

YANMAR

OPERATION MANUAL

JOYSTICK CONTROL SYSTEM

JC10

 English

Welcome to the World of YANMAR Marine!

Introduction:

- This Operation Manual describes the operation, maintenance and inspection of the Joystick Control System.
- Read this Operation Manual carefully before operating the Joystick Control System.
- Keep this Operation Manual in a convenient place for easy access.
- If this Operation Manual is lost or damaged, order a new one from your dealer or distributor.
- Make sure this manual is transferred to subsequent owners. This manual should be considered and remain a permanent part of the system.
- Constant efforts are made to improve the quality and performance of YANMAR products, so some details included in this Operation Manual may differ slightly from your system. If you have any questions about such differences, please contact your authorized YANMAR dealer or distributor.
- This specifications and components described in this manual may differ from ones installed on your vessel.
- Please read the Operation Manual of Engine and Stern Drive with this Operation Manual.

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OPERATION MANUAL	MODEL	JC10
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FOR YOUR SAFETY

Following the precautions described in this manual will enable you to use this system with complete satisfaction. Failure to observe any of the rules and precautions, however, may result in damage or injury. Read this manual carefully and be sure you fully understand it before beginning operation.

Safety Symbols

These are the warning signs used in this manual and on the product.



This safety alert symbol appears with most safety statements. It means attention, become alert, your safety is involved! Please read and abide by the message that follows the safety alert symbol.

▲ DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

▲ WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

▲ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE indicates a situation which can cause damage to the product, personal property and/or the environment or cause the equipment to operate improperly.

Safety Precautions

The Joystick Control System is an appropriate system for cruising to dock and undock, and low-speed navigation in the marina and port. Be sure to comply with the precautions and navigate safely.

Joystick operation

▲ WARNING

- **Operating the Joystick Control System may become difficult when cruising under stormy weather.**
Do not cruise under unfavorable conditions. Unexpected accidents or injury may result.
- **Perform the initial setting and adjustment in an environment without obstacles and do not interfere with other cruising ships, to avoid unexpected accidents, such as collision with another ship or obstacle.**
- **During calibration, you cannot navigate or operate the engine with the steering wheel and control head and do not interfere with other cruising ships, to avoid unexpected accidents, such as collision with another ships and obstacle.**

▲ CAUTION

- **During the Joystick Control System operation, stronger streams and horizontal pull-ups than the usual stern drive and bow thruster may occur. Pay attention to the effect on nearby boats and piers.**
- **In the Joystick Control System, it is not possible to navigate with the steering wheel and control head.**
Pay attention when navigating the boat.
- **In the Joystick Control System, the boat continues to move in the direction of the joystick even when you return the joystick. Operate the joystick to the opposite direction to adjust the boat movement.**

▲ CAUTION

- In the Joystick Control System slow-mode operation, the engine speed is kept lower than under fast-mode operation, so it is more likely to be affected by wind and ocean waves.
Pay attention when navigating the ship.
 - Be sure to stop the engine before you inspect the Joystick Control System components.
 - Care must be taken not to get your hand caught when you inspect the hydraulic cylinder.
As the cylinder fluctuates, you may get caught and injured.
 - If you feel any abnormalities in the boat movement during the joystick navigation, switch to the control head navigation.
 - In the Joystick Control System, the boat moves in the horizontal and diagonal directions, which are different from the conventional boat movement. Care must be taken not to let the passengers fall into the water by a sudden operation and movement of the vessel.
-

Electronic helm operation**▲ CAUTION**

In the Joystick Control System, the normal navigation of a boat is performed by the electronic steering system.

The electronic steering system consists of the electronic helm, solenoid valve, and cylinder.

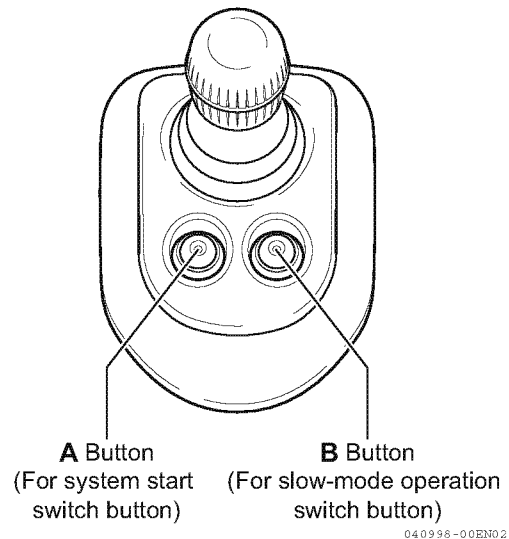
Before sailing, start the engine, steer the steering fully on the right and left, and make sure that the drive moves in the intended direction.

PRODUCT OVERVIEW

The Joystick Control System is a system that is used on boats equipped with twin engines and twin stern drives (it cannot be adapted to boats equipped with a single engine and single stern drive). It allows control of the boat movement at low-speed with a joystick lever.

By tilting the joystick lever to the direction you want to go (forward, reverse, sideways, and diagonal), the boat can be moved in that direction. By twisting the knob on the top of the joystick lever, the boat can also be rotated.

Joystick lever with a knob



Note: You can switch the A or B button for fast-mode or slow-mode. For details, consult your YANMAR dealer or distributor.

HOW TO OPERATE

Inspection before Start

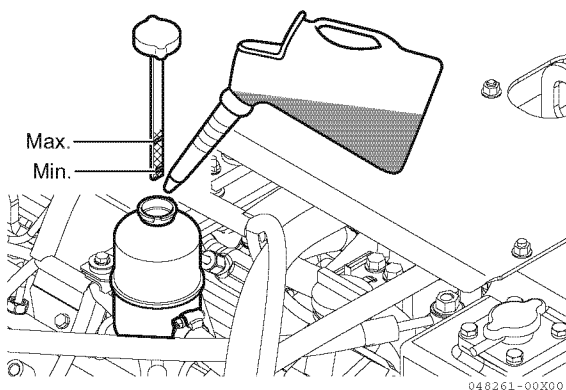
Perform the following inspections before starting the engine and using the Joystick Control System.

If you find any problems, do not operate the engine until the problems are corrected.

Inspection and refilling of the steering oil

- Inspect and refill oil in the steering oil tank attached to the engine.
- Remove the dipstick cap on the tank and inspect the steering oil level. Fill steering oil above the upper mark of the dipstick, if the oil is insufficient.

Recommended steering oil	Automatic Transmission Fluid (ATF DEXRON III)
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Steering oil capacity (oil tank)	Approximately 0.6 L
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Inspection around the engine and stern drive

- Oil leaks from the engine steering system.
- Oil leaks from the stern drive steering system.
- Loose or missing wiring terminals.
- Loose or missing bolts.

Inspection of the joystick

- Jamming of the joystick lever.

Inspection of the electronic helm

- Loose or missing wiring terminals.

Switching to the Joystick Control System Operation

For switching to the Joystick Control System operation, pay attention to the following items:

- The engines on both sides are operating.
- In the Joystick Control System, operation is possible by pressing the A button and switching to the joystick.
- During the Joystick Control System mode, control the control head lever within the same station to forward or reverse operation, the Joystick Control System operation aborts and the control head in operation is selected.
- In the Joystick Control System operation, it is not possible to navigate the boat or operate the engine with the steering wheel or control head.
- In the Joystick Control System operation, the engine speed is limited.
- In the Joystick Control System operation, cruising is affected by strong winds and waves. The Joystick Control System slow-mode operation is more severely affected by strong winds and waves than the Joystick Control System fast-mode operation.

How to operate the Joystick Control System (Fast mode operation and slow-mode operation)

1. Move the control head shift lever to the neutral position.
2. Move the joystick lever to the center position.
3. Press the A button on the joystick. If there are multiple joysticks, select the joystick that you will use.
4. The A button is lit after a beep and you can operate the Joystick Control System in the normal operation.
5. If you press the B button next, the B button is lit (both A and B buttons are lit) after a beep and you can operate the Joystick Control System in the slow-mode operation. In the slow-mode operation, you can operate with the joystick just like the Joystick Control System, but navigation is in a lower engine speed than the fast-mode operation.

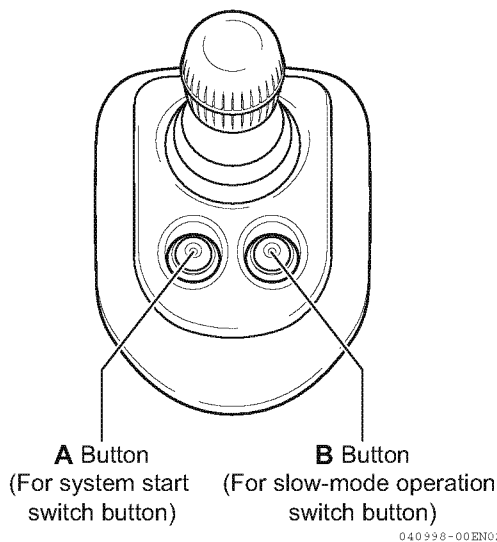
5 — HOW TO OPERATE

6. To interrupt the slow-mode operation, press the B button again.

The light of the B button turns off and you can operate the Joystick Control System in the fast mode operation.

