



BF115J / BF135D / BF140A / BF150D

New OBE Technical Training

Confidentiality Category: **Internal use only**

BF115J / BF135D/ BF140A / BF150D

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BF115J / BF135D / BF140A / BF150D

Specifications / Dimensional Drawing

- **Specifications: BF115J / BF135D**
- **Specifications: BF140A / BF150D**
- **Dimensional Drawing**

Specifications: BF115J / BF135D

Listed figures are accurate **as of December 2021** (Please be aware that there may be revisions)

Specifications/ Dimensional Drawing	Basic Specification														
	Type	BF115J						BF135D							
		LD	LR	XD	XCD	XR	XCR	LD	LCD	LR	LCR	XD	XCD	XR	XCR
	BBWJ						BBVJ								
Description of Major Changes	Engine type	Water cooled, 4-Stroke DOHC 4 cylinder/16 Valves													
	Total displacement	2,354 cm ³													
	Bore x stroke	87.0 mm X 99.0 mm													
	Compression ratio	9.6													
DBW System	Valve train	DOHC 4 valve (Intake 2 / Exhaust 2) without VTEC													
	Rated output	84.6 kW/5,250 r/min						99.3 kW/5,500 r/min							
	Recommended engine speed range	4,500 ~ 6,000 r/min						5,000 ~ 6,000 r/min							
	Idling engine speed range	750±50 r/min													
	Fuel supply system	Programmed Fuel Injection (PGM-FI)													
	Fuel	Unleaded regular gasoline													
	Ignition system	MicroComputer Programmed													
	Lubrication system	Trochoid pump pressure lubrication													
	Remote steering system	Motor mount type													
	Alternator	55 Amps Total (40 Amps Charging)													
Rigging	Gear ratio	2.14 : 1 (30 / 14)													
	Tilt up angle	68° (Transom angle 12°)													
	Trim angle	- 4° ~ 16° (Transom angle 12°)													
	Steering angle	30° (Right and left)													
Display Kit	Transom height (Transom angle 12°)	508 mm		635 mm				508 mm				635 mm			
	Overall height	1,688 mm		1,815 mm				1,688 mm				1,815 mm			
	Dry mass*	224 kg	221 kg	227 kg	230 kg	224 kg	227 kg	224 kg	227 kg	221 kg	224 kg	227 kg	230 kg	224 kg	227 kg
Changed Parts Table	DBW remote control	●		●	●			●	●			●	●		
	Mechanical remote control		●			●	●			●	●			●	●

*: The dry mass values of standard rotation models include 3.0 kg of aluminum propeller weight, and counter rotation models include 6.0 kg of SUS propeller weight.

Specifications: BF140A / BF150D

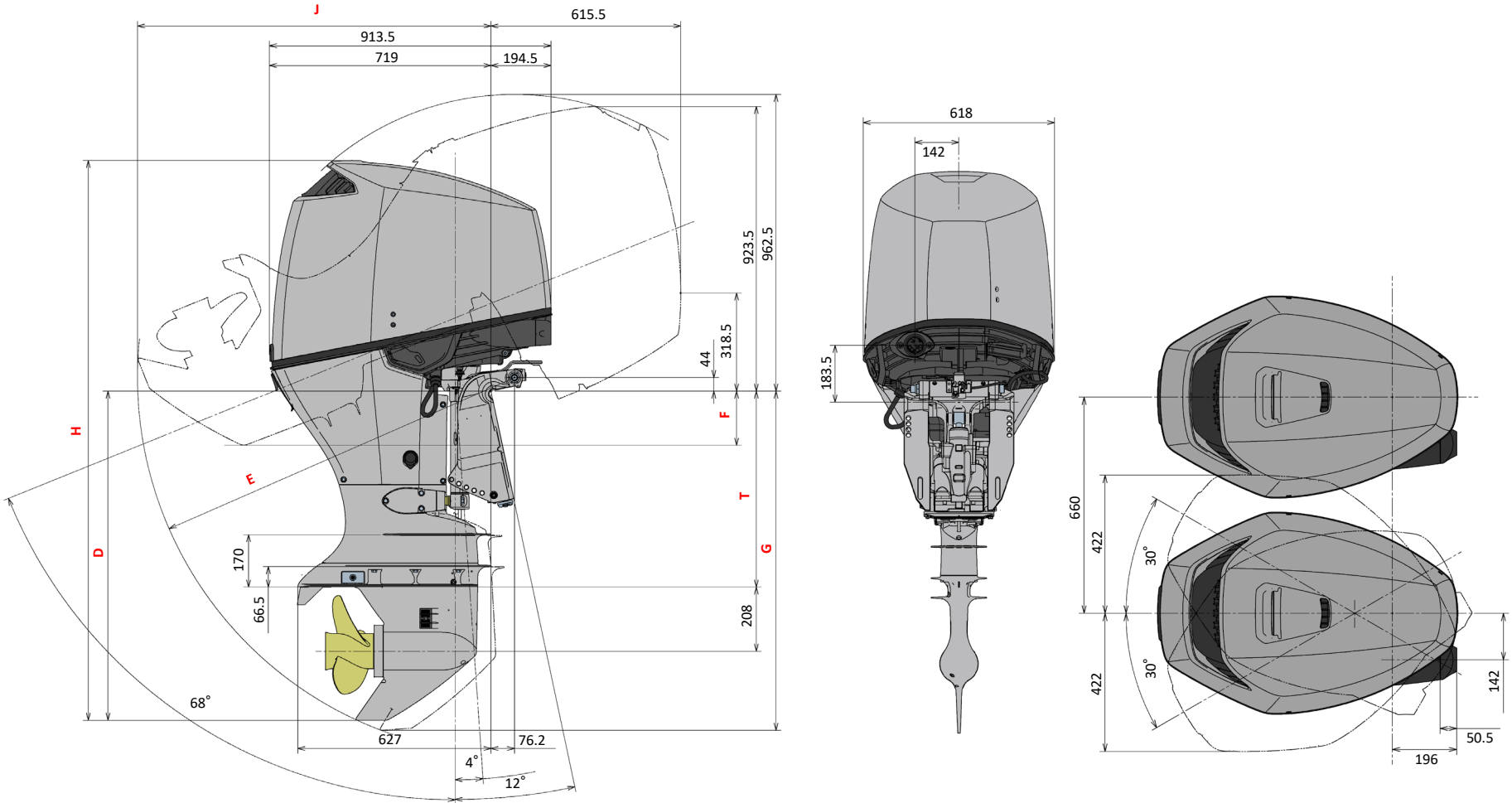
Listed figures are accurate **as of December 2021** (Please be aware that there may be revisions)

Specifications/ Dimensional Drawing	Basic Specification														
	Type	BF140A						BF150D							
		LD	LR	XD	XCD	XR	XCR	LD	LCD	LR	LCR	XD	XCD	XR	XCR
	BBUJ						BBTJ								
Description of Major Changes	Engine type	Water cooled, 4-Stroke DOHC 4 cylinder/16 Valves													
	Total displacement	2,354 cm ³													
	Bore x stroke	87.0 mm X 99.0 mm													
	Compression ratio	9.6													
DBW System	Valve train	DOHC 4 valve (Intake 2 / Exhaust 2) with VTEC													
	Rated output	103 kW/5,500 r/min						110.3 kW/5,500 r/min							
	Recommended engine speed range	5,000 ~ 6,000 r/min													
	Idling engine speed range	750±50 r/min													
	Fuel supply system	Programmed Fuel Injection (PGM-FI)													
	Fuel	Unleaded regular gasoline													
	Ignition system	MicroComputer Programmed													
	Lubrication system	Trochoid pump pressure lubrication													
	Remote steering system	Motor mount type													
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Display Kit	Transom height (Transom angle 12°)	508 mm		635 mm				508 mm				635 mm			
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	Dry mass*	224 kg	221 kg	227 kg	230 kg	224 kg	227 kg	224 kg	227 kg	221 kg	224 kg	227 kg	230 kg	224 kg	227 kg
Changed Parts Table	DBW remote control	●		●	●			●	●			●	●		
	Mechanical remote control		●			●	●			●	●			●	●

*: The dry mass values of standard rotation models include 3.0 kg of aluminum propeller weight, and counter rotation models include 6.0 kg of SUS propeller weight.

Dimensional Drawing

Listed figures are accurate **as of December 2021** (Please be aware that there may be revisions)



Transom	H	T	D	E	F	G	J
L type	1688	508	941	1109	128	973	1033
XL type	1815	635	1068	1223	176	1100	1147

- Specifications/
Dimensional
Drawing
- Description of
Major Changes
- DBW System
- Rigging
- Display Kit
- Changed
Parts Table

Listed figures are accurate **as of December 2021** (Please be aware that there may be revisions)

Specifications/
Dimensional
Drawing

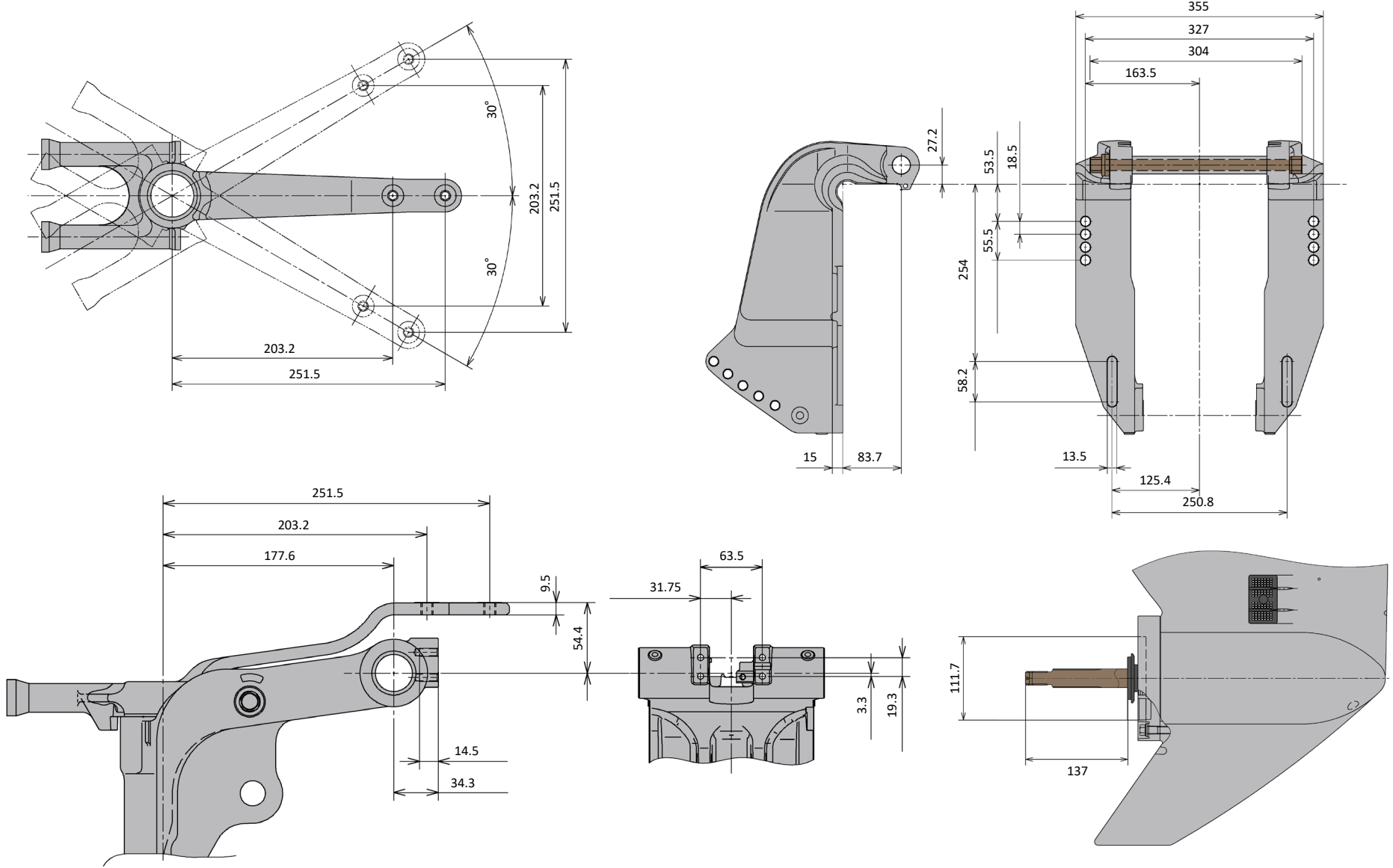
Description of
Major Changes

DBW System

Rigging

Display Kit

Changed
Parts Table



BF115J / BF135D / BF140A / BF150D**2. Description of
Major Changes**

Description of Major Changes



【Frame】

- Improved Appearance
- Improved Ease of Maintenance
- Tilt Limit Switch (YOP)
- Power Interface for 12V Accessories

【Engine】

- Improved Ease of Maintenance
- Non-resonant Knock Sensor
- O2 Sensor
- Smart Key System (DBW & Mechanical)
- Battery Switch OFF Notification
- Improved Ease of Re-Powering

[Frame] Improved Appearance

Adopts “Dynamic Motion Form” to achieve both **advanced design** and **excellent waterproof performance**.

To prevent the water from penetrating into the engine cover and rust from forming, the number of body panel sections (figures) is reduced.

Specifications/
Dimensional
Drawing

Description of
Major Changes

DBW System

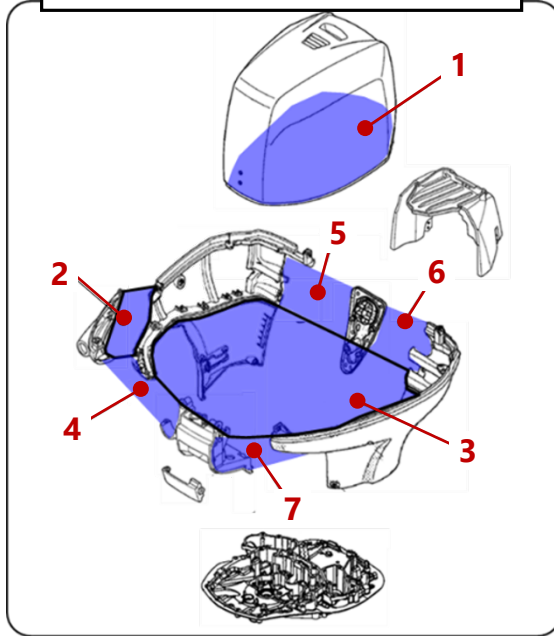
Rigging

Display Kit

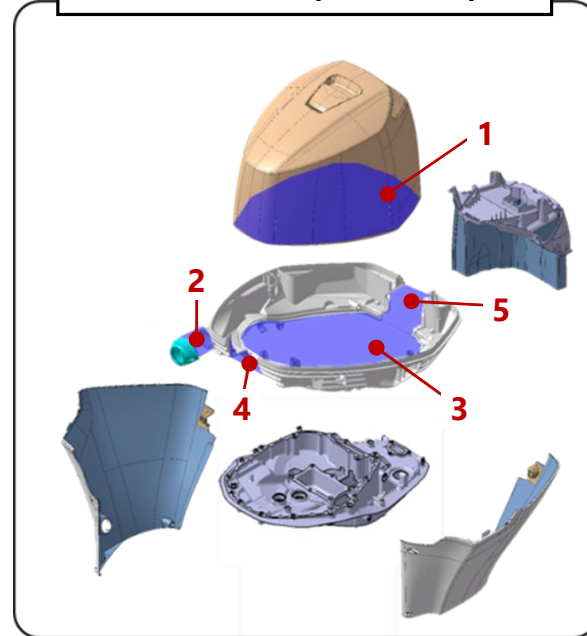
Changed
Parts Table



Previous model (7 sections)

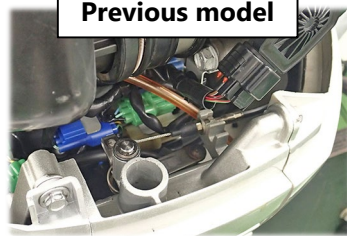


New model (5 sections)

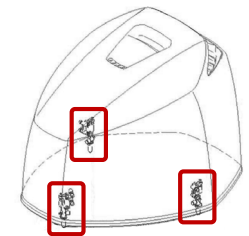
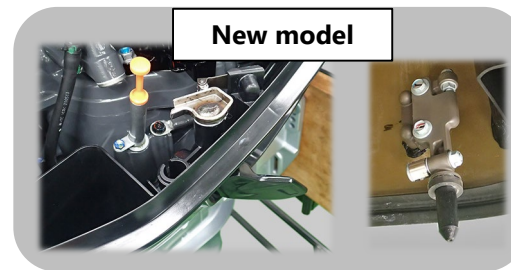


The **simplified locking mechanism** of the engine cover has been achieved by eliminating the cables, and a sealing function is improved by locking the cover at three points.

Previous model



New model



Lock position

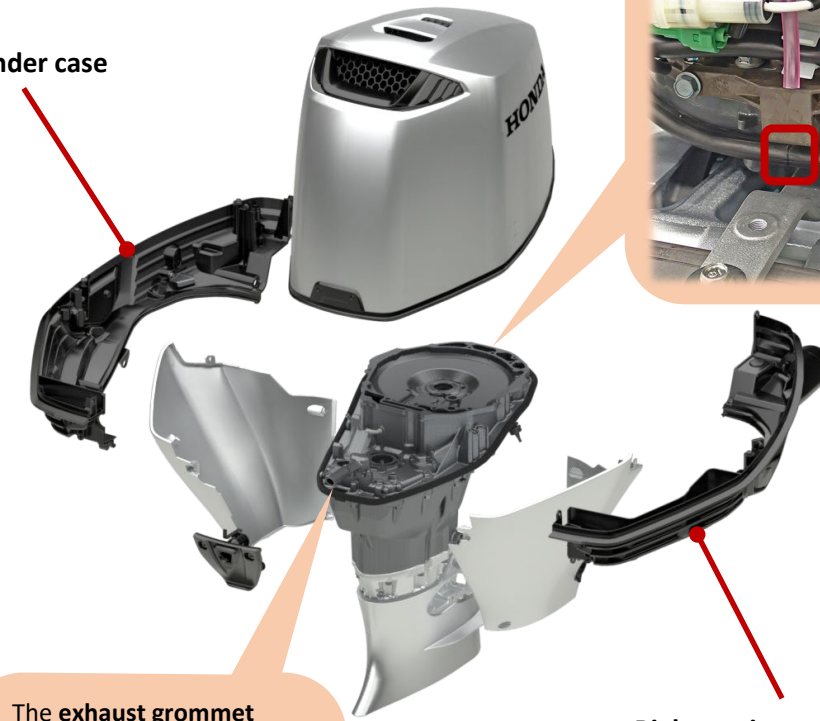
[Frame] Improved Appearance

Prevents moisture from entering the inside of the engine under case.

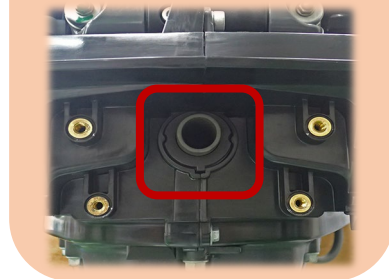
Install the engine under cases while paying attention to the following in order to prevent moisture from entering.

Left engine under case

The mating part of the **under cover seal A** is positioned in the front side.



The **exhaust grommet** is NOT mispositioned.



Right engine under case

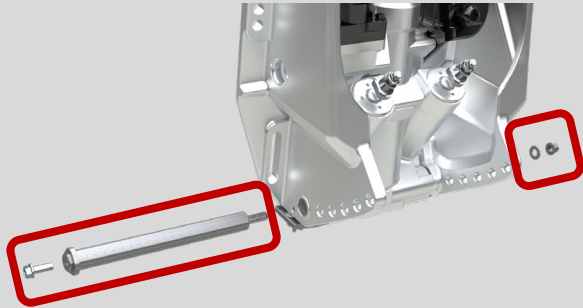
Improved maintainability of **PTT Assy.**

The structure of the lower cylinder shaft and the shape of the stern bracket have been changed.

It is no longer necessary to loosen the stern brackets on both sides, and the PTT Assy. can be removed and installed by removing a bolt, lower cylinder shaft and nut.

[Changed the installation structure of the lower cylinder shaft]

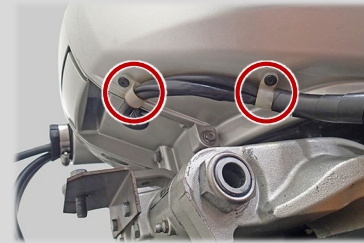
The mounting structure of the PTT lower cylinder shaft was changed to improve the workability of PTT removal and installation.



[Eliminated the PTT wire harness fixing clips]

This prevents the PTT wire harness from getting caught or tangled up in the steering mechanism due to the fixing clips coming off, and also improves the workability of the PTT removal and installation.

Previous model (2 fixing clips)



New model (No fixing clip)



Major removal steps of the previous model: 11 steps

- 1 Remove the steering cylinder.
- 2 Loosen the nut on one side of the tilting shaft.
- 3 Tilt up fully and hang using the engine hanger.
- 4 Remove the trim angle sensor and motor harness.
- 5 Remove the anode metal.
- 6 Remove the lower cylinder collar bolts.
- 7 Remove the hull mounting bolts from the stern bracket on one side.
- 8 Slide that stern bracket to the outside.
- 9 Remove the lower cylinder shaft.
- 10 Remove the upper cylinder pin.
- 11 Remove the PTT Assy..

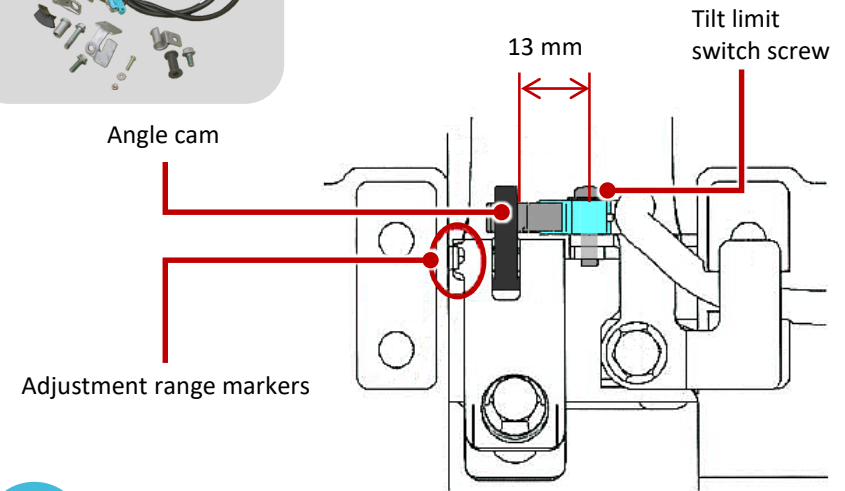
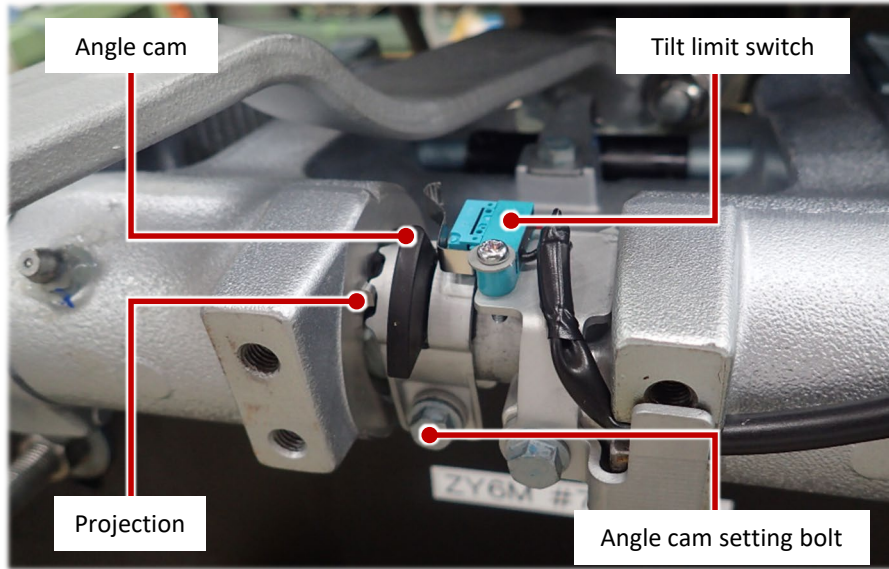
Major removal steps of the new model: 7 steps

- 1 Remove the steering cylinder.
- 2 Loosen the nut on one side of the tilting shaft.
- 3 Tilt up fully and set the tilt lock.
- 4 Remove the trim angle sensor and motor harness.
- 5 Remove the anode terminal.
- 6 Remove the lower cylinder shaft nut and washer.
- 7 Remove the hull mounting bolts from the stern bracket on one side.
- 8 Slide that stern bracket to the outside.
- 9 Remove the bolt and lower cylinder shaft.
- 10 Remove the upper cylinder pin.
- 11 Remove the PTT Assy..



To prevent interference with the boat body, a tilt limit switch is made available as a YOP to allow for **flexible tilt upper limit setting**.

To make the setting easier, the upper tilt limit position can be set by tightening at desired angle.



[How to adjust the upper tilt position]

1. Remove the angle cam setting bolt.
2. With the outboard motor in the vertical position, adjust the angle of the angle cam using the projection of the swivel case as a mark.
3. After adjusting to the desired angle, tighten the angle cam setting bolt to prevent it from turning.
4. Use the PTT switch on the remote control to tilt up, and confirm that the tilt height is limited to the desired position. If it is not at the desired height, go back to step 1. and readjust.

