

Swing to Line

Swing to Line is a function that automatically sets the operation (swing, work equipment operation) to the starting position of ditching.

In addition, you can use the functions that follow with the option setting.

- The machine automatically swings to the set dumping position.
- The machine automatically goes back to the start position of swing, dumping, and digging against the set dumping position.

WARNING

- **The operator is responsible for the safe operation of the machine.**
- **The operator must operate the machine safely in accordance with all the safety rules and regulations.**
- **If the machine operates unexpectedly while this function is used, the operator must use this function in situations where an emergency stop can be done with sufficient margin.**
Also, do not use this function in situations where there can be dangerous damage such as collision with a person or object.
- **The swing operation is required for this operation. Be careful not to let other persons come into the swing radius during the work.**
- **Do not use this function to load a machine such as a dump truck.**
- **If the machine does not operate correctly, do not use this function in situations where contact with the machine can occur such as an environment where there is a high-voltage line above the machine.**
- **Do not use this function during the lifting operation.**
- **Do not use this function in the area where there is a possibility that the machine falls over because of the swing operation on a slope or rough ground.**
- **Before and while you use this function, be sure to visually examine the area around the machine for safety. Do not use this function while you see the monitor.**
- **This function does not give a support for the inattentive driving or operation without steering. If it is necessary to avoid the danger, the operator must do the emergency avoidance operation. This function must be used only when an emergency stop operation can be done.**
- **Before you use this function, be sure to examine the settings and display of the dump point and return point, especially when the jobsite or the operator is changed. If the setting is not done correctly or it is different from the perception of the operator, the machine behaves differently from the operator's intention, and it can cause dangerous damage such as collision to people or objects. Obey this manual, and do the setting correctly.**
- **If the auto control continues even after the machine reaches the dump point or return point, it is not correct. In this case, do the emergency avoidance operation immediately and stop the control.**

⚠ CAUTION

- **Allocate switches for the auto control start and auto control standby to positions where you cannot push them at the same time by mistake, and examine them before the work.**
- **If you operate the lever while you use this function, the automatic operation can be stopped and the operation changes to the manual operation. For details, see “How to Temporarily Stop Swing to Line Control (6-59)”.**
- **This function automatically controls the work equipment and swing operation based on the registered shape and weight of the bucket and work equipment. Use the setting that agrees with the actual machine condition. Also, select the attachment file applicable to the shape of the installed work equipment or bucket before you use this function. You can use the standard bucket, slope bucket, and trapezoidal bucket with this function.**
If this function is used in conditions that follow, it can cause dangerous damage to the target machine and its surroundings.
 - **When an attachment different than the actual one is selected**
 - **When an attachment which is not approved for this function is installed**
 - **When the setting is different from the actual machine condition**
- **Do not start the control from a position higher than the dump point. There is a possibility that the machine moves unexpectedly or that the machine operation stops halfway.**

Preparation Before You Use Swing to Line

1. Allocate lever switches.

Before you use this function, allocate the functions that follow to the lever switch on “Lever Switch Assignment” menu screen.

- Auto/manual
- Auto control standby
- Auto control start
- Dump point selector (option)

2. Changes the control mode.

Activate “Swing to line” function. In addition, select the option of “Auto dumping swing” or “Auto dump”. For details, see “How to Set Swing to line / Travel along line Control Mode (5-275)”.

3. Select the steering target.

You must select a steering target to use this function. For details, see “Steering Target (5-152)”.

4. Select the control/guidance point for the steering.

Select the attachment bucket edge position to be used as a reference when you do the machine control for the steering target. For details, see “Control/Guidance Point (5-190)”.

Swing to Line Setting

The swing to line function has the items that follow.

For details, see “Swing Tab (5-276)”.

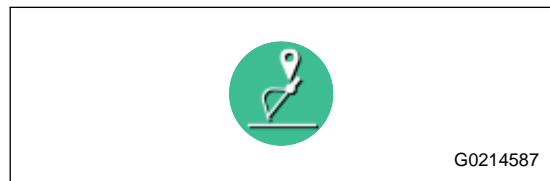
- “Height (H)” of “Return Point”
- “Direction” of “Return Point”
- “Height (H)” of “Dump Point”
- “Dump Distance”
- Setting of the second dumping point
- “Auto Swing Speed”
- “Dumping Swing Bucket Angle”

Display Swing to Line Function on Screen

When you activate the Travel Along Line or Swing to Line function, the display on the screen changes to the specified presets for steering control. For the steering specified preset, see “Display Travel Along Line Function on Screen (6-47)”.