Note: *Normally, pressing the A button let you start the Joystick Control System in the fast-mode. However, depending on the setting, it starts from the slow-mode. In such a case, press the B button to switch to the fast-mode.*

For details, consult your authorized YANMAR dealer or distributor.



Canceling (stopping) the Joystick Control System operation

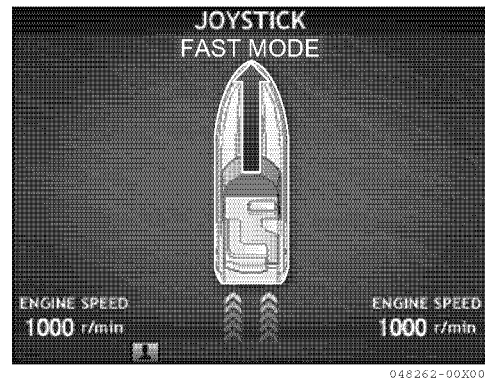
To cancel the Joystick Control System operation, press the Select button on the control head or operate the two control head handles (or one control head handle) to switch to the forward (or reverse). By doing so, the boat can no longer be navigated by the joystick. You can now navigate and operate the engine with the steering wheel and control head. The joystick button is turned off and the Joystick Control System operation is released.

Note: *If you switch by using the control head handle, be sure to return the handle to the neutral position. If you don't return the handle to the neutral position, the engine speed will not increase to speed.*

Navigating in the Joystick Control System Operation (Joystick)

Tilt the joystick lever to the direction you want to move the boat, or twist the top of the joystick to navigate the boat.

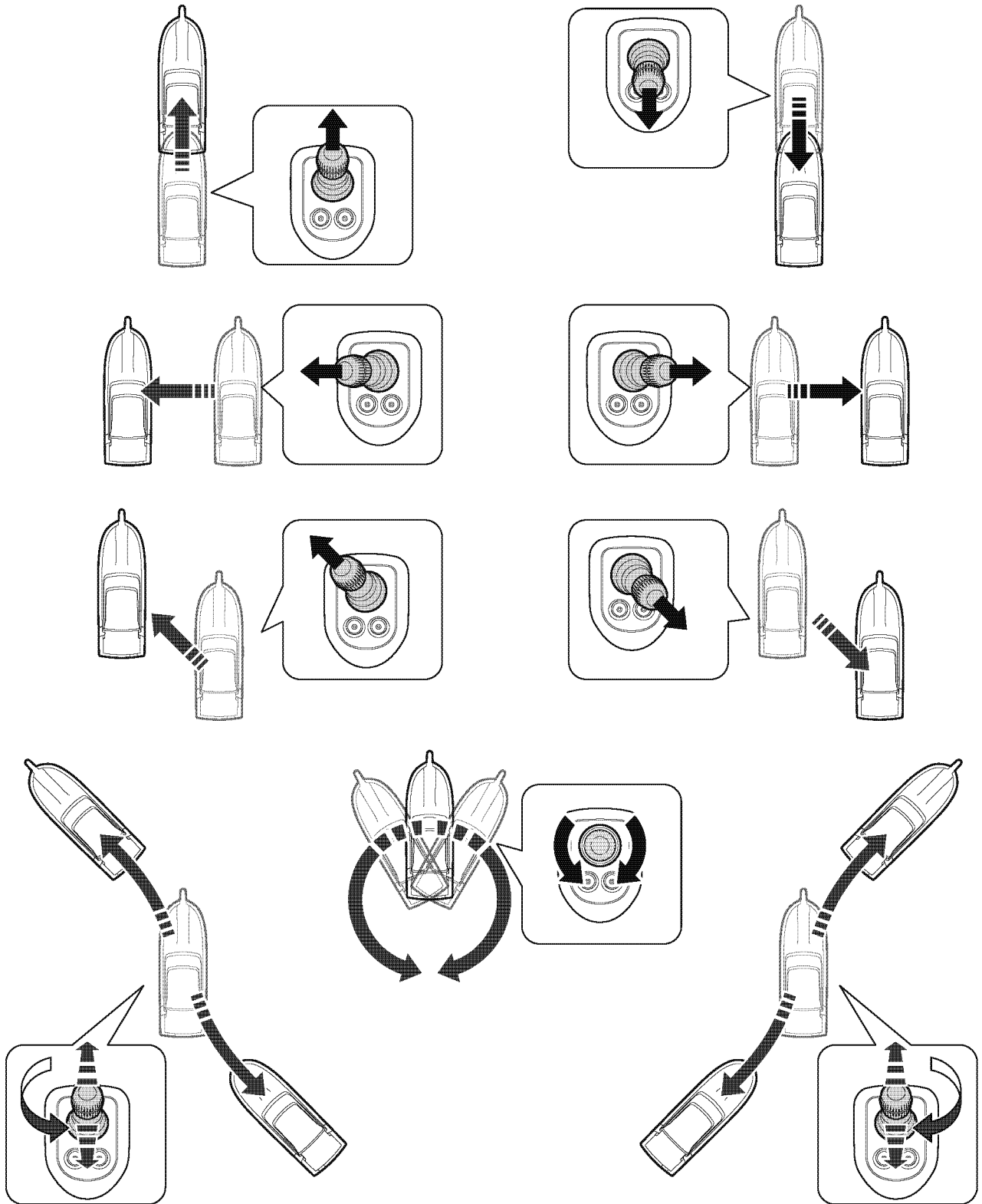
- If you tilt the joystick lever to the direction you want to move the boat (sideways, diagonal forward, and reverse), the boat will move in that direction. If you twist the top of the joystick lever, the boat will rotate.
- You can adjust the change in boat speed by the degree in which you tilt or twist the joystick lever.
- When the joystick operation is selected, the display shows the following indication, which makes the boat movement by the joystick operation easy to understand.



NOTICE

Even if you return the joystick lever tilt, the boat still keeps on moving for a while. Tilt the joystick lever to the opposite direction to adjust the boat movement.

Operation of the joystick lever and the boat movement



Initial Setting and Adjustment of the Joystick Control System Operation

In the Joystick Control System operation, you do not need to perform the initial setting (calibration) or adjustment. However, if you wish to make adjustment, consult your authorized YANMAR dealer or distributor. Also, you can make slight adjustment (calibration) by yourself in the following procedure:

Calibration

Calibrate the boat in a place where there is little wind and no tidal current.

● Check before calibration

- Move the control head shift lever to the neutral position.
- Press the A button on the joystick to switch to the joystick.
- Move the joystick lever to the center position.

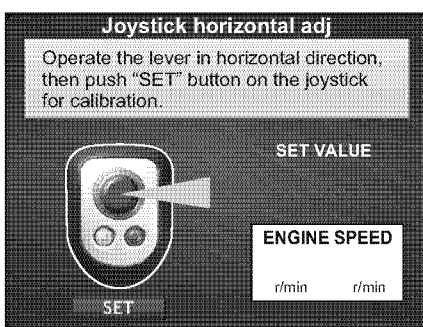
● Calibrating

Calibrate the boat in the sideways direction and diagonal direction. First, calibrate the boat in the sideways direction and then, in the diagonal direction.

