

<b>Title of lesson</b>	<b>Introducing, through practical experience and discussion, the fundamentals of radio transmission, reception, propagation and health &amp; safety.</b>		
<b>Module theme</b>	<b>BSW – session 1</b>	<b>Date &amp; time</b>	TBC
<b>Class background</b>	Y12/13. Studying at A-level equivalent, but in a variety of subjects so no assumptions will be made about previous knowledge or understanding.		
<b>Lesson focus</b>	Using the practical example of <b>building</b> a radio station: <ul style="list-style-type: none"> <li>• <b>know</b> the significance of standing waves and reflected power, modulation, transceiver architecture, AMU and VSWR, the value of the ionosphere and propagation</li> <li>• <b>understand</b> basic High Frequency (HF) science and technology, including the nature of AC electricity, electromagnetic radiation, EMC and interference</li> <li>• be able to <b>apply</b> and explain feeders, basic antenna concepts, and the importance of UTC and different local time zones when making contacts</li> <li>• be able to <b>evaluate</b> station design and its operation through use, health and safety (including EMF, lightning and erection of antenna).</li> </ul>		
<b>Prior knowledge</b>	None assumed		
<b>Success criteria</b>	<b>All</b> will follow the session and take an active part in it. <b>Most</b> will enjoy the session <b>Some</b> will be able to explain to others what has been going on during the demonstration (session 2).		

**Links to UTCSD Student Leaver Profile**

<b>Core Skills</b>	<b>Professional &amp; Career experiences</b>	<b>Academic &amp; Technical knowledge</b>
<p><b>Communicate</b> through the radio at a long distance including dealing with foreign languages and different cultures, including noting different time zones.</p> <p><b>Collaborate</b> Working as a team, under direction, to construct the equipment.</p> <p><b>Persevere</b> while trying to contact a distant radio station</p> <p><b>Reflect</b> on how well the station works and what would be needed to improve it.</p>	<p><b>Gain qualifications</b> All work will lead to Foundation amateur radio licence.</p> <p><b>Opportunity in partnership with outside agencies</b> Working with the RSGB and Ofcom and understanding their requirements.</p> <p><b>A new experience</b> Opening up another experience.</p>	<p>Gaining the technical knowledge to put together a radio station, including working directly with:</p> <ul style="list-style-type: none"> <li>• propagation and resonance at HF;</li> <li>• Voltage Standing Wave Ratio (VSWR);</li> <li>• awareness of speed of light, wavelength and frequency calculations;</li> <li>• Electromagnetic Compatibility;</li> <li>• understanding the units necessary for a radio station;</li> </ul>

<p><b>Respect</b> the equipment and its value, and H&amp;S considerations.</p>		<p>Being aware of new (to them) H&amp;S requirements concerning Radio Frequency Electromagnetic Fields (EMF).</p>
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Outline of lesson		
Event	Content	Timing
<p><b>Introduction</b></p>	<p><b>Introduction to the equipment we have in front of us and their functions:</b></p> <ul style="list-style-type: none"> <li>• power supply</li> <li>• transceiver</li> <li>• AMU</li> <li>• feeder</li> <li>• antenna</li> </ul> <p>Discussion of what each does, and how it does it, concentrating on power supply (why this is necessary – H&amp;S etc), transceiver (block diagram), AMU (including an explanation of VSWR), feeder issues. The antenna will be covered in depth in the development.</p> <p><b>Introduction to general concepts:</b></p> <ul style="list-style-type: none"> <li>• HF (non-ionising) radiation</li> <li>• propagation and ionosphere (D, E F1, F2 layers), skip distance, sky and ground wave</li> <li>• dipole and polarisation</li> </ul> <p>H&amp;S (especially EMF) and methods of calculating antenna exclusion zone.</p>	<p>30-45 minutes</p>
<p><b>Development</b></p>	<p><b>Build and check the antenna system</b></p> <p>Introduce the parts of the antenna system:</p> <ul style="list-style-type: none"> <li>• Mast: purpose, how it locks, reason for backup “keep-up” clamps, separators</li> <li>• Radiating elements: length (1/4 wave), relationship to wavelength and frequency</li> <li>• Radials and their purpose</li> <li>• Bungees and guy lines</li> <li>• Exclusion zone and why (EMF)</li> <li>• Elements and frequencies.</li> </ul> <p>What we will be doing outside. Allocate duties. Responsibilities (especially during erection).</p> <p>Build antenna and run feeder</p>	<p>15 minutes</p> <p>15 minutes</p> <p>30 minutes</p>

	<p>Check VSWR (using Nano Network Vector Analyser) Consider matching – will the AMU cope? Why might it be different from expectation?</p> <p><b>Does it work?</b></p> <p>Try for test contacts. Logging. SSB, voice and data modes – principles including automatic logging (note the use of UTC and the importance of local time) and for data modes additional equipment necessary and the importance of close synchronisation with UTC for FT4 and FT8 exchanges.</p>	15 minutes
<b>Close</b>	<p><b>What's next?</b></p> <p>Operating procedure – Ofcom rules for supervision What can and can't be said on the air – Communications Law Call signs and SES call (GB0UTC) NATO alphabet and why</p> <p>Who's going to do what in session 2?</p>	Remainder of session