Update: Developing test procedures for European eCall

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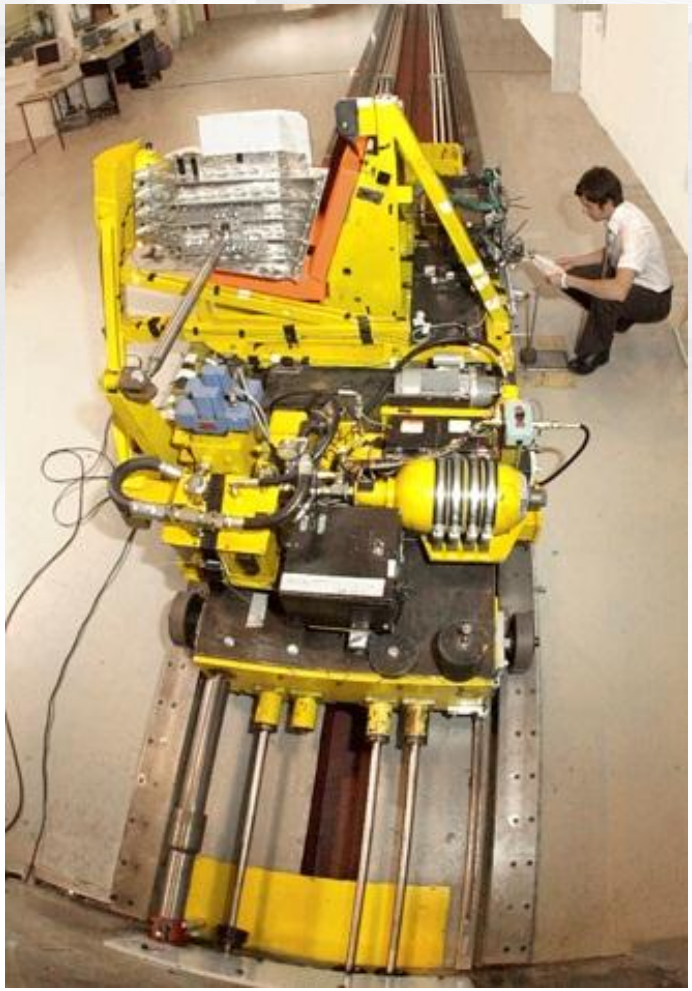
TRL - Transport Research Laboratory

- Established 1933, privatised in 1996
- 320+ staff
- Head office in Wokingham, Berkshire, UK
  - Offices in Scotland, Wales, Abu Dhabi, Qatar, Ethiopia
  - Project offices overseas
- Non profit distributing company
- Impartial and commercially independent transport research, consultancy and testing

TRL's involvement in eCall

- TRL recently completed a project for the European Commission (EC) regarding eCall type-approval: http://ec.europa.eu/DocsRoom/documents/5601/attachments/1/translations/en/renditions/native
- This project (eCall Phase 1) identified aspects that needed to be considered for the type-approval regulation of eCall In-vehicle Systems (IVS) and discussed options
- eCall Phase 2 is the follow-on project to support the EC with developing specific type-approval test procedures
- These will include test procedures for eCall in-vehicle systems (IVS) and vehicles containing these components

