

# ***Haltech***

## **ELITE**

### **YAMAHA PWC**

### **HT-140980**

## **QUICK START GUIDE**



## **WARNING - HALTECH OFF-ROAD USAGE POLICY**

It is unlawful to tamper with your vehicle's emissions equipment.

Haltech products are designed and sold for sanctioned off-road/competition non-emissions controlled vehicles only. Using Haltech products for street/road use on public roads is prohibited by law. It is the responsibility of the installer and/or user of this product to ensure compliance with all applicable local and federal laws and regulations. Please check with your local vehicle authority before using any Haltech product

## **INSTALLATION OF HALTECH PRODUCTS**

No responsibility whatsoever is accepted by Haltech for the fitment of Haltech Products. The onus is clearly on the installer to ensure that both their knowledge and the parts selected are correct for that particular application. Any damage to parts or consequential damage or costs resulting from the incorrect installation of Haltech products are totally the responsibility of the installer.

Always disconnect the battery when doing electrical work on your vehicle. Avoid sparks, open flames or use of electrical devices near flammable substances. Do not run the engine with a battery charger connected as this could damage the ECU and other electrical equipment. Do not overcharge the battery or reverse the polarity of the battery or any charging unit. Disconnect the Haltech ECU from the electrical system whenever doing any welding on the vehicle by unplugging the wiring harness connector from the ECU. After completing the ECU installation, make sure there is no wiring left un-insulated. Uninsulated wiring can cause sparks, short circuits and in some cases fire. Before attempting to run the engine ensure there are no leaks in the fuel system. All fuel system components and wiring should be mounted away from heat sources, shielded if necessary and well ventilated. Always ensure that you follow workshop safety procedures. If you're working underneath a jacked-up car, always use safety stands!

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Unless specified otherwise, Haltech warrants its products to be free from defects in material or workmanship for a period of 12 months from the date of purchase, valid in the original country of purchase only. Proof of purchase, in the form of a bill of sale or receipted invoice, which indicates that the product is within the warranty period, must be presented to obtain warranty service. Haltech suggests that the purchaser retain the dealer's dated bill of sale/receipt as evidence of the date of retail purchase. If the Haltech product is found to be defective as mentioned above, it will be replaced or repaired if returned prepaid along with proof of purchase. This shall constitute the sole liability of Haltech. To the extent permitted by law, the foregoing is exclusive and in lieu of all other warranties or representations, either expressed or implied, including any implied warranty of merchantability or fitness. In no event shall Haltech be liable for special or consequential damages.

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**Returning a sensor or accessory product within 30 days of purchase:** Product may be returned for credit or full refund. (Any sealed packaging must not have been opened or tampered with)

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# **ELITE YAMAHA PWC**

## **Quick Startup Guide**

Congratulations on purchasing a Haltech Engine Management System. This *fully programmable* product opens the door to virtually limitless performance modification and tuning of your vehicle. Programmable systems allow you to extract all the performance from your engine by delivering precisely the required amount of fuel and ignition timing that your engine requires for maximum output under all operating conditions.

This quick startup guide will walk you through installation of a Haltech ECU into a PWC. This guide is accompanied by the full service manual located on the software USB provided with the ECU that you or your tuner will need to refer to before completing your installation and configuration. The Manual can also be downloaded from the Haltech website [www.haltech.com](http://www.haltech.com)

### **Compatibility**

The Haltech Elite Yamaha PWC Kit is compatible with the following Yamaha Waverunner series manufactured after 2008 using the 1.8L High Output Yamaha Marine Engine.

- FX
- FZS
- FZR

### **Supported ECU's**

- Elite 1500
- Elite 2500

**Note:** OEM Functionality Not Supported - Instrument Cluster and Immobilizer

### **Included in Haltech Elite Yamaha PWC Kit ( HT-140980)**

- Elite PWC Mounting Bracket and associated installation hardware
- Plug & Play Patch Harness
- Auxiliary Connector,Pins,Sealing plugs
- IP67 USB Extension Cable
- Screw on USB A Sealing Cap

### **Optional Accessory ( Sold Separately )**

- Yamaha WaveRunner FX, FZS, FZR (2008-2012) WB1 - Kit (HT-159977)

## Yamaha PWC Kit Overview

The Haltech Yamaha PWC kit is designed to quickly and easily replace the factory fitted ECU on Yamaha PWC's, all mounting hardware and patch harnesses have been designed to allow for quick installation.