Calibrating in the sideways direction

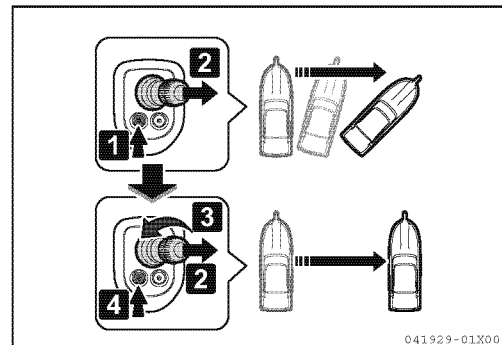
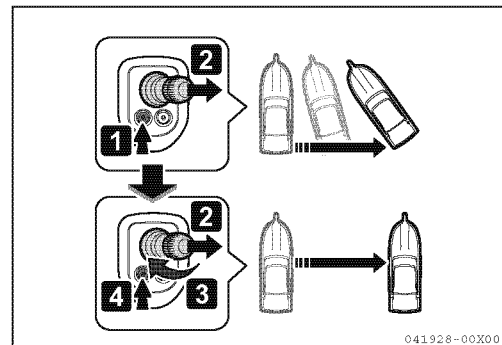
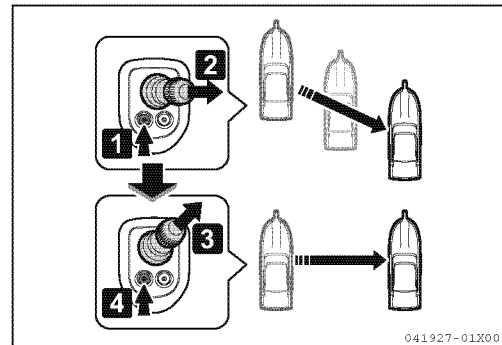
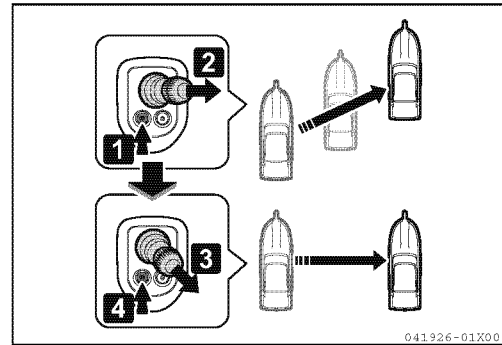
- Press and hold the A button for 5 seconds to start calibrating in the sideways direction, a beep sounds continuously, the A button flashes and you can calibrate in the sideways direction. A beep sounds stops when the calibration is done.

The calibration condition is shown on the display. If you move the joystick within the settings range, the Green Zone is shown and you can calibrate. If you move the joystick outside the range, the Red Zone is shown. In this case, you cannot calibrate. To show the Green Zone, move the joystick in the sideways direction.



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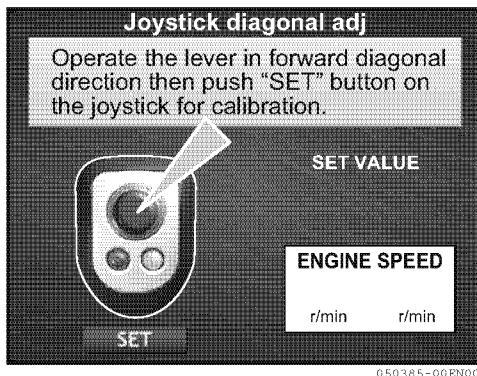
- Move the joystick lever to the sideways. The A button changes from flashing to lighting and it is ready to calibrate.
- If the boat does not move in the sideways direction, operate the joystick lever as shown in the below illustration. While keeping the movable condition to the sideways direction, press the A button to decide.



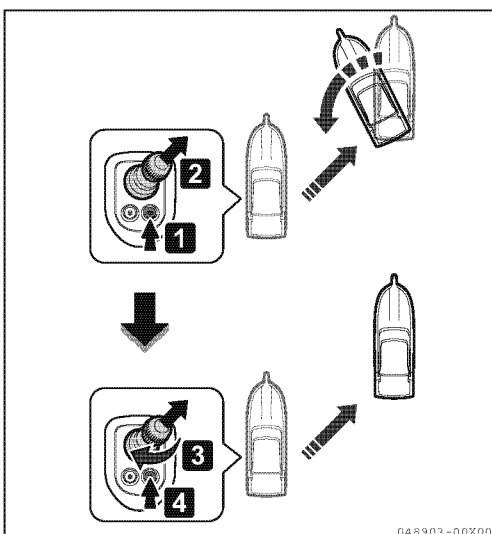
Note: If you calibrate in one sideways direction (left or right), you don't need to calibrate in the opposite sideways direction.

Calibrating in the diagonal direction

- Press and hold the B button for 5 seconds, a beep sounds continuously and the B button flashes and you can calibrate in the diagonal direction. A beep sounds stops when the calibration is done. The calibration condition is shown on the display. If you move the joystick within the settings range, the Green Zone is shown and you can calibrate. If you move the joystick outside the range, the Red Zone is shown. In this case, you cannot calibrate. To show the Green Zone, move the joystick 30 degrees in the diagonal direction.



- Move the joystick lever 30 degrees diagonally forward (left or right). The B button changes from flashing to lighting and the system is ready to calibrate.
- If the boat slews while moving, twist the top of the joystick to the opposite direction of slewing as shown in below illustration and while maintaining the non-slewing condition, press the B button to calibrate.



Note: If you calibrate in one diagonally forward direction (left or right), you don't need to calibrate in the opposite diagonally forward direction.

● Canceling the calibration

To cancel the calibration, return the joystick lever to the center position and press the A (Sideways direction) or B (Diagonal direction) button. The beep stops and calibration is canceled.

● Re-calibration

If the boat does not move in the direction of joystick after finishing calibration, re-calibrate the boat. You may need to calibrate the boat multiple times before it is stable.

● Resetting the calibration

To reset calibration, press and hold the A or B button for 5 seconds in the calibration mode. The saved calibration value is reset to the initial setting value.

● Other settings and adjustment

To perform other settings and adjustment, special knowledge and expertise are required. Consult your authorized YANMAR dealer or distributor.

FAILURES AND CORRECTIVE ACTIONS

As inspection for failure measures, repair, and replacement require a specialized expertise, contact your authorized YANMAR dealer or distributor.

Failures	Probable causes	Corrective actions
The button lamp does not turn on when you press the A button on the joystick.	<ul style="list-style-type: none"> • The engines in the both sides are not operating. • Joystick failure • Joystick lamp and internal connection failure 	<ul style="list-style-type: none"> • Operate the engines in the both sides. • Inspect and replace • Inspect and replace
The beep does not sound when you press the A button.	<ul style="list-style-type: none"> • Display buzzer and internal connection failure 	<ul style="list-style-type: none"> • Inspect and replace
Joystick lever does not move, is jammed or broken.	<ul style="list-style-type: none"> • Joystick failure 	<ul style="list-style-type: none"> • Inspect and replace
During the Joystick Control System operation, "ALARM" and "WARNING" appear on the display.	<ul style="list-style-type: none"> • Joystick failure • Electronic helm failure • Electronic hydraulic cylinder failure • Joystick/ECU failure • Hydraulic valve unit failure • One side engine is stopped 	<ul style="list-style-type: none"> • Inspect and repair • Inspect and repair • Inspect and repair • Inspect and repair • Inspect and repair • Restart the stopped engine
The boat does not move when you operate the joystick lever.	<ul style="list-style-type: none"> • The power (A button) for the joystick is not turned on • There is no steering oil • Joystick failure • Hydraulic valve unit failure • Hydraulic hose piping failure • Electronic hydraulic cylinder failure • Stern drive forward/reverse solenoid failure 	<ul style="list-style-type: none"> • Turn on the power • Inspect and refill • Inspect and replace • Inspect and repair • Inspect and repair • Inspect and repair • Inspect and replace
The boat moves only slightly when you operate the joystick lever.	<ul style="list-style-type: none"> • The joystick is in the slow-mode operation • Insufficient steering oil • Electronic hydraulic cylinder failure • Hydraulic piping failure • The boat is too heavy 	<ul style="list-style-type: none"> • Switch to the fast-mode operation • Inspect and refill • Inspect and repair • Inspect and repair
There is a difference between the joystick lever operation direction and the boat movement.	<ul style="list-style-type: none"> • Calibration is required • Electronic hydraulic cylinder failure • One side engine is stopped 	<ul style="list-style-type: none"> • Calibrate • Inspect and repair • Restart the stopped engine
Electronic helm does not turn on.	<ul style="list-style-type: none"> • Joystick Control System is operating • Electronic helm failure • Helm/ECU failure 	<ul style="list-style-type: none"> • Canceling the Joystick Control System operation • Inspect and repair • Inspect and repair
The boat cannot be operated with the steering wheel for electronic helm.	<ul style="list-style-type: none"> • Electronic helm failure 	<ul style="list-style-type: none"> • Inspect and replace