Task 1 – Resistance of eCall IVS to severe crashes

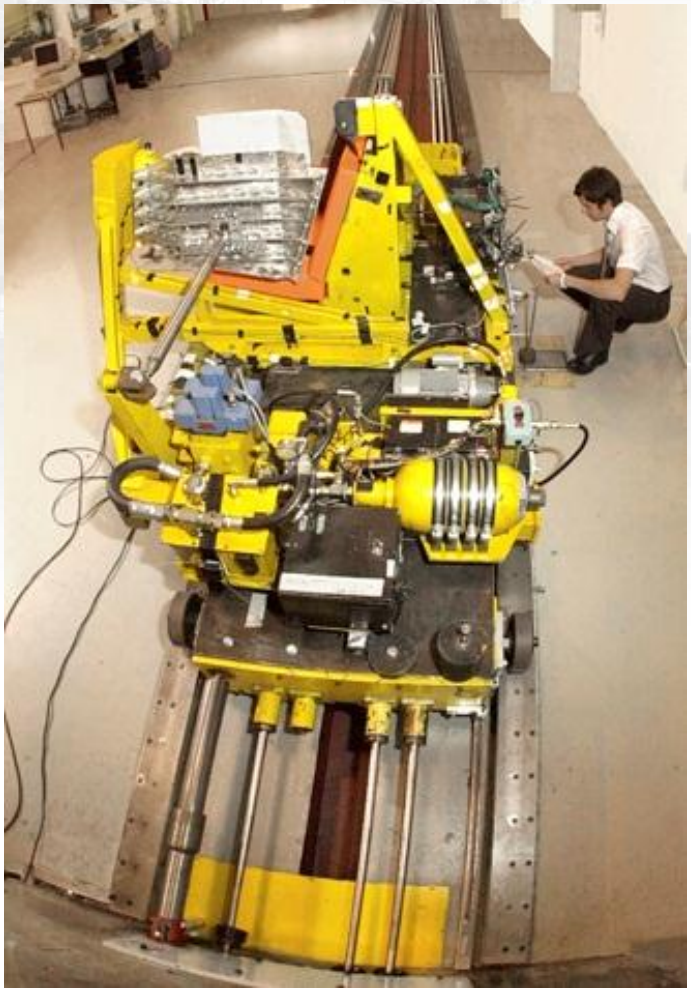


- Motivation
  - Demonstrate that the eCall In-Vehicle System (IVS) can withstand collisions of higher severity than experienced in full-scale crash tests.
  - Most reliable way would be in-situ testing in a new high severity full-scale crash test.
  - More cost-effective way is a high severity component-level test used in conjunction with the existing full-scale tests (UN R94 and UN R95).

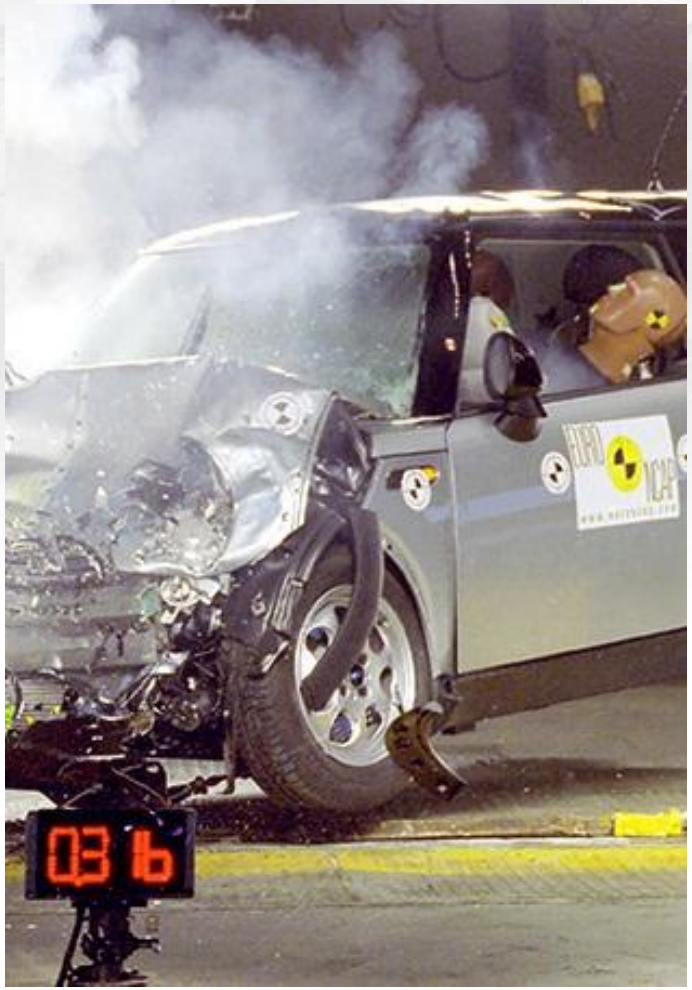
- Task
  - Develop a component-based deceleration test procedure for eCall IVS.
  - General outline: Expose the components under test to a defined deceleration for a defined period of time (using deceleration sled/drop rig).
  - Develop an operability check procedure to be performed after the deceleration test.

Task 1 – Resistance of eCall IVS to severe crashes (cont.)

- Approach
  - Define an appropriate severity level and deceleration corridor.
  - Define the components of an IVS that are required and feasible to include in a component test.
  - Define operability check procedure, pass/fail criteria and test equipment requirements.
  - Conduct testing to demonstrate the procedure.
- Output
  - Draft technical annexes 'Requirements' and 'Test procedure' for proposed European legislation.
- Current status
  - A draft deceleration corridor was presented at 7th UN AECS meeting.
  - Initial demonstration tests using vehicle telematics units completed and presented at 8th UN AECS meeting.
  - Acknowledged proposals and discussions at UN AECS working group meetings.



