

21.October 2015

Input of Christoph Adam, WABCO to questions raised during the 4th meeting of GRRF IG MVC for further discussion at 5th meeting.

In red colour: Questions taken from OF's notes.

In black colour: comments and answers by C. Adam

Communication between vehicles:

- Debate on the necessity to define a router (repeater). There is no real need to define the technical solution of the trailer. Important that the trailer properly transmit the signals rearward and forward. Taking into account the loss of signals at each connection. This seems to be prescribed in ISO11992. Mr. Adam committed to check ISO11992 in this regard for the next meeting, in order to know whether and how it is necessary to define a router/repeater in UN R13, with the nature/type of messages to be transferred through the trailers. Agreement that the regulation does not address the technical solution, rather the functional performance from the truck to the last trailer.

Router

ISO 11992 is based on a point-to-point communication between 2 nodes, see ISO 11992-1. If more than 2 ECUs are to be connected to the CAN, this shall be done by adding nodes, which have the following tasks according to

ISO 11992-2, 6.3. Message routing

If there is no provision for a successor, the message routing function is not required.

To allow communication between towing and towed vehicles, a node shall be capable of

- *receiving messages from its predecessor and successor within the road train,*
- *identifying receiver(s) by the destination address (PDU 1 type messages) or the PDU format (PDU 2 type messages),*
- *routing all messages from its predecessor(s) to its successor(s) within the road train by sending them with the unchanged source address (SA) and destination address (DA) to its successor within a maximal delay time of $t_d = 13$ ms,*
- *routing all messages from its successor(s) to its predecessor(s) within the road train by sending them with the unchanged SA and DA to its predecessor within a maximal delay time of $t_d = 13$ ms.*

No particular technical solution is proposed or required by ISO 11992 for the message routing. In the case of the braking system of a modular vehicle combination it could be done by the trailer braking system ECU or by a router by the choice of the trailer manufacturer. If a trailer to be type approved as a towing trailer is developed, the trailer manufacturer has to take care by design, that the above mentioned requirements of ISO 11992 are fulfilled. In practice this usually means, the manufacturer will ask the supplier of the trailer braking system for an appropriate technical solution. Some systems are available on the market, working as additional routers, most (all?) of them being tested and approved according to the requirements of ISO 11992.

These routers take care to manage the tasks of ISO 11992-2, para 6.3. An additional requirement in UNECE R 13 is not necessary, as the CAN communication is already required to fulfill ISO 11992.

Repeater

A repeater is used to amplify a CAN signal between 2 ECUs, if the distance between them exceeds the values given by ISO 11992-1 (18 m in a trailer, 40 m total length).

UNECE R 13

UNECE R 13 requires in para 5.1.3.6., that an electric control line shall conform to ISO 11992-1 and 11992-2:2003 incl amendment 1:2007 and be a point-to-point type. ISO 11992 contains any necessary information and data that are required for a safe data connection and communication.

In 5.1.3.6.1. and 5.1.3.6.2. the support of messages and a procedure how to test that during the type approval are prescribed and reference the appropriate Annexes 16 and 17.
An additional requirement in UNECE R 13 is not necessary.

Power supply dimensioning:

- Debate on air transmission:
 - o on air dryer. Can be necessary in very cold countries, but not defined in current text of UN R13.
 - o Debate on the transmission of pressure: need to ensure that the last trailer is filled with sufficient air pressure, and soon enough for the normal operation of the vehicle at the 1st start.
 - o Conclusion: Annex 7 sufficiently covers this point.
- Electric supply: max current and consumption at the time of ignition, when there is a self-check of all valves and components. This cannot occur in practice in normal driving conditions. It may happen that the electric management system limit the electric power supply at the time of ignition, because the power supply is the battery during the time before the engine is running. A message to the driver is foreseen for this case. CLEPA (Mr. Adam) committed to cross check in ISO7638 the number of trailers possible with regard to the current provisions concerning the cross section of the wires, for EBS and ABS vehicles (paragraph 5.2.2.17.2.).

In ISO 7638 we find no hint to a restricted number of trailers to be connected to a modular vehicle combination. ISO 7638 does not even require a min cable square section, but requires the connector to be able to host max cable square sections.

In the past, when ABS systems became mandatory for heavy trailers, relatively high current values were consumed by the trailer brake system after ignition switch on (test cycling of all solenoid valves) or under extreme situations, e.g. all wheels locking at the same time on slippery roads followed by actuating all solenoid valves at the same time. But with introducing trailer EBS systems, an intelligent power management was introduced with a drastic reduction of both peak current values and electric power consumption with a tremendous saving effect.

To protect the other vehicles in a combination against a short circuit in one trailer, separate fuses are integrated in the router devices, which cut off the electric power in case of too high current values.

Stability:

- There was a debate on the general principle of the master/slave relation:
 - o The possibility that the last trailer informs that the speed is too high could be a good idea. Yet this could be understood as a command to activate the truck brakes
 - o There was a debate on the possibility to transfer the information of last trailer EVSC intervention to the front vehicles.
 - o Conclusion: technical impact and feasibility on trailers to be documented. CLEPA to provide input
- EVSC directional control
 - o No comment
- EVSC Mandatory or optional?
 - o Debate on possible unstable situation created by a last trailer not equipped with stability system.
 - o Pneumatic signal would anyway be transmitted to the last trailer.
 - o Conclusion: Mr. Adam to confirm at next meeting.

C. Adam to confirm: the pneumatic signal is always transmitted in parallel to the electric signal.

