

CHALLENGER OF RECORD & DEFENDER AMERICA'S CUP 36

Interpretation 045 of AC75 Class Rule Version 1.9 issued 20th March 2020

Rules References:

- 23.2 No information exchange between **ECCs**, the **ILS**, the **CIS** and other systems is permitted except via specified communication channels through the **FCS** and **Media System** in accordance with Figure 23.1.
- 23.6 Batteries or regulated power supplies are permitted to be shared between **ECCs**, the **ILS**, the **CIS**, cameras and screens provided that where these systems are required to be **isolated**, the **isolated** wiring begins immediately beyond these supplies.
- 24.4 An **ECC** shall:
- (a) be **hardwired**;
 - (b) have wiring that is **isolated** from other devices and systems, except for:
 - (i) connections shown in Figure 23.1; and
 - (ii) connections from common power supplies permitted by Rule 23.6.
- 25.1 The **ILS** shall:
- (a) be **hardwired**;
 - (b) have wiring that is **isolated** from other devices and systems, except for:
 - (i) connections shown in Figure 23.1; and
 - (ii) connections from common power supplies permitted by Rule 23.6;
 - (c) not be capable of having any significant effect on the **yacht state**; and
 - (d) not include any **crew indication devices**.
- 27.7 The **FCS** will include supplied batteries, and this battery pack may be expanded with a specified battery model to increase overall power capacity, unless otherwise indicated in the **FCS** specification. The supplied batteries are exempt from the requirements of Rule 5.13 and may be replaced as required.
- 27.8 Unless otherwise indicated in the **FCS** specification, the following may be powered by the **FCS's** batteries:
- (a) **ECC** systems, the **ILS** and the **CIS**;
 - (b) systems required by **COR/D**, the **Rules Committee** or the **Measurement Committee**, and devices permitted to be connected to those system;

Questions:

These questions assume that the **FCS** specification, when issued, does not change the permissions currently contained in rule 27.8. We recognise that a more restrictive **FCS** specification could alter the answers to some of these questions.

- I. Figure I shows a simple power distribution circuit. The lines shown are independent wires that feed power from the battery to these systems for use as otherwise allowed by the **AC75 Class Rule**. The only contact between these wires happens at the terminals of the battery. Elsewhere these wires are electrically insulated and physically separated. The **ECC** power distribution supplies power to **electric actuators** that do work on a **control surface**.

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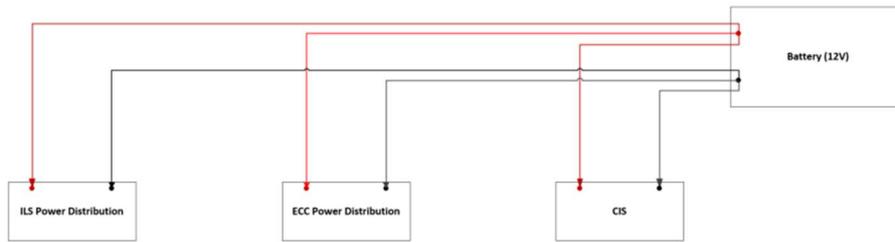


Figure 1

- a. Is the battery part of the **CIS**, **ILS** or **ECC**? If so, which one?
 - b. Does this circuit comply with the **AC75 Class Rule**? If not, which rules are infringed by the arrangement, and how are those rules infringed?
2. Figure 2 shows a modification to Figure 1, whereby the **ECC** and **ILS** circuits are electrically grounded to the structure of the boat, in addition to being connected to the negative terminal of the power source.

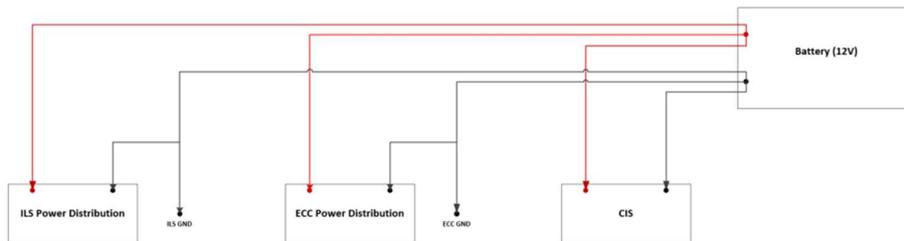


Figure 2

Does this circuit comply with the **AC75 Class Rule**? If not, which rules are infringed by the arrangement, and how are those rules infringed?

3. In figure 3, the separate circuits are additionally isolated from one another by the installation of isolated DC-DC converters, with the grounding points removed.