Task 2 – Full-scale crash test assessments

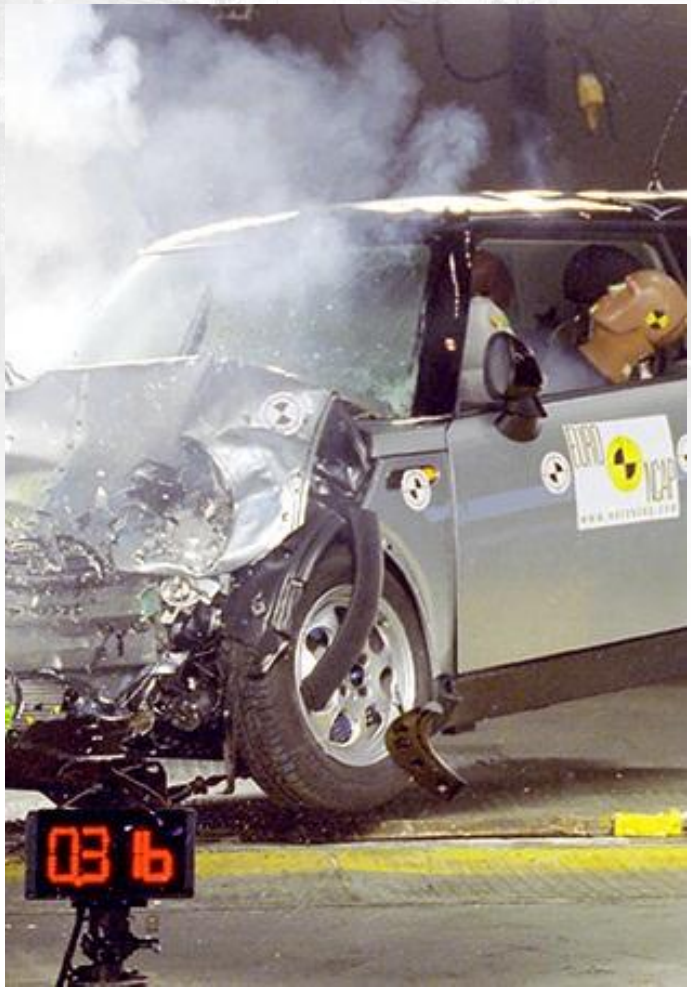


- Motivation
  - Ensure the survivability of the eCall system after a collision.
  - Assess all of the components in their final mounting situation and configuration in the vehicle.

- Task
  - Desk-based task.
  - Define a method to assess eCall systems in full-scale crash tests.
  - Minimize testing costs: Procedure to be carried out alongside UN R94 and UN R95 tests.
  - Assess the ‘safe-zone concept’ proposed at UN level.

Task 2 – Full-scale crash test assessments (cont.)

- Approach
  - Define how to integrate the steps necessary for eCall preparation, testing and operability assessment into existing full-scale tests.
  - Define necessary operational checks and specify pass/fail criteria and test equipment specifications.
  - Confirm with stakeholders that the defined procedure is fit for purpose to be carried out during full-scale crash tests.
- Output
  - Draft technical annexes 'Requirements' and 'Test procedure' for proposed European legislation.
- Current status
  - The draft procedure will involve automatic and manual test call to a PSAP simulator.
  - Options via mobile network (simulated, or live network using a long number) or wired connection.
  - Acknowledged UN proposals for Annex 6 (RUS) and Annex 8 (OICA) of AECS Regulation.



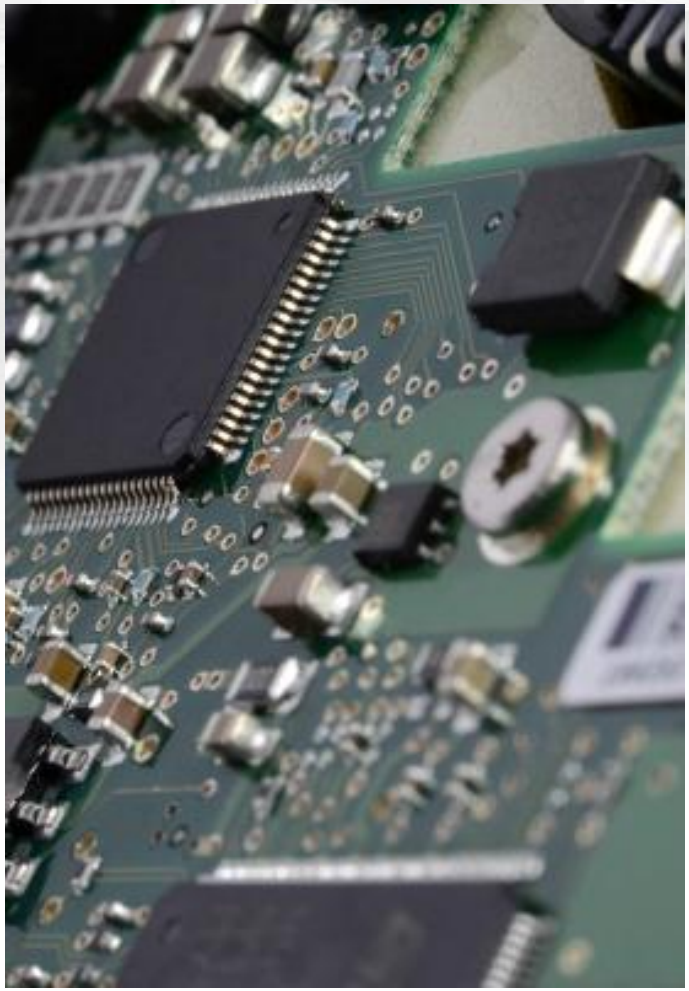
Task 3 – Crash resistance of audio equipment