The display that follows is shown while the semi-auto mode is waiting or under control.

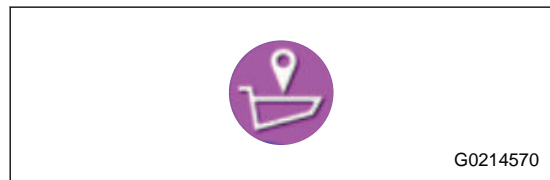
(1) Return point icon



(2) Dump point icon

REMARK

If the control of the return point icon or dump point icon cannot start, the icon shows in gray. The dump point icon is shown when “Auto dumping swing” is activated.

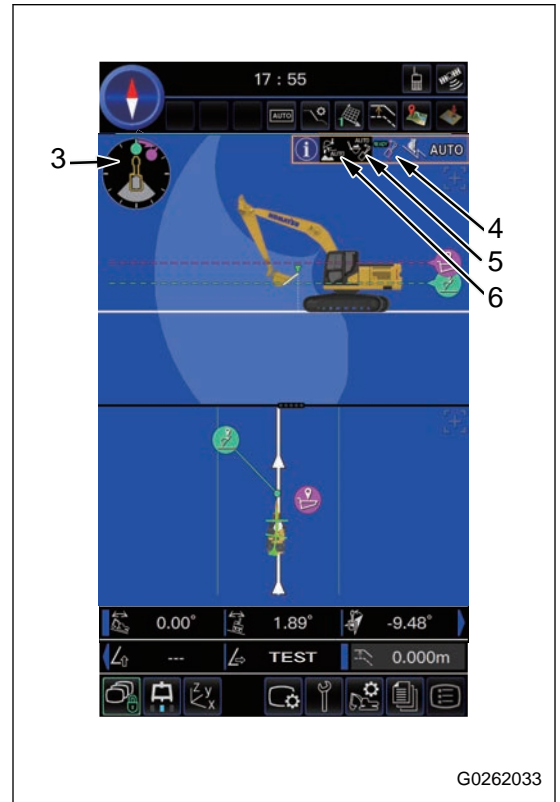


(3) Swing indicator

This shows the positional relationship with the return point and dump point, or the swing direction and swing angle when the control starts. If the Auto Return Swing function works when the auto control start is pushed, it is shown with the green arrow. If the Auto Dumping Swing function works, it is shown with the magenta arrow. The area behind the return point shown in gray is the area where control start is not possible.

REMARK

The return point is shown directly above.



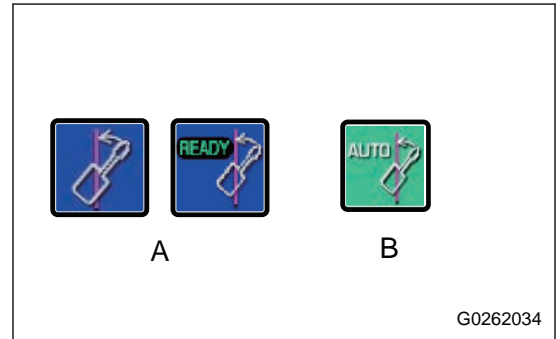
(4) Swing control icon

The swing control icon changes between waiting and under control, as shown in the figure.

(A): Waiting

(B): Under control

“READY” is shown in the effective range of steering control.

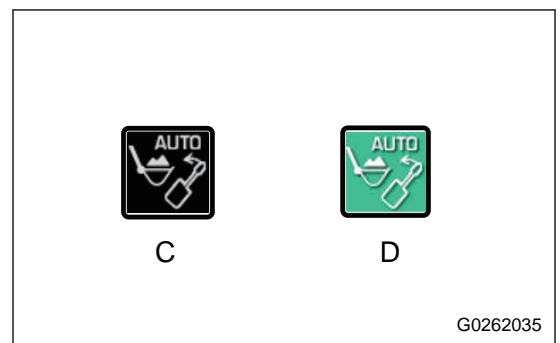


(5) Auto dumping swing icon

This is shown in black when Auto Dumping Swing is waiting, and it changes to green while it is in operation.