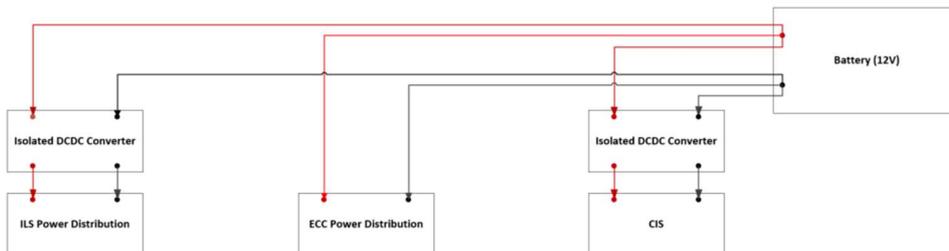


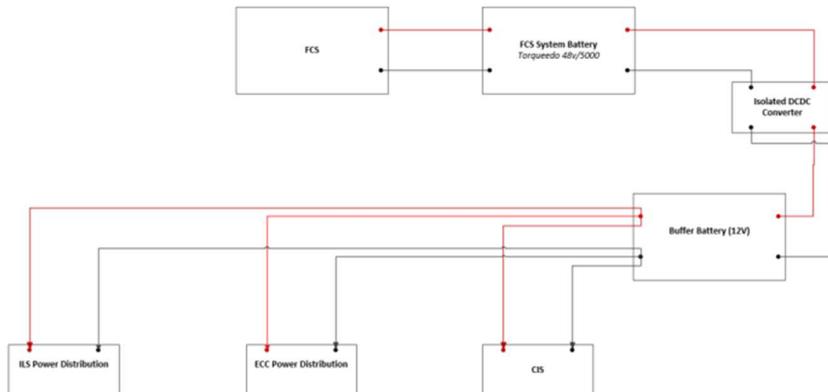
Figure 3

Does this circuit comply with the **AC75 Class Rule**? If not, which rules are infringed by the arrangement, and how are those rules infringed?

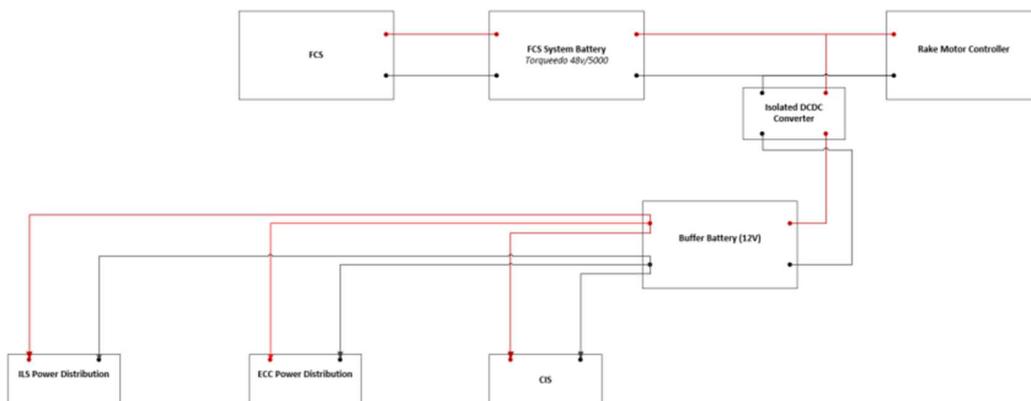
4. Figure 4 shows an alternative system. Power is taken from the **FCS** battery (as allowed by rule 27.8a) to power other systems, via a buffer battery. The specification of the isolated DC-DC converter is such that power can only flow from the **FCS** battery into the buffer battery.

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- Is the buffer battery considered a “battery or regulated power supply” as per rule 23.6?
 - If so, must this battery be a “specified battery model” per rule 27.7, or may it be selected by the **competitor** to suit the application?
 - Does this circuit comply with the **AC75 Class Rule**? If not, which rules are infringed by the arrangement, and how are those rules infringed?
 - Do the answers to question (c) change if the DC-DC converter allowed power to flow in both directions, rather than solely from the **FCS** battery to the buffer battery?
 - If the answer to question d above is “yes”, how and why do those answers change?
5. Figure 5 shows an additional arrangement fundamentally identical to that described in question 4, except that a component of the **ECC** (containing only **electric actuators** as permitted by rule 24.2) takes power directly from the 48V system. The specification of the isolated DC-DC converter is such that power can only flow from the **FCS** battery into the buffer battery.



- Does this circuit comply with the **AC75 Class Rule**? If not, which rules are infringed by the arrangement, and how are those rules infringed?
- Do the answers to question (a) change if the DC-DC converter allowed power to flow in both directions?
- If the answer to question b above is “yes”, how and why do those answers change?

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Interpretation:

The text in question 5 and figure 5 are inconsistent. The text describes the component of the **ECC** as “containing only electric actuators [...]”. The figure has the box labelled “Rake Motor Controller”, which includes control electronics. The answers below treat both as components of an **ECC**.

Answers:

1.
 - a. Yes. The battery is shared by the **CIS**, **ILS**, and **ECC**.
 - b. Yes.
2. No. If, as in figure 2 of the request for interpretation, the **ECC** and **ILS** have conductors to ground as a part of their wiring, then the **ECC** and **ILS** wiring are not isolated. Case grounded hardware such as motors and screens that are part of an **ECC** or **ILS** are not required to be isolated from the hull, but their wiring is.
3. Yes.
4.
 - a. Yes.
 - b. The buffer battery shown in figure 4 may be selected by the **competitor** to suit the application.
 - c. Yes.
 - d. Yes.
 - e. If the DC-DC converter allows any current to flow from the buffer battery to the **FCS** battery, the buffer battery “expands” the **FCS** battery and therefore is subject to Rule 27.7 and therefore the **FCS** specification.
5.
 - a. No. Rule 23.6 requires that **ECC** wiring be isolated. In figure 5, a component of the **ECC** has wiring that is not isolated. With the general arrangement shown, if the **ECC** component and the isolated DC-DC converter are each connected directly and independently to terminals on the **FCS** battery, rather than being interconnected as drawn, the circuit would comply.
 - b. No, because the wiring requirements laid out in answer 5.a. are not met. See also answer 4.e, above for additional constraints on this arrangement even if the wiring is modified as specified in answer 5.a.
 - c. Not applicable.

END