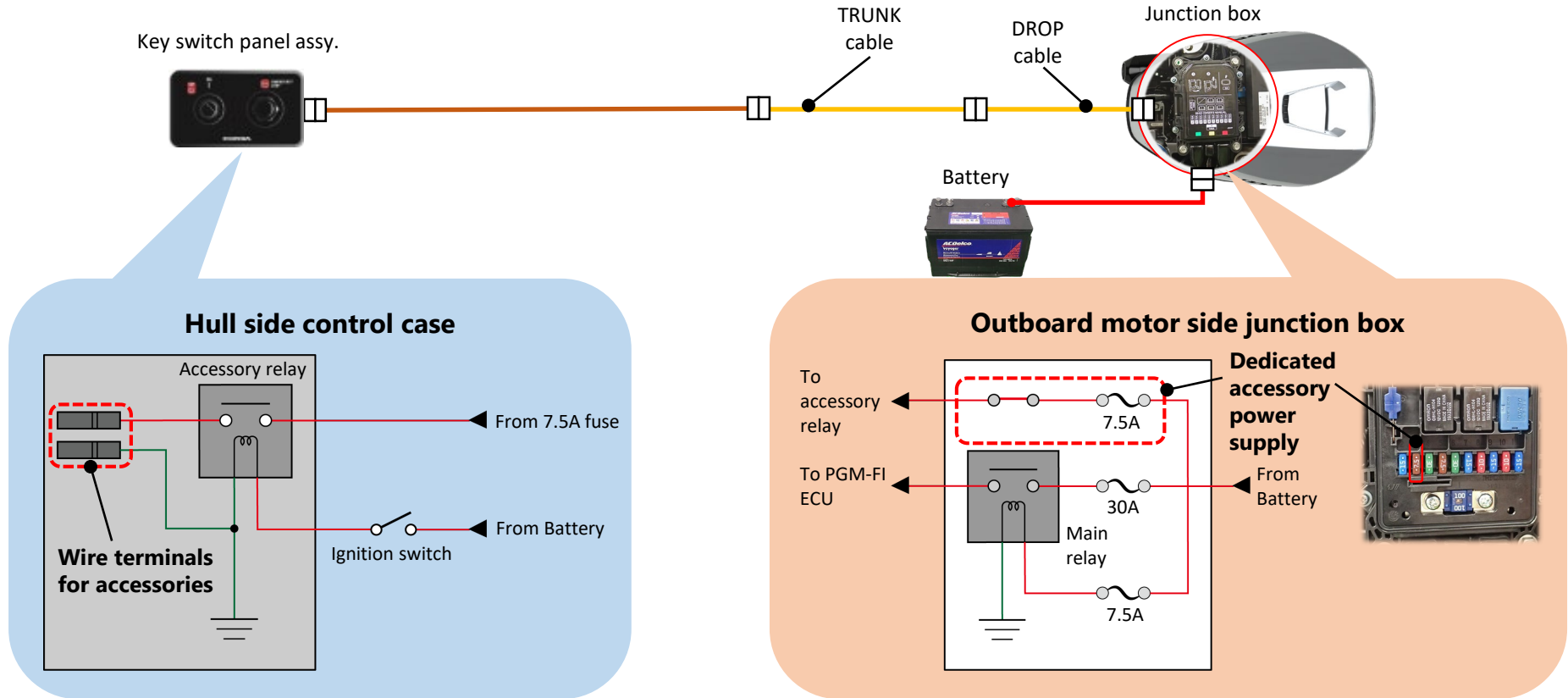


- Do not adjust the angle cam outside of the **adjustment range markers**. Adjustment outside the range may cause malfunction such as activation of the tilt limit switch in the trim range, or inactivation of the switch.
- Install the tilt limit switch so that the distance from the center of the tilt limit switch screw to the end face of the angle cam is **13 mm**. If it is not set in the correct position, the switch may not activate or parts may contact each other and cause damage.

[Frame] Power Interface for 12V Accessories

Provides **12V power supply** to accessories.

A dedicated accessory power supply is provided in the junction box of the outboard motor. The 12V power can be supplied from the wire terminals via the accessory relay (linked to the ignition switch) on the hull side.



Make sure that the load **does not exceed 12V-5A (60W)**.

Failure to follow this precaution may result in blown fuses and deterioration of engine starting performance.

BF115J / BF135D/ BF140A / BF150D**2. Description of
Major Changes**

Description of Major Changes



【Frame】

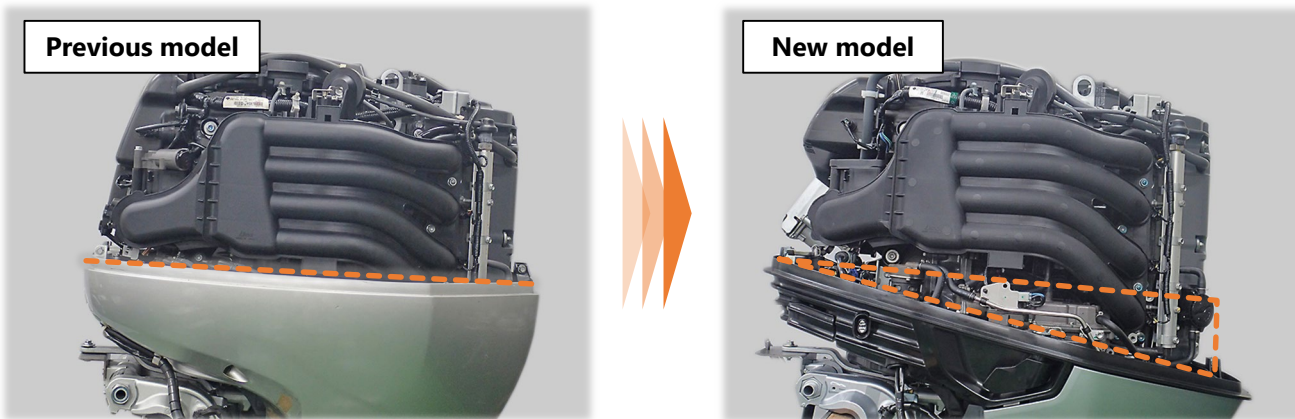
- Improved Appearance
- Improved Ease of Maintenance
- Tilt Limit Switch (YOP)
- Power Interface for 12V Accessories

【Engine】

- Improved Ease of Maintenance
- Non-resonant Knock Sensor
- O2 Sensor
- Smart Key System (DBW & Mechanical)
- Battery Switch OFF Notification
- Improved Ease of Re-Powering

[Engine] Improved Ease of Maintenance

Deeper engine cover and lowered engine under case for **improved accessibility to various parts.**



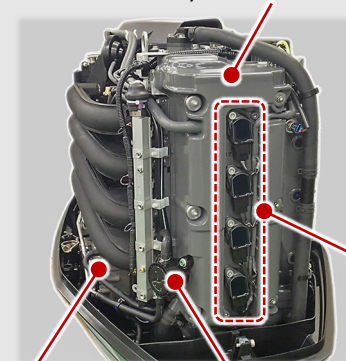
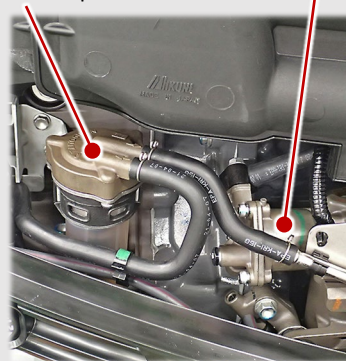
Examples of parts with improved accessibility

Achieved easier detachability of each part.
Periodic maintenance work, such as valve clearance inspection/adjustment, can now be performed without removing the engine under case.

Low pressure fuel filter/Water separator

High pressure fuel filter

Cylinder head cover



PTCs/
Spark plugs

Vapor separator

Low pressure fuel pump

Redesigned to **improve workability** of parts replacement

Specifications/
Dimensional
Drawing

Description of
Major Changes

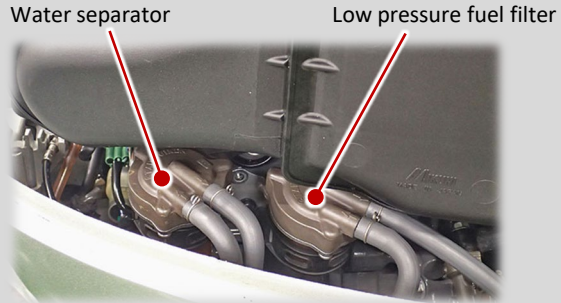
DBW System

Rigging

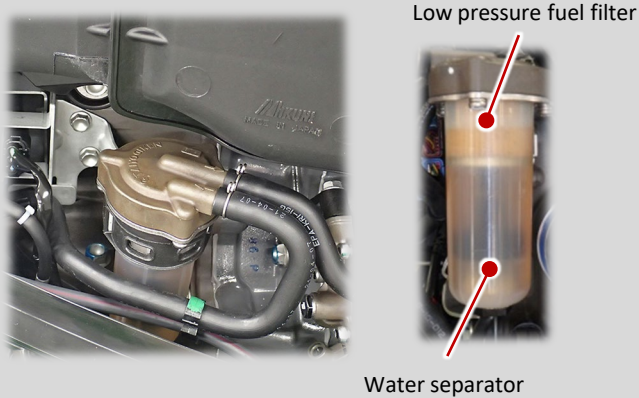
Display Kit

Changed
Parts Table

Previous model (separate)

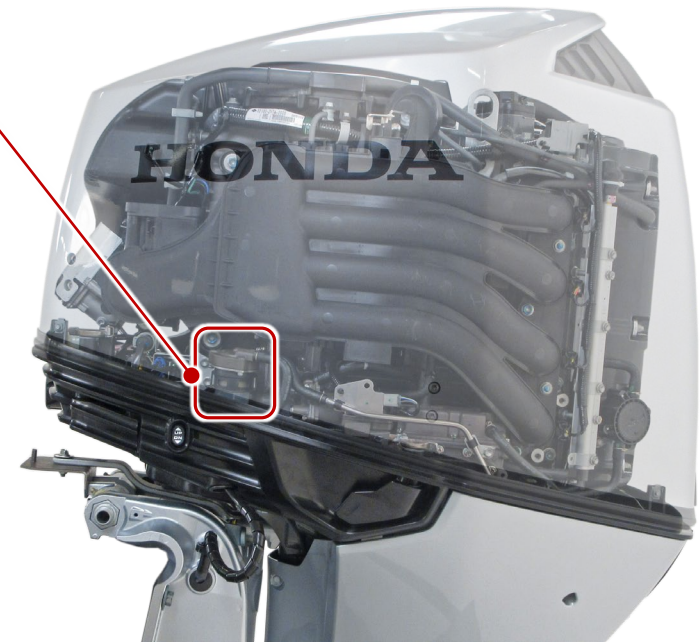


New model (integrated)



Integration of low pressure fuel filter and water separator

The low pressure fuel filter and water separator have been integrated and positioned in a location that affords good accessibility. Replace every 2 years or per 400 hours of use.



The structure around the level gauge pipe and oil filler cap has been modified to **improve maintainability** at sea.

Specifications/
Dimensional
Drawing

Description of
Major Changes

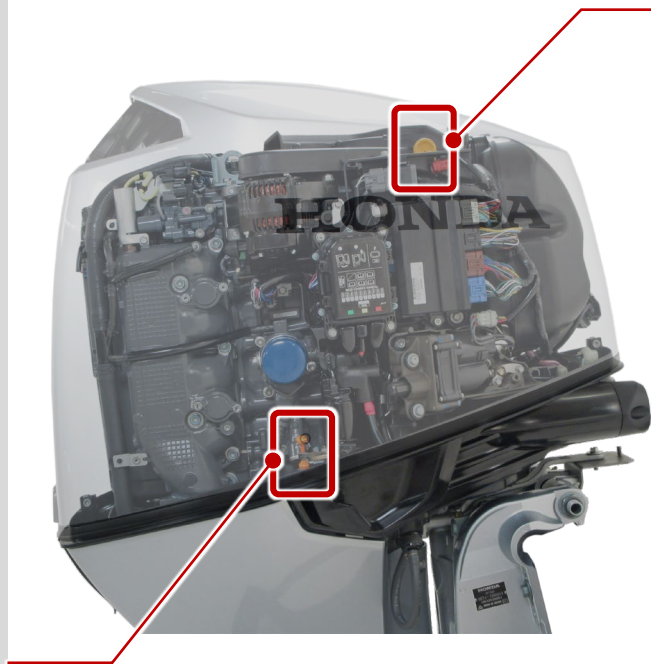
[Level gauge pipe]

The inner diameter of the pipe has been enlarged to allow the use of a larger diameter tube for the oil changer, improving workability.

Previous model
(Inner diameter: $\phi 9.2$)



New model
(Inner diameter: $\phi 12.0$)



[Oil filler cap]

The cap has been changed from a screw-on type to a 90-degree rotating type, making it easier to remove and install.



Previous model



New model



DBW System

Rigging

Display Kit

Changed
Parts Table

Redesigned the oil drain area to **improve maintainability** and increase **eco-friendliness**

Specifications/
Dimensional
Drawing

Description of
Major Changes

DBW System

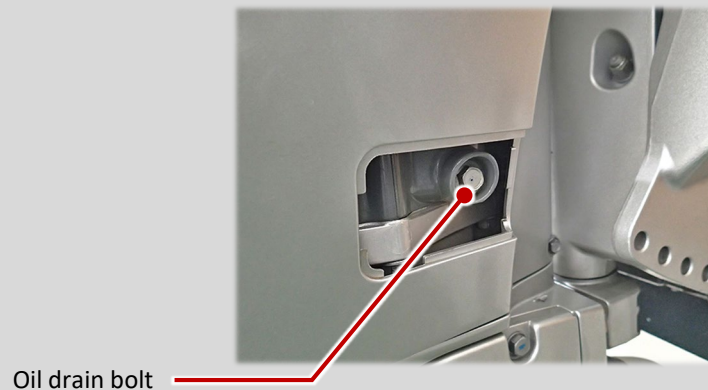
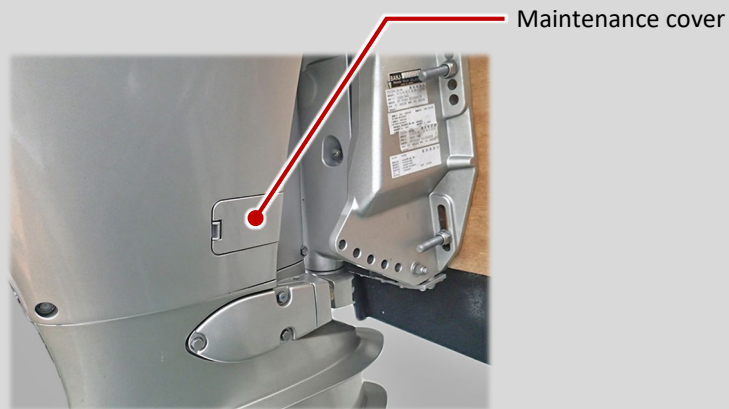
Rigging

Display Kit

Changed
Parts Table

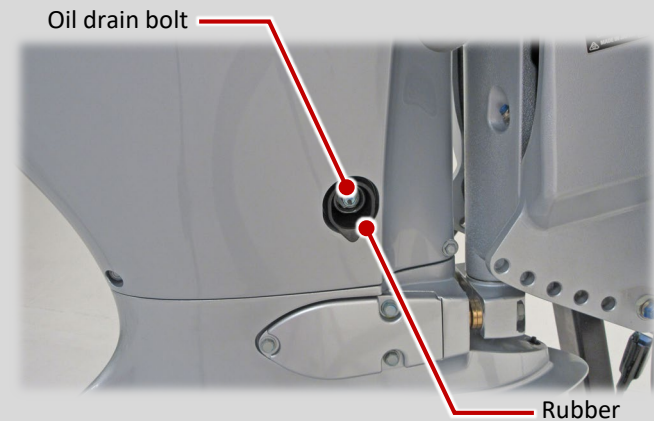
Previous model

To access the oil drain bolt, the maintenance cover must be removed.



New model

The maintenance cover has been eliminated, and the oil drain bolts can be directly removed to **improve work efficiency**. In addition, to **prevent the oil from spilling** into the water and from sticking to the surrounding parts during operation, a rubber to prevent oil adhesion has been installed around the oil drain bolt.



Seeks to **improve the accuracy of knocking detection**

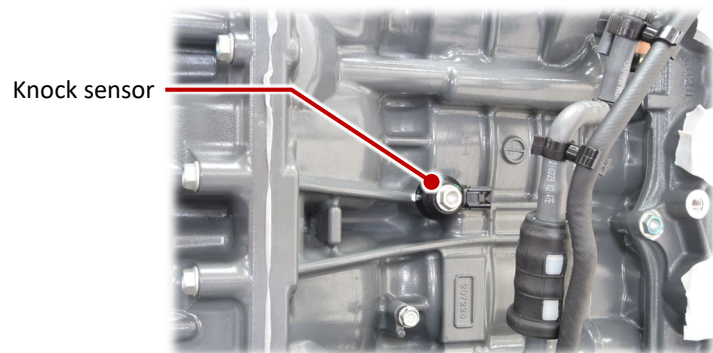
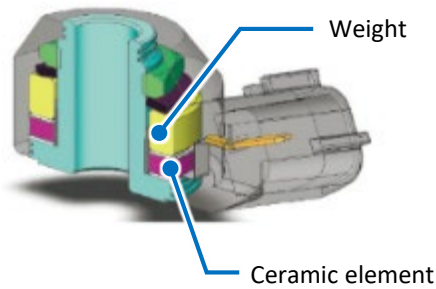
Adopts non-resonant knock sensor different from conventional types.

Improves engine output and fuel efficiency by improving knocking detection accuracy (detection of minute knocking).

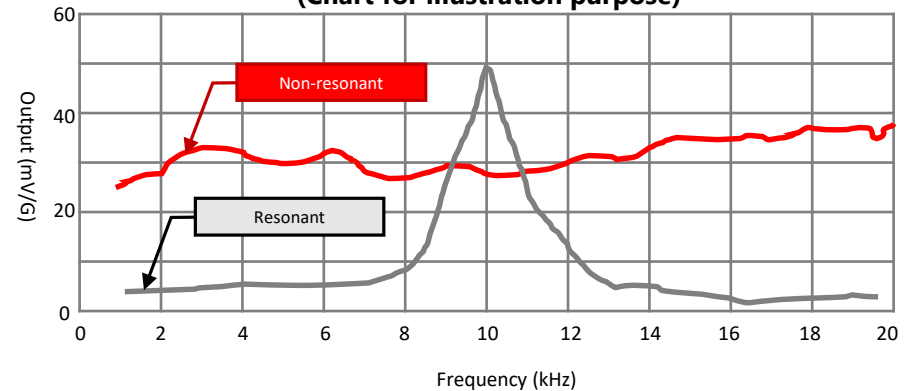
Output characteristics

The conventional resonant type knock sensor generates an electric charge when the resonating body distorts. On the other hand, with a non-resonant type knock sensor, an electric charge is generated when an internal weight compresses a piezoelectric element.

Non-resonant knock sensor (Sample)



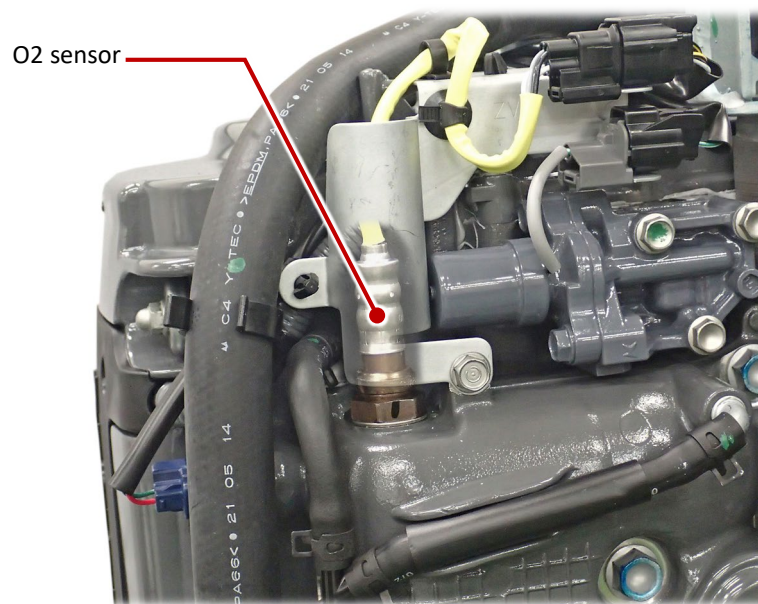
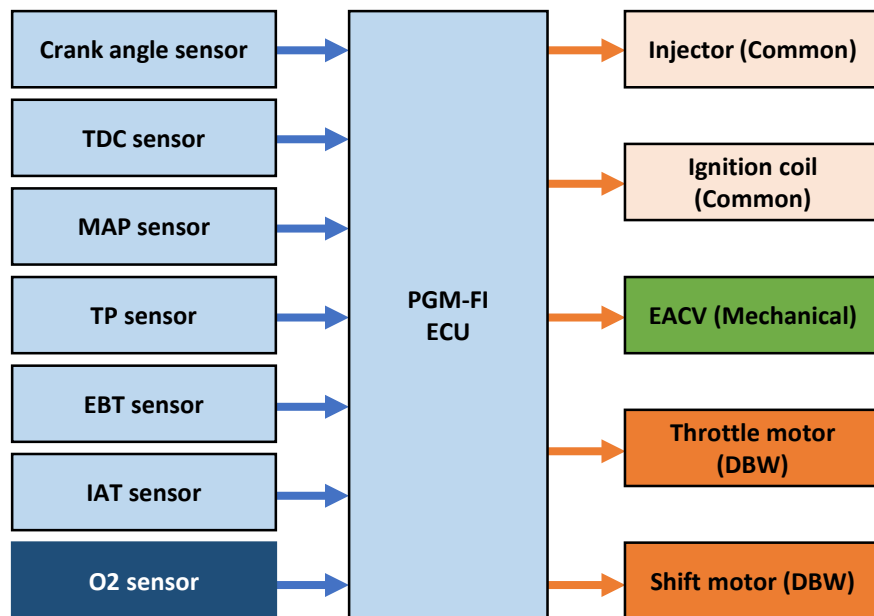
Knock sensor output characteristics (Chart for illustration purpose)



***NOT compatible with conventional cylinder block and knock sensor.**

The **O2 sensor** is adopted instead of the conventional LAF sensor.

Block diagram of the control system





***NOT compatible with the conventional LAF sensor.**

- Specifications/ Dimensional Drawing
- Description of Major Changes
- DBW System
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- Changed Parts Table

Smart key system aimed at **improving convenience** and **theft prevention**

Smart key is a system designed to improve convenience as well as prevent theft.

Communication devices

Part name	Function
 <p>Smart key</p>	<p>Battery-powered key. Setting an arbitrary communication ID (during user registration) allows linking to the smart key unit via UHF.*</p>
 <p>Smart key unit</p>	<p>Smart key authentication unit that connects and communicates (H-CAN) with the FI-ECU. When communicating (UHF) with the smart key and authentication of the smart key is verified, an instruction to enable engine start is transmitted to the FI-ECU. Be sure to memorize the pass code necessary for starting the engine using a mechanical key, in cases where the smart key is lost or misplaced. User registration is required to use the pass code. (Default pass code when shipped from factory is 0000)</p>

*UHF (Ultra High Frequency) refers to radio waves with frequencies ranging from 300 MHz to 3 GHz, with wavelengths from 10 to 100 cm.

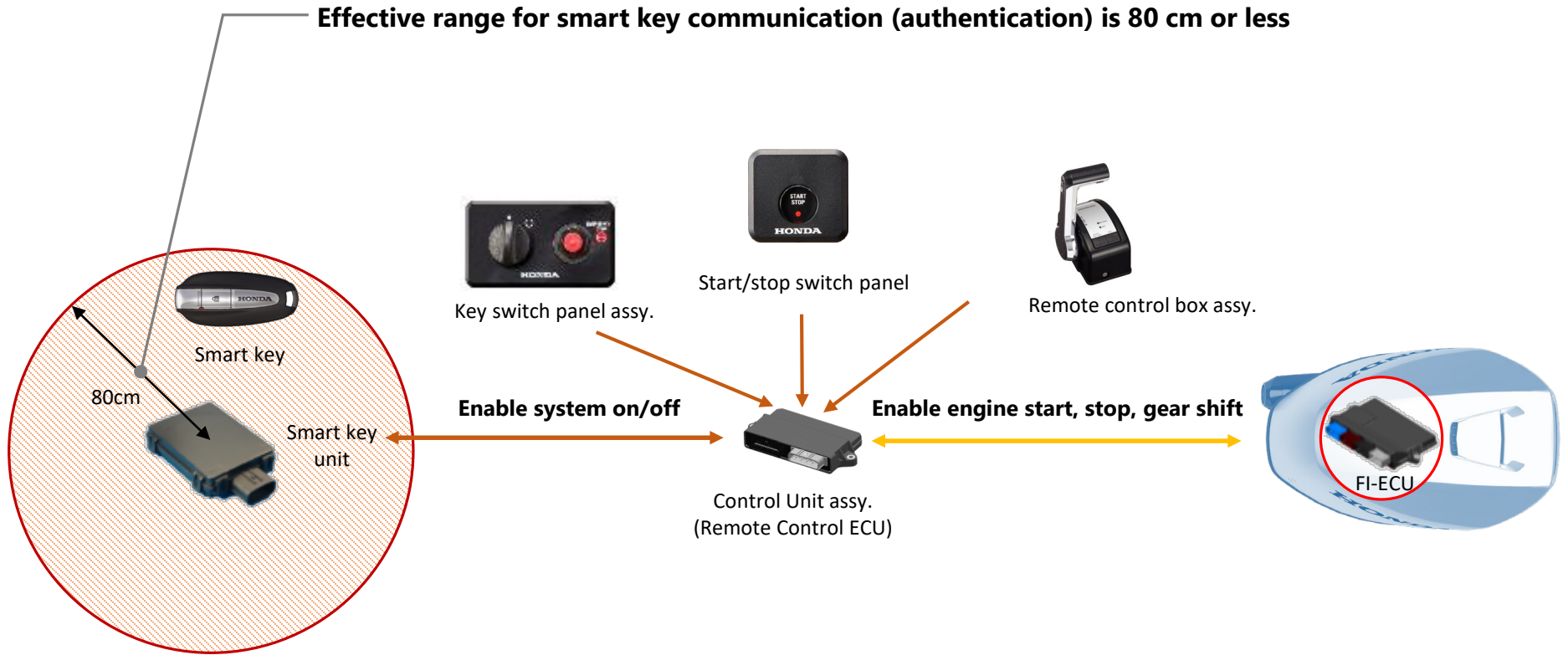
Function

- (1) Smart key function (convenience)
Carry the smart key for easy system on/off.
- (2) Keyless entry function (convenience)
System can be turned off from a distance by pressing the lock button on the smart key.
- (3) Immobilizer function (theft prevention)
The smart key being carried communicates with the smart key unit for authentication.
The engine starts only if the smart key matches the registration.