(C): Waiting

(D): Under control

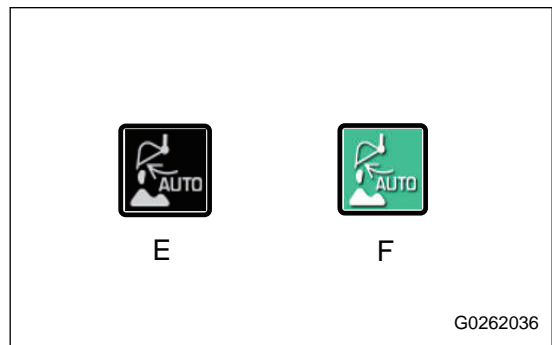


(6) Auto dumping icon

This is shown in black when Auto Dumping is waiting, and it changes to green while it is in operation.

(E): Waiting

(F): Under control

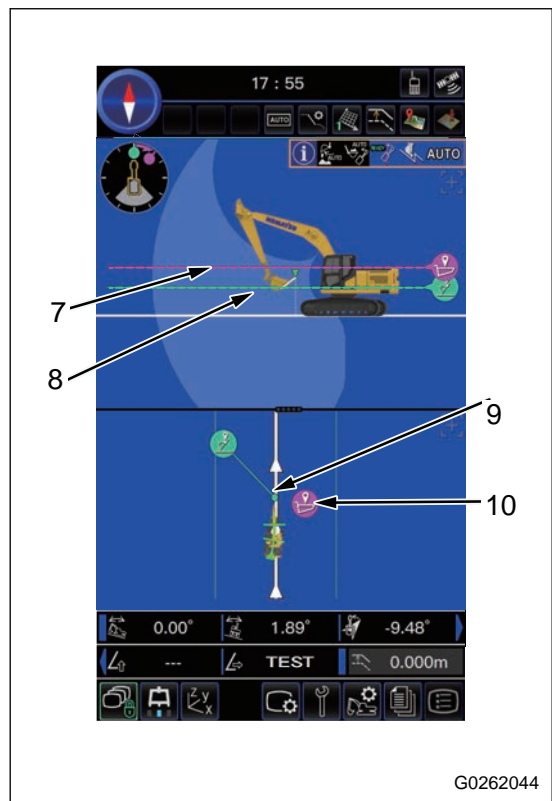


(7) Dump point height

(8) Return point height

(9) Return point position

(10) Dump target position



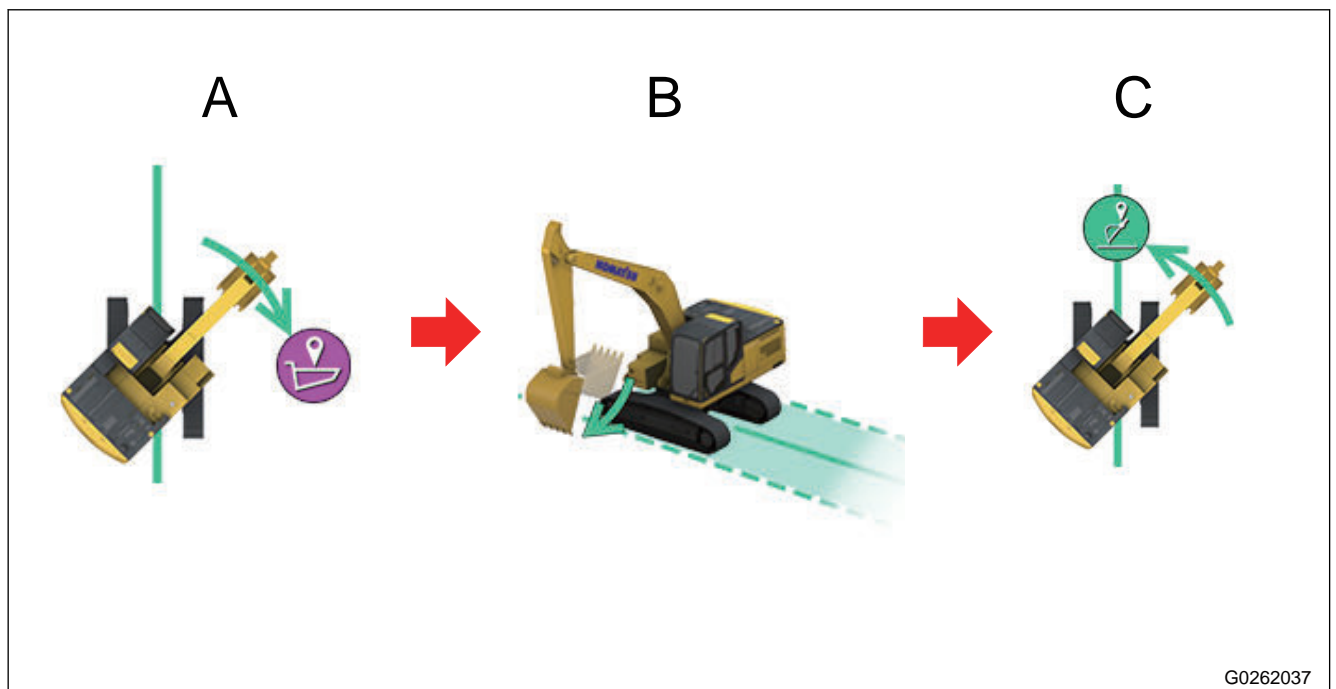
Swing to Line Control

Swing to Line Patterns

There are 3 patterns of Swing to Line.

Pattern	Dump swing (A)	Do dumping (B)	Return swing (C)
1. Return Swing Only	Manual operation		AUTO
2. Dumping Swing and Return Swing	AUTO	Manual operation	AUTO
3. Dumping Swing, Dumping, and Return Swing	AUTO		

The figure shown in each pattern is as follows.



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To set each pattern, you are required to set “Swing to Line”, “Auto dumping swing”, “Auto dump” on the monitor as follows. For the setting method, see “How to Set Swing to line / Travel along line Control Mode (5-275)”.

Pattern	“Swing to line”	“Auto dumping swing”	“Auto dump”
1. Return Swing Only	○	×	×
2. Dumping Swing and Return Swing	○	○	×
3. Dumping Swing, Dumping, and Return Swing	○	○	○

○: Valid

×: Invalid

Procedure for each selected pattern

After you do "Preparation Before You Use Swing to Line (6-51)", do the operations that follow in response to the selected pattern.

1. Return Swing Only

When the control starts after dumping if you select only the return swing pattern, the machine turns against the steering target. The boom lowers to let the arm top pin align with the set return point height.

