

Jammertest 2022 - Transmission plan

| Session | Transmissions | Comments |
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| Session 1 | | |
| Monday (14.00-18.00) | <p><u>Tests of low effect jammers (1. l.j.a)</u></p> <p><u>Stationary jammers</u></p> <p>Single band jammers</p> <ul style="list-style-type: none"> ● 14:00-14:10 – Placement tests ● 14:10 – Jammer 1 (inside car) ● 14:11 – Jammer 2 (inside car) ● 14:12 – Jammer 3.1 (inside car) ● 14:13 – Jammer 3.2 (inside car) ● 14:14 – Jammer 6.1 (inside car) ● 14:15 – Jammer 6.2 (inside car) ● 14:16 – Jammer 7.1 (inside car) ● 14:17 – Jammer 7.2 (inside car) ● 14:18 – Jammer 8.1 (inside car) ● 14:19 – Jammer 8.2 (inside car) ● 14:20 – Jammer 8.3 (inside car) ● 14:21 – Jammer 8.4 (inside car) ● 14:22 – Jammer 10 (inside car) ● 14:23 – Jammer 11 (inside car) ● 14:24 – Jammer 12 (inside car) ● 14:25 – Jammer 13 (inside car) ● 14:30 – Jammer 1 (outside car) ● 14:31 – Jammer 2 (outside car) ● 14:32 – Jammer 3.1 (outside car) ● 14:33 – Jammer 3.2 (outside car) ● 14:34 – Jammer 6.1 (outside car) ● 14:35 – Jammer 6.2 (outside car) ● 14:36 – Jammer 7.1 (outside car) ● 14:37 – Jammer 7.2 (outside car) ● 14:38 – Jammer 8.1 (outside car) ● 14:39 – Jammer 8.2 (outside car) ● 14:40 – Jammer 8.3 (outside car) ● 14:41 – Jammer 8.4 (outside car) | <p>Need a thorough log for different time stamps for each jammer</p> <p>Use the same car and note down the position of the jammer and the type of car</p> <p>For an overview of the different jammers, see 'Jammer overview – frequency bands and modulations'</p> |

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| | <ul style="list-style-type: none"> ● 14:42 – Jammer 10 (outside car) ● 14:43 – Jammer 11 (outside car) ● 14:44 – Jammer 12 (outside car) ● 14:45 – Jammer 13 (outside car) <p>Dual band jammers</p> <ul style="list-style-type: none"> ● 15:00 – Jammer 4.1 (inside car) ● 15:01 – Jammer 4.2 (inside car) ● 15:02 – Jammer 5.1 (inside car) ● 15:03 – Jammer 5.2 (inside car) <ul style="list-style-type: none"> ● 15:10 – Jammer 4.1 (outside car) ● 15:11 – Jammer 4.2 (outside car) ● 15:12 – Jammer 5.1 (outside car) ● 15:13 – Jammer 5.2 (outside car) <p>Multi band jammers</p> <ul style="list-style-type: none"> ● 15:20 – Jammer 9 (inside car) ● 15:21 – Jammer 14 (inside car) <ul style="list-style-type: none"> ● 15:25 – Jammer 9 (outside car) ● 15:26 – Jammer 14 (outside car) | |
| | <i>Half hour break – 15:30 to 16:00</i> | |
| | <p><u>High effect jammer (Cemetery)</u></p> <ul style="list-style-type: none"> ● 16:00 - L1 CW ● 16:15 - L1 PRN ● 16:30 - L1, G1 CW ● 16:45 - L1, G1 PRN ● 17:00 - L1, G1, L2 CW ● 17:15 - L1, G1, L2 PRN ● 17:30 - L1, G1, L2, L5 CW ● 17:45 - L1, G1, L2, L5 PRN | <p>Directional antenna (right hand circular polarization) at maximum output (20 W EIRP)</p> <p>10 minutes jamming sessions with 5 minutes breaks to change set-up(s)</p> |
| | <p><u>Long-time jamming with low effect jammer (2. l.j.a.)</u></p> <p>16:00-17:30 (Jammer 9)</p> | |
| <p>Session 2</p> <p>Tuesday</p> <p>(09.00-13.00)</p> | | |