How it works (DBW)

The smart key system of DBW control model works as follows.

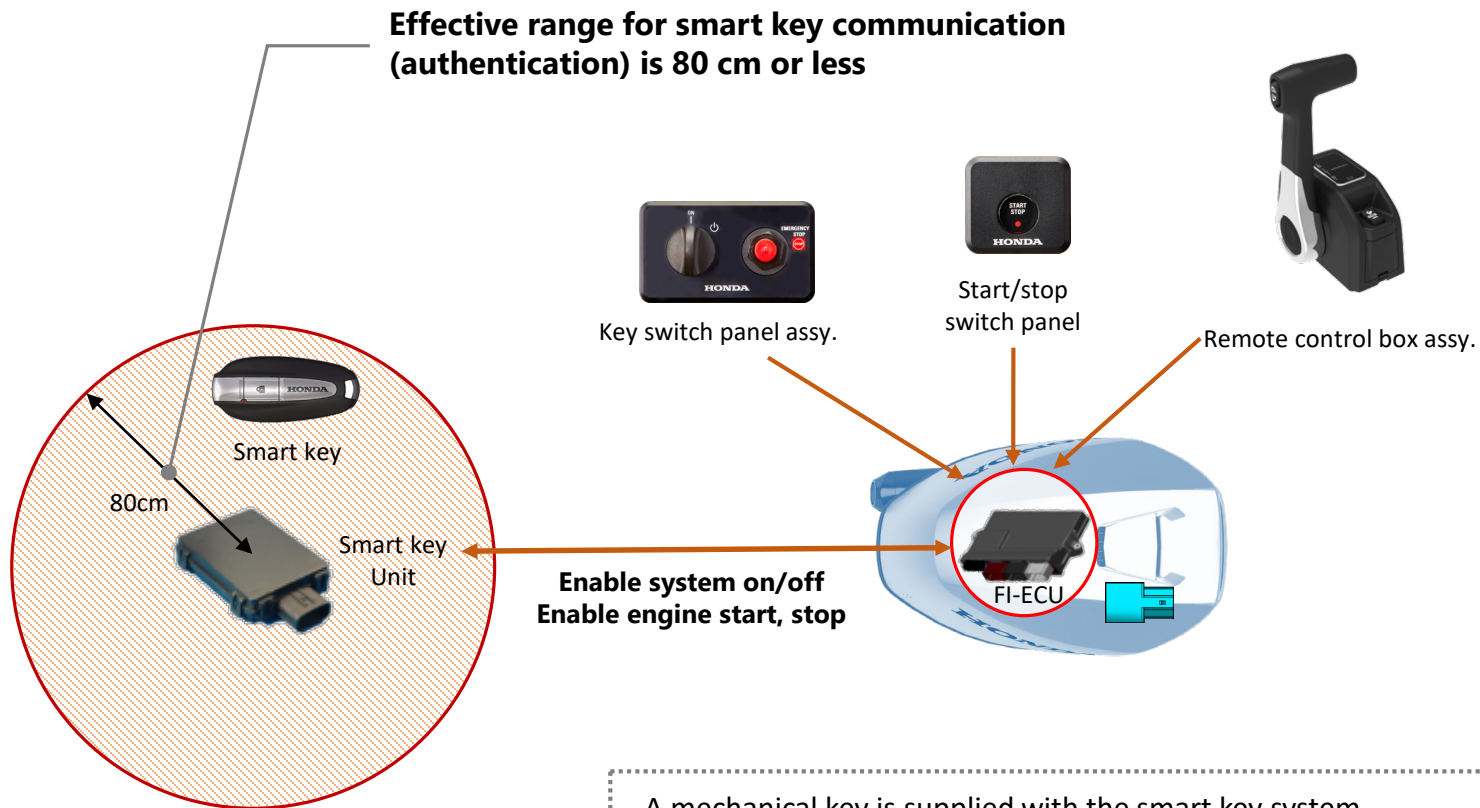


A mechanical key is supplied with the smart key system. Ignition switch (IG/SW) can be operated using the mechanical key if the smart key is misplaced. However, when the engine is started using the mechanical key there will be a 3,000 rpm limit on engine speed.



How it works (Mechanical)

The smart key system of mechanical control model works as follows.



A mechanical key is supplied with the smart key system. Ignition switch (IG/SW) can be operated using the mechanical key if the smart key is misplaced. However, when the engine is started using the mechanical key there will be a 3,000 rpm limit on engine speed.



[Engine] Smart Key System (DBW & Mechanical)

To **cancel smart key usage** when selling the boat, **initialize the FI-ECU**

Since the FI-ECU of the outboard motor equipped with the smart key system thinks that the smart key is active even when the smart key unit is absent, the engine cannot start unless the FI-ECU is initialized.
 If using the smart key system, be sure to initialize the FI-ECU before selling the boat.
 FI-ECU initialization cannot be done using Dr.H.

Specifications/
Dimensional
Drawing

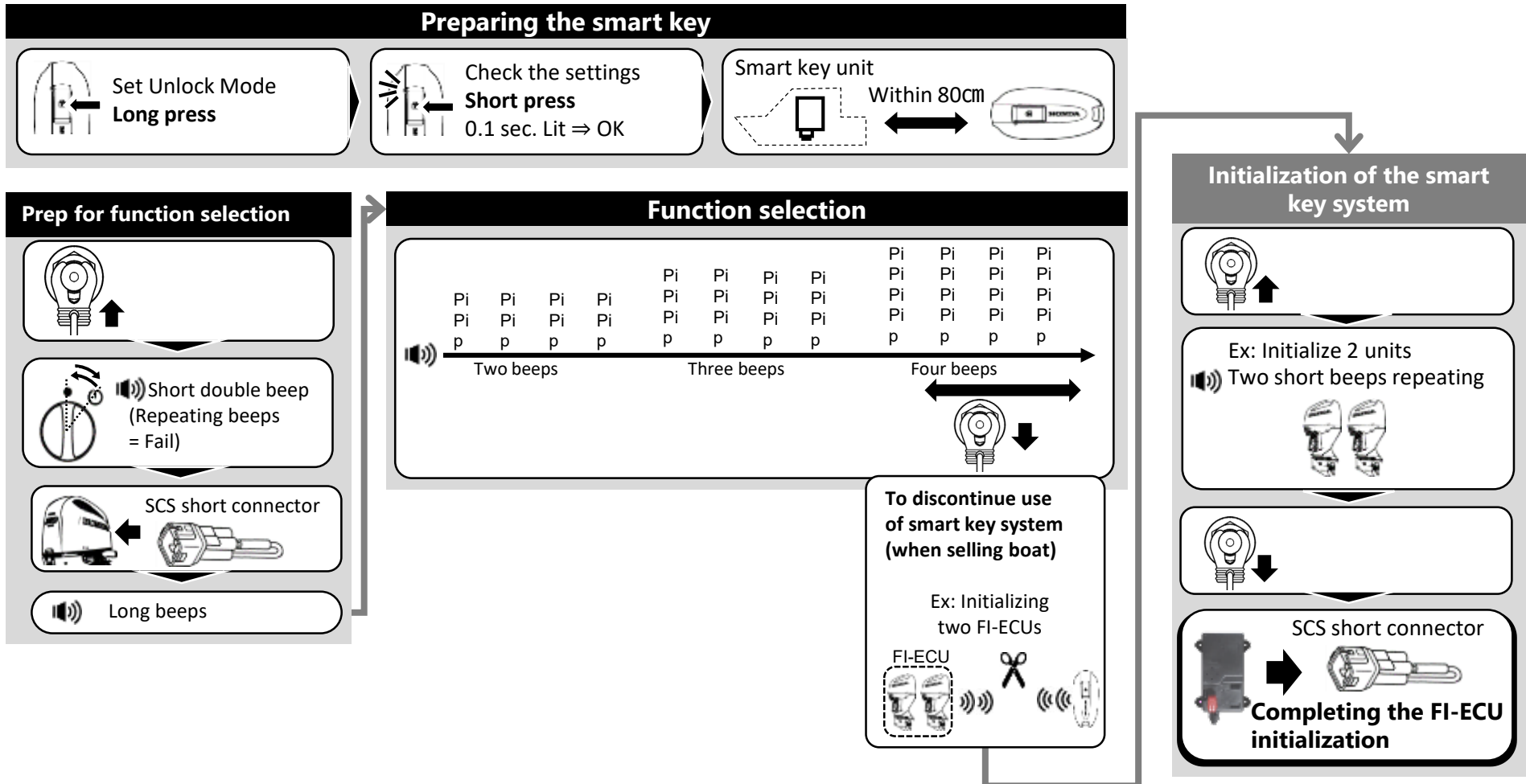
Description of
Major Changes

DBW System

Rigging

Display Kit

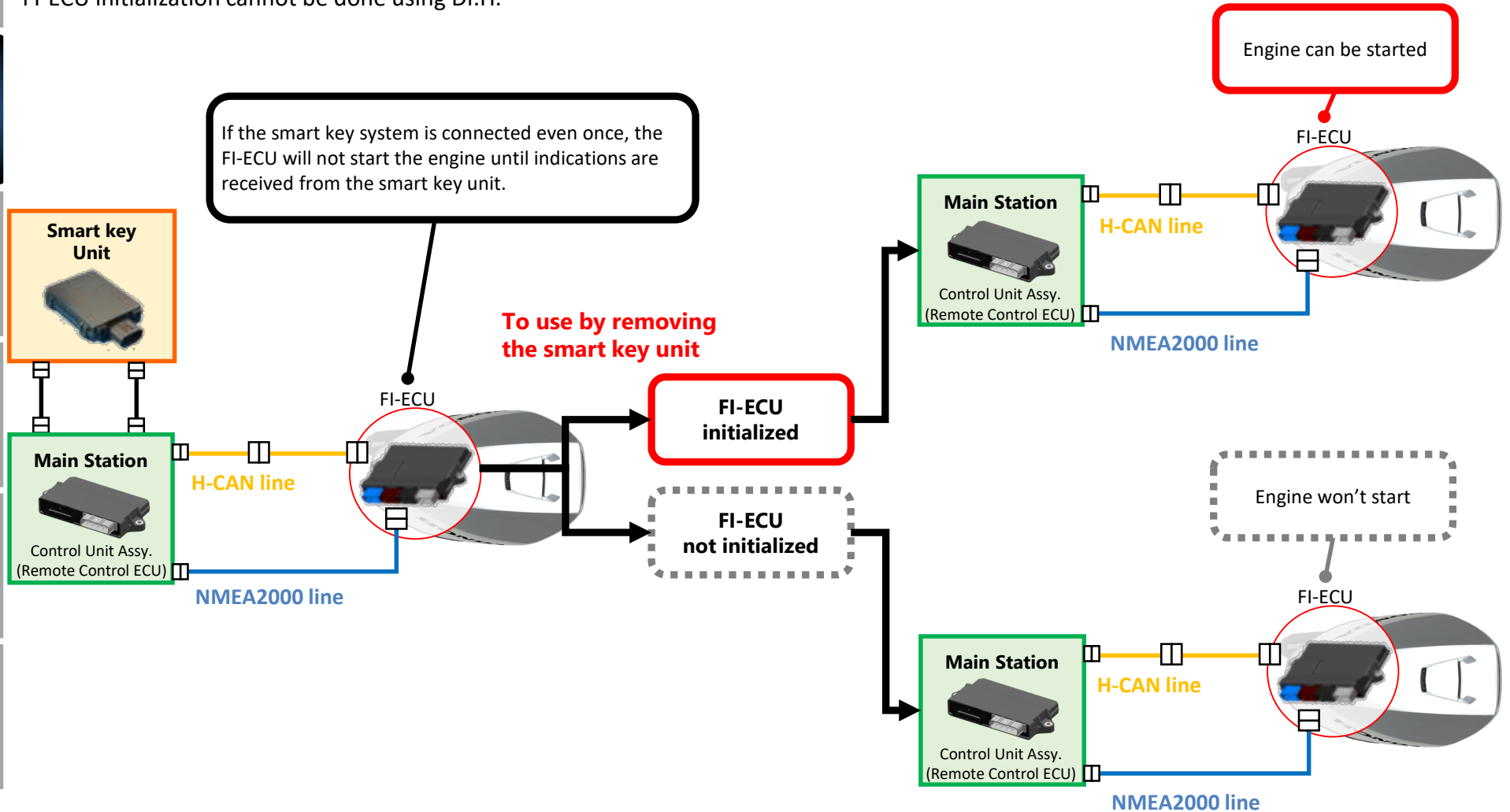
Changed
Parts Table



[Engine] Smart Key System (DBW & Mechanical)

To **cancel smart key usage** when selling the boat, **initialize the FI-ECU**

Since the FI-ECU of the outboard motor equipped with the smart key system thinks that the smart key is active even when the smart key unit is absent, the engine cannot start unless the FI-ECU is initialized.
If using the smart key system, be sure to initialize the FI-ECU before selling the boat.
FI-ECU initialization cannot be done using Dr.H.

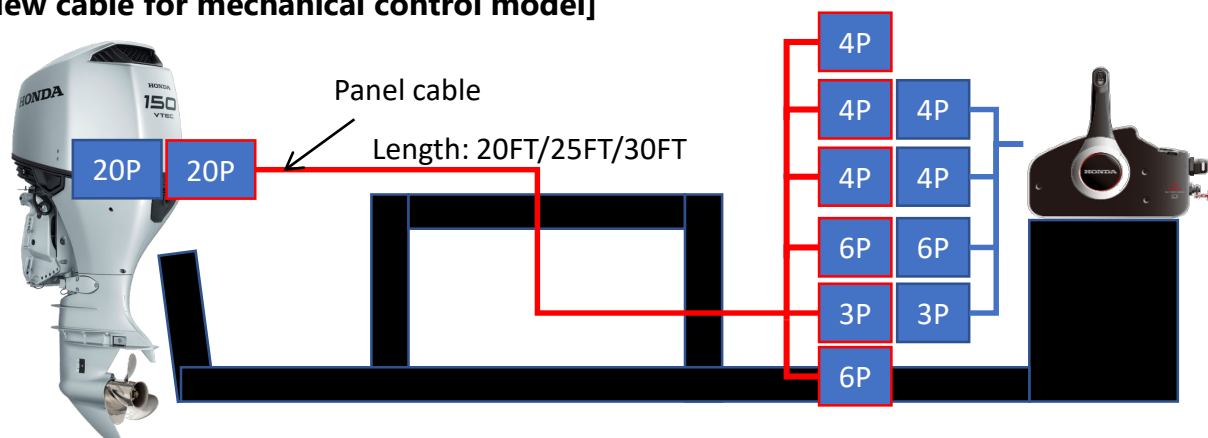


[Engine] Improved Ease of Re-Powering

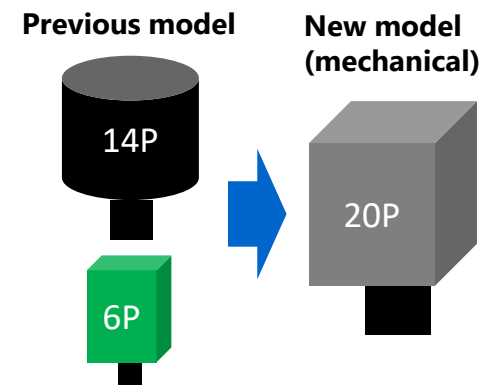
To support reusing of existing cables due to **change of the panel cable connectors** of the mechanical control model

The 20P panel cable, which integrates the conventional switch panel cable (14P) and PGM indicator cable (6P), is newly adopted. In response to the engine connector change, a conversion cable is made available so that the existing cable can be used when the outboard motor is replaced.

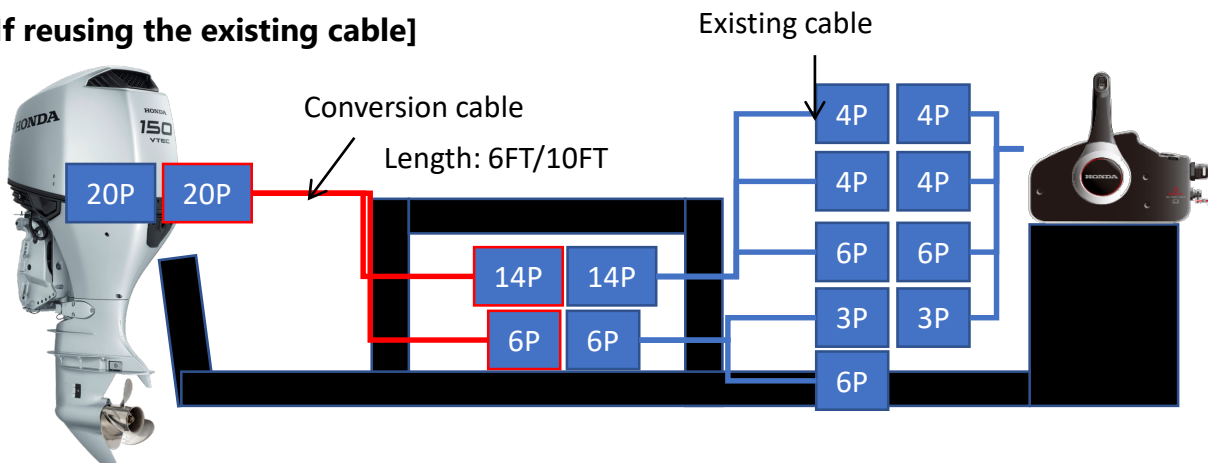
[New cable for mechanical control model]



[Connector shape]



[If reusing the existing cable]



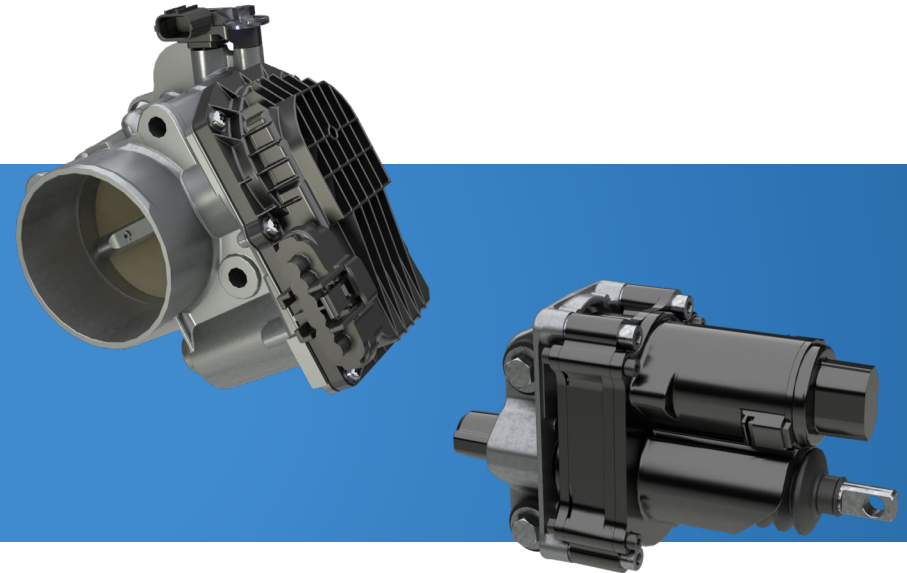
Panel cable	
20FT	32580-ZVL-900
25FT	32580-ZVL-910
30FT	32580-ZVL-920
Conversion cable	
6FT	32590-ZVL-900
10FT	32590-ZVL-910

*The above cables for mechanical control models are not compatible with trolling control or smart key. Compatible products are currently under development.

BF115J / BF135D / BF140A / BF150D

3. DBW System

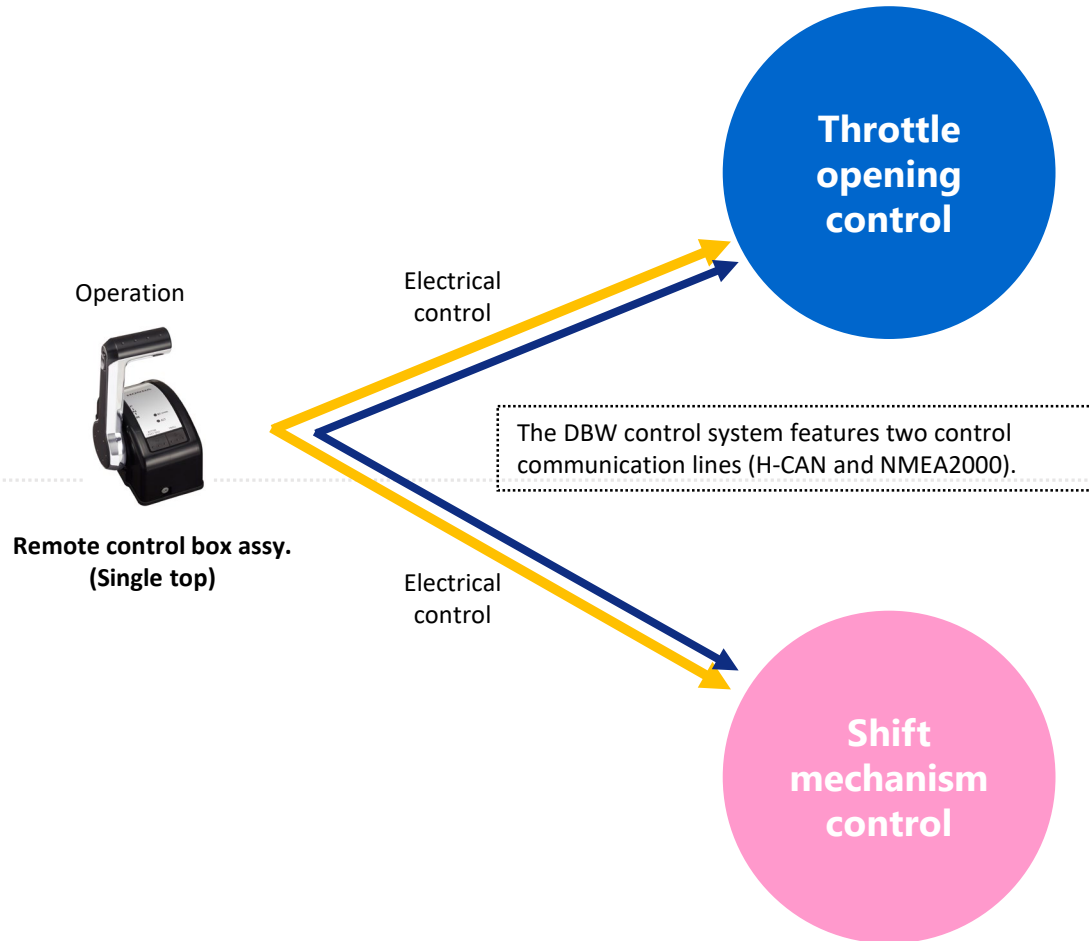
DBW System



- DBW System Overview
- Safety Network System
- Function Explanations

Electric throttle and electric shifting systems based on DBW (Drive-by-Wire)

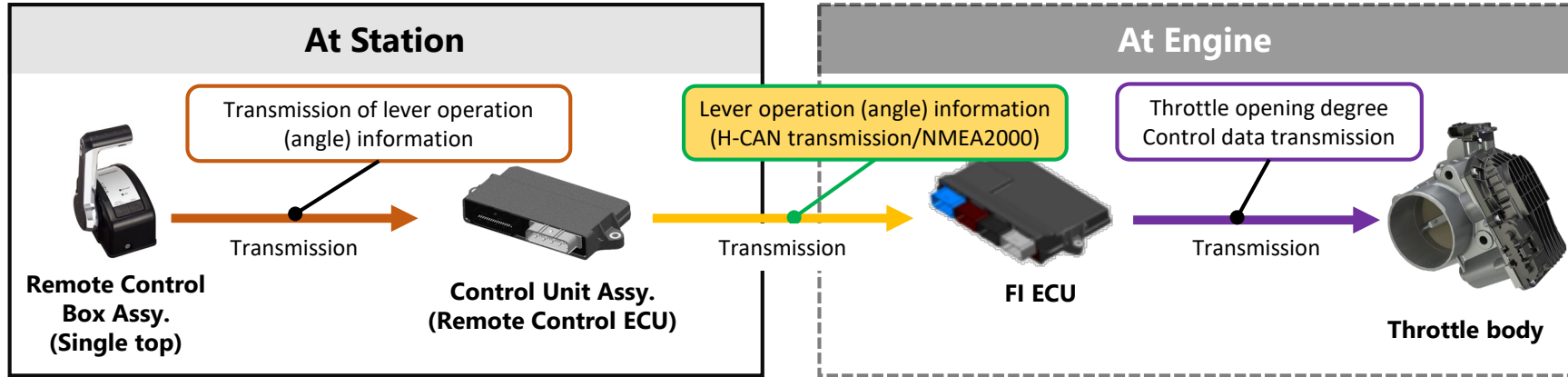
The DBW control system mainly changes throttle control and shift control mechanisms from a mechanical to an electrical system. Resulting benefits include improved cable workability during rigging setup.



- Specifications/ Dimensional Drawing
- Description of Major Changes
- DBW System**
- Rigging
- Display Kit
- Changed Parts Table

Electric throttle system

Basic flow of electric throttle control



Benefits of adopting electric throttle system

- Since an ECU controls*¹ the throttle, the IAC valve (EACV) was eliminated. No need to adjust the idling speed.
- Since throttle opening control is motorized*², the system affords fine and smooth operation unaffected by the friction that would occur with mechanical control systems.
- Since it is possible to provide two separate control lines, a backup system can be provided in case of system failure to enable continued cruising in emergency situations, thereby improving safety.
- Since the throttle valve's opening degree can be adjusted to the optimum level for any situation, it contributes to higher fuel efficiency.

*1 The throttle opening degree is determined through information from each sensor, and controlled.