- Motivation
  - To allow an eCall voice connection speaker(s) and microphone(s) need to survive a collision.
  - Survival of the audio equipment can be assessed alongside the full-scale crash tests.
- Task
  - Define an inspection procedure to be carried out after full-scale crash tests (UN R94 and UN R95).
  - The goal is to verify whether the components specified by the manufacturer to be used for eCall (i.e. the crash-hardened components) remained operable.

Task 3 – Crash resistance of audio equipment (cont.)

- Approach
  - Determine which aspects of the audio equipment need to be assessed and which level of operability is required.
  - Draft operability check procedure.
  - Confirm with stakeholders that the defined procedure is fit for purpose to be carried out after a full-scale crash test.
- Output
  - Protocol to be added to the technical annexes produced for Task 2 (Full-scale crash tests).
- Current status
  - The draft procedure will involve:
    - Performance assessment using a subset of ITU Recommendation P.emergency; or
    - Simplified comparison of performance pre- and post-crash (measurement of 'differential performance'); or
    - Subjective functionality assessment.

Task 4 – Co-existence of TPS

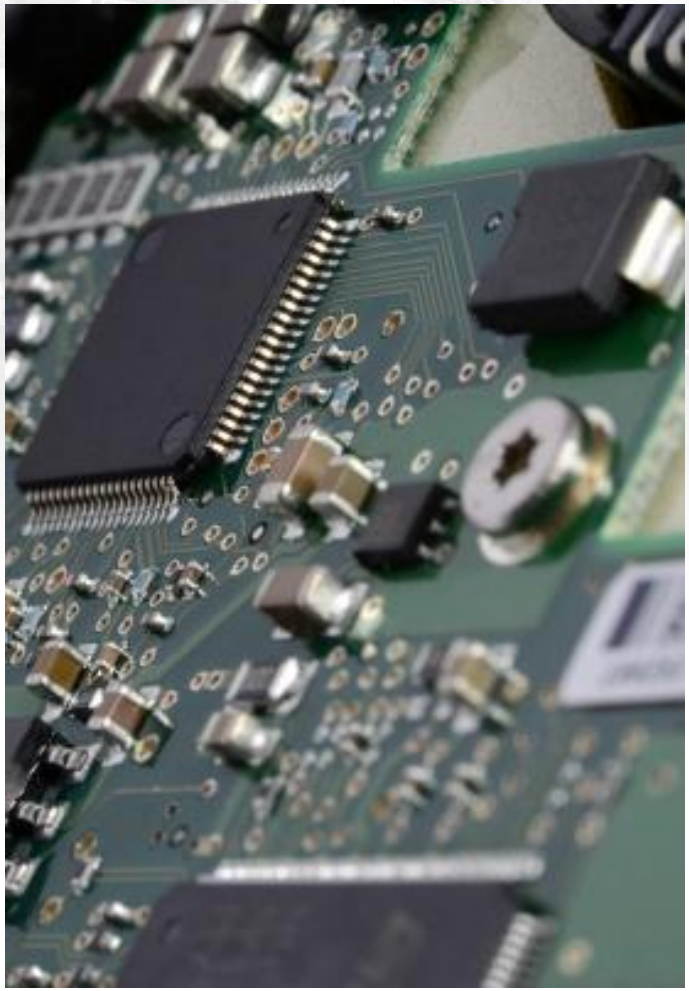


- Motivation
  - Third-Party Services (TPS) will allow offering value-added services to customers.
  - If the TPS-IVS should fail to make connection, it needs to switch to the 112-based eCall IVS.
  - Type-approval testing needs to facilitate systems which switch between one mode of operation and the other.