	DTC	SPN	FMI	DTC description	Alarm message on the display	Detail
From Drive ECU	U1204	521999	9	CAN COM ERROR EPV-DRIVER TO DRIVE-ECU	The display shows "CALL SERVICE MECHANIC". Consult your authorized YANMAR dealer or distributor.	CAN communication error EPV-driver
	P1823	521947	5	RUDDER CONTROL SOLENOID-1 CIRCUIT		Proportional valve solenoid-1 Disconnection
	P1818	521947	6			Proportional valve solenoid-1 Over current
	P1821	522011	6			Proportional valve solenoid-1 Short circuit
	P1824	521948	5	RUDDER CONTROL SOLENOID-2 CIRCUIT		Proportional valve solenoid-2 Disconnection
	P1819	521948	6			Proportional valve solenoid-2 Over current
	P1822	522012	6			Proportional valve solenoid-2 Short circuit
	C1051	521240	3	RUDDER ANGLE SENSOR CIRCUIT		Rudder sensor - High input
			4			Rudder sensor - Low input
	C1056	521256	3	SUB RUDDER ANGLE SENSOR CIRCUIT		Sub rudder sensor - High input
			4			Sub rudder sensor - Low input
	C1057	522000	11	RUDDER ANGLE SENSOR FAULT		There is too much difference between rudder sensor and sub rudder sensor input values
	P1820	522001	7	RUDDER CYLINDER CONTROL FAILURE		Hydraulic cylinder failure
	C1052	521996	13	RUDDER SENSOR CALIBRATION ERROR		Rudder sensor calibration error
	C1059	522005	13	RUDDER SUB SENSOR CALIBRATION ERROR		Sub rudder sensor calibration error
P1810	522013	0	STEERING OIL TEMP TOO HIGH	Power steering oil temperature - Too high		
P1825	522016	7	RUDDER CYLINDER CONTROL PRE FAILURE	Minor hydraulic cylinder failure before getting to the P1820 error code		
From Helm ECU	B1035	521257	3	ELECTRICAL STEERING MAIN-SENSOR CIRCUIT	EPS main sensor input - Too high	
	B1031		4		EPS main sensor input - Too low	
	B1030		11		EPS main sensor failure	
	B1036	521258	3	ELECTRICAL STEERING SUB-SENSOR CIRCUIT	EPS sub sensor input - Too high	
	B1029		4		EPS sub sensor input - Too low	
	B1028		11		EPS sub sensor failure	
	B1037	522002	11	ELECTRICAL STEERING SENSOR FAULT	There is too much difference between main and sub steering sensor input values	
	B1027	521957	5	ELECTRICAL STEERING BREAK-COIL CIRCUIT	Steering brake - Coil current - Too low	
			6		Steering brake - Coil current - Too high	
	U1205	522004	9	CAN COM ERROR JOYSTICK	CAN communication error - Joystick	
	B1033	522014	2	EPS CONNECTION ERROR	EPS connection failure	
B1032	522016	11	EPS SENSOR MISMATCH ERROR	There is an unconformity between EPS sensor and Helm ECU		
B1026	521957	2	EPS COIL CONNECTION ERROR	EPS coil - Connection failure		
From Joystick ECU	B1040	521252	3	JOYSTICK X-AXIS SENSOR CIRCUIT	Joystick X-axis sensor input - Too high	
			4		Joystick X-axis sensor input - Too low	
	B1044	521253	3	JOYSTICK Y-AXIS SENSOR CIRCUIT	Joystick Y-axis sensor input - Too high	
			4		Joystick Y-axis sensor input - Too low	
	B1045	521254	3	JOYSTICK Z-AXIS SENSOR CIRCUIT	Joystick Z-axis sensor input - Too high	
			4		Joystick Z-axis sensor input - Too low	
	B1038	520734	3	JOYSTICK A-SWITCH CIRCUIT	Joystick A button - Failure	
	B1039	520735	3	JOYSTICK B-SWITCH CIRCUIT	Joystick B button - Failure	
C1058	522003	11	ECU WRONG ASSEMBLY	JOYSTICK-ECU wrong assembly		

Emergency Actions when the Electronic Helm Fails

If the electronic helm has a malfunction, you can no longer navigate the boat. In such an emergency, use the hydraulic valve unit backup switch to bring both stern drives in a straight position. Then you can navigate the boat by changing the speed of the port or starboard engine and return to port.

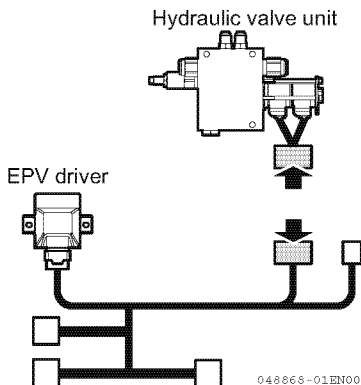
Connect the hydraulic valve unit backup switch stored in the boat with the following procedure to bring both stern drives in a straight position.

Note • Do not use the hydraulic valve unit backup switch if only one stern drive has a failure, because the other stern drive can be used for navigation.

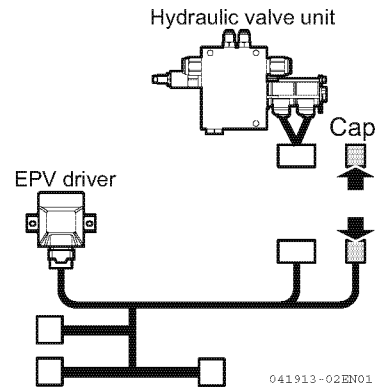
- Do not use the backup switch except in an emergency.
- The switch must be stored in an easily accessible location on board away from seawater and rainwater within the vessel operator can move to and operate the vessel via the backup switch.

How to handle the hydraulic valve unit backup switch (for both stern drives)

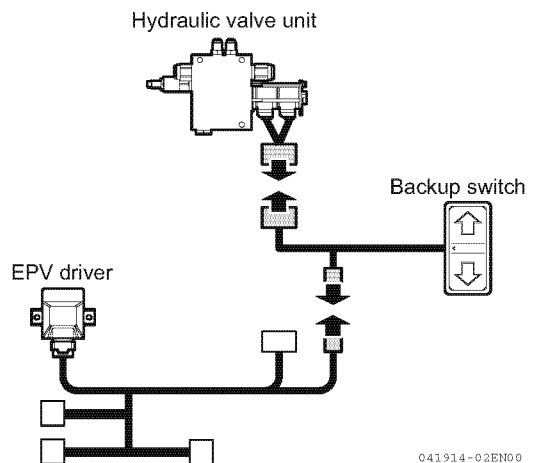
1. Stop the engines in both stern drives and turn off the power.
2. Disconnect the harness (EPV driver) on port or starboard.



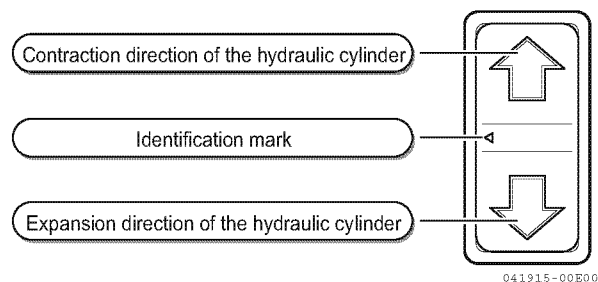
3. Remove the cap of the three pins connector from the harness (EPV driver).



4. Connect the harness for the hydraulic valve unit backup switch stored in the boat to the hydraulic valve unit and the three pins connector with the removed cap.



5. Turn on the engine only in the side where the hydraulic valve unit backup switch is connected, and start the engine.
6. Press the arrow switch of the hydraulic valve backup switch to adjust the cylinder and bring the stern drive in a straight condition (center).



7. After adjusting the cylinder, stop the engine, and turn off the power. And remove the backup switch. After that, reinstall the cap.

8. And then carry out same procedure for other side drive also.

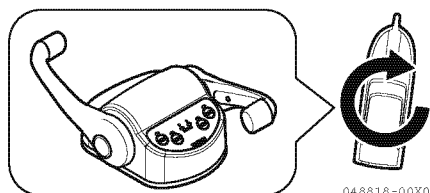
9. Disconnect the harness of the backup switch and connect the harness (EPV driver) to the hydraulic valve unit as original condition and then attach the cap for both side.

Note: *If you connect the backup switch in case of emergency, be sure to remove it after the adjustment. Do not reconnect the backup switch to the original harness (EPV driver) until the repair is complete.*

10. Check whether both stern drives are in a straight condition. Then start the engines in the both sides. Navigate the boat by changing the speed of the port or starboard engines.

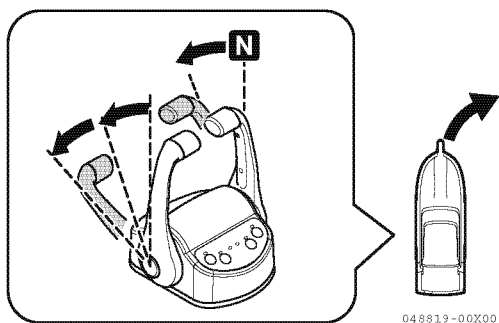
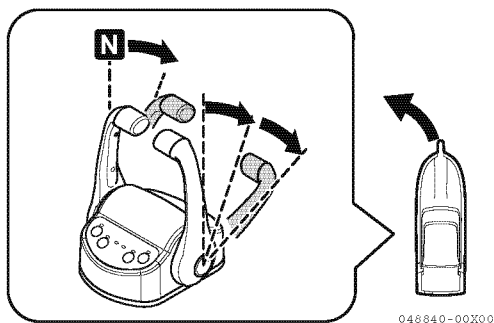
- If you want to move to the right and left, move the both stern drives forward and increase the engine speed in the direction you want to move and the opposite side, you can move in that direction.