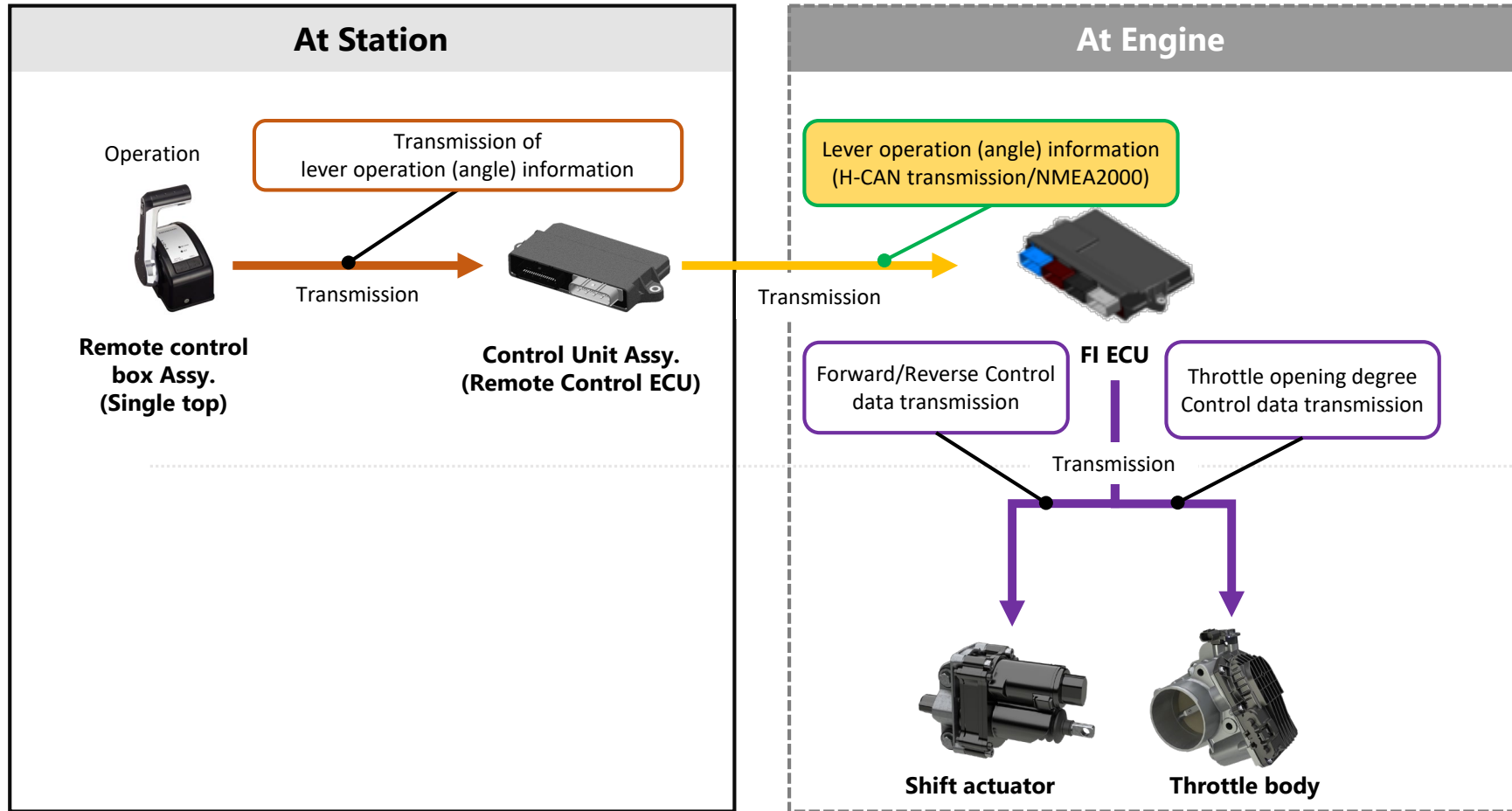
*2 A motor on the throttle body is driven by a control signal from the ECU to control the opening and closing of the throttle valve.

Controls possible by electric throttle

	Mode	Control content
Single or Multiple	Normal mode	The degree of throttle opening is electrically controlled depending on the throttle angle of the remote control lever.
	Idle mode	Stabilizes engine revolutions while idling
	Synchro mode	Synchronizes engine revolutions when using multiple outboard motors

Electric shifting system

With this electric type shifting system, an engine speed of 1,500 rpm or less is preset* to allow forward/reverse shifting in order to reduce wear and damage to the clutch.

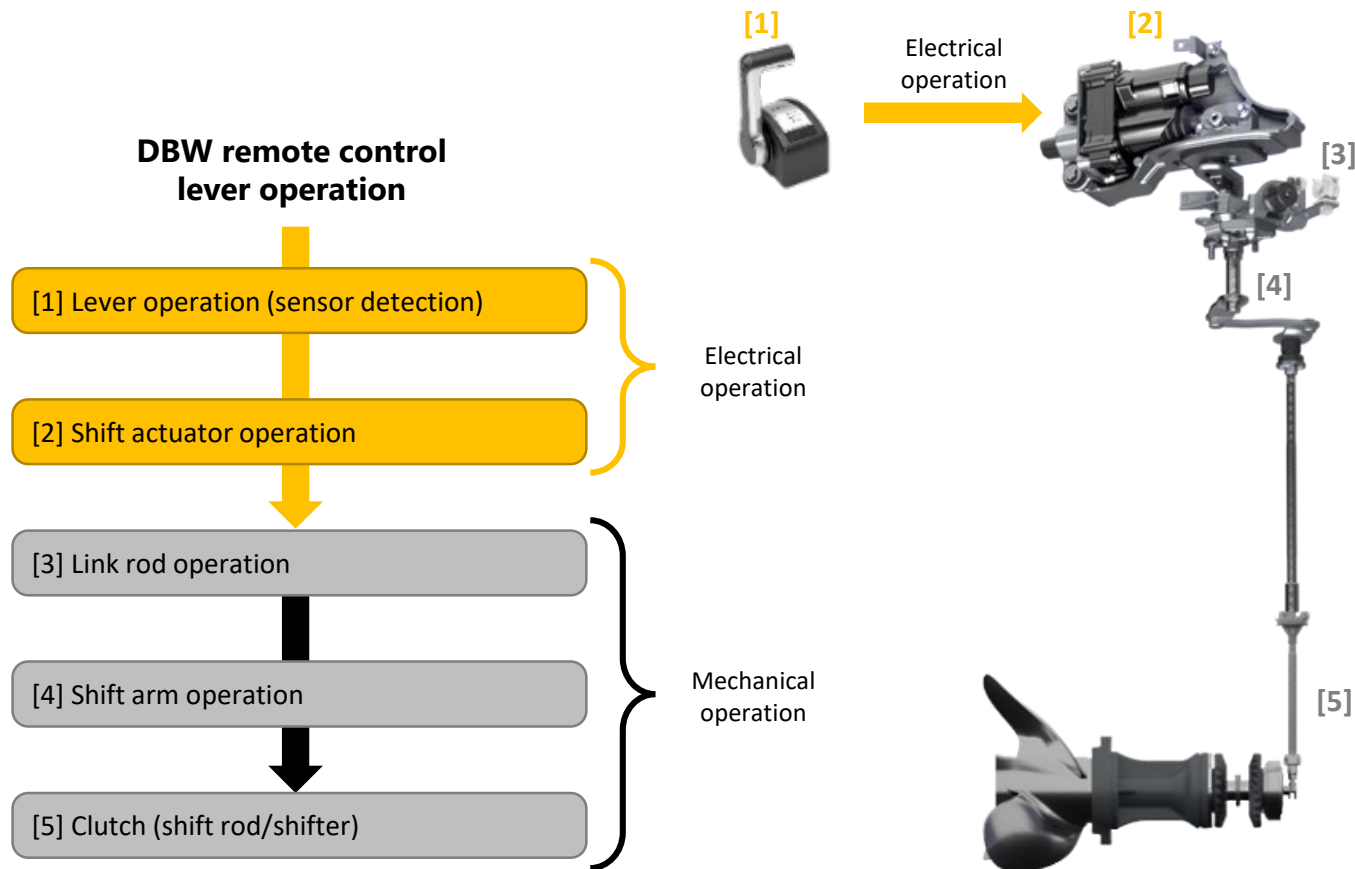


*Gears do not engage even if the lever position is changed while the engine is running at 1,500 rpm or higher.

- Specifications/Dimensional Drawing
- Description of Major Changes
- DBW System
- Rigging
- Display Kit
- Changed Parts Table

Electric shifting system

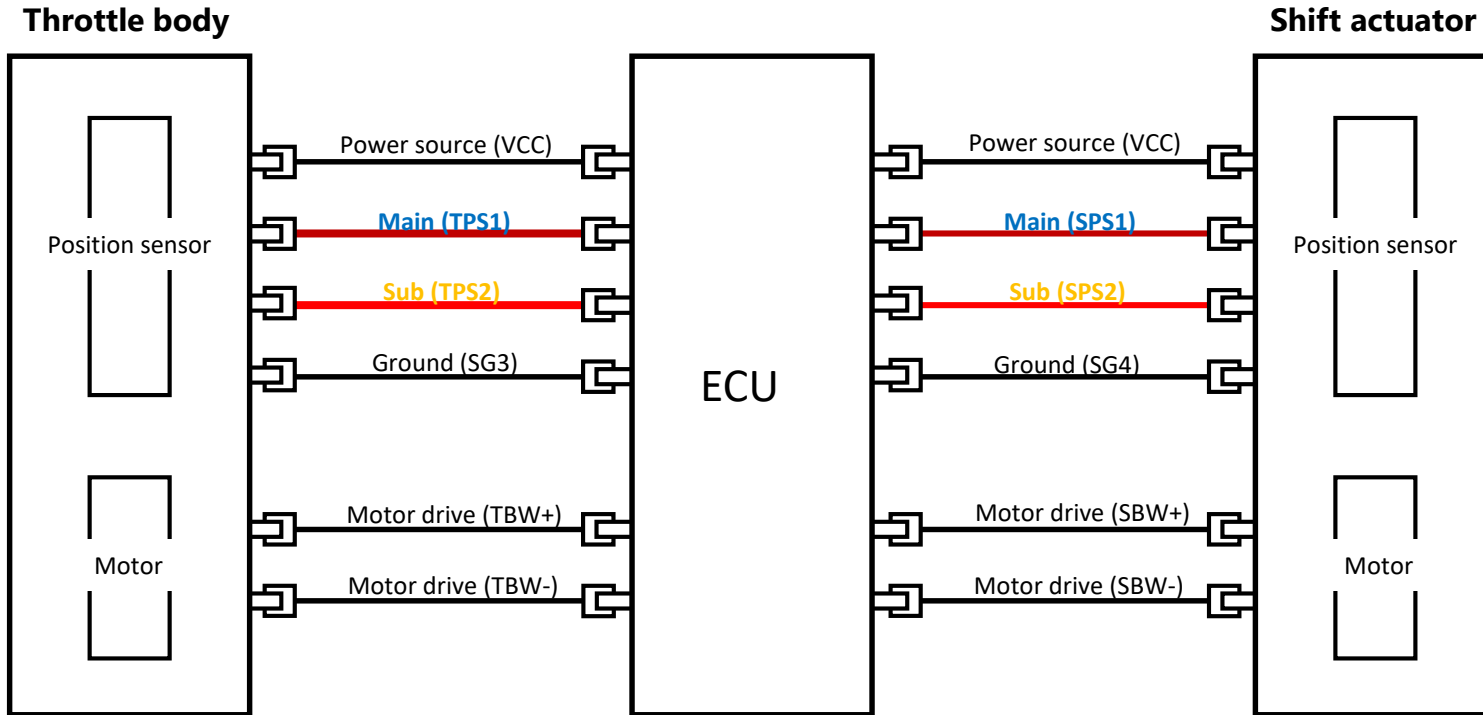
With the electric shifting system, the operation of the link rod is electrically controlled by an actuator (motor) in response to lever operation. All operations from the shift arm to the clutch are the same as conventional systems.



Each **throttle body/shift actuator** is equipped with **two sensors**

Each throttle body/shift actuator has two sensor circuits (main and sub).

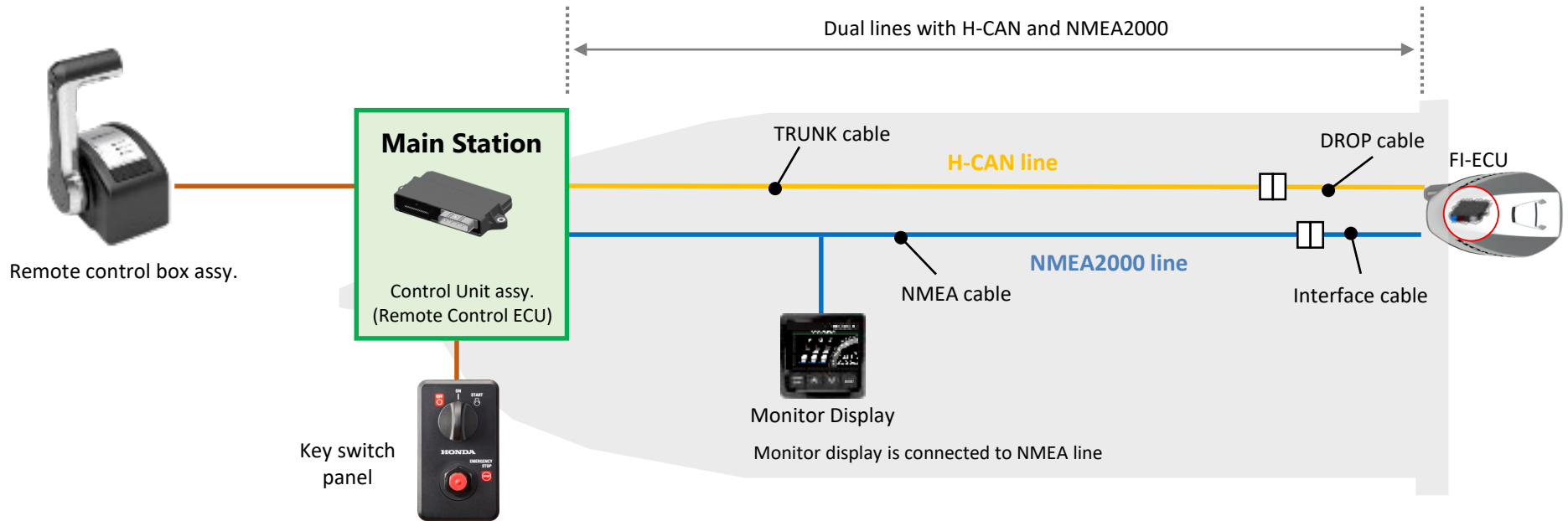
Even if the main or sub sensor malfunctions, the motor keeps running based on the unaffected sensor, enabling uninterrupted cruising even during a malfunction.*



*Throttle enters fail-safe mode when an error is detected at either sensor. A warning appears on the Multi Display along with a buzzer sound at this point.

Safety network system (2 lines of communication)

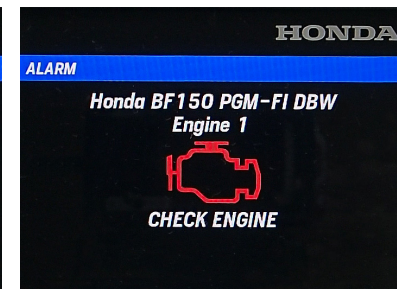
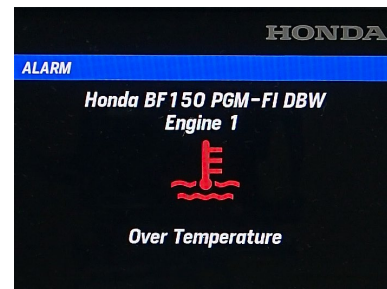
Robust system incorporates two lines: H-CAN (Honda CAN) and NMEA2000. Normally, system control is performed through the H-CAN line. Even if there is a problem* with the H-CAN line, system control can be done via the NMEA2000 line, so the vessel can continue to cruise.



*When there is a problem with the H-CAN line, the remote control ECU and the FI-ECU cannot monitor each other, so fail-safe is engaged and engine speed is limited to 3,500 rpm. Also a pop-up appears on the monitor display along with a buzzer sound.

When there is a problem with the NMEA2000 line, fail-safe is not engaged but a pop-up appears on the monitor display along with a buzzer sound.

Monitor display examples

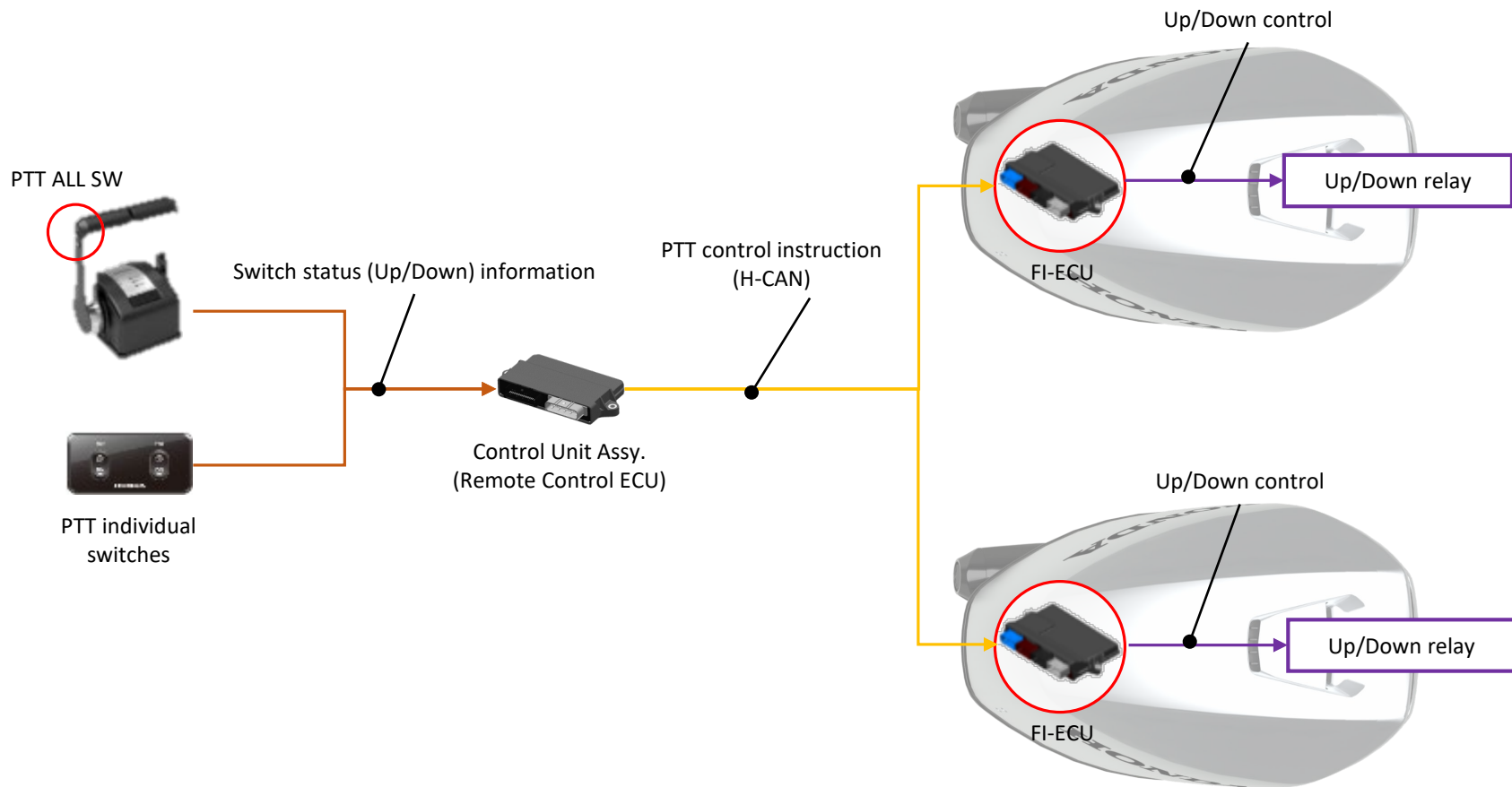


PTT (Power Trim & Tilt) unified control system

When running on multiple engines, pressing the PPT ALL SW on the remote control lever enables unified PTT control of all engines. PTT control equivalent to current models is still possible with the ignition switch in the OFF position (IG/SW-OFF).

Flow of control

When the switch is pressed/released, the control unit Assy. (remote control ECU) receives the up/down information and sends control signals to the FI-ECU. While ignition is switched off (IG/SW-OFF), the circuit launches the ECU in conjunction with the PTT ALL SW. If PTT control is not performed for a certain duration, the power of each ECU is switched off.



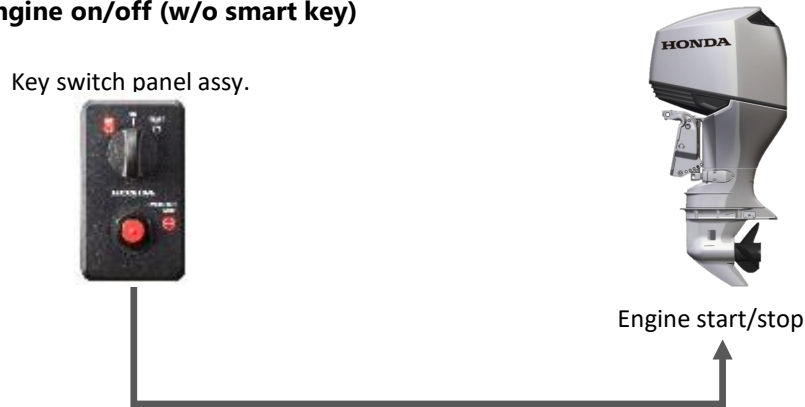
- Specifications/Dimensional Drawing
- Description of Major Changes
- DBW System
- Rigging
- Display Kit
- Changed Parts Table

One-push Start/Stop unified system

A push button type Start/Stop switch has been adopted.

It is possible to start and stop up to 4 engines in unison by pressing the ALL Start/Stop button in a multi-engine mounted rig.

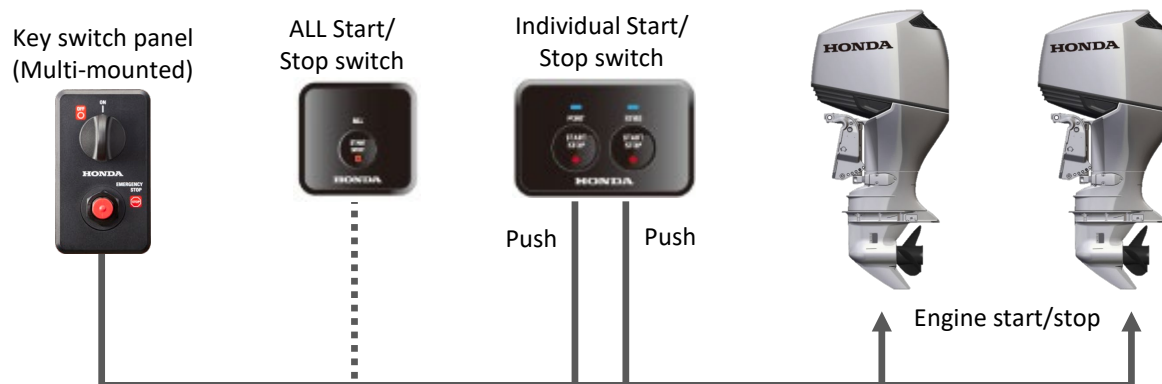
Single-mounted: Engine on/off (w/o smart key)



Switch name	Standard		Smart key	
	Single-mounted	Multiple-mounted	Single-mounted	Multiple-mounted
Individual Start/Stop switch	-	✓	-	✓
ALL Start/Stop switch	-	✓	-	✓
Single Start/Stop switch	-	-	✓	-

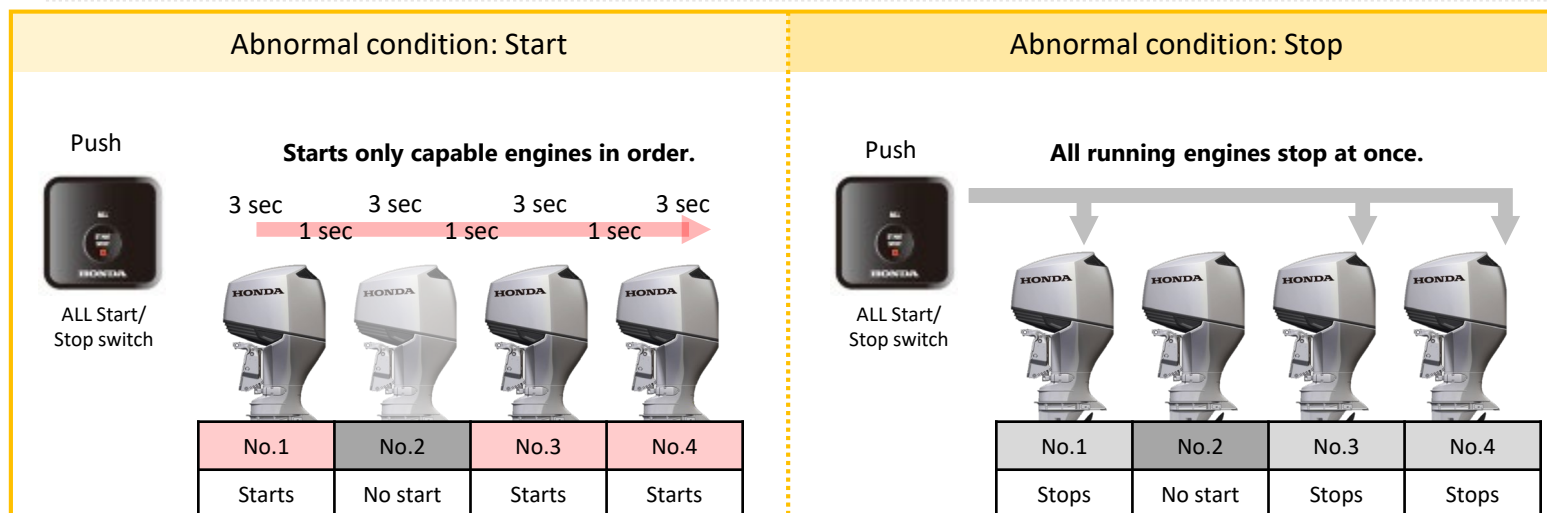
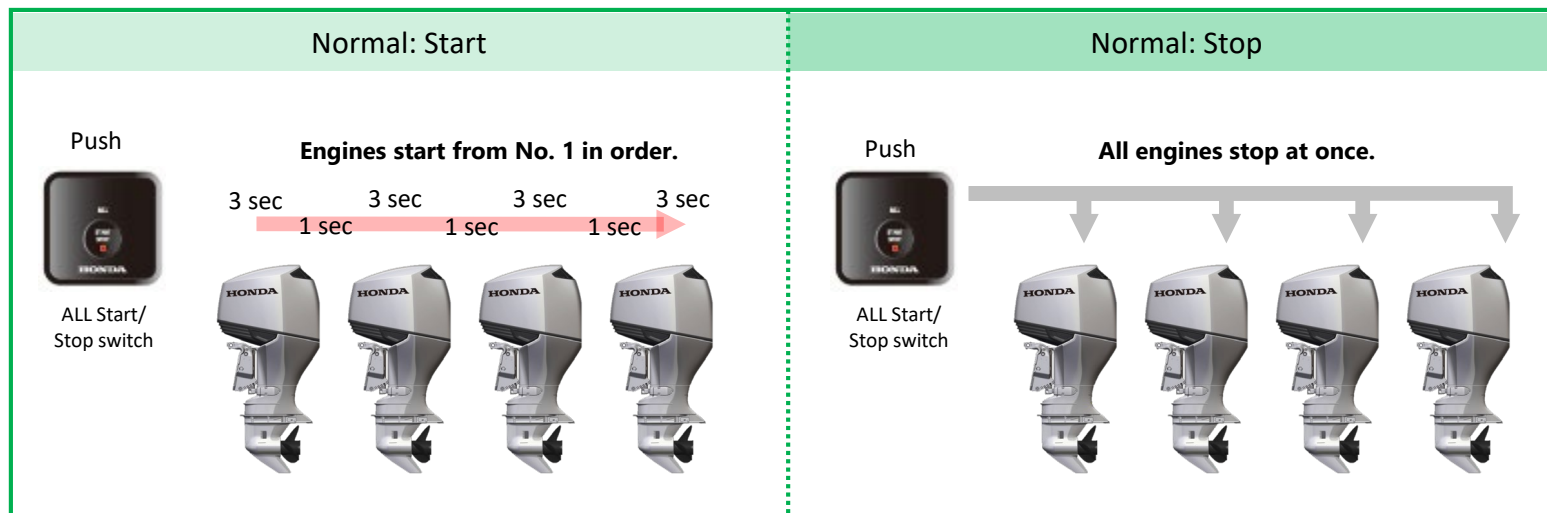
Start/stop is performed at the key switch panel Assy. in the case of a single engine installed in a standard configuration.