- Task
  - Only 112-based eCall functions will be mandatory, hence TPS-IVS will not be assessed.
  - Define a mechanism to demonstrate to the Technical Service that the TPS-IVS switches to the 112-based eCall IVS in case no connection to the TPSP can be established.
  - Demonstrate that a TPS service can be interrupted sufficiently to perform all of the necessary tests on 112-based IVS for type-approval.

Task 4 – Co-existence of TPS (cont.)

- Approach
  - Gather knowledge on switching function from technical experts (e.g. TPS-IVS suppliers).
  - Investigate suitable forms of documenting the automatic switch function towards the Technical Service.
  - Consider implications for the full-scale testing protocol and develop protocol to ensure successful testing of the 112-based systems.
- Output
  - Protocol to be added to the technical annexes produced for Task 2 (Full-scale crash tests).
- Current status
  - Assessment of switching function to 112-based system during full-scale test by preventing the TPS call from succeeding (e.g. non-reachable long number).
  - Potentially additional documentation to cover other TPS failures (e.g. in form of a fault tree analysis).



Task 5 – Automatic triggering mechanism

- Motivation
  - Latest draft of eCall Regulation: An automatic eCall should be triggered by a *"severe accident, detected by activation of one or more sensors or processors within the vehicle"*.
  - Awaits translation into a specific type-approval demonstration procedure.

- Task
  - Desk-based task
  - Derive a mechanism for manufacturers/suppliers to demonstrate to a Technical Service that their system will trigger in potentially injurious situations.
  - This could be a dossier of information provided to Technical Service; for example showing a link between airbag deployment and eCall triggering.

Task 5 – Automatic triggering mechanism (cont.)

- Approach
  - What information is sufficient as proof that automatic triggering requirements are fulfilled?
  - Prepare suggestion for required information.
  - Gather suggestions and opinions from stakeholders.
  - Convert into a working template for use in the type-approval process.
- Output
  - Template of information to be provided to the Technical Service.
- Current status
  - Triggering to be demonstrated in UN R94 and UN R95 tests.
  - Documentation of link between airbag and deployment and eCall triggering*: What information would be necessary and sufficient to convince a Technical Service of the link?

*Note: This shall not restrict automatic eCalls to operate only in collisions where an airbag deployed.

Task 6 – In-vehicle system (IVS) self-test

- Motivation
  - Vehicle user can detect malfunctions of the eCall system only with a self-test and a malfunction indicator.
  - The extent of the required self-test might influence the severity of other requirements.

- Task
  - Define a list of the components that need to be monitored by the self-test function.
  - Define the failure modes expected to be detected.
  - Define suitable paper-based declaration for the Technical Service to provide sufficient assurance that the self-test requirements are fulfilled.

Task 6 – In-vehicle system (IVS) self-test (cont.)

- Approach
  - Which components to include in the self-test and which failure modes to cover?
  - Prepare suggestion for components, requirements and required documentation.
  - Gather suggestions and opinions from stakeholders.
- Output
  - Template of information to be provided to the Technical Service.
- Current status
  - The draft procedure will involve a list of items that are required in the self-test where technically feasible.
  - Manufacturer would be expected to show which of these items is included in the self-test function and, if absent, provide justification as to why it wasn't technically feasible.
  - Acknowledged corresponding ERA-GLONASS requirements.

Thank you

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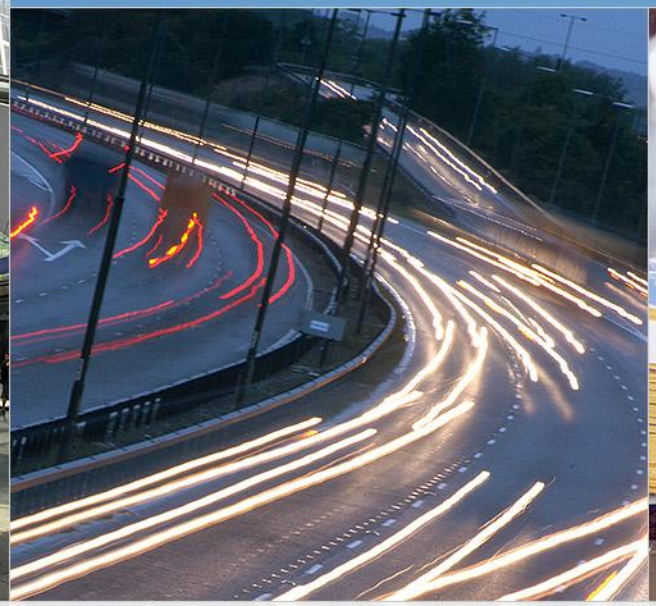

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