1. Dump the soil at the side of the ditch. Set the bucket in the dumping posture.
2. Push the auto/manual selector switch to change the mode to the semi-auto mode waiting state.

At this time, icon (1) is shown.

Examine the top view, profile view, and swing indicator to make sure that the return point icon (2) is at the desired position.

3. Make sure that the area around the machine is safe. Push auto control start while you push the auto control unlock switch.

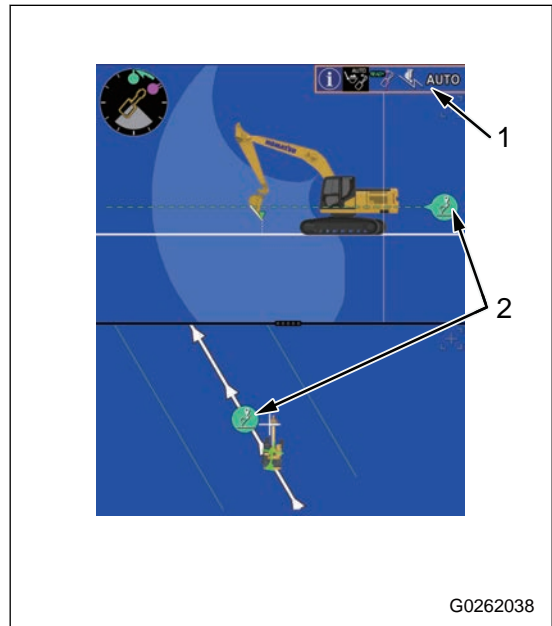
The auto return swing starts.

The conditions that make the control "READY" (possible to start) are as follows.

- The swing center must be in the range of 0.5 m from the steering target.
- The machine must not be in an area where the control cannot be started.
- The bucket must be in the dumping posture.
- The machine inclination must not be large.

The machine swings to align the selected steering control/guidance point with the steering target, and the boom moves to align the arm top pin with the set return point height. At this time, the icon is shown as in the figure.

When the swing is completed, it goes back to the icon (1).



NOTICE

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- You can move the boom, arm, and bucket freely during the control, but if you operate the lever fully, it will become an emergency avoidance operation, and the control will terminate.
- If you make a travel or swing operation during the control, it will become an emergency avoidance operation, and the control will terminate.
- When you use it in combination with the 3D boundary function, this control is disabled when the machine is in "Proximity" or "Contact" state.