Multi-mounted: Engine on/off in unison (w/o smart key)



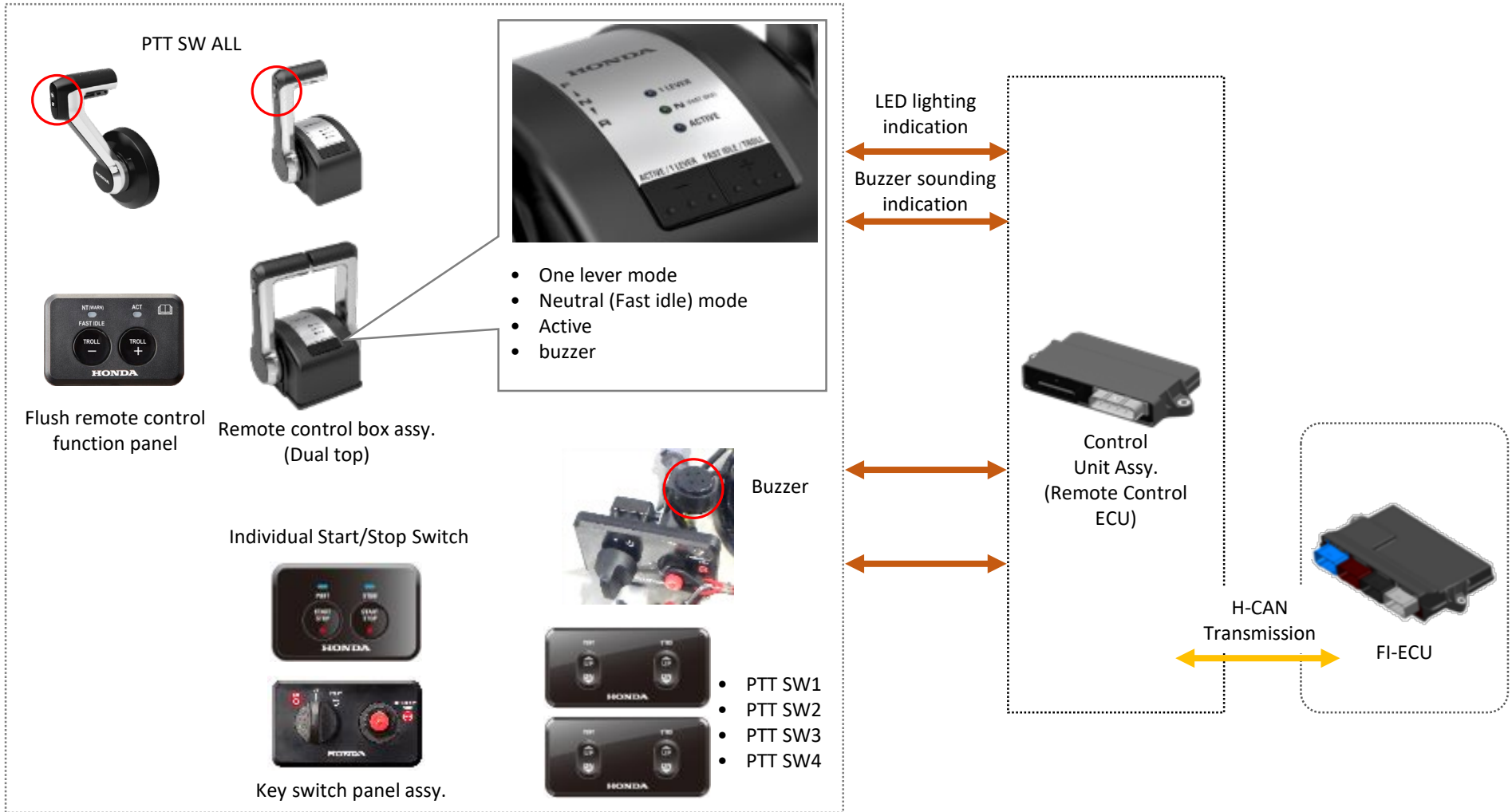
One-push Start/Stop unified system

Use the ALL Start/Stop switch to start/stop the engine as described below.
To avoid excessive battery load, cranking is done within 3 seconds, with 1-second intervals between successive engines.




System overview of control devices for DBW control

Based on the state of each switch and the sensor voltage of the remote control lever, information such as the shift position and lever degree is transmitted to the PGM-FI ECU via H-CAN by the remote control ECU.



Functions list

Various modes can be engaged by switching the DBW control box Assy.

Function		Purpose	Control
	Trolling control mode	Stable running in low speed range	Adjust settings within the range of 650 rpm to 1,000 rpm Each press changes the number of revolutions in increments of ± 50 rpm. Disengages when raised to 3,000 rpm or higher.
	Fast idle mode	Maintenance	Can raise engine speed without shifting gears.
	One-lever mode	Synchronize the speed of multiple-mounted engines	Can control two or more outboard motors using one remote control.
	Synchro mode	Synchronize engine speed in one-lever mode to reduce the whirring noise caused by the difference in speed of multiple engines	Controllable within range of 2,000 rpm to 5,000 rpm. (All outboard motors on the same network controllable)
	Station select	Enable selection of control station in a two-station setup	Switches from one system to another when both a Main Station and a 2nd Station are present.

Specifications/ Dimensional Drawing

Description of Major Changes

DBW System

Rigging

Display Kit

Changed Parts Table

Mode switching

Switching to various modes is possible by operating the button on the remote control box assy. or the function panel.

Specifications/
Dimensional
Drawing


Description of
Major Changes





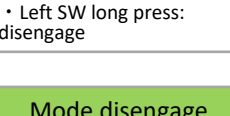


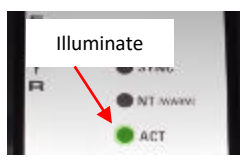









DBW System


Rigging


Display Kit

Changed
Parts Table



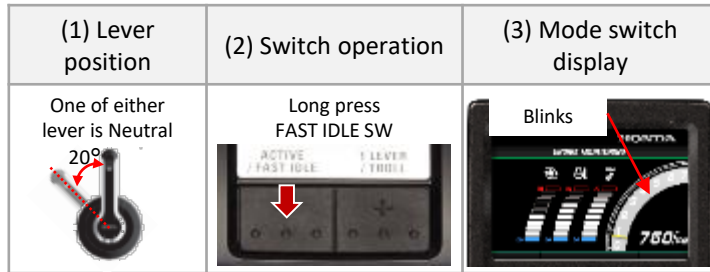
	Lever position	Switch operation	Mode switch display	Mode disengage
Trolling Control Mode	Shift-in for all levers 	Long press TROLL SW 		<ul style="list-style-type: none"> • Right SW: increase revs  <ul style="list-style-type: none"> • Left SW long press: disengage 
One-lever Mode	All levers in Neutral 	Long press 1LEVER SW 		<ul style="list-style-type: none"> Long press 1LEVER SW 
Fast Idle Mode	One of either lever is Neutral 	Long press FAST IDLE SW 		<ul style="list-style-type: none"> Lever Neutral Long press FAST IDLE SW 
Station select	All levers in Neutral 	Long press ACTIVE SW 		<ul style="list-style-type: none"> Long press ACTIVE SW 





Fast idle mode

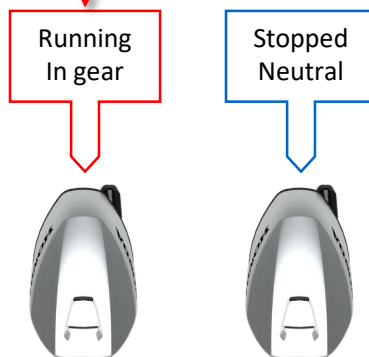
Engine speed can be increased or decreased while in Neutral, such as during maintenance.



Conditions for mode switching

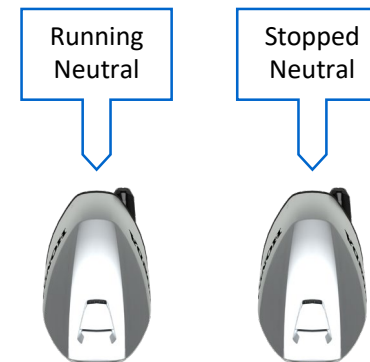
Mode switching is disallowed if even one engine is in gear and running.

Gear position	Engine status	
	Running	Stopped
In gear	—	✓
Neutral	✓	✓



Conditions for mode disengagement



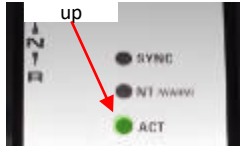
Gear must be in Neutral regardless of whether engine is stopped or running.



- Specifications/
Dimensional
Drawing
- Description of
Major Changes
- DBW System
- Rigging
- Display Kit
- Changed
Parts Table

One-lever Mode

Mode that allows 2 or more outboard motors to be controlled using one remote control lever. Up to 4 engines can be controlled. When this mode is engaged, the speed of all engines are synchronized with that of engine No.0.

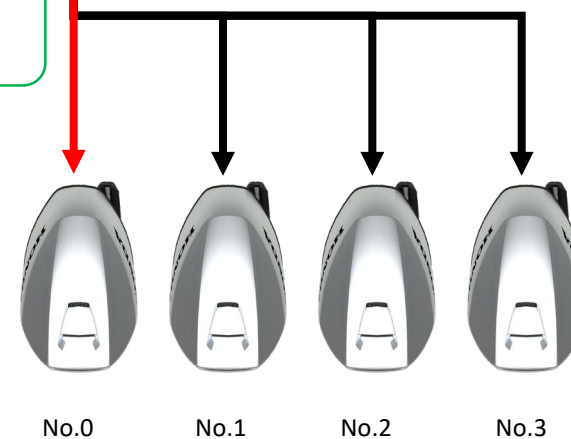
(1) Lever position	(2) Switch operation	(3) Panel display
All levers in Neutral 	Long press 1LEVER SW 	Light up 

Left lever operation



Control Unit Assy.
(Remote Control ECU)

All respond to indications from the remote control lever for engine No.0



Tuning control of engine speed

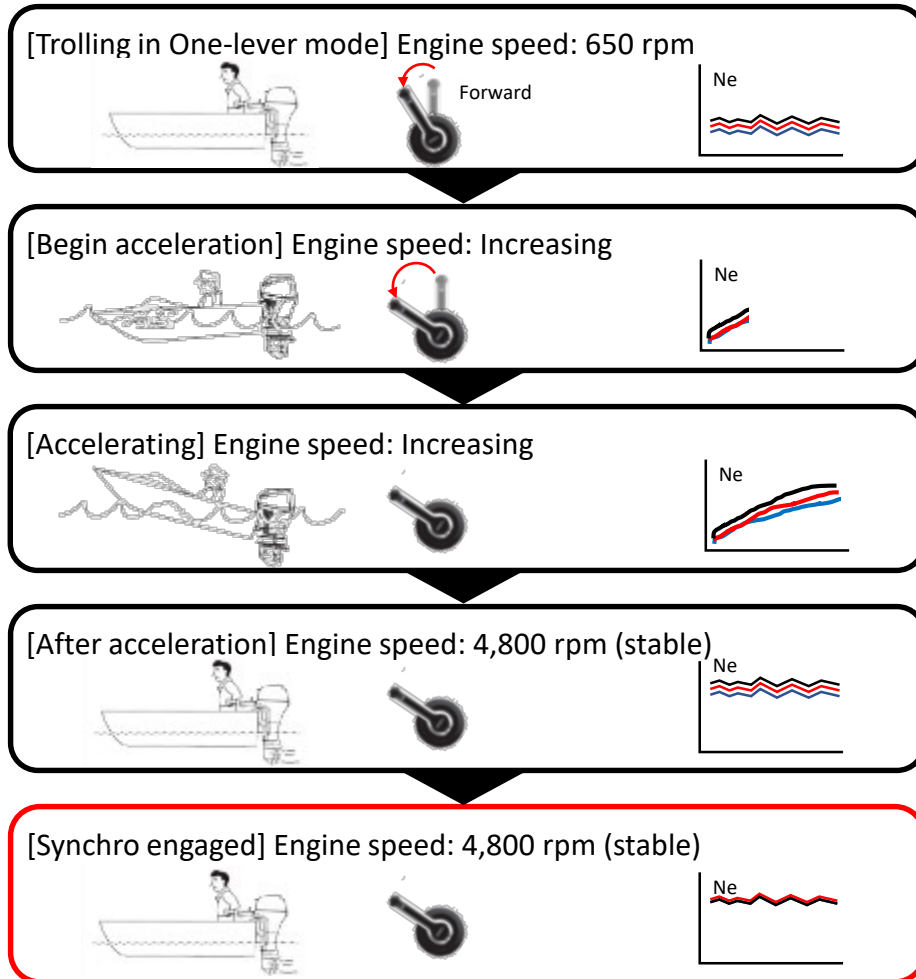
Set No.0, No.1, No.2, No.3 according to Dr. H device settings.

- Specifications/ Dimensional Drawing
- Description of Major Changes
- DBW System
- Rigging
- Display Kit
- Changed Parts Table

Synchro mode

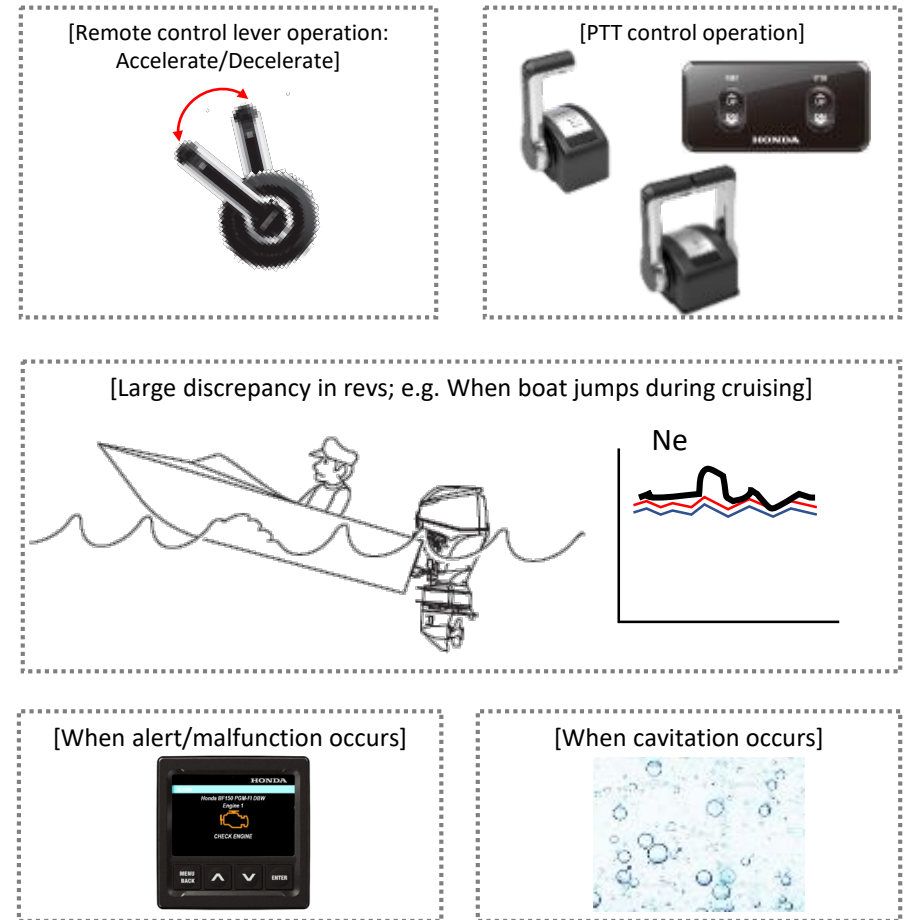
Synchro mode is engaged only when all necessary conditions are met during One-lever mode operation. Synchro mode synchronizes the revs for all connected outboard motors to reduce the whirring noise caused by the difference in speed of multiple engines for quieter running.

Flow until Synchro mode is engaged (image)



Disengage Synchro (image)

Synchro mode disengages if even one engine's status becomes as follows.



Conditions for Synchro mode engagement/disengagement

Conditions	Synchro mode engages	Synchro mode disengages (Exits from Synchro mode)
Remote control lever operation	While lever position is fixed (Not being operated)	While lever is being operated
Engine speed (Stability)	Engine speed \pm 300 rpm range for 3 sec. (All outboard motors on same network applicable) [Example case] • Vessel is stable, waves are tame	Engine speed \pm 300 rpm range (only for port outboard motor) [Example case] • Rough waves, sudden turning
Engine speed (Synchro possible range)	Within 2,000 rpm to 5,000 rpm range (All outboard motors on same network applicable)	Under 1,800 rpm or over 5,200 rpm (All outboard motors on same network applicable)
Engine speed (Deviation)	$ \text{Port engine speed} - \text{engine speed} < 350$ rpm (All outboard motors on same network applicable) [Example case] • Same model, same propeller	$ \text{Port engine speed} - \text{engine speed} \geq 350$ rpm (All outboard motors on same network applicable) [Example case] • Sudden turning, rough waves
Throttle valve status	Throttle open $\geq 10^\circ$ (All engines on same network applicable)	Throttle open $< 8^\circ$ (All outboard motors on same network applicable)
Others	<ul style="list-style-type: none"> • No alerts/malfunctions • Gearshift in F position • After warming up engine (TW $\geq 52^\circ\text{C}$) • Synchro mode can start on all outboard motors 	<ul style="list-style-type: none"> • During PTT operation • During alert (overheat, oil pressure) or malfunction • Gearshift in N or R position • While engine is cold (TW $< 52^\circ\text{C}$) • If even one outboard motor disengages Synchro mode

BF115J / BF135D / BF140A / BF150D



4. Rigging

Rigging

- Rigging Overview
- Rigging Components (DBW)
- Rigging Components (Mechanical)
- Battery's Power and Ground Connections
- Terminating Resistor in System Circuit
- Starter Kit

DBW control type and mechanical control type selectable according to the user's needs

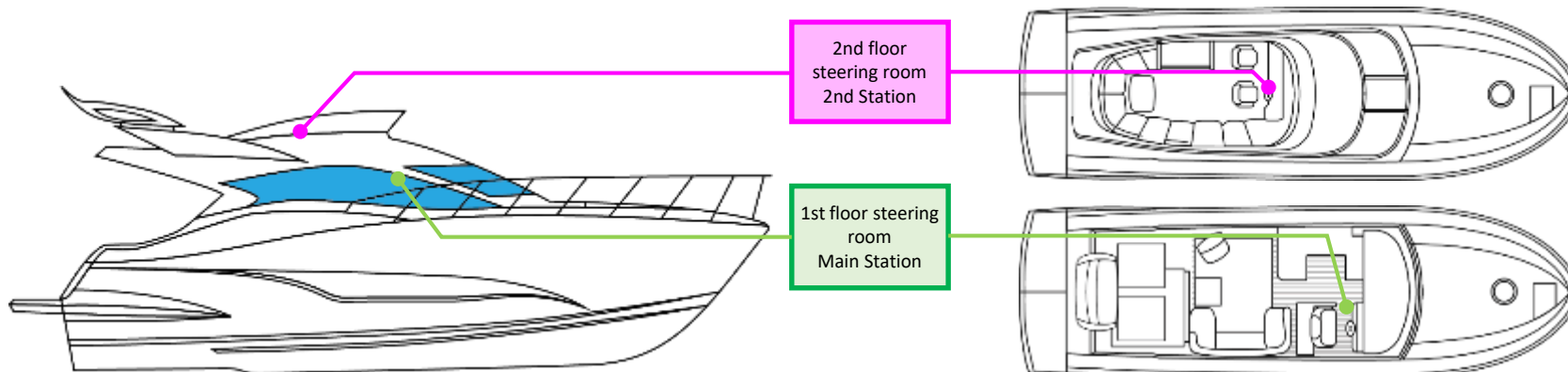
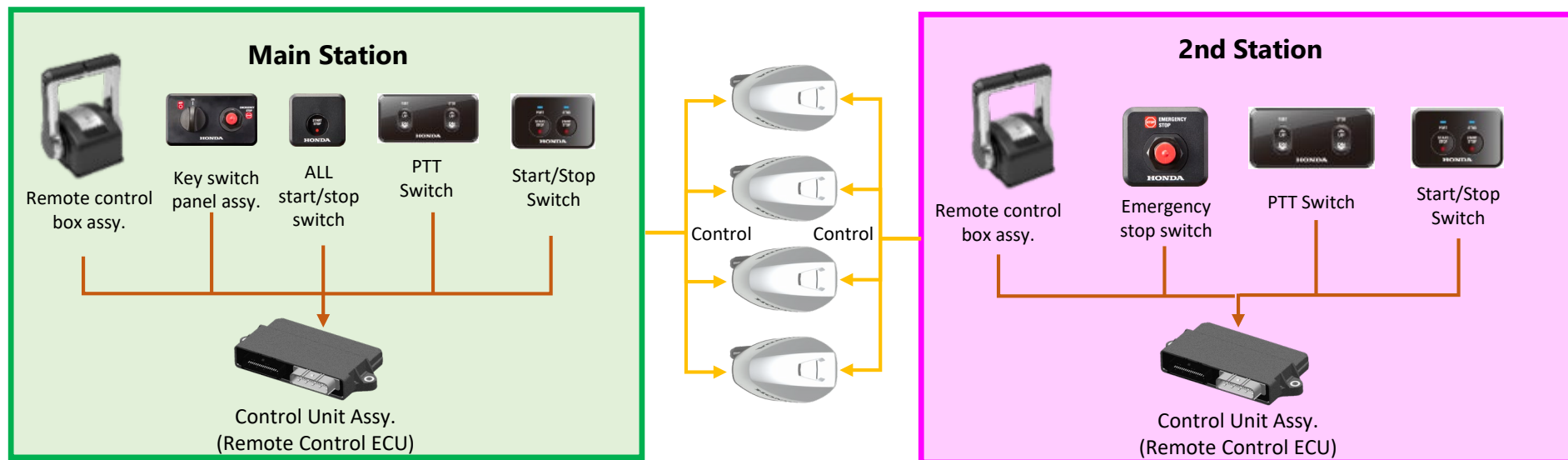
The customer can choose DBW control type or mechanical control (conventional) type. Different types are comprised of different devices.

	DBW type (150/140/135/115)			Mechanical type (150/140/135/115)	
Specifications/ Dimensional Drawing	<p>PGM-FI ECU</p> <p>FI-ECU</p>			<p>FI-ECU</p>	
Description of Major Changes	Control Unit Assy. (Remote Control ECU) 			Remote control box Assy. 	
DBW System	Remote control/ Switches, etc.) 			Remote control box Assy. Switch 	
Rigging	Multi Display 			Multi Display 	
Display Kit	Smart Key Unit Kit 			Smart Key Unit Kit (Single kit shown) 	
Changed Parts Table					

Representative parts are listed.

