

Hand Held Extinguishers

Contaminated Halon 1211

Presented to: 2010 Triennial Conference

By: Harry Webster, Aerospace Engineer

Date: October 28, 2010



Federal Aviation
Administration



Background

- **All of the Halon 1211 currently installed in aircraft hand held fire extinguishers comes from recycled stock piles**
- **A major Halon recycler, LyonTech Engineering Ltd, in the United Kingdom has been accused of falsifying purity analysis**
- **Halon 1211, with varying types and amounts of contaminants has been installed in hand held extinguishers supplied by Fire Fighting Enterprises (FFE)**
- **Initial analysis indicated some extinguishers may contain less than 50% Halon 1211**
- **The contaminated extinguishers were installed on European aircraft, some on US carriers.**

EASA, FAA Airworthiness Directives

- **Specific batches of contaminated Halon 1211 were identified.**
- **EASA issued ADs to remove and replace any FFE extinguishers with less than 90% 1211, remaining extinguishers to be removed at a later date**
- **FAA issued AD to remove all affected extinguishers**

FAA Contaminated Halon Tests

- **The FAA Tech Center Fire Safety Team was requested to evaluate the fire fighting effectiveness and potential toxicity hazard of 90% Halon 1211 / 10% contaminant hand held fire extinguishers.**
- **Extinguishers were prepared using 90/10 mixtures Halon 1211 and R12, R11, R141b and R600a. These were selected based on potential toxicity and flammability**
- **The R600a test was repeated using a 50% 1211 and 50% R600a (isobutane)**

Test Method

- **A modified version of the Hand Held Extinguisher Minimum Performance Standard was employed**
- **Seat Fire Test: Simulated triple seat fire, primed with 50ml of gasoline, preburn time 35 seconds**
- **Remote actuated and controlled extinguisher**
- **Toxic gas measurement by gas absorption tube and FTIR. Phosgene gas by colormetric badge.**
- **Hidden Fire Test: Measures the flooding characteristics on the Halon 1211 mixture**