### Notes on Installation

- Ensure PWC is stabilized and ready to work on
- Disable / Unlock the OEM immobiliser if fitted before starting installation
- Ensure all cabling is secured and installed away from extreme sources of heat

### Recommendation

It is recommended the thermostat be removed to help the cooling of the engine under the increased performance load.

Various cooling upgrade kits are available from PWC performance retailers.

### Plug and Play Patch Harness

The Haltech Elite Yamaha PWC Plug and Play patch harness is designed to connect the Elite ECU to the engine harness of the Yamaha PWC.

Connectors of the patch harness are outlined below.

Note\* The program loop enables the ECU to be powered up without the PWC running.

This loop MUST be removed after programming and setup has been completed.

Failure to remove this loop will flatten your battery in time.

1. Main engine harness connection
2. Auxiliary connector
3. CAN connector
4. \* Program/setup loop
5. Program/setup connector
6. Main ECU connectors

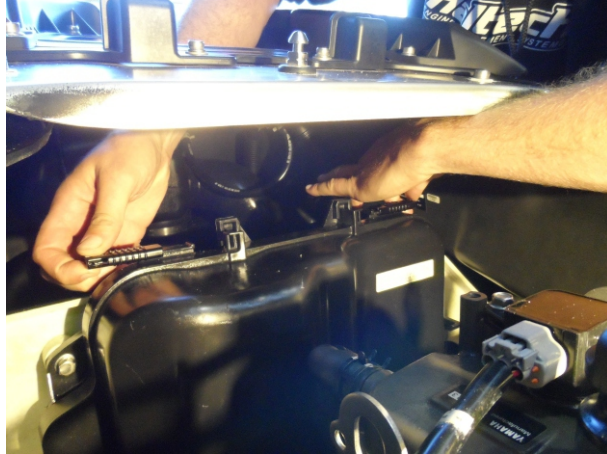


**Figure 1 – Plug and Play Patch Harness**



**STEP 2:**

Remove the ECU splash cover on the PWC to reveal the OEM ECU. Disconnect and remove the OEM ECU from the PWC



*Figure 3 – Removing the splash cover*



*Figure 4 – OEM ECU Mounted on support*

## Installation

Installing the Haltech Elite Yamaha PWC kit into your PWC is simple. Installation notes are based on a new installation in conjunction with the Haltech Plug and Play WB1 Kit (HT-159977).

### STEP 1:

Using the mounting screws provided with your Elite ECU, mount the Elite ECU to the mounting bracket included with the Haltech Plug and Play PWC kit.

If you are going to install the Haltech WB1 Kit, just mount it in a secure location within the hull.



***Figure 2 – Elite ECU Mounted to the custom PWC mounting bracket.  
Note orientation of bracket and ECU.***

**STEP 3:**

Install the Haltech Elite ECU to the PWC in the OEM Location using the 4 x M6x12mm socket cap bolts and washers supplied with the kit. A suitable thread locker compound can be applied to the threads of the mounting bolts at this time to help resist against loosening due to vibration.



*Figure 5 – Mounting Elite ECU to PWC*



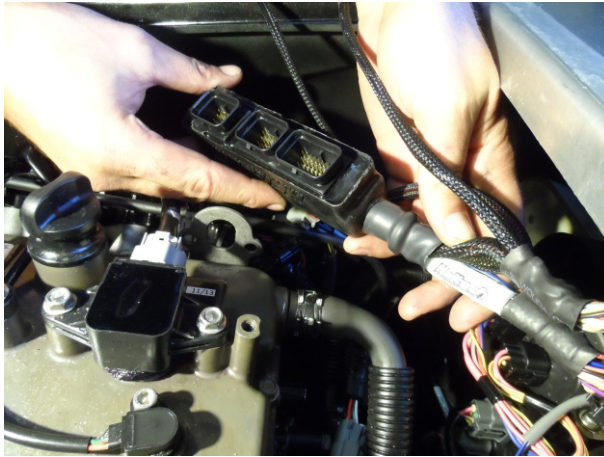
*Figure 6 – Elite ECU Mounted in the OEM location.*

**STEP 4:**

Install the WB1 wiring harness and WB1 to the PWC if purchased  
(See WB1 Yamaha PWC quick start guide for detailed information.)

**STEP 5:**

Install the Plug and Play Yamaha Patch Harness to the PWC  
Connect the 3 main PWC engine harness connectors to the patch loom.  
Connect the 2 main ECU connectors to the Haltech Elite ECU.  
Route the Program/Setup cable to the front of the PWC and up into the  
front storage compartment for easy access.  
Connect the optional CAN Wideband to the CAN cable on the patch harness  
if installed.  
Connect any aftermarket sensors to the auxiliary connector if available.