Control Station

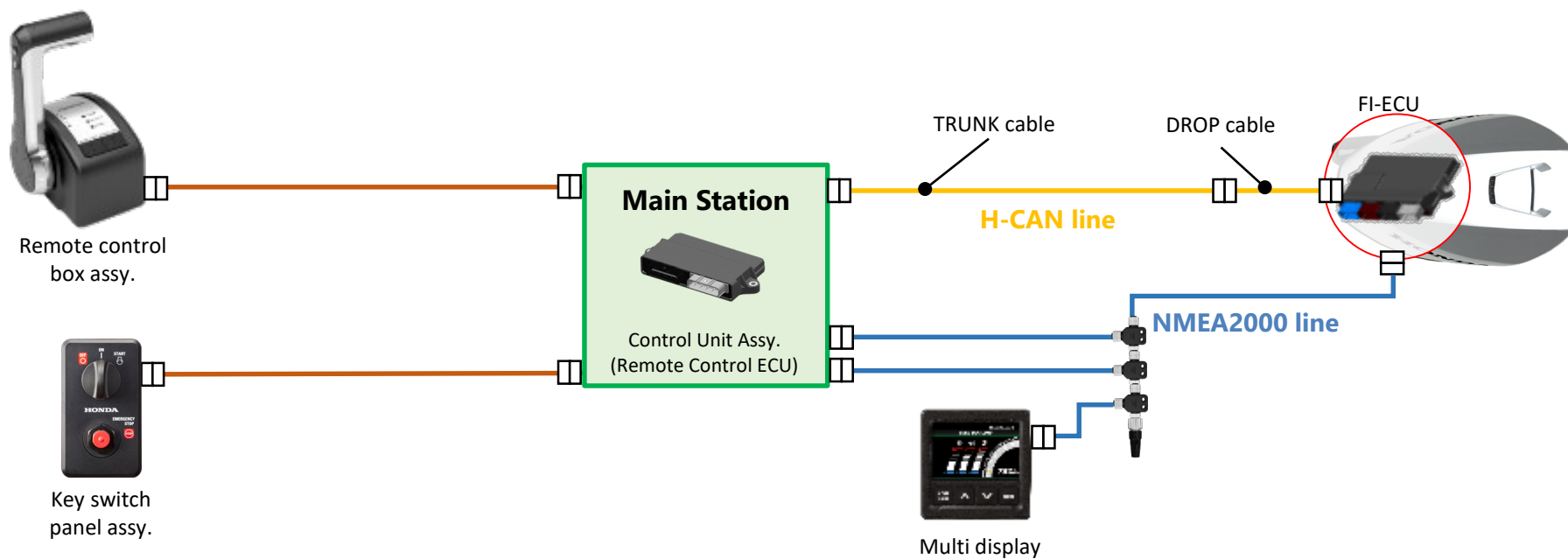
There are two control stations for DBW control, the Main Station and 2nd Station. One station can control up to four mounted engines. If more than four engines, it is necessary to add both a “Main” and “2nd” station. Normally only the Main Station is used, but if the vessel has a 2nd floor deck, it is possible to install a 2nd Station separate from the 1st floor steering room and configure the systems separately.



Rigging Components (DBW)

Setup: **One outboard motor, DBW control, Main Station only**

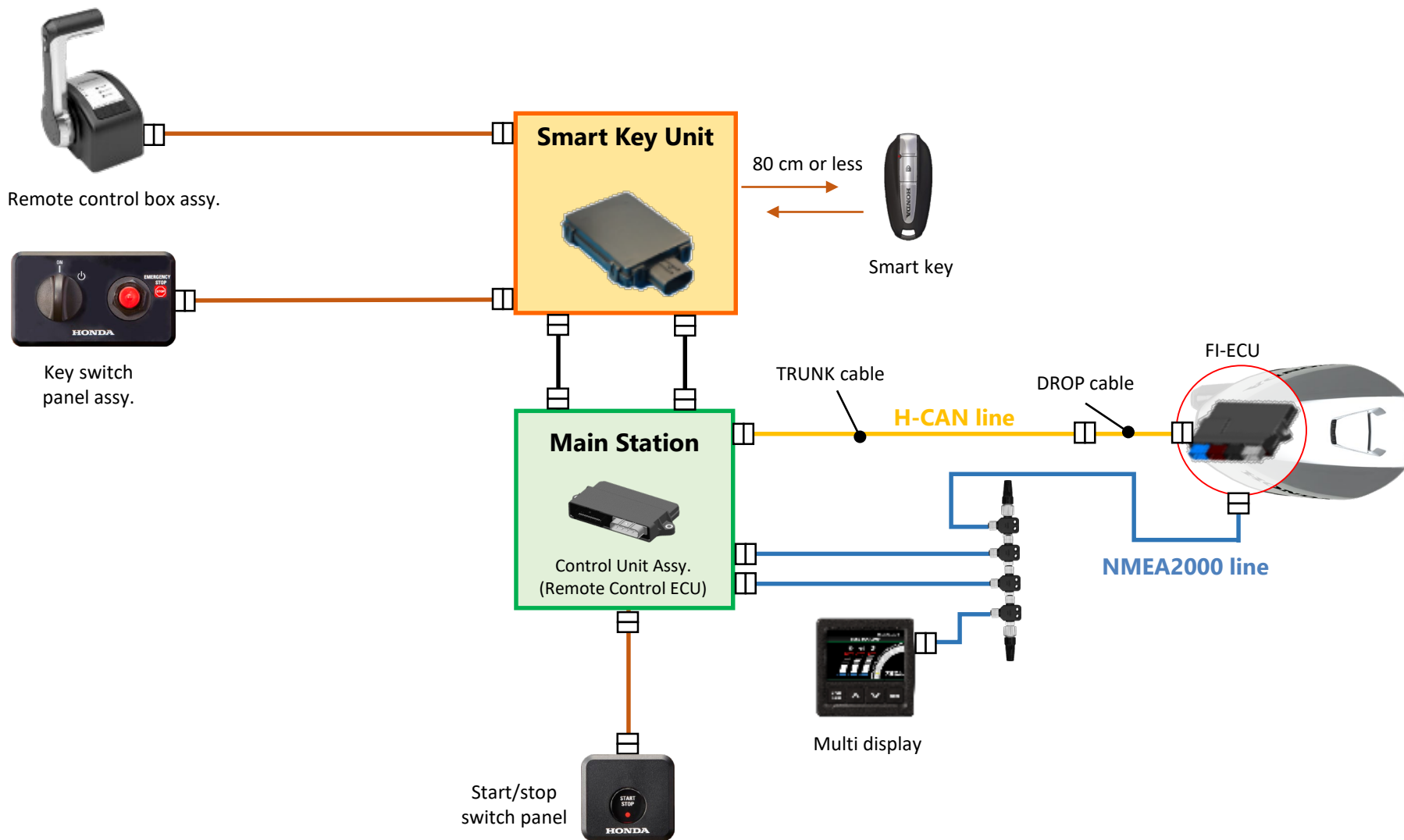
The following is a rigging example for a single engine in DBW control configuration using only a Main Station.



Rigging Components (DBW)

Setup: **One outboard motor, DBW control, Smart key, Main Station only**

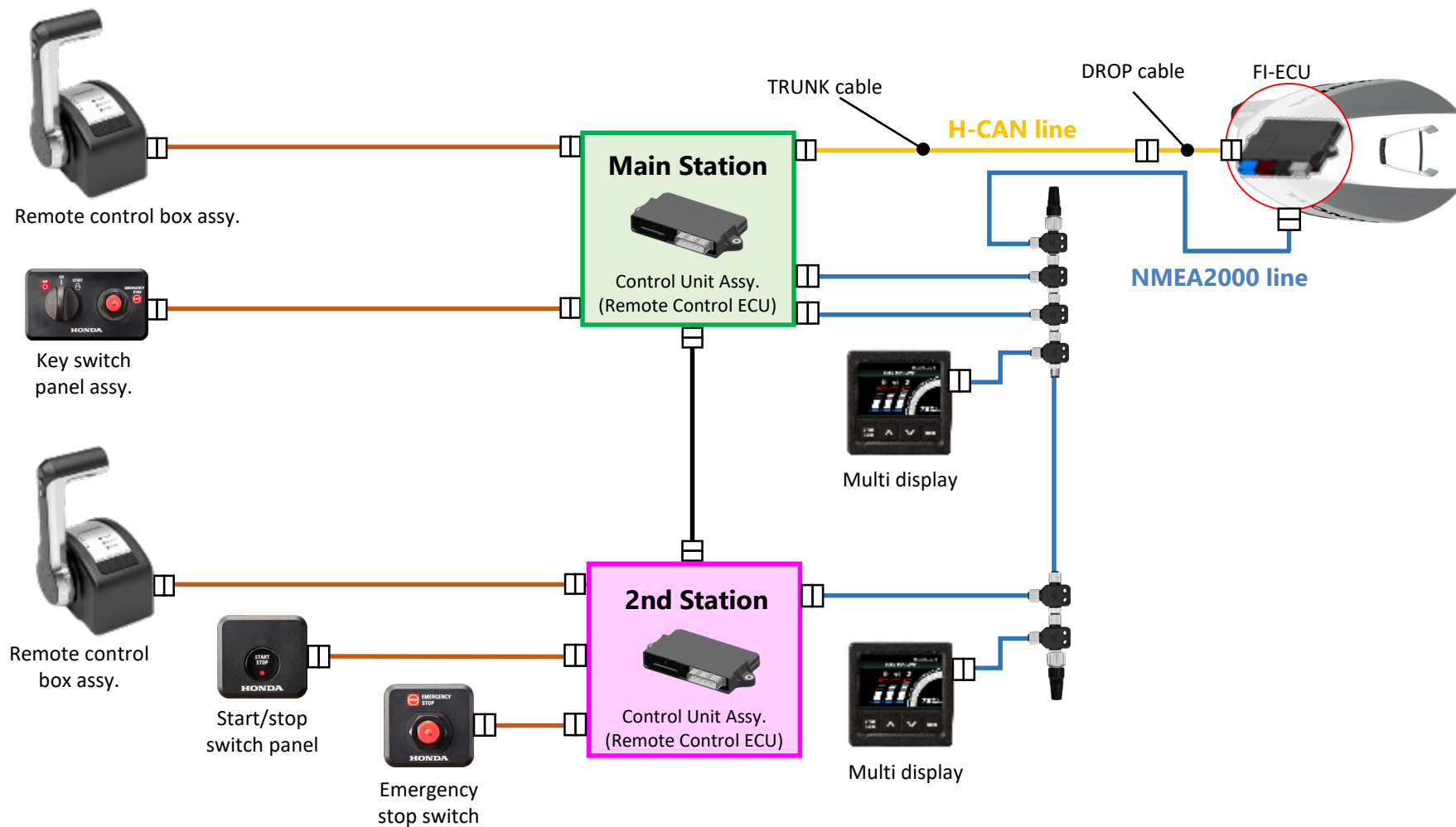
The following is a rigging example for a single engine in DBW control configuration with smart key, using only a Main Station.



Rigging Components (DBW)

Setup: **One outboard motor, DBW control, Main Station and 2nd Station**

The following is a rigging example for a single engine in DBW control configuration using a Main Station and 2nd Station.

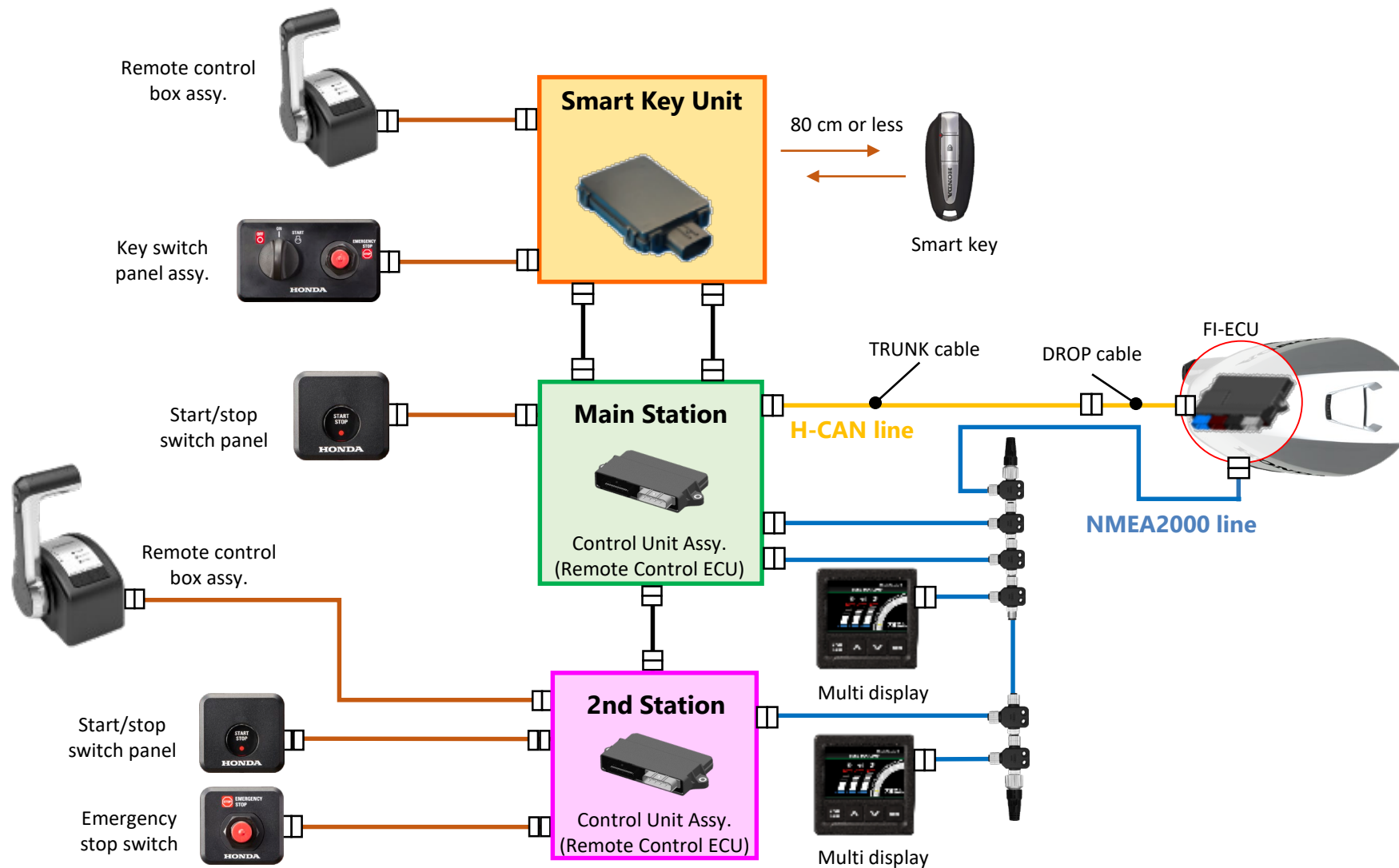


- Specifications/ Dimensional Drawing
- Description of Major Changes
- DBW System
- Rigging**
- Display Kit
- Changed Parts Table

Rigging Components (DBW)

Setup: **One outboard motor, DBW control, Smart key, Main Station and 2nd Station**

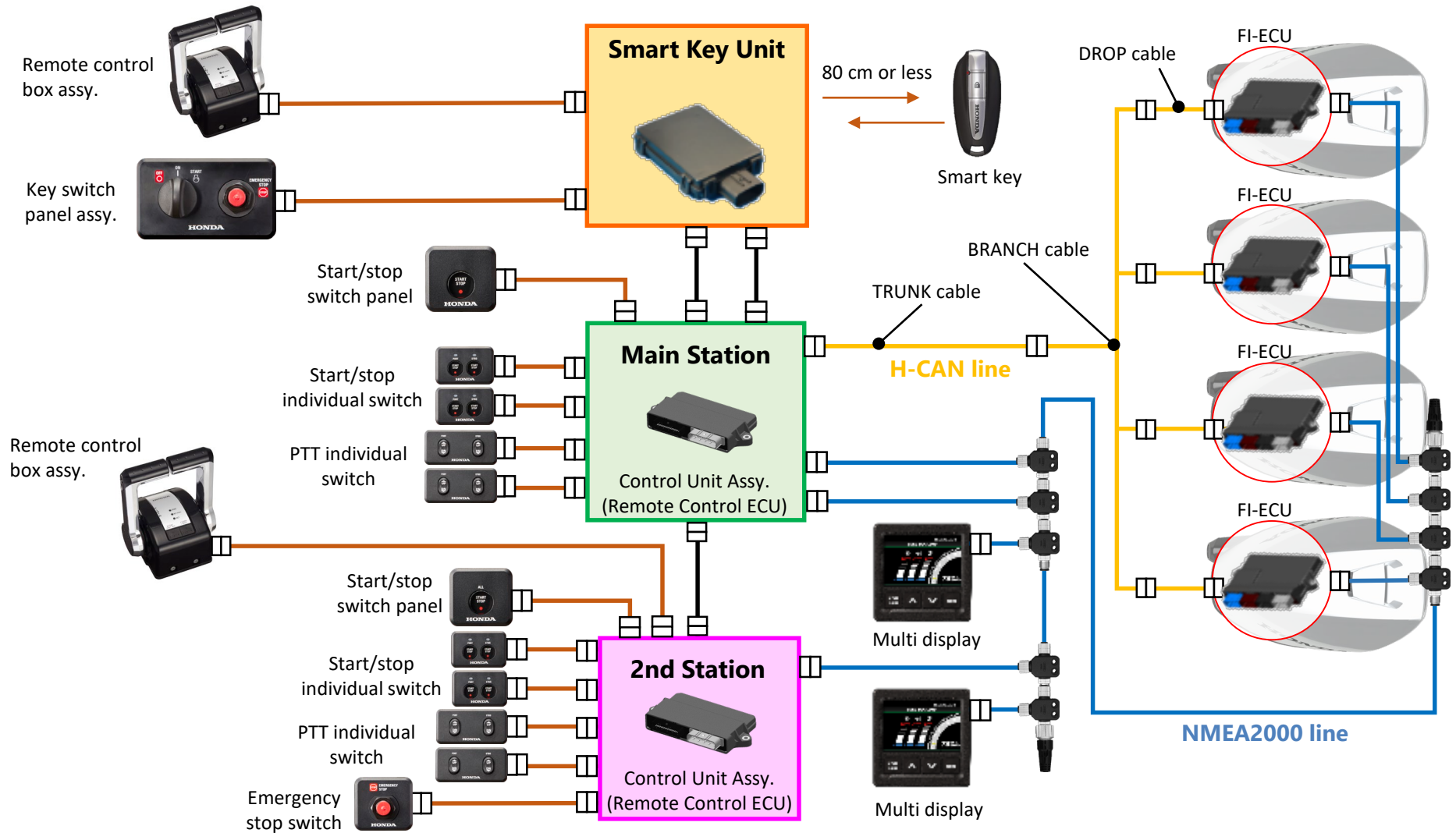
The following is a rigging example for a single engine in DBW control configuration with smart key, using a Main Station and 2nd Station.



Rigging Components (DBW)

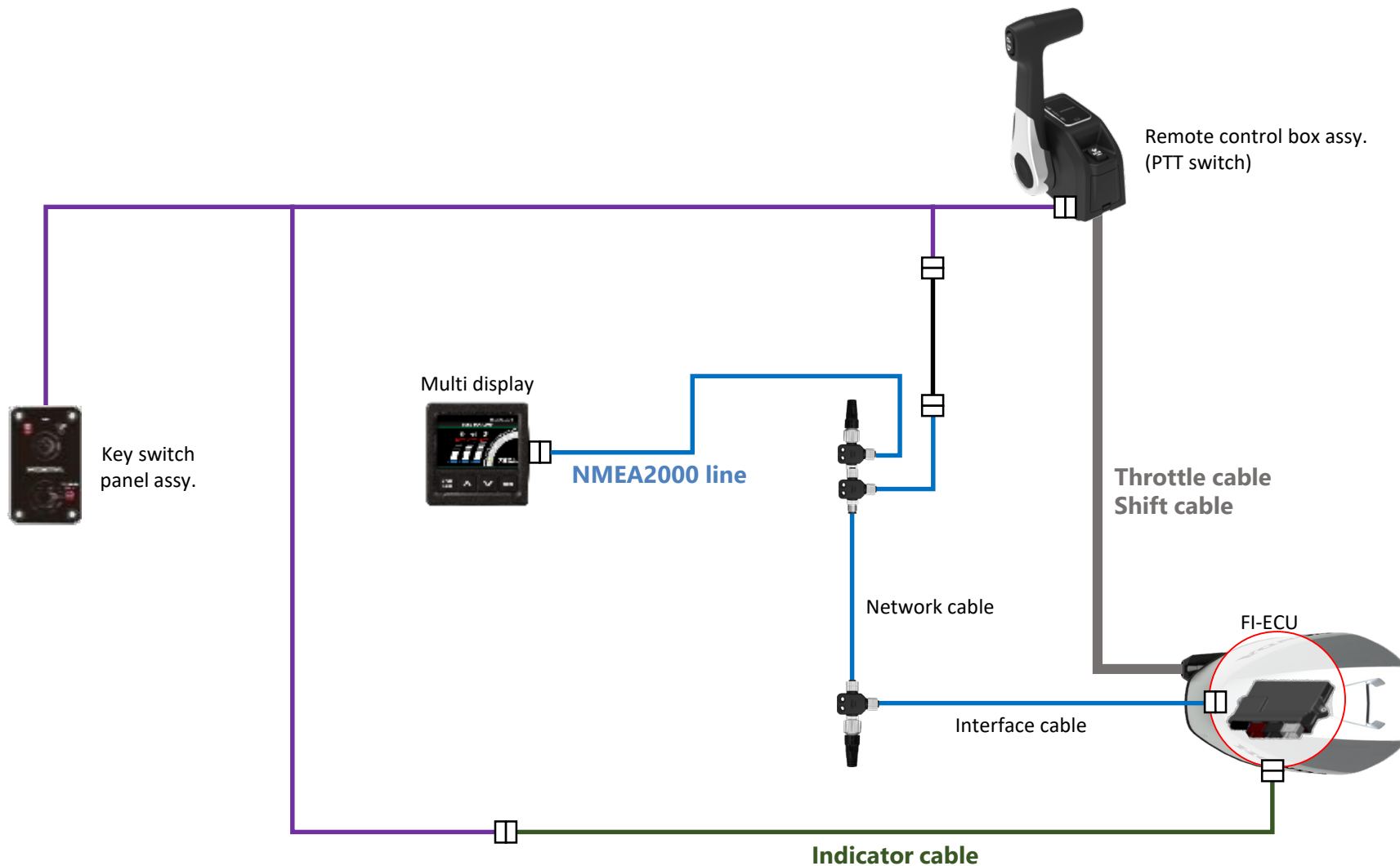
Setup: **Four outboard motors, DBW control, Smart key, Main Station and 2nd Station**

The following is a rigging example for four engines in DBW control configuration with smart key, using a Main Station and 2nd Station.



Setup: **One outboard motor, Mechanical control**

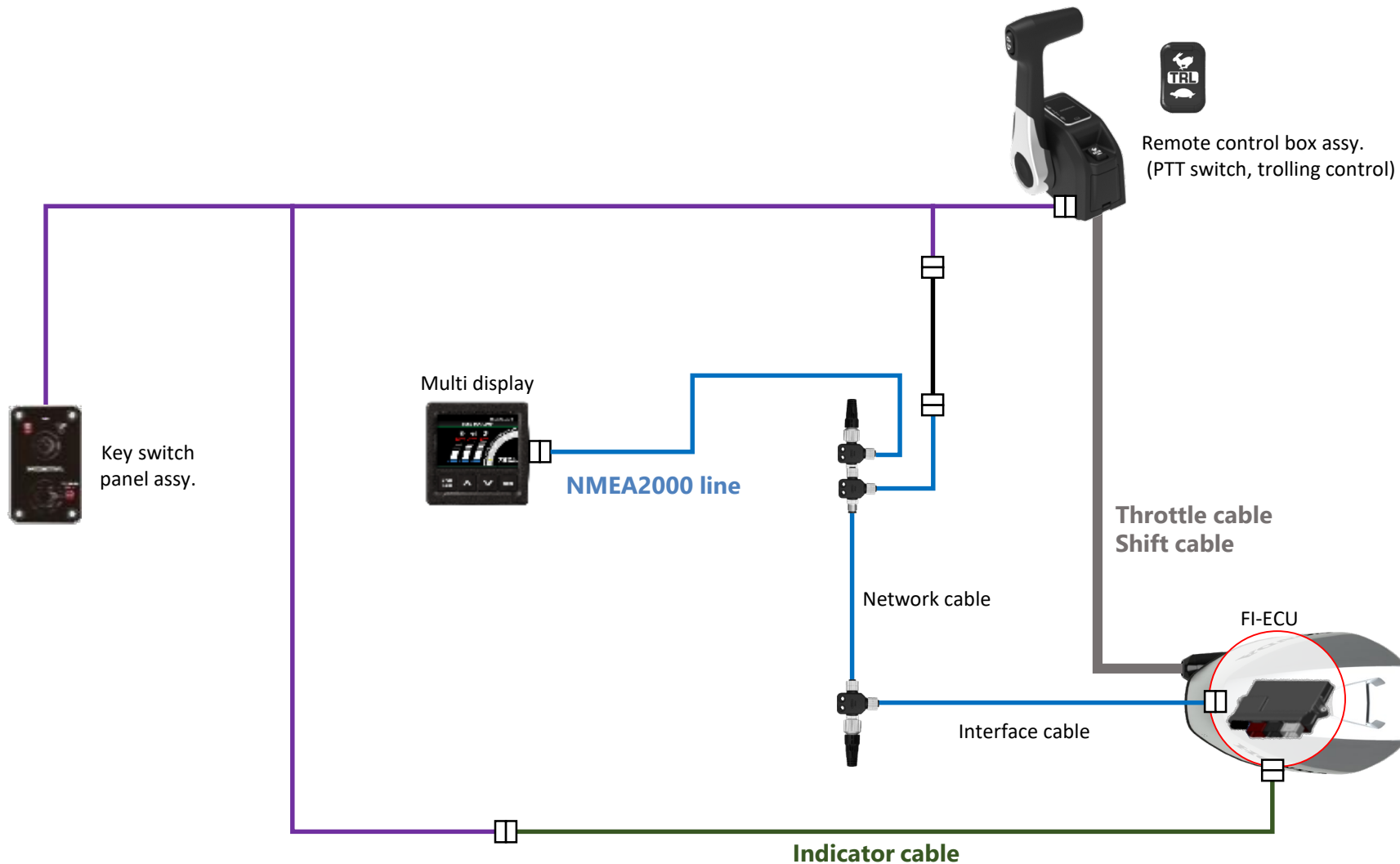
The following is a rigging example for a single engine in mechanical control configuration without trolling control.