- To turn the boat, move the stern drive in the direction you want to turn to backward and the opposite stern drive to forward.



CAUTION

- In such an emergency, you cannot navigate the boat in the same way as you do with the steering wheel. Be sure to operate the engine at a speed of 2000 min⁻¹ or less. Navigate the boat very carefully. Be sure to decrease the speed and move slowly when you turn or navigate in narrow passages.
- Be sure to contact your authorized YANMAR dealer or distributor for repair immediately after returning to port.



In Case that the Engine in One Side Stops during the Joystick Control System Operation

When the engine in one side stops due to any failures during the Joystick Control System operation, the buzzer sounds and the alarm screen is displayed for 2 seconds.

In this case, you can operate the boat in forward and reverse direction. However, the boat moves unintended directions when you operate the boat in sideways and diagonal direction, or turn the boat on the spot.

Restart the stopped engine, then you can operate the usual Joystick Control System operation.

In addition, when you press the “SEL” button on the remote control head, the boat is operated by the steering wheel. The boat cannot be operated by the joystick system unless the stopped engine is restarted.

PERIODIC MAINTENANCE

Periodic maintenance of the Joystick Control System is performed along with periodic maintenance of the engine and stern drive.

Periodic maintenance of the Joystick Control System is as follows:

Daily (at starting)

- Inspection of the power steering equipment
 - Inspection of the steering oil quantity
Inspect that the oil level is close to the upper mark

NOTICE

Do not start the engine without having sufficient steering oil. The steering pump may seize.

- Inspection for oil leaks from the hydraulic cylinder, connecting hose, hydraulic valve unit and the hydraulic piping.
- Check the steering wheel operation
 - Check for the presence of rattle and play in the steering wheel of the electronic helm, abnormal operating force, and abnormal noise
- Check the joystick operation
 - Check that the button lamp lights when pressing the A button
 - Check that no alarm indication appears on the display when pressing the A button

Initial 50 hours, every 250 hours or every year of operation

- Inspect the harness
- Inspect looseness of each bolts and nuts
- Inspection for cracks in the hydraulic hoses

Every 2 years of operation (Regardless of operation hours)

- Replace the hydraulic hoses

Every 1000 hours of operation

- Replace the steering oil

APPENDIX: AUTOPILOT SYSTEM

Safety Precautions

Safety precautions are necessary to operate this autopilot system safely.

Read and understand all of the safety precautions before operation.

⚠ WARNING

- The autopilot system continuously adjusts the steering of your boat to hold a constant heading when it's activated.

Read the manual of your autopilot system carefully and learn to operate it in calm and open waters.

- The vessel operator has a responsibility of safety operating your boat. Avoid navigational hazards and never leave the helm unattended. Always be prepared to quickly regain manual control of your boat.
- Never operate the autopilot system near hazards in the water, such as docks, pilings, and other boats.

NOTICE

- The following models are applicable as YANMAR Autopilot System.

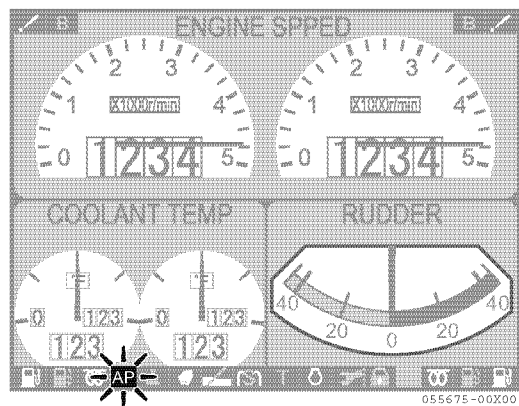
Manufacturer	Model
Garmin Ltd.	GHP20 Marine Autopilot System
Raymarine Ltd.	Evolution Autopilot EV-DBW

- Please ensure the appropriate autopilot system manual is included with your purchase.

Operating for Autopilot

■ Check on the YANMAR Vessel Control System display before operation

When operating the autopilot system, confirm that the autopilot icon appears on the YANMAR Vessel Control System display. Then, operate the autopilot from the autopilot system side.

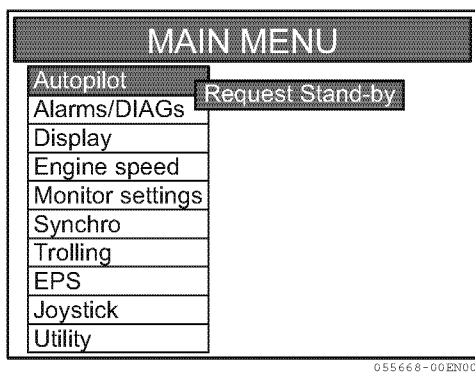


■ STAND-BY on the YANMAR Vessel Control System display

The usual stand-by operation is performed by the autopilot system side, not performed by the YANMAR Vessel Control System side. When the stand-by operation cannot be performed on the autopilot display, it can be operated from the YANMAR Vessel Control System display.

The operating procedure is as follows.

1. Press [ENTER] button on the display, and [MAIN MENU] is indicated.
2. Select [Autopilot] from [MAIN MENU] and set [Request Stand-by].



3. When you engage the autopilot operation again, operate it from the normal autopilot system side.

■ Failures and corrective actions

When the poor operation or abnormalities of the autopilot system should arise, the buzzer of the autopilot system sounds and “Helm ECU detect Failure” appears on the YANMAR Vessel Control System display.

At this time, engine will be in the neutral of idling automatically and the autopilot operation is canceled, and then is changed to the normal steering operation.

Be sure to consult with the dealer of the autopilot system for repair.

Alarm on the YANMAR Vessel Control System display



1. Alarm “Helm ECU detect Failure” appeared.
2. Highlight “DETAIL” and press [ENTER] button.
3. If the display indicates “AUTOPILOT FAILURE”, the autopilot operation will be canceled.

APPENDIX: POSITION KEEPING SYSTEM

Safety Precautions for Use of Position Keeping System

Position Keeping System is a function that receives signal transmitted from satellite to your boat to keep the boat's direction and position at place. This function can be used when you need to stay still on the water while waiting for a movable bridge to open, or preparing fenders. Your boat is under way (the propellers are rotating and the boat is moving) when this function is activated.

Pay attention to your operation and take sufficient care for your safety.

If you do not comply with the warnings, there is a risk of death or severe injury.

WARNING

Stay out of water, propellers are spinning

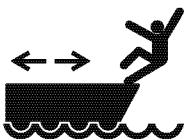


- When this function is activated, the propellers are rotating and your boat will start moving. Therefore, always make sure there is nobody under water near your boat, and that there are no other boats or other objects around. Also, you must explain to your passengers about the risk of using this function.

Boat is considered under way (the propellers are rotating and the boat is moving). Keep proper lookout



- This function is only an auxiliary function for operating the boat. The operator must keep in mind that the boat is in an operating state (the propellers are rotating and the boat is moving) while this function is activated, and never leave the operator's seat. The person responsible for the operation of the boat shall be responsible for this function with the same responsibility.
- The accuracy of keeping the same position performed by this function will be affected by waves and winds, tide, and signal quality from the satellite. Depending on the above-mentioned conditions your boat may move. While this function is activated, your boat must stay away from swimmers, boats, and other objects around and maintain enough distance to avoid them (at least 2 boat lengths).
- While this function is in use, the engine speed and the propeller speed change, creating noises and waves. You must make sure that your boat does not affect the surroundings.



Hold on to prevent falling, boat may move suddenly

- Your boat may suddenly move while this system is activated. The operator and passenger must hold on to something to prevent falling or being thrown into water.



Read operation manual for safe use of the system

- Before activating this function, read the operation manual thoroughly, understand the details, and handle this safely.

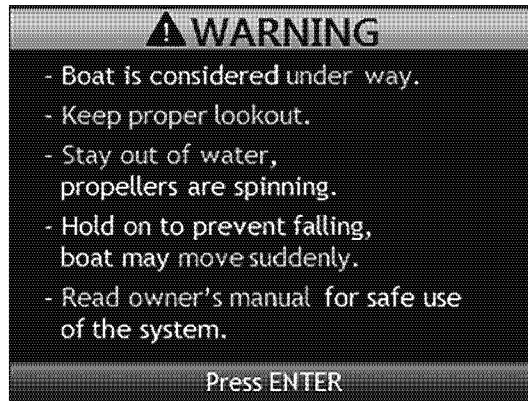
⚠ WARNING

Read warning message and labels for safety

- Before activating this system, the operator and passenger must read the warnings displayed on the screen carefully and the warning labels attached to the boat such as on the helm station or swim platform, and follow the safety cautions.