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| | <p><u>Power ramp tests</u></p> <p>100 dB (reduction) – 10 seconds</p> <p>98 dB – 10 seconds</p> <p>...</p> <p>2 dB – 10 seconds</p> <p>0 dB – 10 seconds</p> <p>2 dB – 10 seconds</p> <p>...</p> <p>98 dB – 10 seconds</p> <p>100 dB – 10 seconds</p> <ul style="list-style-type: none"> ● 09:10 - Ramp 1: L1 CW ● 09:40 – Ramp 2: L1 PRN ● 10:10 – Ramp 3: L1, G1, L2, L5 CW ● 10:40 – Ramp 4: L1, G1, L2, L5 PRN | <p>2 nW to 20 W EIRP (100 dB dynamics)</p> <p>16.5 minutes in total with transmissions for each test. However, each change will require a few moments</p> |
| | <p>Half hour break – 11:00 to 11:30</p> | |
| | <p><u>Power ramp tests</u></p> <ul style="list-style-type: none"> ● 11:30 - L1, L5, E5b CW ● 12:00 - L2, L5, G2, E5b CW ● 12:30 - L2, L5, G2, E5b PRN | <p>16.5 minutes in total for each ramp test</p> |
| <p>Session 3</p> <p>Tuesday</p> <p>(14.00-18.00)</p> <p><i>Driving Bleik community house (‘Samfunnshuset’) – Grunnvatnet allowed</i></p> | <p><u>Long time, high effect jamming</u></p> <ul style="list-style-type: none"> ● 14:00 – L1 CW ● 14:30 – L1 PRN ● 15:00 – L1, G1, L2, L5 CW ● 15:30 – L1, G1, L2, L5 PRN | <p>20 W EIRP in 20 minutes sessions</p> |
| | <p>Half hour break – 16:00 to 16:30</p> | |
| | <p><u>Pyramid</u></p> <p><i>Everything with PRN</i></p> | <p>3 minutes jamming sessions with 2</p> |



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| | <p>Start 16:30</p> <ul style="list-style-type: none"> ● E5b ● Eb5, L5 ● E5b, L5, G2 ● E5b, L5, G2, L2 ● E5b, L5, G2, L2, B1l ● E5b, L5, G2, L2, B1l, G1 ● E5b, L5, G2, L2, B1l, G1, L1 ● E5b, L5, G2, L2, B1l, G1 ● E5b, L5, G2, L2, B1l ● E5b, L5, G2, L2 ● E5b, L5, G2 ● E5b, L5 ● E5b | <p>minutes breaks to change set-up(s)</p> <p>Effect: 10 W</p> |
| <p>Session 4</p> <p>Wednesday</p> <p>Part 1</p> <p>(09.00-13.00)</p> <p><i>Driving Bleik community house – Grunnvatnet allowed</i></p> | <p><u>Long time, high effect jamming</u></p> <ul style="list-style-type: none"> ● 09:10 – L1 CW ● 09:30 – L1 PRN ● 09:50 – L1, G1, L2, L5 CW ● 10:10 – L1, G1, L2, L5 PRN <p>Half hour break – 10:30 to 11:00</p> <p><u>Low-effect jammers</u></p> <p>11:00-11:30 - Preparation for vehicle test type 2 (inline jammer)</p> <p>11:30-11:55 – Driving from <i>cemetery</i> to Grunnvatnet</p> <ul style="list-style-type: none"> ● 11:30 – platoon 1 – SBJ (L1) ● 11:35 – platoon 2 – DBJ (L1, L2) ● 11:40 – platoon 3 – Jammer 9 | <p>5 til 20 W EIRP in 15 minutes sessions</p> <p>Here the idea is to create an environment in which it is possible to move in and out of jammed areas</p> <p>It is necessary to choose which single band jammer (SBJ) and dual band jammer (DBJ) to pick for these driving tests. Use experience from earlier in the week to decide this.</p> |



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| | <p>11:50-12:30</p> <p>Quick turn around and grace period (5 min to get systems to get position again)</p> <p>Change vehicle roles and do smaller and other changes based on experiences from first platoon</p> <p>12:30-12:50 – Driving from Bauktua to <i>cemetery</i></p> <ul style="list-style-type: none"> ● 12:30 – platoon 1 – Jammer 9 ● 12:35 – platoon 2 – SBJ (L1) ● 12:40 – platoon 3 –DBJ (L1, L2) | <p>It is necessary to keep a log from the driving tests to document when jammers were used, at to note done the results from each vehicle</p> |
| <p>Session 4</p> <p>Wednesday</p> <p>Part 2</p> <p>(09.00-13.00)</p> | <p><u>“Jammer playground” at 2. l.j.a.</u></p> <p>Jammers not in use in part 1 are brought to Grunnvatn for a loose test session.</p> <p>Driving allowed in the vicinity of Grunnvatn.</p> | |
| <p>Session 5</p> <p>Wednesday</p> <p>Part 1</p> <p>(14.00-18.00)</p> | <p>14:15-14:40 – Driving from <i>cemetery</i> to Bauktua</p> <ul style="list-style-type: none"> ● 14:15 – platoon 1 – DBJ (L1, L2) ● 14:20 – platoon 2 – Jammer 9 ● 14:25 – platoon 3 – SBJ (L1) <p>14:50-15:05</p> <ul style="list-style-type: none"> ● Vehicle with jammer drives from Samfunnshuset to Bauktua and passes the platoon. ● All other vehicles start from Bauktua towards Samfunnshuset. <p>15:10 – 15:25</p> <ul style="list-style-type: none"> ● Vehicle with jammer drives from Bauktua to Samfunnshuset and passes the platoon. ● All other vehicles start from Samfunnshuset towards Bauktua. <p>15:30 – 16:30</p> <ul style="list-style-type: none"> ● Place one jammer in vehicle parked between Samfunnshuset and Bauktua and other vehicles pass it | <p>Use experience from earlier driving tests to choose which jammer is most applicable for these driving tests</p> |