*Figure 7 – Installing the Plug and Play Harness*



*Figure 8 – Plug and Play Harness Installed*

**STEP 6:**

Install the waterproofing kit to the ECU so that the ecu can be tuned on the water, the kit comprises of the IP67 USB Cable, Sealing cap and 4 Pin CAN Connector with sealing plugs.

Route the USB Cable to the front of the PWC for easy access when tuning.



*Figure 9 – Waterproofing Kit for tuning.*

**STEP 7:**

Re-install the splash cover over the ECU and patch harness.



*Figure 10 – Splash cover re-installed*

## STEP 8:

Upload the basemap to the ECU

Connect the Program/Setup Loop Connector to the patch harness to power up the ECU.

With the ECU powered up connect to the ECU using the Haltech Elite Software Programmer (ESP).

When connected navigate through the software to file>upload map>yamaha and select the basemap that suits your application.

ESP will now upload the selected basemap to your ECU.

When upload is complete it is now time to setup your MAP and add any auxiliary functionality that your PWC may require.

**At this time it is important to calibrate your DBW throttle.**

To do this please go to the Drive By Wire function in the setup page and follow the prompts to calibrate the throttle.

Once complete and tested remove the Program/Setup Loop connector from the harness.

Your PWC will now be ready to start and tune.

The screenshot shows the Haltech Elite Software Programmer (ESP) interface. On the left, there is a sidebar with 'Add/Remove Functions...' and 'Search Results' sections. The 'Add/Remove Functions...' section lists various functions like 'Battery Voltage Diagnostics', 'Coolant Temperature Sensor', 'Drive By Wire', 'Engine Control Relay Function', 'Fuel Pump', 'GenSensor 1 - TempSwitch', 'GenSensor 2 - TipOver', 'GenSensor 3 - MufflerTem', 'GenSensor 4 - Oil Press', 'GenTimer 1 - Timed Stop', 'Idle Control', and 'Kill Switch Function'. The 'Search Results' section lists various sensors and controls like 'Air Conditioner Control', 'Air Conditioner Pressure Sensor', 'Air Conditioner Temperature Sensor', 'Air Temperature Sensor', 'Alternator Control', 'Anti-Lag', 'Auxiliary RPM Limiter Function', 'Barometric Pressure Sensor', 'Battery Voltage Diagnostics', 'Boost Control', and 'Brake Pedal Switch'. The main window displays the 'Drive By Wire' calibration wizard. The wizard has a progress bar at the top showing 'Step 1: 0% APP', 'Step 2: 100% APP', and 'Step 3: TPS'. Below the progress bar, there is a section titled 'DBW Calibration' with a sub-section 'DBW Calibration' and a text box stating: 'This step through wizard will configure the internal Drive By Wire (DBW) throttle control of this device. Please follow the steps carefully. An accurate DBW calibration is important for safe and responsive throttle behaviour.' Below this text box are 'Reset' and 'Start >>' buttons. At the bottom of the wizard, there is a graph titled 'APP to TPS Calibration' with a 'Custom' dropdown. The graph shows a curve mapping APP (%) on the x-axis to TPS (%) on the y-axis. The 'Max TPS Limits' section includes settings for 'Max TPS' (100.0%), 'Brake Pedal Check' (Disable), 'Max Braking TPS' (0.0%), 'Vehicle Speed Check' (Disable), and 'Max Stopped TPS' (20.0%). At the bottom of the interface, there are buttons for 'View I/O Report...', 'OK', 'Cancel', and 'Apply'. The profile name 'YAMAHA PWC FZS' is visible in the bottom left corner.

Figure 11 – Calibration of the DBW throttle



## Engine Control Relay (ECR) Latching

The ECU requires the engine control relay (ECR) to activate after the user has pressed the start button and to de-activate five seconds after the motor has stopped running.

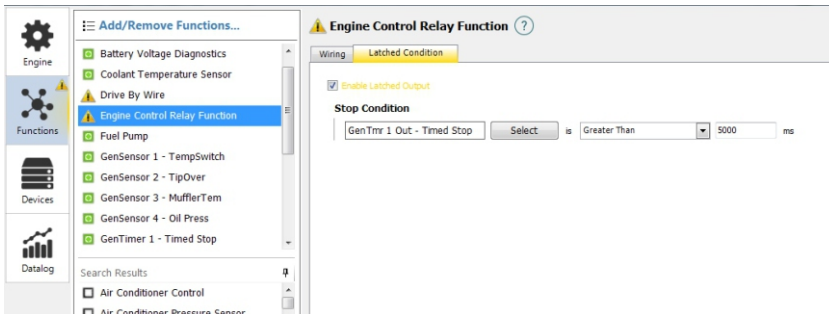
Although this is pre-configured in the respective Jet ski base map, an overview of the ECR activation/deactivation is detailed below.