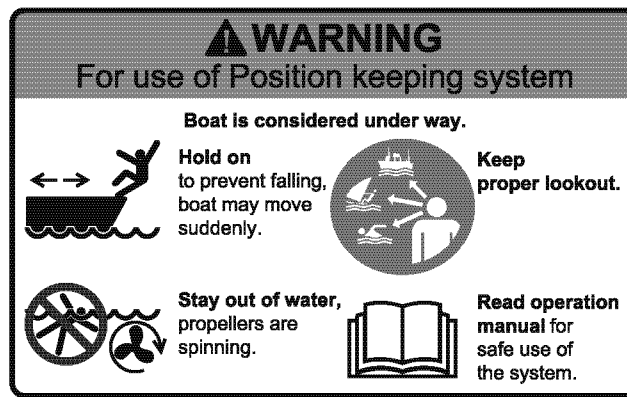
If you lose a warning label, or it is damaged and cannot be read, please contact your authorized YANMAR dealer or distributor for a new label and replace it.

Warning message on the Position control display



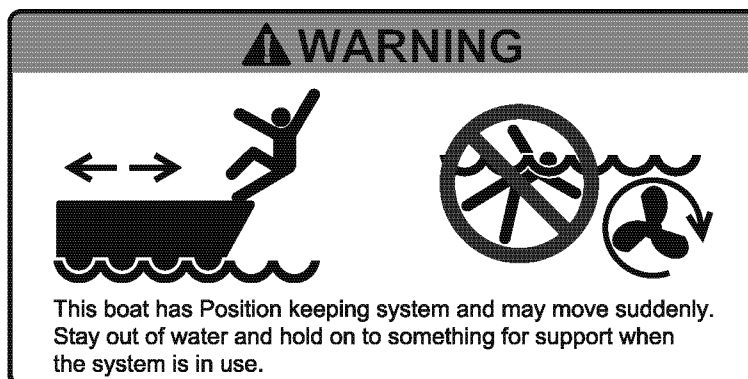
073296-00 EN00

Warning label for helm station



164000-91400

Warning label for swim platform



164000-91410

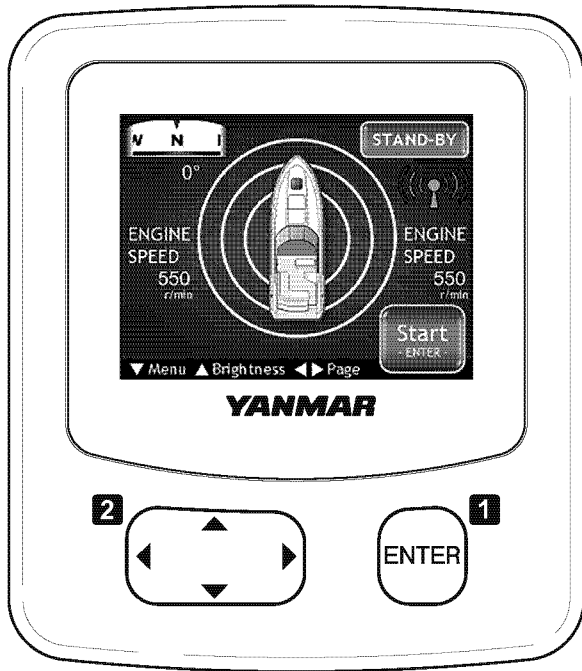
Operation of the Position Control Display


A position control display is a display panel for controlling the Position Keeping System.

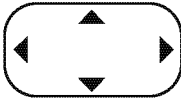
The display includes a position keeping display page and an information display page. The position keeping display page shows the positioning keeping state. The information display page can show satellite data, engine speed, and boat speed when the Position Keeping System is not activated.

There are buttons for starting and stopping the Position Keeping System, and switching between display pages.

Buttons



1  • Starting and stopping the Position Keeping System
• Selecting a function

2  ▲ : Move up when selecting a menu
Move to Brightness
▼ : Move down when selecting a menu
Move to Menu list
◀ : Move left when selecting a menu
Switch pages
▶ : Move right when selecting a menu
Switch pages

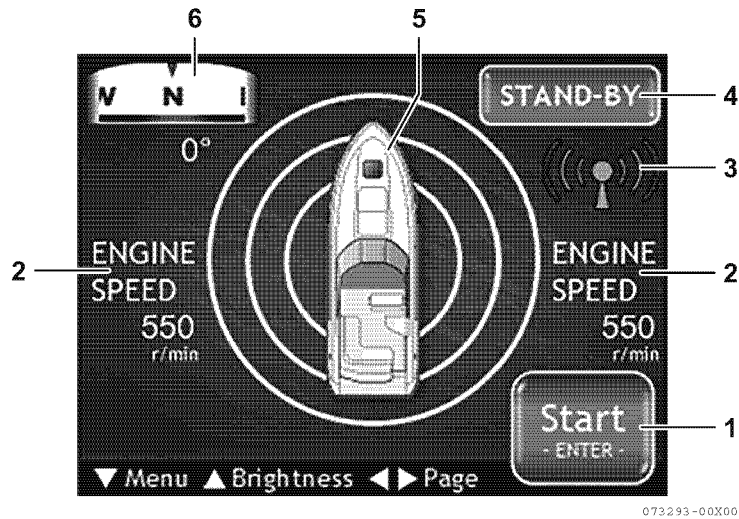
073303-00EN00

■ Hot key list

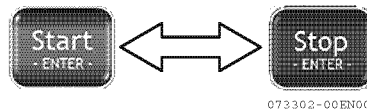
	Item	Operation	Indication
Position keeping display page/ Information display page	START/STOP Position keeping	Press [ENTER].	Starts or stops the Position Keeping System.
	Switching monitor display indication	Press [◀] or [▶].	Switches between the position keeping display page and the information display page. Alternately pressing [◀] or [▶] will switch the two pages.
	Adjusting brightness	Press [▲].	Brightness adjustment bar will be shown. Use [▲][▼] to adjust the brightness.
	MAIN MENU	Press [▼].	The MAIN MENU will show.
	SELECT MENU	Press [▲][▼][◀] or [▶].	You can select and display the details for each of the items in the MAIN MENU.
	Setting complete	Press [ENTER] for one second while the [◻] icon is highlighted.	Closes the setting page and the MAIN MENU.
MENU LAYER SKIP	Press [◀] for one second.	Closes the MAIN MENU.	

Screen

■ Position keeping display page



1 - Shows what happens when you press [ENTER] (Start or Stop)



2 - Left side is the speed of port engine, right side is the speed of starboard engine

3 - Satellite signal Reception level

No signal reception (Cannot perform position keeping)	Signal level: Weak	Signal level: Mid	Signal level: Strong

4 - Current status of the Position Keeping System



Position Keeping System is not started yet.



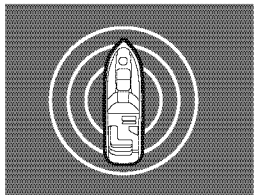
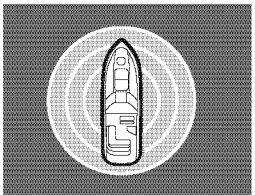
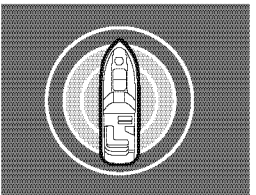
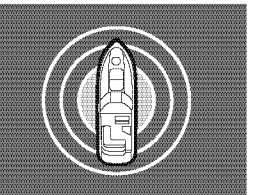
Position Keeping System is activated.



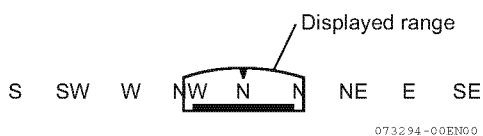
Override condition when operating the Joystick.

By setting the joystick to the center position (neutral position), the Position Keeping System can be restarted.

5 - Accuracy level of the Position Keeping System

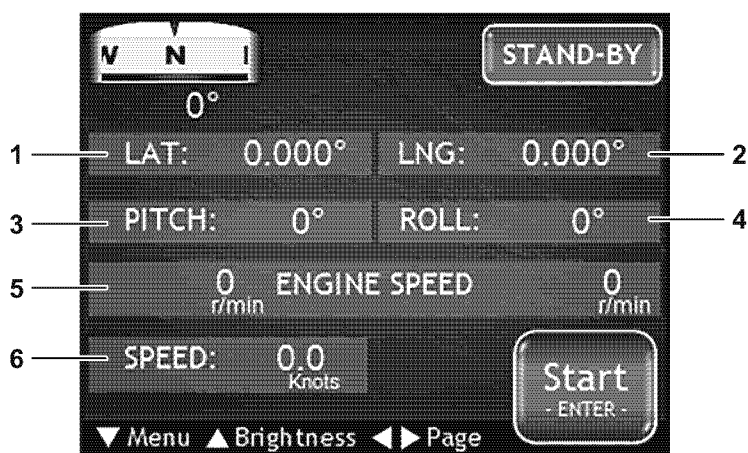
			
Accuracy deviation (Cannot perform position keeping)	Accuracy level: Low	Accuracy level: Mid	Accuracy level: High

6 - Compass



■ Information display page

Information display page will not be displayed during the position keeping control.