2. Dumping Swing and Return Swing

When you select return swing and dumping swing, if you start the control while you hold the soil after ditching, the machine moves as follows. If the starting position is lower than the return point, the boom does not rise and only the machine swings.

- The machine swings against the dump point (2) and the boom moves to let the arm top pin align with the set height of the dump point.
- The arm moves forward or rearward to let the arm top reach the set dump point.
- The bucket moves to keep its angle to the ground.

Then, when the control is started again after the dumping of the dug soil by manual operation, a return swing starts.

1. Dump the soil at the side of the ditch. Set the bucket in the dumping posture.
2. Push the auto/manual selector switch to change the mode to the semi-auto mode waiting state.

At this time, icon (1) is shown.

Examine the top view, profile view, and swing indicator to make sure that the dump point icon (2) is at the desired position.

3. Make sure that the area around the machine is safe. Push auto control start while you push the auto control unlock switch.

The auto dumping swing starts.

The conditions that make the control "READY" (possible to start) are as follows.

- The bucket must be in the curled posture.
- The machine must not be in an area where the control cannot be started.
- The machine inclination must not be large.
- The machine must be near the top of the steering target.

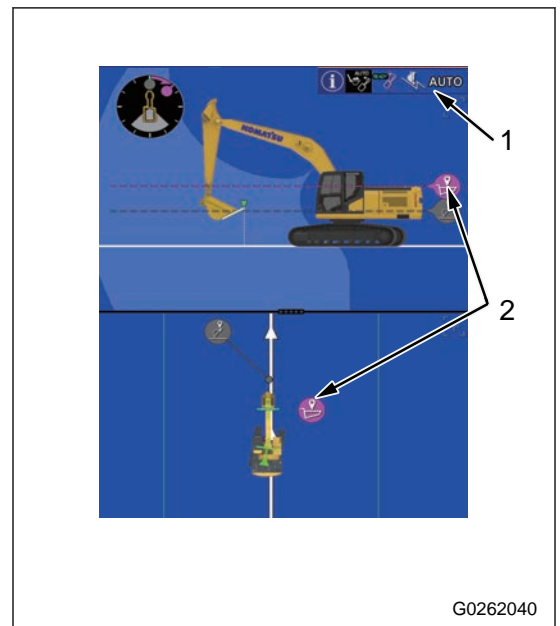
When the control starts, the machine moves as follows.

- The machine swings against the dumping target (1) and the boom moves to let the arm top pin align with the set height of the dump point.
 - The arm moves to reach the set dump point distance (A).
 - The bucket moves to keep its angle to the ground.
- At this time, the icon is shown as in the figure.

When it is completed, it goes back to icon (1).

4. Do the manual operation to do the dumping.
5. Make sure that the area around the machine is safe. Push auto control start while you push the auto control lock release switch.

The auto return swing starts. For the auto return swing, see "1. Return Swing Only".



NOTICE

- You can move the boom, arm, and bucket freely during the control, but if you operate the lever fully, it will be an emergency avoidance operation, and the control will terminate.
- If you make a travel or swing operation during the control, it will be an emergency avoidance operation, and the control will terminate.
- When you use it in combination with the 3D boundary function, this control is disabled when the machine is in “Proximity” or “Contact” state.

3. Dumping Swing, Dumping, and Return Swing

If the full process is selected and the control starts after the ditching is done, dumping swing, dumping, and return swing are done continuously without the operation by the operator.

1. Dig the ditch, and set the bucket in the curled posture with soil in it.
2. Push the auto/manual selector switch to change the mode to the semi-auto mode waiting state.

At this time, the icon is shown as in the figure.

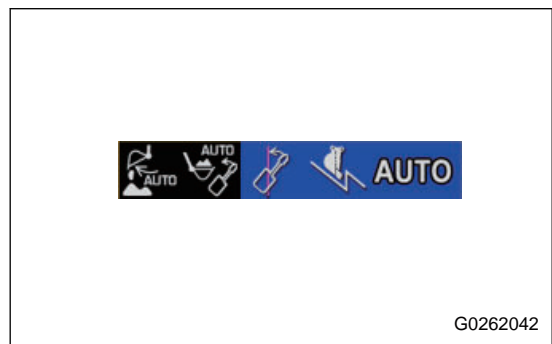
Examine the top view, profile view, and swing indicator to make sure that the icon of the return swing position is in the desired position.