Rigging Components (Mechanical)

Setup: **One outboard motor, Mechanical control, Trolling control**

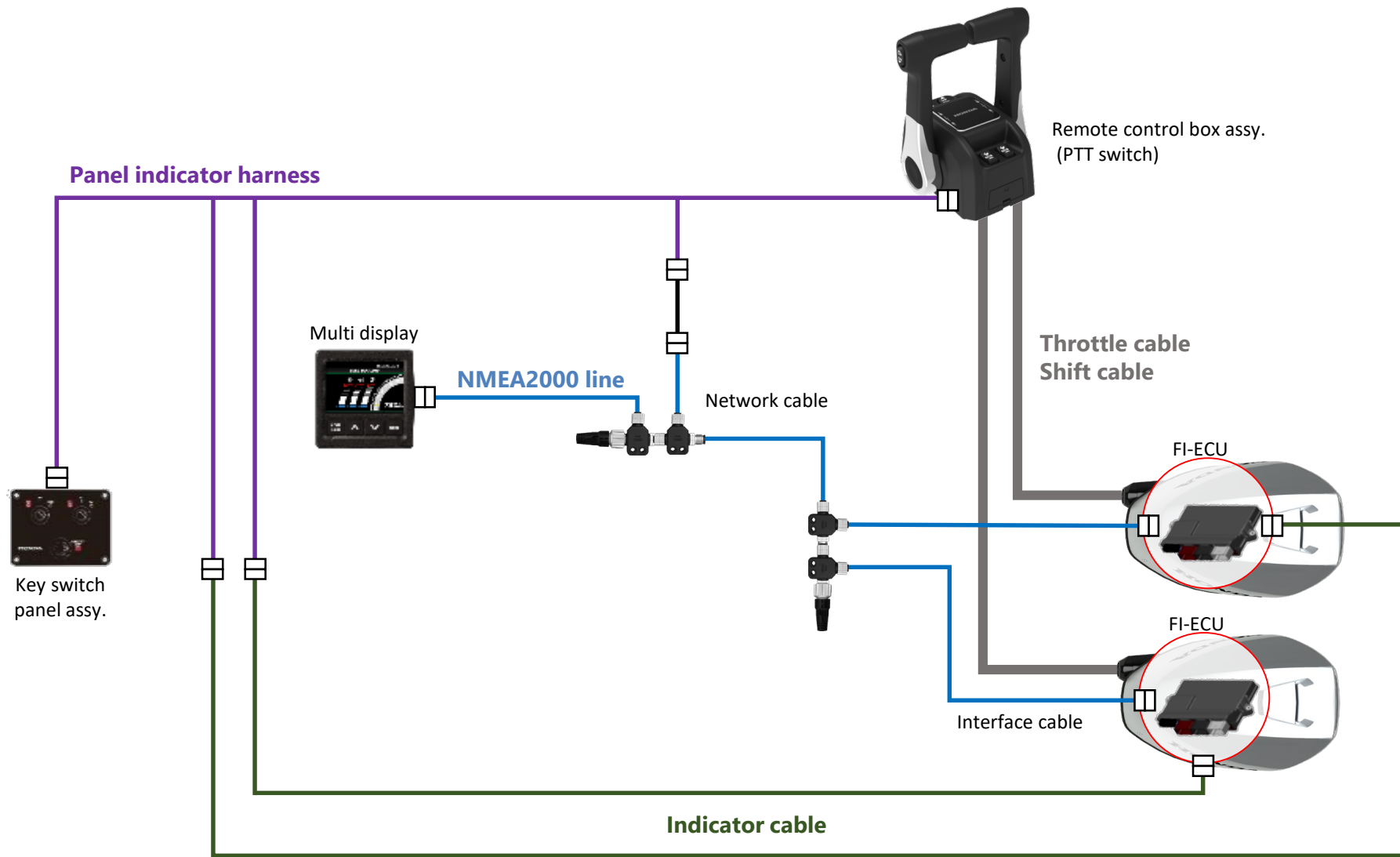
The following is a rigging example for a single engine in mechanical control configuration with trolling control.



Rigging Components (Mechanical)

Setup: **Two outboard motors, Mechanical control**

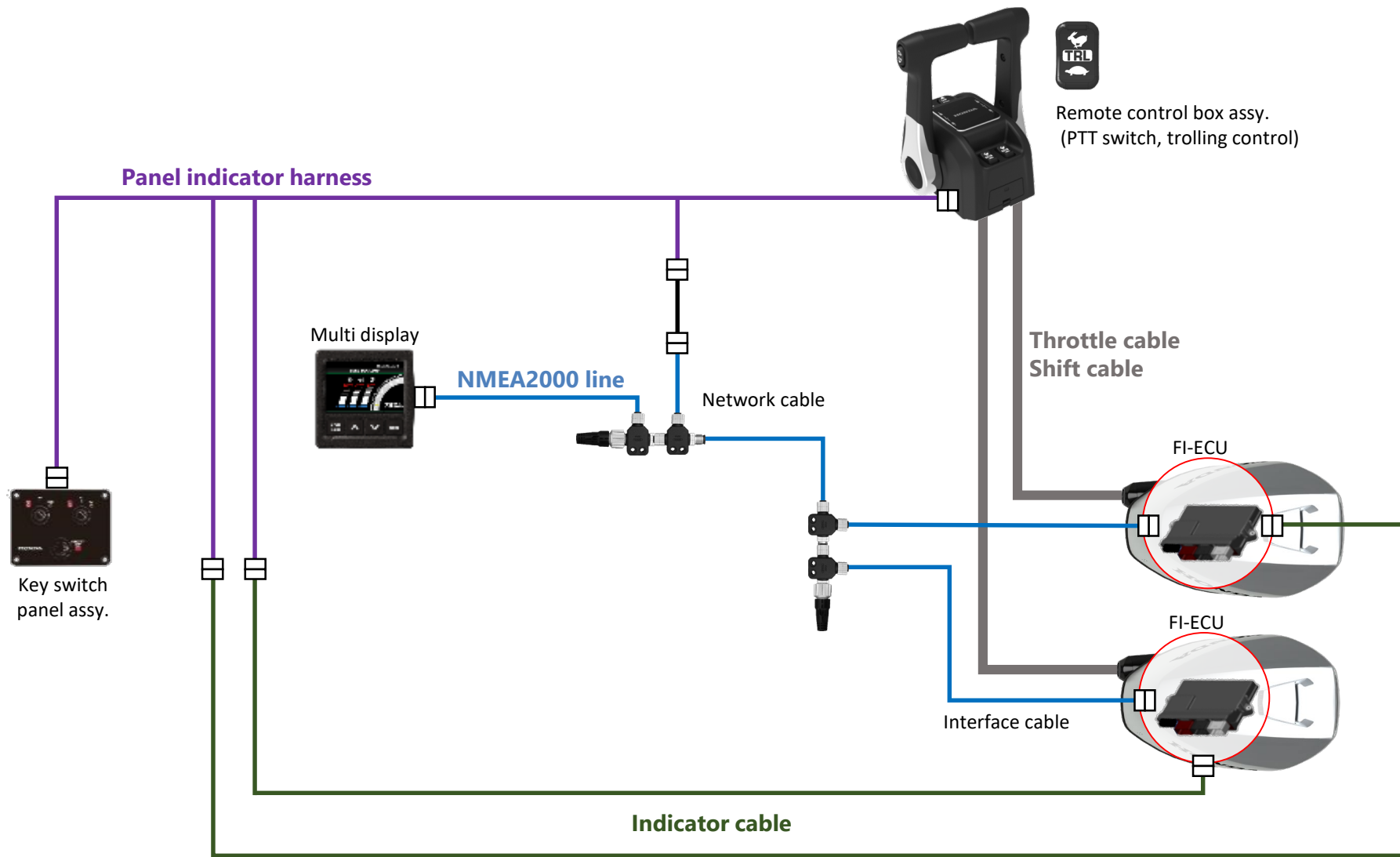
The following is a rigging example for two engines in mechanical control configuration without trolling control.



Rigging Components (Mechanical)

Setup: **Two outboard motors, Mechanical control, Trolling control**

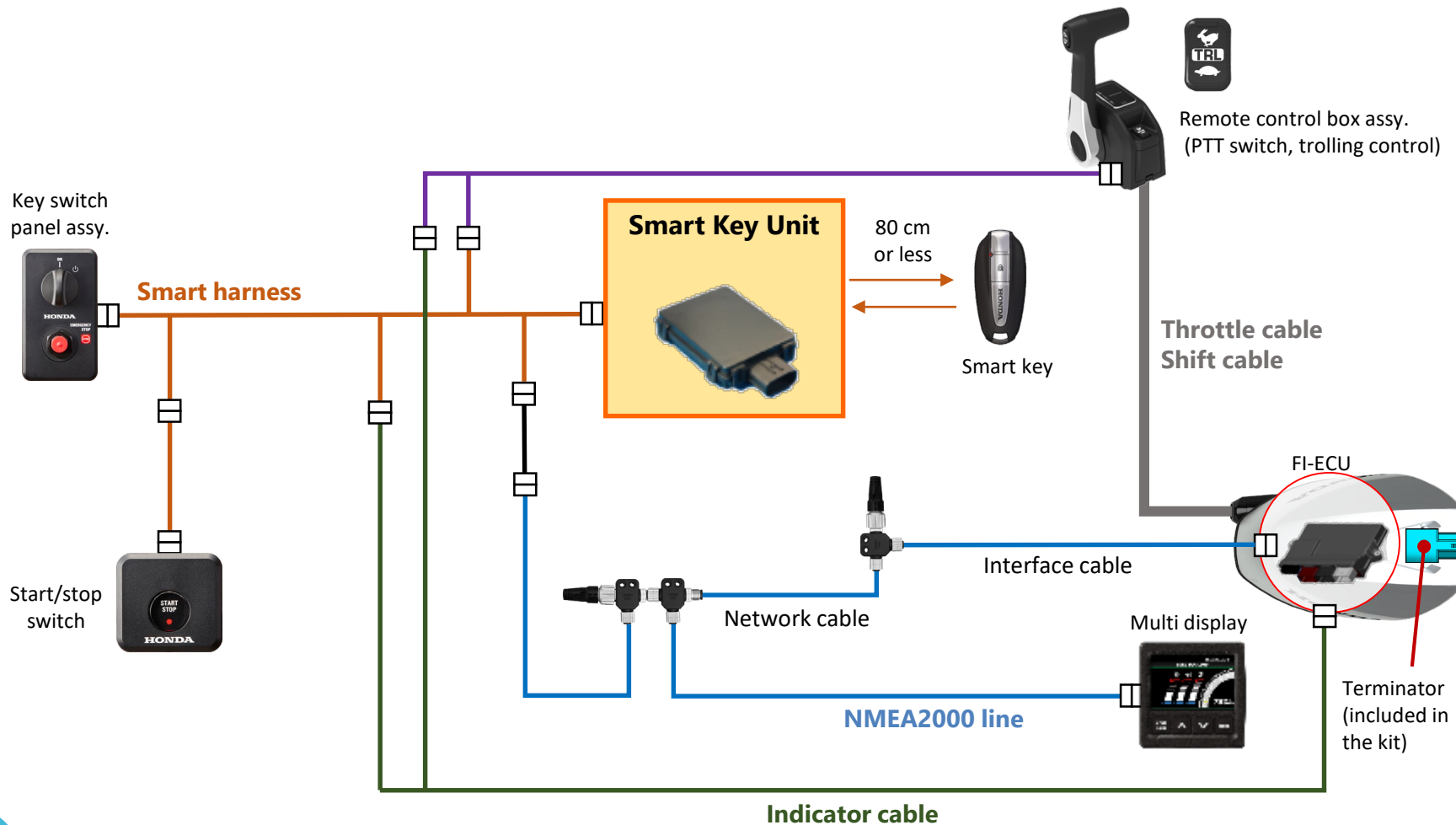
The following is a rigging example for two engines in mechanical control configuration with trolling control.



Rigging Components (Mechanical)

Setup: **One outboard motor, Mechanical control, Smart key**

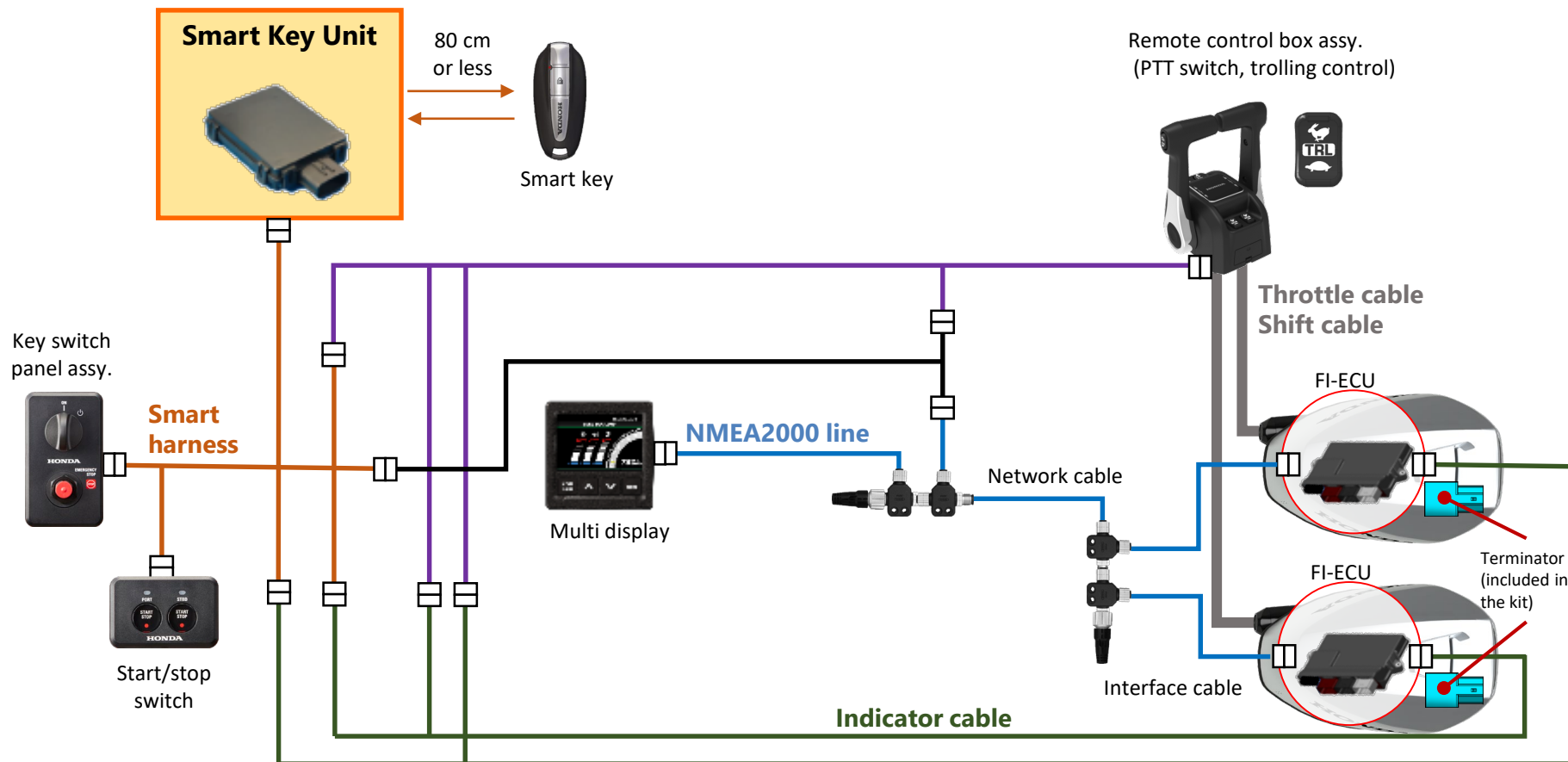
The following is a rigging example for a single engine in mechanical control configuration with smart key.



An **NMEA display** is required for a mechanical control configuration with smart key.

Setup: **Two outboard motors, Mechanical control, Smart key**

The following is a rigging example for two engines in mechanical control configuration with smart key.

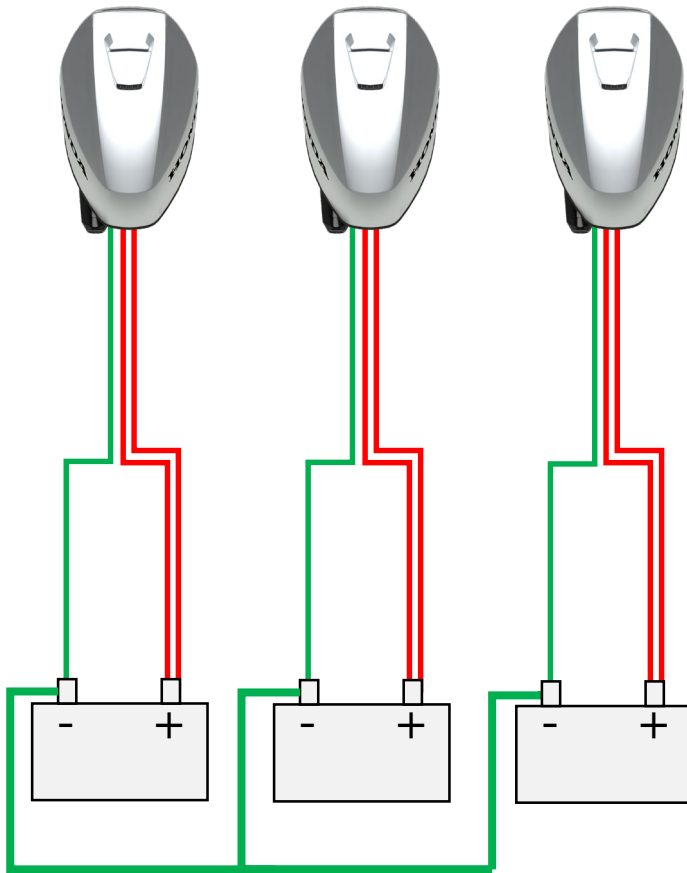


- An **NMEA display** is required for a mechanical control configuration with a smart key.
- The ALL start/stop switch cannot be used for two engines in mechanical control configuration with smart key.

Connection of power supply circuit

In multiple-mounted configurations that require multiple power sources, the battery ground terminals need to be connected by an extension cable.

When extending the battery cable, follow the requirements in the table below in accordance with cable size and ambient temperature. The extension battery cable length refers to the total length of the positive (+) and negative (-) cables combined.



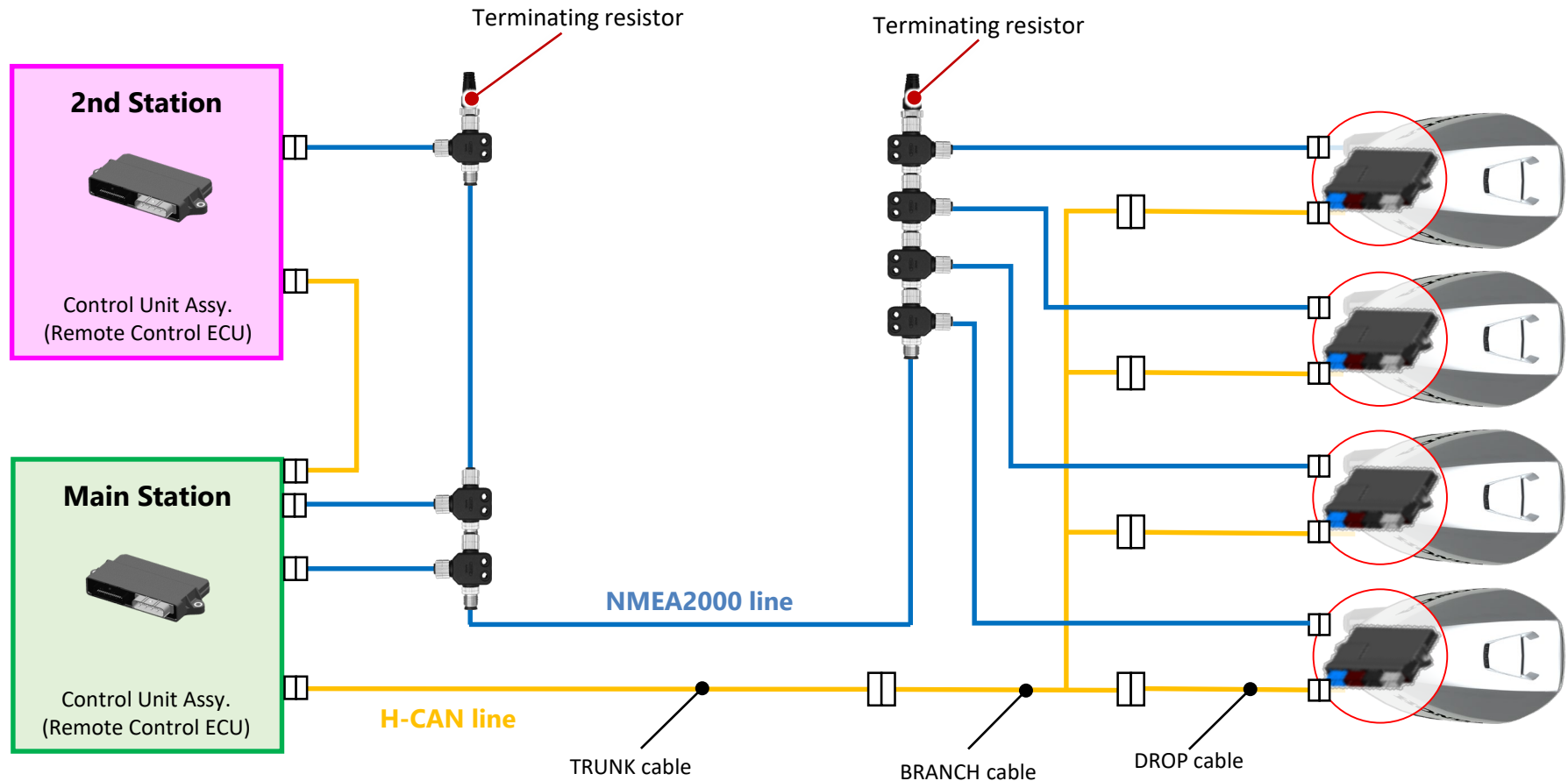
Model	Air temperature	Battery	Max. Total length of extension				
			AWG4 20 mm ²	AWG2 30 mm ²	AWG1/0 50 mm ²	AWG2/0 60 mm ²	AWG4/0 100 mm ²
BF115/ BF135D/ BF140A/ BF150D DBW and mechanical control	0°C or higher	130E41 (JIS)	5.5 m (18 ft)	8.3 m (28 ft)	13.8 m (48 ft)	16.6 m (55 ft)	26.0 m (85 ft)
	0°C to -15°C	130E41 (JIS)	2.3 m (8 ft)	3.5 m (12 ft)	5.8 m (19 ft)	7.0 m (23 ft)	12.5 m (41 ft)

The total length of extension cable on the boat (i.e. lengths of all extension cables combined) should not exceed that shown in the chart above.

Terminating Resistor in System Circuit

A **terminating resistor** is required for the **H-CAN/NMEA2000 circuit**

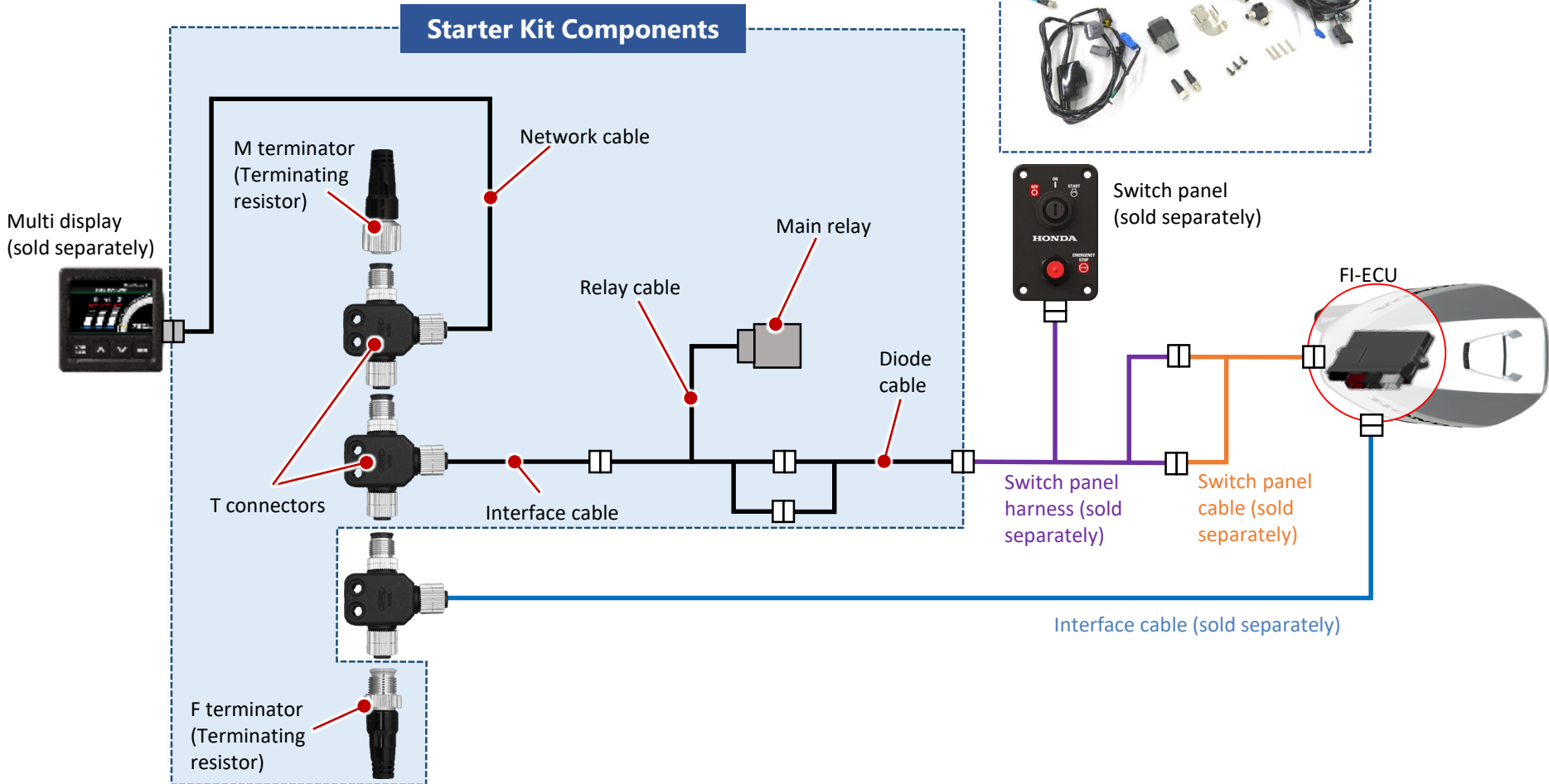
The H-CAN/NMEA2000 lines need a terminating resistor. The system requires two terminating resistors; one on the engine side and one on the remote control side. The diagram below shows an example for four engines in DBW control configuration.