In order to activate and de-activate the engine control relay (ECR) the ECU utilises one generic timer and the engine control relay function.

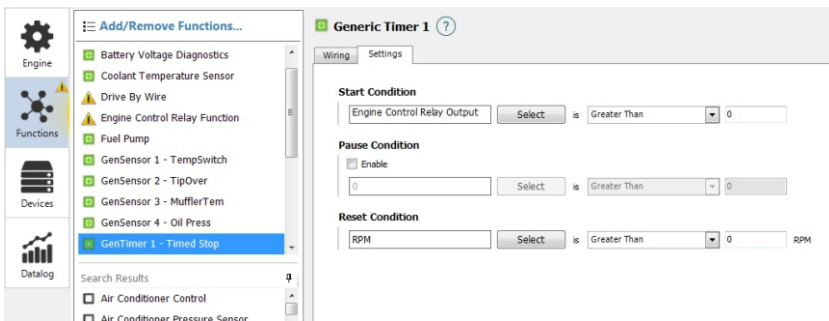
With the “Enable Latched Output” setting enabled within the engine control relay function, the ECR will be activated as soon as battery voltage is seen at the ignition signal input.

The ECR will continue to be held active, until the “Stop Condition” has been satisfied.

The stop condition for the ECR is a generic timer which starts to count upwards when the RPM is 0 (engine off). When this timer exceeds five seconds, the “Stop Condition” is satisfied and the ECR is deactivated which will result in the ECU powering down.



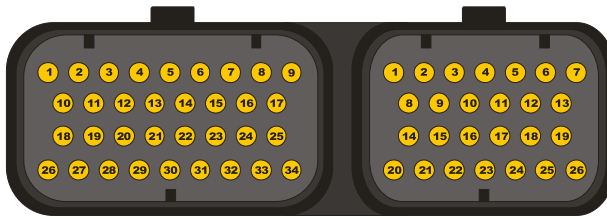
**Figure 12 – Engine control relay latching settings**



**Figure 13 – Generic timer settings for ECR un-latching**

## ECU Connection Table

Figure 12- ECU Connector



**34 Pin**

**26 Pin**

Looking into the ECU

### 34 Pin Connector

Pin #	Wire Colour	Connection	YAMAHA PWC CONNECTION
1	V/BR	DPO 2	AUXILIARY CONNECTOR PIN 4 - SPARE DPO
2	O/Y	AV14	APP SENSOR 1
3	Y/B	IGN 1	IGNITION OUTPUT #1
4	Y/R	IGN 2	IGNITION OUTPUT #2
5	Y/O	IGN 3	IGNITION OUTPUT #3
6	Y/G	IGN 4	IGNITION OUTPUT #4
7	-	-	-
8	-	-	-
9	O	+5V DC	5V OUTPUT TO SENSORS AND AUXILIARY CONNECTOR
10	B	CHASSIS GROUND	GROUND
11	B	CHASSIS GROUND	GROUND
12	-	+8V DC	-
13	P	IGNITION INPUT	IGNITION INPUT
14	W	AV110	TIP OVER SWITCH
15	Y	AV19	PWC MAP SENSOR
16	O/B	AV12	THROTTLE POSITION SENSOR 1
17	O/R	AV13	THROTTLE POSITION SENSOR 2
18	-	DPO 1	-
19	L	INJ 1	INJECTOR #1
20	L/B	INJ 2	INJECTOR #2
21	L/BR	INJ 3	INJECTOR #3
22	L/R	INJ 4	INJECTOR #4
23	-	DPO 3	-
24	B/Y	DPO 5 (FUEL PUMP)	FUEL PUMP RELAY
25	B/R	DPO 6 (ECR)	ENGINE CONTROL RELAY
26	R/L	+12V INJECTOR PWR	+12V INJECTOR PWR FROM ENGINE CONTROL RELAY
27	-	-	-
28	-	-	-
29	-	-	-
30	-	-	-
31	-	STEPPER1 / DPO	-
32	-	STEPPER2 / DPO	-
33	-	STEPPER3 / DPO	-
34	G/R	STEPPER4 / DPO	AUXILIARY CONNECTOR PIN 5 - SPARE DPO