1 - Latitude

2 - Longitude

3 - Pitch angle of the GNSS antenna

4 - Roll angle of the GNSS antenna

5 - Left side is the speed of port engine, right side is the speed of starboard engine

6 - Ground speed

Operating for Position Keeping

■ Checkup before starting the Position Keeping System

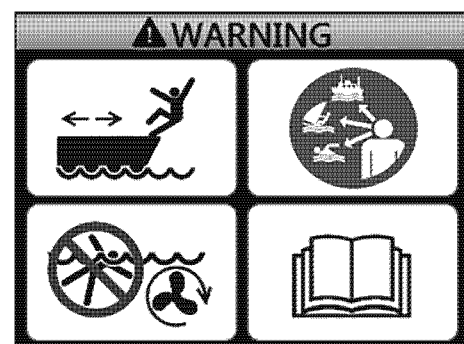
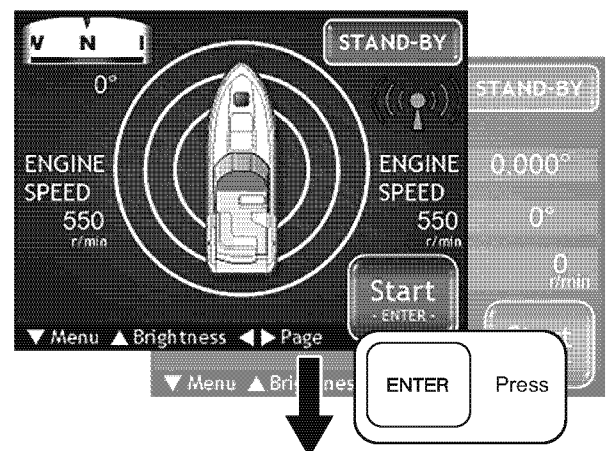
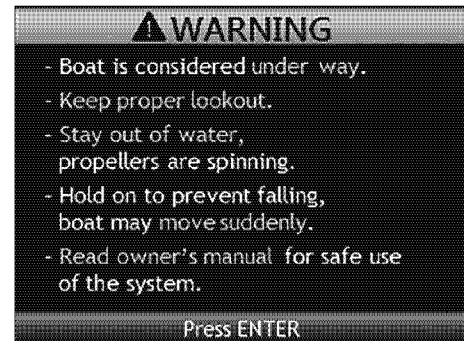
Pursuing to the instructions in the Operation Manual of the engine and the JC10, go through inspection before activating the Position Keeping System.

■ How to operate the Position Keeping System

1. Make sure there is nobody under water near your boat, and that there are no other boats or other objects around and maintain enough distance to avoid them (at least 2 boat lengths).
2. Follow the "HOW TO OPERATE" part of the JC10 Operation Manual and change to joystick mode.
3. Set the joystick of the selecting station to center position (neutral position).
4. Confirm the warning message and press ENTER.
5. Press ENTER in the position control display, and turn the Position Keeping System "ON".
 - You can switch to position keeping state from the position keeping display page or the information display page.
 - When starting the position keeping control, warning symbols will be displayed. Confirm.
 - The system is working properly if you hear two short beeps every two seconds while the position keeping is on.
 - Indication will be switched from [STAND-BY] to [AUTO] while the position keeping is on.
 - You cannot switch to the information display page while the position keeping is on.

▲ CAUTION

If any other sound is continuously heard from the position control display, something abnormal is happening. Please operate the boat manually.



23 — APPENDIX: POSITION KEEPING SYSTEM

6. Your boat will attempt to stay in the direction and position at the point when the Position Keeping System was turned ON.
7. When you want to change the keeping position, tilt the joystick and move your boat (override mode). In the **OVERRIDE** mode, the display changes from **[AUTO]** to **[OVERRIDE]**. Your boat will attempt to stay in the direction and position at the point when the joystick was in the center position (neutral position) again.
8. How to stop/cancel the Position Keeping System.
 - Press **ENTER** in the position control display again.
 - Press the select button of the control head.
 - Move the control head handle of the selecting station from the neutral position.
 - Press the left side **A** button on the joystick.
 - Stop the engine.

⚠ CAUTION

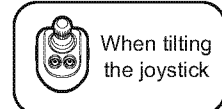
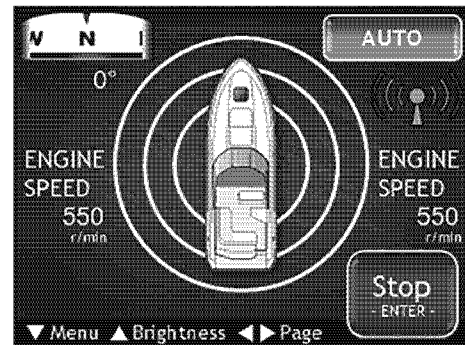
The accuracy level is only a guide. Despite the high accuracy, wave, wind, or tide can effect the boat's movement suddenly.

When you use this system in a region where accurate GNSS signal cannot be received, or when it is effected by electromagnetic waves from radar or radio, or large structures and terrain surrounding the device, the accuracy of keeping the same position may change.

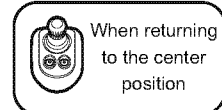
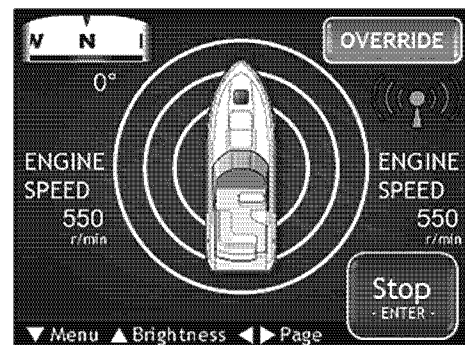
NOTICE

In the following situations, **ALARM** and **NOTICE** will be displayed on the screen, and the Position Keeping System cannot be started.

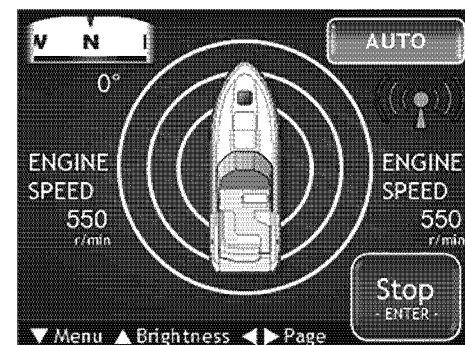
- If it is under a situation where the position cannot be detected.
 - GNSS antenna is still warming up
 - Not enough number of acquired satellites
 - High latitude area where accuracy cannot be obtained (Antarctica, Arctic)
 - Area where GNSS signal cannot be received (Obstacle above)
- The boat speed is faster than 2 m/s (\approx 3.9 knot)
- Either of the engines is stopped
- A failure that effects the Position Keeping System is occurring



073298-00E100



073298-00E100



073298-00E101

Failures and Corrective Actions

As inspection for failure measures, repair, and replacement require a specialized expertise, contact your authorized YANMAR dealer or distributor.

Failures	Probable causes	Corrective actions
Cannot start the position keeping control (“Notice” indication appears once and then disappears)	<ul style="list-style-type: none"> • GNSS antenna is still warming up • Joystick of the station is not selected • Either of the engine is stopped • Boat speed is faster than 2 m/s • Joystick is being calibrated • Station protecting • The latitude of the current area is over 80° • Error occurring on the VC10 system side 	<ul style="list-style-type: none"> • Wait in a place where GNSS communication can be received • Select the joystick of the station • Start the engine, and then both the starboard and port engines run • Slow down the boat speed • Complete the joystick calibration • Unlock the station protection • This cannot be used in latitude over 80° • Remove the error on the VC10 system side
Cannot start the position keeping control (“ALARM STOP POSITION KEEPING” is displayed on the position control display)	<ul style="list-style-type: none"> • System line is cut, and cannot CAN communicate • GNSS antenna failure 	<ul style="list-style-type: none"> • Inspect and replace • Inspect and replace
Cannot start the position keeping control (Other cases)	<ul style="list-style-type: none"> • Position control display is not connected • Joystick ECU is not applicable • Position control display failure 	<ul style="list-style-type: none"> • Connect the position control display • Inspect and replace • Inspect and replace
Accuracy of the position keeping control is low	<ul style="list-style-type: none"> • Joystick calibration is not done correctly • Effected by wind and wave • Error is occurring to the engine or drive system, or the boat body • Reception state of the GNSS signal is not good 	<ul style="list-style-type: none"> • Calibrate the joystick • Check at places where wind and wave are calm • Inspect and replace • Make sure that the attaching state of the GNSS antenna is following the manual, and then move to an open space, turn on the power, and wait for a while.
There is no sound during the position keeping control	<ul style="list-style-type: none"> • The speaker for the position control display is broken 	<ul style="list-style-type: none"> • Inspect and replace

Alarm on the Position Control Display

When errors occur to the Position Keeping System, the position control display will show pop-ups such as ALARM or WARNING as shown below. If these are displayed, turn off the Position Keeping System.