*The terminating resistor is for an operating circuit (CAN, etc.) that normally communicates at high frequency. If a terminating resistor is not installed on the high-frequency communication cable, the signal cannot be communicated properly, resulting in system errors and malfunctions.

To facilitate the introduction by providing a set of parts necessary for NMEA2000 configuration

To facilitate the introduction of NMEA2000, a kit that satisfies the minimum configuration is provided to achieve the improved availability of parts and convenience. The diagram below shows an example for single engine in mechanical control configuration.



BF115J / BF135D / BF140A / BF150D

5. Display Kit

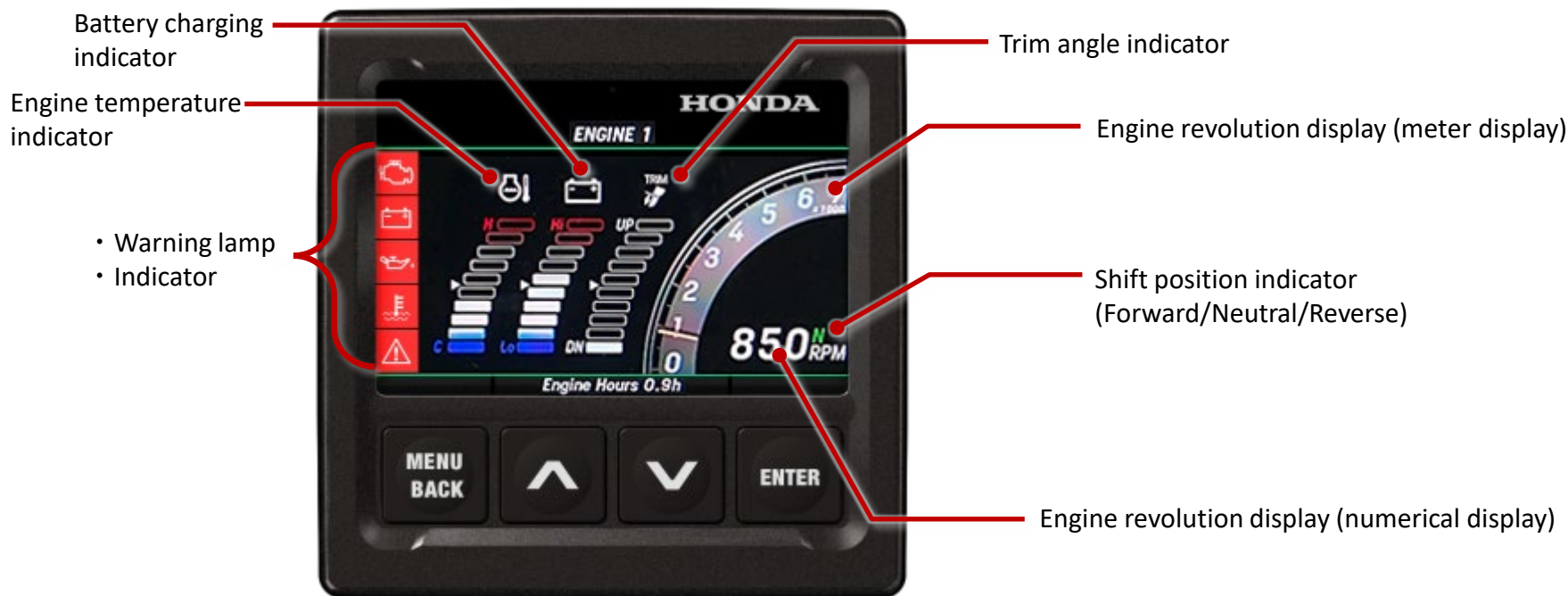
Display Kit



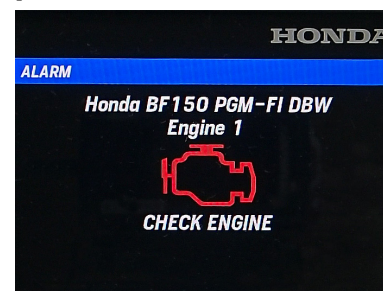
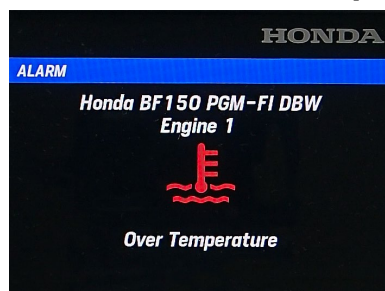
- **Multi Display**
- **Notification Functions of Multi Display**
- **Resetting the Maintenance Notification Indication**

The **Multi Display** shows a **wide range of information**

Multi display can be connected to the NMEA2000 line. The display shows various information, for example, mode transition indication such as trolling control mode, DTC display, in addition to engine speed.



Display example

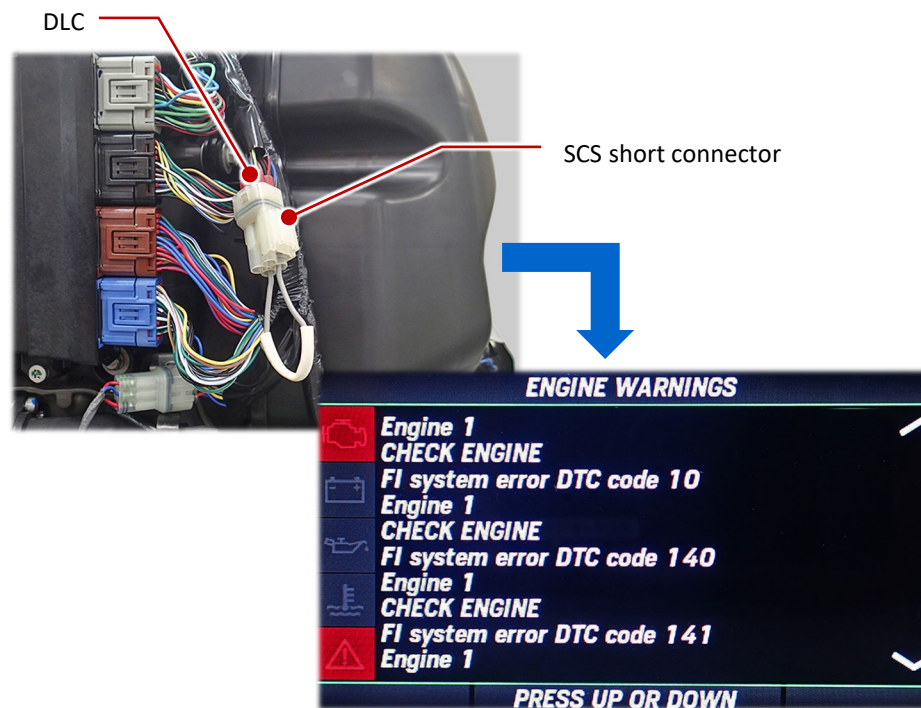


DTC display on the Multi Display

The current DTC can be indicated on the multi display screen.

By connecting an SCS short connector to the DLC, it is also possible to display past DTC history.

Example of DTC display



- Specifications/Dimensional Drawing
- Description of Major Changes
- DBW System
- Rigging
- Display Kit
- Changed Parts Table

Resetting the Maintenance Notification Indication

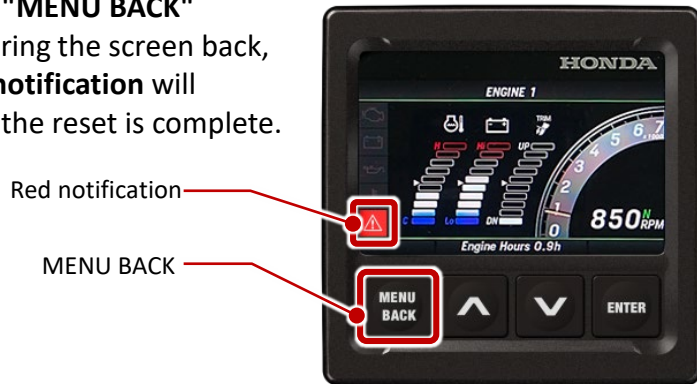
Reset notifications with display kit after periodic maintenance

The engine ECU is programmed to notify the user that it is time for periodic maintenance every 20, 80, or 100 hours of operation. In order to correctly notify the next maintenance period, the notification needs to be reset after the maintenance is completed.

[Display when the notification appears]








Pressing the "MENU BACK" button will bring the screen back, but the red notification will remain until the reset is complete.



For mechanical control models, the notification is unavailable if the conventional analog meters are used.



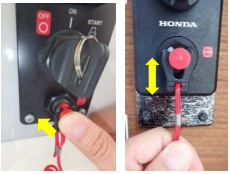
[Reset procedures for DBW control model]

<p>(1) Turn the ignition switch to ON. (The buzzer sounds 2 times.) *Do not start the engine.</p>	<p>Leave it for more than one second.</p>	<p>(2) Put the shift lever in F (forward) or R (reverse) position.</p>	<p>(3) Turn the ignition switch to OFF.</p>	<p>(4) Turn the ignition switch to ON. (The buzzer sounds two times.)</p>	<p>(5) Remove and insert the emergency stop clip 5 times within 20 seconds (reset is complete when the buzzer sounds once)</p>
					

After the reset is complete, return the shift lever to N (neutral) position and the ignition switch to OFF.

* If the reset is not completed, retry the reset operation by waiting more than one second between steps 1 and 2.

[Reset procedures for mechanical control model]

<p>(1) With the engine stopped, put the shift lever in F (forward) or R (reverse) position.</p>	<p>(2) Turn the ignition switch to ON. (The buzzer sounds once.)</p>	<p>(3) Push the emergency stop switch 5 times, or remove and insert the emergency stop clip 5 times within 20 seconds (reset is complete when the buzzer sounds once)</p>
		

After the reset is complete, return the shift lever to N (neutral) position and the ignition switch to OFF.

BF115J / BF135D / BF140A / BF150D

6. Changed Parts
Table

Changed Parts Table



■ Changed Parts (Major Parts)

Changed Parts (Major Parts)

	BF150 (previous)		BF115J-150D (new)			BF150 (previous)		BF115J-150D (new)		
Specifications/ Dimensional Drawing	CASE COMP, CRANK					PISTON B				
		11100-ZY6-000		11100-ZVT-000			13101-ZY6-000		13102-ZY6-000	
		Old →	New	N	New →		Old	N	New →	Old
Description of Major Changes	BLOCK COMP, CYLN					GAUGE COMP, OIL LEVEL				
		12100-ZY6-040		12100-ZVT-000			15655-ZY6-010		15655-ZVT-000	
		Old →	New	N	New →		Old	N	New →	Old
DBW System	BLOCK COMP, LOWER					PIPE COMP, OIL LEVEL				
		11130-ZY6-000		11130-ZVT-000			15665-ZW1-030		15665-ZVT-000	
		Old →	New	N	New →		Old	N	New →	Old
Rigging	BLOCK COMP, LOWER					PIPE COMP, OIL LEVEL				
		11130-ZY6-000		11130-ZVT-000			15665-ZW1-030		15665-ZVT-000	
		Old →	New	N	New →		Old	N	New →	Old
Display Kit	BLOCK COMP, LOWER					PIPE COMP, OIL LEVEL				
		11130-ZY6-000		11130-ZVT-000			15665-ZW1-030		15665-ZVT-000	
		Old →	New	N	New →		Old	N	New →	Old
Changed Parts Table	BLOCK COMP, LOWER					PIPE COMP, OIL LEVEL				
		11130-ZY6-000		11130-ZVT-000			15665-ZW1-030		15665-ZVT-000	
		Old →	New	N	New →		Old	N	New →	Old

Changed Parts (Major Parts)

Specifications/
Dimensional
Drawing


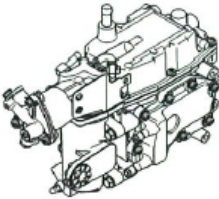






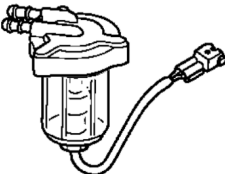

Description of
Major Changes

DBW System

Rigging

Display Kit

Changed
Parts Table

Parts	BF150 (previous)	BF115J-150D (new)	Parts	BF150 (previous)	BF115J-150D (new)			
GUARD, THROTTLE BODY (DBW)	N/A		VAPOR SEPARATOR ASSY					
		16406-ZVT-000		16730-ZY6-123	16730-ZVT-003			
		New → Old		N	Old → New	N	New → Old	N
GUARD, THROTTLE BODY (MECH)	N/A		STRAINER ASSY, FUEL LOW					
		16406-ZVT-900		16900-ZY3-003				
		New → Old		N		Old → New	N	
THROTTLE BODY ASSY (DBW)			SEPARATOR, WATER					
				16400-ZY6-013		16400-ZVT-003	16800-ZY6-003	16900-ZVL-003
				Old → New		N	New → Old	N

Changed Parts (Major Parts)

Specifications/ Dimensional Drawing

Description of Major Changes

DBW System

Rigging

Display Kit

Changed Parts Table

Parts	BF150 (previous)	BF115J-150D (new)	Parts	BF150 (previous)	BF115J-150D (new)		
GASKET, THROTTLE BODY (DBW)	N/A		GROMMET, SILENCER (DBW)				
		16176-ZVT-003			17374-ZVT-000		
		New → Old			N	New → Old	N
SPACER COMP, THROTTLE BODY (DBW)	N/A		GROMMET, SILENCER (MECH)				
		16404-ZVT-000			17374-ZY6-000	17374-ZVT-900	
		New → Old			N	Old → New	N
CASE COMP, SILENCER			MANIFOLD COMP, EXHAUST				
		17371-ZY6-020			17371-ZVT-000	18110-ZY6-020	18110-ZVT-000
		Old → New			N	New → Old	N

Changed Parts (Major Parts)

Specifications/ Dimensional Drawing

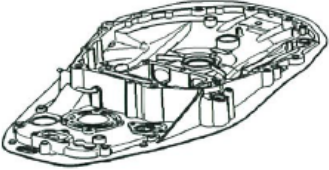
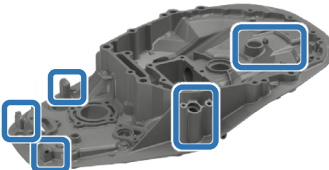
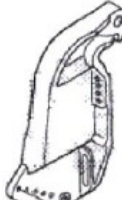

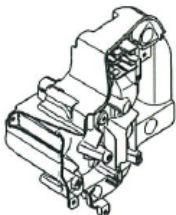



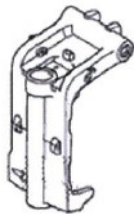



Description of Major Changes

DBW System

Rigging

Display Kit

Changed Parts Table

Parts	BF150 (previous)		BF115J-150D (new)		Parts	BF150 (previous)		BF115J-150D (new)	
CASE COMP, MOUNT					BRACKET, STERN R				
	23170-ZY6-000		23170-ZVT-000			50301-ZW1-070		50301-ZVT-000	
	Old → New	N	New → Old	N		Old → New	N	New → Old	N
CASE ASSY, ELEC PARTS					BRACKET, STERN L				
	30410-ZY6-030		30410-ZVT-000			50311-ZW1-070		50311-ZVT-000	
	Old → New	N	New → Old	N		Old → New	N	New → Old	N
CASE, SWIVEL					SHAFT, TILTING				
	50201-ZW1-040		50201-ZVT-000			50381-ZY3-000		50381-ZVL-010	
	Old → New	N	New → Old	Y		Old → New	N	New → Old	N

Changed Parts (Major Parts)

Specifications/
Dimensional
Drawing



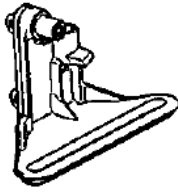
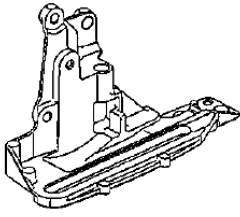
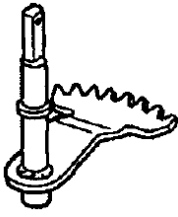
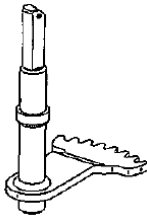
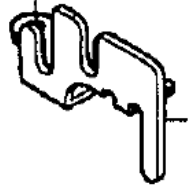
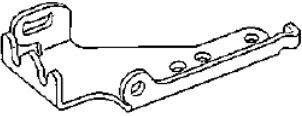
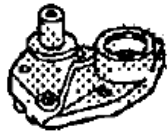

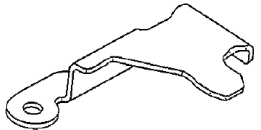
Description of
Major Changes

DBW System

Rigging

Display Kit

Changed
Parts Table

Parts	BF150 (previous)		BF115J-150D (new)		Parts	BF150 (previous)		BF115J-150D (new)	
SHAFT, LWR CYLN					BRKT, SHIFT LINK (MECH)				
	56539-ZZ0-C00		56539-ZVL-000			24628-ZY6-000		24628-ZVT-600	
	Old → New	N	New → Old	N		Old → New	N	New → Old	N
SHAFT COMP B, SHIFT (MECH)					PLATE, REMOTE CONTROL (MECH)				
	24620-ZY6-000		24620-ZVT-600			17877-ZY6-010		17877-ZVT-600	
	Old → New	N	New → Old	N		Old → New	N	New → Old	N
HOLDER, SEAL					COVER, REMOTE CONTROL (MECH)	N/A			
	24629-ZY6-000		24629-ZVT-000					17878-ZVL-600	
	Old → New	N	New → Old	N				New → Old	N

Changed Parts (Major Parts)

Specifications/ Dimensional Drawing

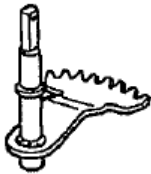










Description of Major Changes

DBW System


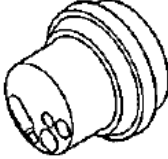


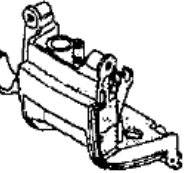



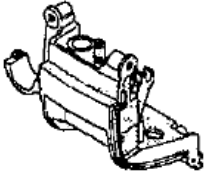

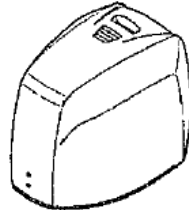

Rigging

Display Kit

Changed Parts Table

Parts	BF150 (previous)	BF115J-150D (new)	Parts	BF150 (previous)	BF115J-150D (new)
SHAFT COMP, SHIFT (DBW)			GUIDE, SHIFT LINK (DBW)		
	(SHAFT COMP B, SHIFT)				
	24620-ZY6-000			24628-ZY6-000	24627-ZVT-000
	Old → New			N	Old → New
ARM, SHIFT (DBW)			SHIFT-NEUTRAL ASSY (DBW)	N/A	
	(SHAFT COMP A, SHIFT)				
	24610-ZY6-000			24630-ZVT-000	24160-ZVT-000
	Old → New			N	New → Old
PIVOT, SHIFT (DBW)			PIVOT, SHIFT (DBW)		
	24612-ZY6-020			24612-ZVT-000	24617-ZVT-000
	Old → New			N	Old → New

Changed Parts (Major Parts)

	Parts	BF150 (previous)	BF115J-150D (new)	Parts	BF150 (previous)	BF115J-150D (new)				
Specifications/ Dimensional Drawing	GROMMET, UNDER CASE (DBW)			COVER, REAR						
							40105-ZVL-000	40116-ZY6-000	63721-ZVT-000	
							New → Old	N	New → Old	N
Description of Major Changes	GROMMET, UNDER CASE (MECH)			COVER, SEPARATE						
							40105-ZY6-020	40105-ZVT-600	40151-ZY6-010	40151-ZVL-000
							Old → New	N	New → Old	N
DBW System	BRKT, UNDER CASE FRONT			COVER ASSY, ENGINE						
							40154-ZY6-000	40154-ZVT-000	63100-ZY6-050	63100-ZVT-000
							New → Old	N	New → Old	N
Rigging										
Display Kit										
Changed Parts Table										

Changed Parts (Major Parts)

Specifications/
Dimensional
Drawing

Description of
Major Changes

DBW System

Rigging

Display Kit

Changed
Parts Table

Parts	BF150 (previous)		BF115J-150D (new)		Parts	BF150 (previous)		BF115J-150D (new)	
DUCT ASSY, ENGINE COVER					SEAL, ENGINE COVER				
	63144-ZY6-000		63140-ZVT-000			63102-ZY6-010		63102-ZVT-000	
	Old → New	N	New → Old	N		New → Old	N	New → Old	N
GUIDE, ENGINE COVER AIR	N/A				CASE, ENG UNDER R				
			63144-ZVT-000					40101-ZVT-000	
			New → Old	N				New → Old	N
GUARD, REAR	N/A				COVER, ENGINE UNDER R				
			63161-ZVT-000			63711-ZY6-010		63711-ZVT-000	
			New → Old	N		Old → New	N	New → Old	N

Changed Parts (Major Parts)

	Parts	BF150 (previous)	BF115J-150D (new)	Parts	BF150 (previous)	BF115J-150D (new)				
Specifications/ Dimensional Drawing	CASE, ENG UNDER L			CASE ASSY, GEAR L						
							40106-ZVT-000	41100-ZY6-050 (STD) 41100-ZY6-705 (C/R)	41100-ZVT-600 (STD) 41100-ZVT-800 (C/R)	
							New → Old	N	New → Old	N
Description of Major Changes	COVER, ENGINE UNDER L			GEAR BEVEL F						
							63716-ZY6-010	63716-ZVT-000	41141-ZY6-300 (STD) 41141-ZY6-710 (C/R)	41141-ZVT-300 (STD) 41141-ZVT-700 (C/R)
							Old → New	N	New → Old	N
DBW System	RUBBER, DRAIN PLUG			SHIFTER, CLUTCH						
							40212-ZY6-020	40209-ZVT-000	24101-ZY6-000 (STD) 24101-ZY6-000 (C/R)	24101-ZVT-000 (STD) 24101-ZVT-700 (C/R)
							New → Old	N	New → Old	N
Rigging										
Display Kit										
Changed Parts Table										

Changed Parts (Major Parts)

Specifications/
Dimensional
Drawing

Description of
Major Changes

DBW System

Rigging

Display Kit

Changed
Parts Table

Parts	BF150 (previous)		BF115J-150D (new)		Parts	BF150 (previous)		BF115J-150D (new)	
ECU ASSY					SENSOR, OXYGEN				
						(LAF Sensor)		(O2 Sensor)	
	34750-ZY6-063		34750-ZVT-003 (BF150 DBW) 34750-ZVT-A01 (BF150 DBW) 34750-ZVT-901 (BF150 MECH) 34750-ZVT-A11 (BF150 MECH) 34750-ZVT-A21 (BF140 DBW) 34750-ZVT-A31 (BF140 MECH) 34750-ZVS-003 (BF135 DBW) 34750-ZVS-901 (BF135 MECH) 34750-ZVR-003 (BF115 DBW) 34750-ZVR-A01 (BF115 DBW) 34750-ZVR-901 (BF115 MECH) 34750-ZVR-A11 (BF115 MECH)			35668-ZY6-003		35655-ZY9-H01	
	New → Old	N	New → Old	N	Old → New	N	New → Old	N	
SENSOR, KNOCK					SENSOR COMP, TA				
	30530-ZY6-003		30530-5YS-J01			37880-PLC-004		37880-RE1-Z01	
	Old → New	N	New → Old	N		New → Old	N	New → Old	N
CABLE ASSY, START					CABLE ASSY, START				
	32410-ZY6-020		32410-ZVT-000			32410-ZY6-020		32410-ZVT-000	
	New → Old	N	New → Old	N		New → Old	N	New → Old	N

Changed Parts (Major Parts)

Specifications/
Dimensional
Drawing


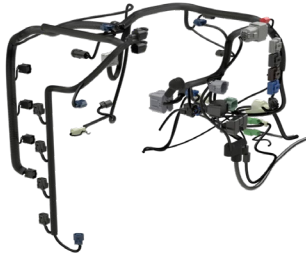



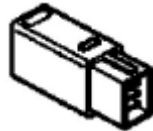
Description of
Major Changes

DBW System

Rigging

Display Kit

Changed
Parts Table

Parts	BF150 (previous)	BF115J-150D (new)	Parts	BF150 (previous)	BF115J-150D (new)			
HARN ASSY			SW ASSY, POWER TILT					
	32100-ZY6-070			35640-ZY6-003		35640-ZY9-003		
	New → Old N			Old → New N		New → Old N		
HARN ASSY, POWER	N/A	<ul style="list-style-type: none"> 32100-ZVT-000 (BF150/140 DBW) 32100-ZVT-600 (BF150/140 MECH) 32100-ZVS-000 (BF135 DBW) 32100-ZVS-600 (BF135 MECH) 32100-ZVR-000 (BF115 DBW) 32100-ZVR-600 (BF15 MECH) 	ACTUATOR ASSY, SHIFT (DBW)	N/A				
		New → Old N		37880-RE1-Z01		New → Old N		
		N/A		N/A			38580-ZVT-003	
New → Old N		31575-ZVL -000		New → Old N		New → Old N		
New → Old N		UNIT ASSY, SENSING RELAY		N/A		New → Old N		

Changed Parts (Major Parts)

Parts	BF150 (previous)	BF115J-150D (new)	
BOX ASSY, JUNCTION (DBW)			
		32370-ZVT-003	
		New → Old	N
BOX ASSY, JUNCTION (MECH)			
		32370-ZY6 -004	
		Old → New	N
RELAY ASSY, POWER TILT			
		38550-ZY6-003	
		Old → New	N
RELAY ASSY, POWER TILT			
		38550-ZVT-003	
		New → Old	N