

CHALLENGER OF RECORD & DEFENDER

AMERICA'S CUP 36

Interpretation 036

of

AC75 Class Rule Version 1.7 issued 4th November 2019

Rules References:

- 21.2 No **control system** or part thereof shall be capable of using feedback from the **yacht state** to control a **control surface**, except:
- (a) motion of a **control function** may be restricted where permitted by Rule 21.3;
 - (b) one or more **force input devices** may be connected **mechanically** and/or through an **HCC** to a single **control surface**; forces acting on that **control surface** can only be transmitted to those **force input devices**;
 - (c) one or more **force input devices** may be connected **mechanically** and/or through an **HCC** to common mechanical drive trains or common pressure supply lines that provide power to multiple **control surfaces**; forces acting on those **control surfaces** can be transmitted through those mechanical drive trains or pressure supply lines to those **force input devices**;
 - (d) as permitted within an **HCC** by Rules 22.5 (d) and 22.5 (e);
 - (e) as permitted within an **ECC** by Rule 24; and
 - (f) a **control surface** can move passively as the result of **external forces** acting on that **control surface**, providing the above Rules are respected.
- 21.9 Sensors that measure, or are used to estimate the:
- (a) height of the **yacht** above water;
 - (b) vertical velocity of the **yacht**; or
 - (c) vertical acceleration of the **yacht**
- are permitted only as part of an **ILS**. Mechanical or other non-electronic sensors measuring these quantities are not permitted.
- 23.1 Electric or electronic components or circuits are permitted only as:
- (a) part of an **ECC**, **ILS**, or **CIS**;
 - (b) standalone **crew indication devices**, such as wristwatches, that are incapable of measuring or receiving any part of the **yacht state**;
 - (c) standalone **hardwired** cameras and screens mounted on the **yacht** to aid visibility of different parts of the **yacht**, providing no information other than raw audio and video from the **yacht** is transmitted, played or displayed;
 - (d) supplied and required by **COR/D**, the **Rules Committee** or the **Measurement Committee**, including permitted devices connected to these supplied components;
 - (e) bilge pumps; and
 - (f) supplied ultrasonic transmitters.

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- 24.1 Only the following sensors within, or inputs to an **ECC** are permitted:
- (a) outputs from **passive input devices**;
 - (b) sensors measuring the angle of a **foil flap** relative to a **foil wing**, or a proxy for that angle, at any number of spanwise locations along the **rondure** of the **foil wing**;
 - (c) one sensor measuring **rudder rake angle** relative to the **yacht**, or a proxy for that angle;
 - (d) sensors measuring the internal state of the **ECC**, such as voltage, current, CPU temperature, so long as those sensors provide no **yacht state** information, and are not used to estimate **yacht state** information;
 - (e) sensors measuring the internal geometric state of a **drive clutch** or **HCC** component, so long as those sensors do not directly measure **yacht state** information, and are not used to estimate **yacht state** information, for example:
 - (i) a sensor measuring the orientation of a cam in a hydraulic valve can be measured in order to drive that cam to a desired position, as long as the orientation of the cam is not used to estimate pressure or flow; and
 - (ii) current in a servo motor can be measured as part of a position control loop within the servo motor circuit, as long as the current is not used to estimate any part of the yacht state, such as control surface load; but
 - (iii) a sensor measuring the position of a plunger in a pressure relief valve cannot be measured, as it provides direct information about pressure in the system; and
 - (f) a sensor measuring the pressure of an accumulator permitted by Rule 22.8 (b).

Questions:

A processor wired into the **ECC** contains an accelerometer. The manufacturer of this processor supplies it with a custom operating system that disables the drivers for this accelerometer at the operating system level. This prevents the accelerometer from producing any information for use internally or externally. There would be no way for a competitor to modify the firmware on the unit. The manufacturer of the controller will supply a certificate verifying that the accelerometer is functionally disabled and isolated from the rest of the system at the operating system level, and that there is no possibility that the Competitor can modify this firmware.

1. Is a sensor that can be proven, to the satisfaction of the **Measurement Committee**, to have no way of communicating any information to the **ECC** deemed to be part of the **ECC** simply because of its physical proximity to the **ECC** system?
2. Is this arrangement legal according to the **AC75 Class Rule**? If not, which parts of the **AC75 Class Rule** does it break?

Answers:

1. Yes, a sensor is part of the **ECC** if it is electrically connected to the **ECC**.
2. No, the arrangement infringes rule 24.1.

END.