	FOUP/Carrier Move-Out Start
4							Move-Out	FOUP/Carrier Move-Out Complete
5							Unclamped	Ready to Unload
6		On	On	On		On		
7	Push Operator Access Switch							
8						Blink		Hand Off
9								
10	Remove the FOUP/Carrier							
11								
12								Unload-Completion Timer
13	Place the FOUP/Carrier							FOUP/Carrier is placed before timer ends
14		On	On	On				
15								
16	Push Operator Access Switch							
17						On		
18							Unclamped	

Unload-Completion Timer

Timer becomes the trigger of the end of HandOff because of the replacement of Switch.
The Timer period is defined by the equipment parameter.
Unload-Completion Timer is begun from the Presence sensor non-detection.



11.3.4.5 Unload Quit case

Unload Quit case											
Operator			Indicator				Switch	Hardware			
1. Unloading Sequence Switch > Switch Unload Indicator lights: Load port is Undocked and Unclamped			PRESENCE	PLACEMENT	UNLOAD	LOAD	OPERATOR ACCESS	Load Port Behavior	Comment		
			Yellow	Green	Orange	Green	White				
1						:	:	:	Process Complete		
2	Carrier Out										
3											
4											
5											
6											
7	Push Operator Access Switch						On	FOUP/ Carrier Move-Out Unclamped	FOUP/Carrier Move-Out Complete Ready to Unload		
8											
9											
10	Push Operator Access Switch						Blink		Hand Off Operator Interaction Timer		
11											
12							On				

Operator Interaction Timer
This timer starts when the Operator Access switch is pushed with Hand Off can shift.
This timer value can be changed by the parameter of the tool.
When a presence sensor or a placement sensor is detected Operator Interaction Timer is canceled.

To exit Hand Off state, either time-out occurs or Operator pushes the Access switch a second time.



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