■ ALARM pop-up

Buzzer will sound when the “ALARM” pop-up is displayed. The buzzer will not stop unless the error is removed.

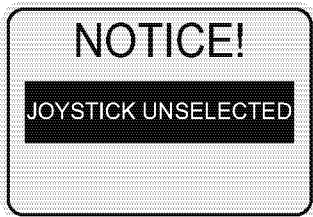


073288-01EN00

- In order to turn off the pop-up, select “CLOSE”.

■ NOTICE pop-up

You cannot start the position keeping control when the NOTICE pop-up is on. The NOTICE display will be temporarily displayed, and automatically be turned off.



073289-00EN00



When the “STOP POSITION KEEPING” is displayed, turn off the position keeping control. Please operate the boat manually.



073288-00EN00

■ WARNING pop-up

Buzzer will sound when the “WARNING” pop-up is displayed. The buzzer will not stop and the position keeping control cannot be resumed unless the error is removed.



073290-00EN00

- In order to turn off the pop-up, select “CLOSE”.
- Select “DETAIL” to check the pop-up detail. The pop-up will turn off after checking the error detail in the error list.

Note: When the pop-up is off, the buzzer sound will decrease to the sound level set by the user.



073290-01EN00



073300-00EN00



073301-00EN00

Error List

	DTC	SPN	FMI	Description	Detail
WARNING	U1209	522046	9	CAN COM ERROR JSTKECU-GPS	CAN communication error between Joystick ECU and GNSS antenna
	U1210	522047	9	CAN COM ERROR JSTKECU-PCD	CAN communication error from Joystick ECU until Position control display
	U1211	522047	9	CAN COM ERROR PCD-JSTKECU	CAN communication error from Position control display until Joystick ECU
	C1064	522056	11	GPS ANTENNA FAILURE	GNSS antenna failure
ALARM	-	-	-	STOP POSITION KEEPING	GNSS value undetectable
	-	-	-	OUT OF CONTROL LIMIT	Control range exceeds the limit
	-	-	-	UNSTABLE CONDITION	Pitching or Rolling signal is unstable
	-	-	-	ATTITUDE UNDETECTABLE	Attitude data can not be detected
NOTICE	-	-	-	GPS IS WARMING UP	GNSS antenna is now in preparation
	-	-	-	JOYSTICK UNSELECTED	Joystick mode is not selected
	-	-	-	NOT SLOW SPEED	The boat is moving faster than 2 m/s
	-	-	-	IN CALIBRATING JOYSTICK	Joystick system is under calibration
	-	-	-	THIS STATION IS PROTECTED	Station protect is active
	-	-	-	HIGH LATITUDE AREA	The boat is in high latitudes
	-	-	-	NO ENGINE OPERATION	The engine is stopped

Declaration of Conformity for Recreational Craft Joystick steering control system requirements of Directive 94/25/EC as amended by 2003/44/EC

Name of manufacturer: Yanmar Co., Ltd.

Street: 1-9

Town: Tsuruno-cho, Kitaku, Osaka-City

Post Code: 530-8311

Country: Japan

Name of Authorized Representative: Yanmar Co.,Ltd. Marine Operations Division

Street: 5-3-1

Town: Tsukaguchi Honmachi, Amagasaki, Hyogo

Post Code: 661-0001

Country: Japan

Name of Notified Body: Dutch Certification Institute

Street: Nipkowsweg 9

Town: Joure

Post Code: 8501 XH

Country: The Netherlands

ID Number: 0613

Description of Joystick steering control system and applied standards

Product: Joystick control system Type: JC10

Applied standards: ISO 25197:2012

Directive 94/25/EC as amended by 2003/44/EC

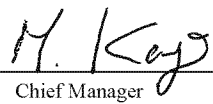
RSG Guidelines 2012

Comments of the EC to the Directive Combined, second edition

I declare on behalf of the manufacturer that the Joystick steering control system will meet the requirements of Directive 94/25/EC as amended by Directive 2003/44/EC when installed in a recreational craft, in accordance with the manufacturer's supplied instructions and that this (these) must not be put into service until the recreational craft into which it is (they are) to be installed has been declared in conformity with the relevant provisions of the above mentioned Directive.

Name: Mitsuo Kaji
(Identification of the person empowered to sign on behalf of the manufacturer or his authorized representative)

Signature and title: _____
(or an equivalent marking)


Chief Manager
Development Dept.
Marine Operations Division
Yanmar Co.,Ltd.

Date: (yr/month/day) 2013/ 11 / 21

YANMAR CO., LTD.

■ Large Power Products Operations Business

Quality Assurance Division

5-3-1, Tsukaguchi-honmachi, Amagasaki

Hyogo, 661-0001, Japan

Phone: +81-6-6428-3137 Fax: +81-6-6421-5549

<https://www.yanmar.com/>

■ Yanmar Marine International B.V.

Brugplein 11, 1332 BS Almere-de Vaart, Netherlands

Phone: +31-36-5493534 Fax: +31-36-5493219

<http://www.yanmarmarine.eu/>

Overseas Office

■ Yanmar Europe B.V. (YEU)

Brugplein 11, 1332 BS Almere-de Vaart, Netherlands

Phone: +31-36-5493200 Fax: +31-36-5493209

<http://www.yanmar.eu/>

■ Yanmar Asia (Singapore) Corporation Pte. Ltd. (YASC)

4 Tuas Lane, Singapore 638613

Phone: +65-6861-3855 Fax: +65-6862-5189

<https://www.yanmar.com/sg/>

■ Yanmar America Corporation (YA)

101 International Parkway,

Adairsville, GA 30103, U.S.A.

Phone: +1-770-877-9894 Fax: +1-770-877-9009

<http://us.yanmar.com/>

■ Yanmar Engine (Shanghai) Co., Ltd.

10F, E-Block Poly Plaza, No.18 Dongfang Road,

Pudong Shanghai, China P.R.C. 200120

Phone: +86-21-6880-5090 Fax: +86-21-6880-8090

<https://www.yanmar.com/cn/>

As of May 20, 2015

OPERATION MANUAL

JC10

1st edition: August 2012

2nd edition: January 2013

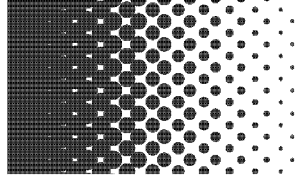
3rd edition: August 2013

4th edition: February 2014

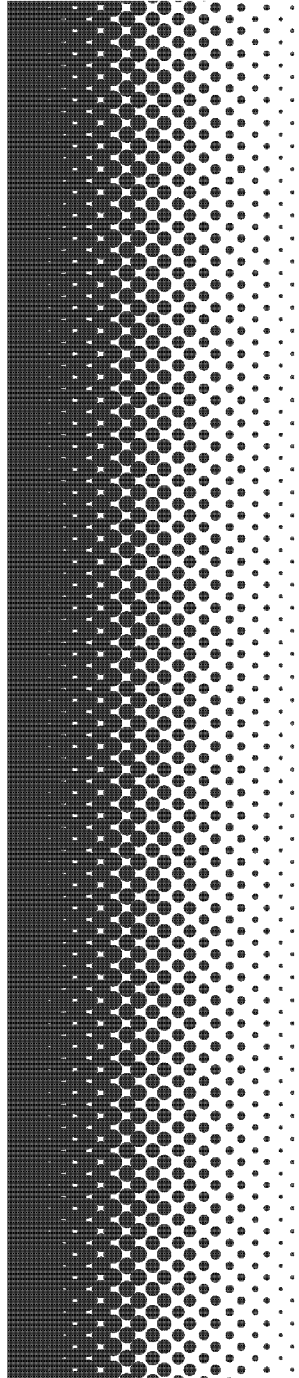
5th edition: November 2015

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Edited by: YANMAR TECHNICAL SERVICE CO., LTD.



**JOYSTICK CONTROL
SYSTEM**



YANMAR

YANMAR CO., LTD.

<https://www.yanmar.com>