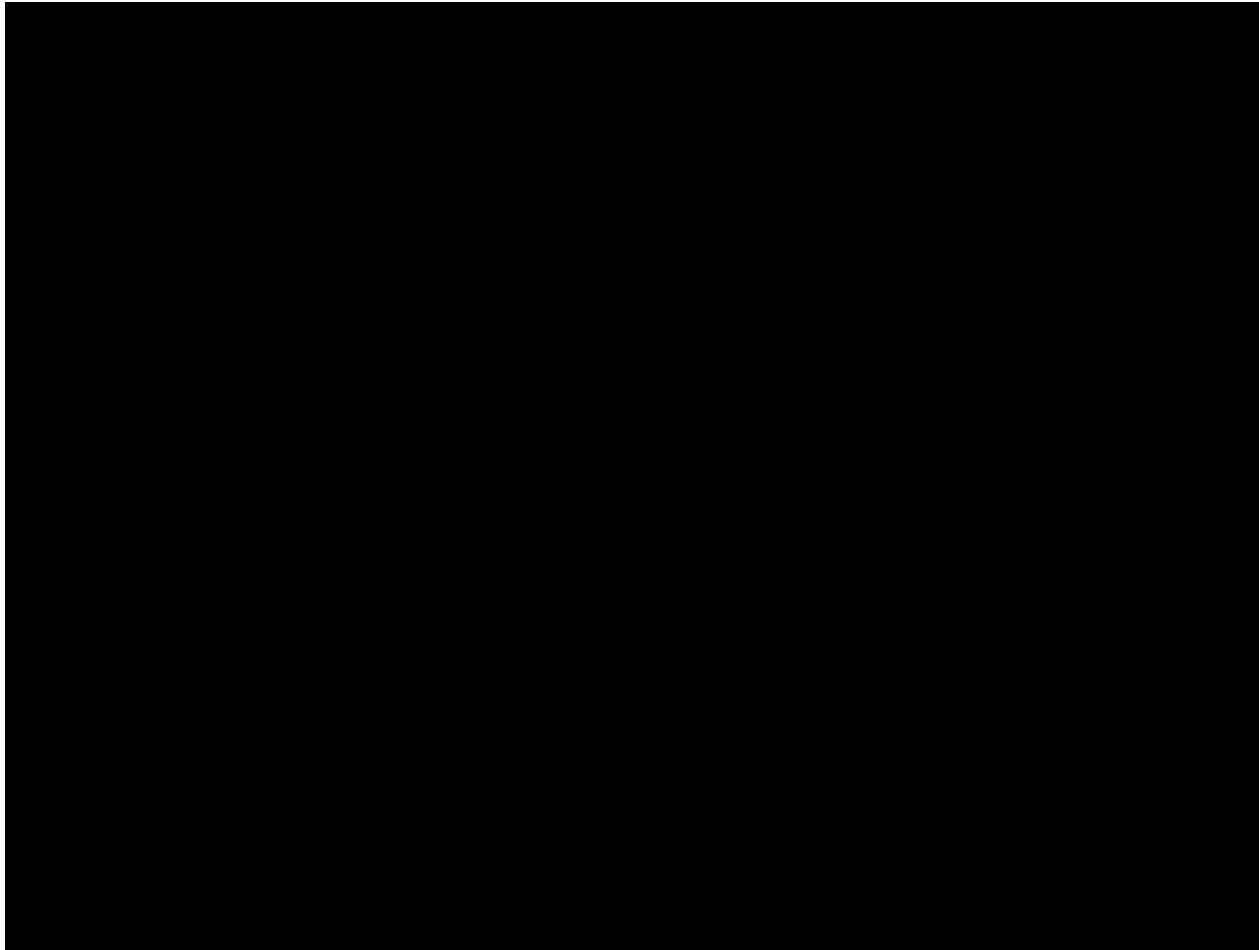
Seat Fire Test



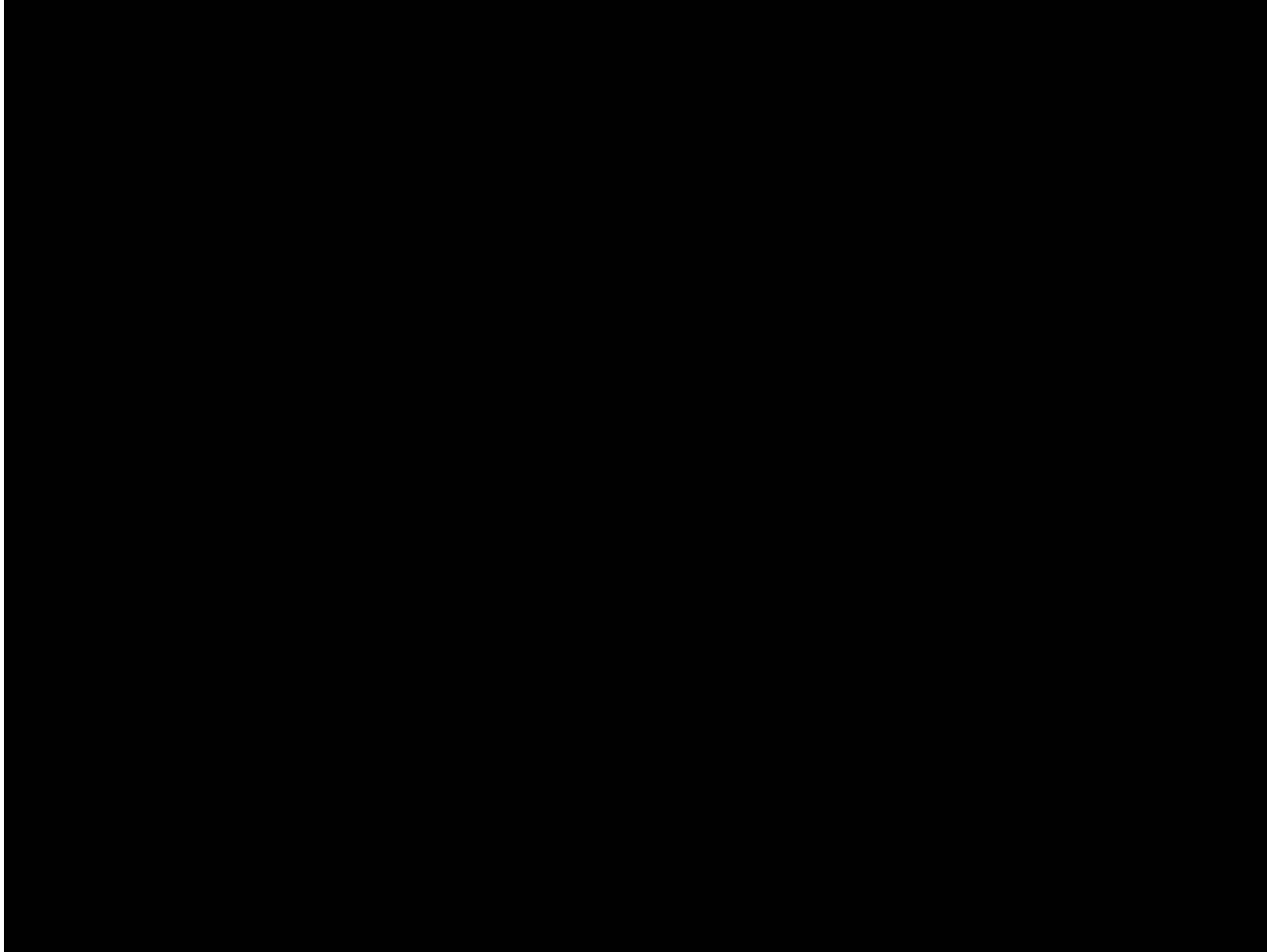
Remote Extinguisher Controller



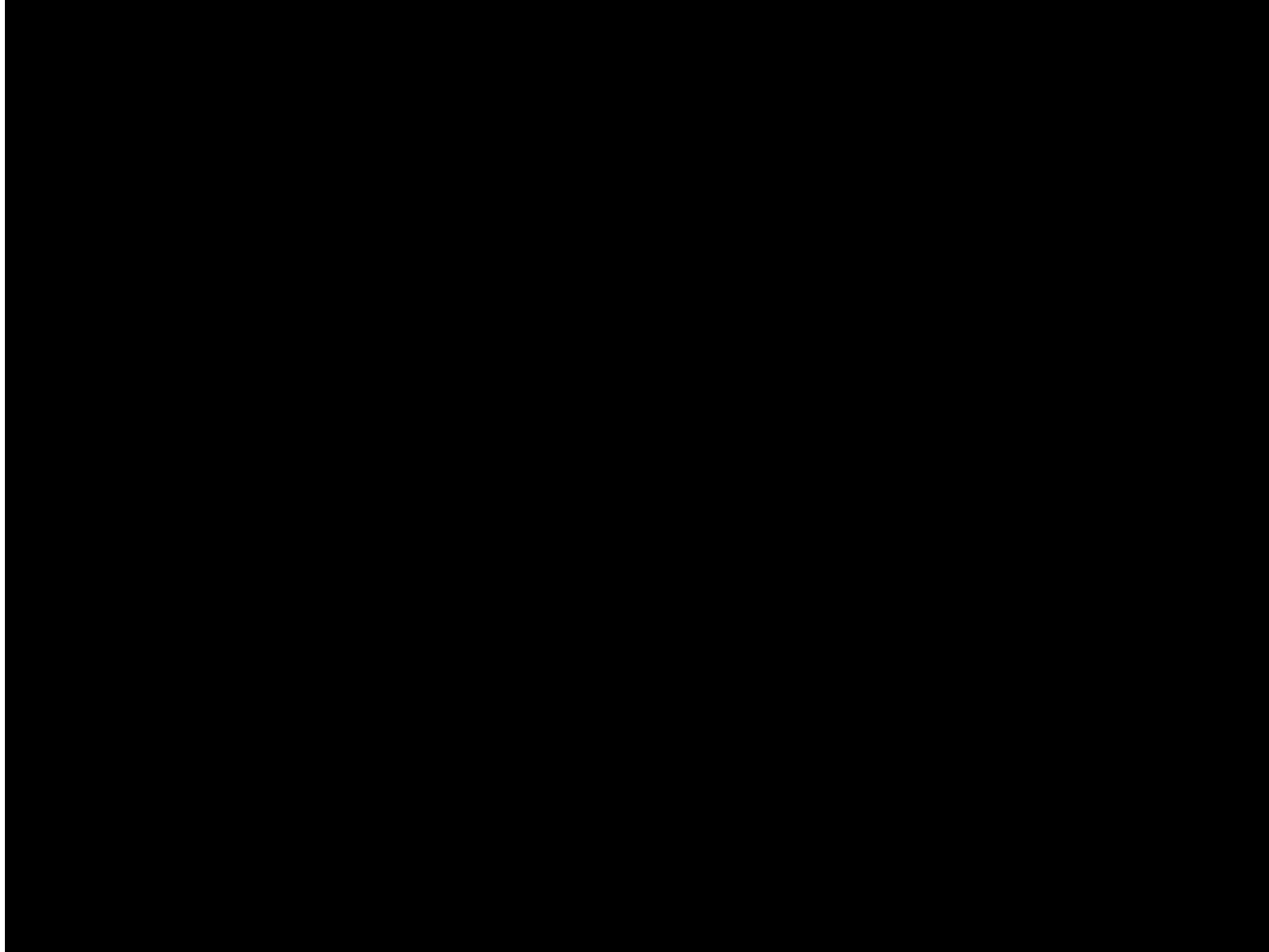
Pure Halon 1211, Seat Fire Test



90% Halon 1211 / 10% R600a



50% Halon 1211 / 50% R600a



Hidden Fire Test



Hidden Fire Test



Hidden Fire Test

90%1211 / 10%R12



Results

- **Seat Fire Test:**
 - All of the 90/10 mixtures were effective in extinguishing the triple seat fire
 - The 50/50 R600a mixture failed and actually increased the fire intensity
- **Hidden Fire Test**
 - All of the 90/10 mixtures were at least as effective as pure Halon 1211
 - The 50/50 R600a was not tested
- **Toxicity**
 - Analysis pending

Future Tests

- **The full MPS is currently being set up in the TC-10**
- **Boeing has requested that we test BTP as a hand held 1211 replacement**
- **Time permitting, 3M NOVEC 1230 may also be evaluated.**