3. Make sure that the area around the machine is safe. Push auto control start while you push the auto control unlock switch.

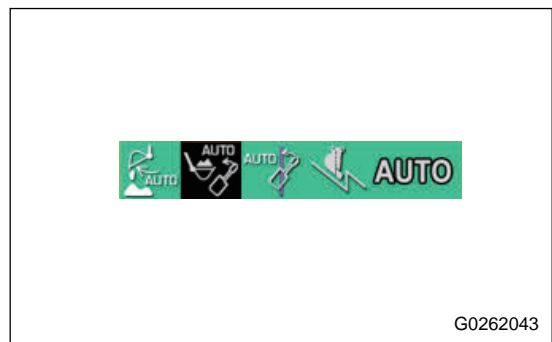
The auto dumping swing starts. If the bucket is not in the curled posture at this time, the control does not start. For the auto dumping swing, see “2. Dumping Swing and Return Swing”.

When the bucket comes near the dumping point, the bucket is dumped automatically, and the auto dumping starts. At this time, the icon is shown as in the figure.

When the auto dumping is completed, the auto return swing starts. For the auto return swing, see “1. Return Swing Only”.



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NOTICE

- The return swing starts after the auto dumping is completed.
- If the starting position is lower than the return point, the boom doesYou can move the boom, arm, and bucket freely during the control, but if you operate the lever fully, it will become an emergency avoidance operation, and the control will terminate.
- If you make a travel or swing operation during the control, it will become an emergency avoidance operation, and the control will terminate.
- When you use it in combination with the 3D boundary function, this control is disabled when the machine is in “Proximity” or “Contact” state.

How to Temporarily Stop Swing to Line Control

When you do the operations that follow, Swing to Line is temporarily disabled. The machine operates as operated by the operator. Secure the safety around the machine when you operate it.

- Temporary control cancel switch
- Travel operation
- Swing operation
- Work equipment full lever operation

Change Dumping Point

When you use this function, you can register 2 dump points and easily change the dumping position after ditching.

To use this function, you must allocate "Dump point selector" to the lever. For the allocation procedure of the lever switch, see "Lever Switch Assignment (5-267)".

How to Register Second Dump Point

See "How to Add Dump Point (Option)" in "Swing Tab (5-276)".

How to Change Dump Point

1. Activate the Swing to Line and Auto Dumping Swing functions while the second dump point is registered.
For how to change the setting, see "How to Set Swing to line / Travel along line Control Mode (5-275)".
2. Tap "Dump Point Switch" button allocated to the lever.
The active and inactive dump points change.

NOTICE

After the change, examine the top view, profile view, and swing indicator to make sure that the dumping swing position icon is in the desired position.

REMARK

You cannot change the dump point during a swing control. You can change the dump point selection only when the dump points are shown.

Messages Shown During Use of Swing to Line Function

For an abnormality, see “Abnormality with Message Shown on ICT Monitor (2-10)”.

Message	Description and remedy
“Press "Auto control start" switch to start dumping swing.”	It is shown when the machine can start the auto dumping swing after the digging operation.
“Press "Auto control start" switch to start return swing.”	It is shown when the machine can start the auto return swing after the dumping operation.
“Auto-Control Disabled: Switch Not Set”	It is shown when the button is not allocated.
“Auto-Control Disabled: Prohibited Area”	It is shown when the heading is at the position where the control cannot start.
“Auto-Control Disabled: Switch Cancel Operation”	It is shown when the emergency stop is done by button operation.
“Auto-Control Disabled: Slope Limit Exceeded”	It is shown when the function cannot be used because of the inclination of the machine body. Use it on a level area.
“Auto-Control Disabled: Lock Lever”	It is shown when the work equipment lock lever is set to ON.
“Auto-Control Disabled: Swing Lock Switch”	It is shown when the function cannot be used when the swing lock switch is set to ON.
“Auto-Control Disabled: Travel Detected”	It is shown when the automatic swing function cannot be used because of the travel operation.
“Auto-Control Disabled: Attachment Error”	It is shown when an attachment other than the bucket is installed.
“Auto-Control Disabled: Invalid Waypoints - Key Off Required”	It is shown when a problem is sensed in the held information. Turn the starting switch to the OFF position, and then turn it to the ON position.
“Auto-Control Disabled: Incorrect Working Mode”	It is shown when the working mode is other than P+, P, or E.