## 26 Pin Connector

Pin #	Wire Colour	Connection	YAMAHA PWC CONNECTION
1	Y	TRIGGER ( + )	CRANK POSITION SENSOR
2	G	HOME ( + )	CAM POSITION SENSOR
3	GY	AIR TEMP	INTAKE AIR TEMPERATURE SENSOR
4	V	COOLANT TEMP	COOLANT TEMPERATURE SENSOR
5	-	TRIGGER ( - )	-
6	-	HOME ( - )	-
7	GY/R	DPI 4	OIL PRESSURE SWITCH
8	GY	DPI 1	KILL SWITCH
9	GY/B	DPI 2	MUFFLER TEMPERATURE SENSOR
10	GY/BR	DPI 3	AUXILIARY CONECTOR PIN 3 - SPARE SPI
11	R/W	+12V ECU POWER	+12V ECU PWR FROM ENGINE CONTROL RELAY
12	GY/O	AVI 6	AUXILIARY CONECTOR PIN 1 - SPARE AVI
13	GY/Y	AVI 1	TEMPERATURE SENSOR - SWITCH
14	B/W	SIGNAL GROUND	SIGNAL GROUND
15	B/W	SIGNAL GROUND	SIGNAL GROUND
16	B/W	SIGNAL GROUND	SIGNAL GROUND
17	-	-	-
18	-	-	-
19	-	DPO 4	-
20	O/G	AVI 5	APP 2 SIGNAL
21	GY/G	KNOCK 1	KNOCK SENSOR
22	-	-	-
23	W	CAN H	CAN H TO CAN CONNECTOR ON PLUG AND PLAY HARNESS
24	L	CAN L	CAN L TO CAN CONNECTOR ON PLUG AND PLAY HARNESS
25	BR/B	DBW 1 / DPO	DBW MOTOR -
26	BR/R	DBW 2 / DPO	DBW MOTOR +

### Legend- Wire Colours

**B=Black**

**BR=Brown**

**G=Green**

**GY=Grey**

**L=Blue**

**O=Orange**

**P=Pink**

**R=Red**

**V=Violet**

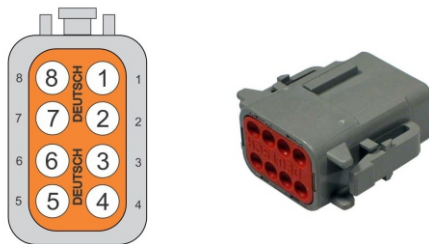
**Y=Yellow**

**W=White**

**When two Colours are used in a wire by the alphabetical code, the first letter indicates the basic wire colour, the second colour indicates the colour of the stripe.**

## Auxiliary Connector

The Auxiliary connector is used to connect additional inputs and outputs to the installation. Terminations are outlined below.



### Auxiliary Connector

Pin	Colour	Description
1	GY/O	AVI 6 SPARE ANALOGUE VOLTAGE INPUT
2	W/L	OEM K-LINE
3	GY/BR	SPI 3 SPARE SYNCHRONISED PULSED INPUT
4	V/BR	DPO 2 SPARE DIGITAL PULSED OUTPUT
5	G/R	STEPPER 4 / DPO SPARE STEPPER OUTPUT / DIGITAL PULSED OUTPUT
6	O	+5V +5V SUPPLY FOR ADDITIONAL SENSORS
7	B	GROUND GROUND FOR ADDITIONAL SENSORS
8	R	+12V +12V SUPPLY FOR ADDITIONAL SENSORS

### Legend- Wire Colours

**B=Black**  
**O=Orange**  
**W=White**

**BR=Brown**  
**P=Pink**

**G=Green**  
**R=Red**

**GY=Grey**  
**V=Violet**

**L=Blue**  
**Y=Yellow**

**When two Colours are used in a wire by the alphabetical code, the first letter indicates the basic wire colour, the second colour indicates the colour of the stripe.**

## CAN Connector

The Main CAN connector is used to connect other Haltech devices via CAN. Connect the optional Haltech CAN Wideband to this connection via the supplied cable. Terminations are outlined below.



**Main CAN Connector**

Pin	Colour	Description
1	GY/R	+12V Supply
2	B/W	Signal Ground
3	W	CAN High
4	L	CAN Low

### **Main CAN Connector Wiring**

## Program / Setup Connector

The Program / Setup connector is used to power up the ECU upon initial installation and setup.

Connect the supplied opposing program/setup loop connector to this to power up the ECU for the first time to load the base map.

**Ensure the opposing program/setup loop connector is removed once the PWC is setup and running to avoid flattening the battery of the PWC.**



**Program / Setup Connector**



**Program / Setup loop connector**

# *Haltech*

V4.0

## Need more help?



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