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| <p><i>Driving allowed in the vicinity of Bleik community house ('Samfunnshuset').</i></p> | <p>16:30-18:00 - Static testing of small jammers with vehicles at Samfunnshuset</p> | |
| <p>Session 5 Wednesday Part 2 (14.00-18.00)</p> | <p><u>"Jammer playground" at 2. l.j.a.</u> Jammers not in use in part 1 are brought to Grunnvatn for a loose test session. Driving allowed in the vicinity of Grunnvatn.</p> | |
| <p>Session 6 Thursday (09.00-13.00)</p> <p><i>Driving allowed in the vicinity of Bleik community house ('Samfunnshuset')</i></p> | <p><u>Simple spoofing</u> See Annex 1.</p> | |
| <p>Session 7 Thursday (14.00-18.00)</p> <p><i>Driving allowed in the vicinity of Bleik community house ('Samfunnshuset')</i></p> | <p><u>Advanced spoofing</u> See Annex 2</p> | |
| <p>Session 8 Friday (09.00-13.00)</p> <p><i>Driving Bleik community house – Grunnvatnet allowed</i></p> | <p>Rest tests and new ideas. Demonstrations of tests which turned out to be demonstration worthy. Fill in during the test week</p> | |

Annex 1

| Simple spoofing | | | | | | | | | |
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| Initial conditions | | | | | | | | | |
| Signals | Eph | Pos | Time | Initial jamming | Continous jamming | Scenario | Estimated start | Estimated duration | Comments |
| GPS L1 C/A Galileo E1 | Simulated | False | False | None | None | Static position | 0900 | ~1 hour | Initial capability tests. Running continous, change jamming during run. |
| | Simulated | False | False | All bands/signals | All except L1/E1 | Static position | | | |
| | | | | | G1 | Static position | | | |
| | | | | | None | Static position | | | |
| | Simulated | True | False | All bands/signals | All except L1/E1 | Jump in position | 1000 | ~15 min | If time, repeat with variations in jamming conditions |
| | Simulated | True | False | All bands/signals | All except L1/E1 | Static position (up to 15 min) + Motion | 1020 | 20-30 min | |
| | Simulated | True | True (< 30 seconds off) | All bands/signals | All except L1/E1 | Static position (up to 15 min) + Motion | 1055 | 20-30 min | |
| | Simulated | False | True (< 30 seconds off) | All bands/signals | All except L1/E1 | Static position, jump in time | 1130 | ~15 min | |
| | Simulated | False | True (< 30 seconds off) | All bands/signals | All except L1/E1 | Static position, drift in time (frequency step) | 1145 | 20-30 min | |
| Simulated | True | True (< 30 seconds off) | All bands/signals | All except L1/E1 | Static position, jump in time | 1215 | ~15 min | | |
| Simulated | True | True (< 30 seconds off) | All bands/signals | All except L1/E1 | Static position, drift in time (frequency step) | 1230 | 20-30 min | | |

Annex 2

| Advanced spoofing | | | | | | | | | |
|--------------------------|------|------|--------------|-------------------|-------------------|--|-----------------|--------------------|----------------------------|
| Initial conditions | | | | | | | | | |
| Signals | Eph | Pos | Time | Initial jamming | Continous jamming | Scenario | Estimated start | Estimated duration | Comments |
| GPS L1 C/A Galileo E1 | True | True | Synchronised | All bands/signals | All except L1/E1 | Static position + motion | 1400 | 20-30 min | |
| | True | True | Synchronised | All bands/signals | None | Static position + motion | 1430 | 20-30 min | |
| | True | True | Synchronised | None | None | Static position + motion | 1500 | 20-30 min | |
| | True | True | Synchronised | All bands/signals | All except L1/E1 | Static position + drift in time (frequency step) | 1530 | 20-30 min | |
| | True | True | Synchronised | All bands/signals | None | Static position + drift in time (frequency step) | 1600 | 20-30 min | |
| | True | True | Synchronised | None | None | Static position + drift in time (frequency step) | 1630 | 20-30 min | |
| | True | True | Synchronised | All bands/signals | All except L1/E1 | Inject leap second | 1700 | 15 min | |
| | True | True | Synchronised | All bands/signals | All except L1/E1 | Remove leap second | 1715 | 15 min | |
| | True | True | Synchronised | All bands/signals | All except L1/E1 | Static position + time step (1-100 μ s) | 1730 | 30 min | Performed in several steps |