This is GB1SS listening and standing by.....

Can you answer Tims’ call with amateur radio?
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INTRODUCTION

Tim Peake and the Principia Mission to the International Space Station

Tim Peake will become the first British ESA astronaut when he starts his journey to the International Space Station in November 2015. This represents a unique opportunity to reach out to students all over the UK and help inspire them to become the next generation of scientists, engineers and mathematicians.

The UK Space Agency, with the assistance of ARISS, AMSAT-UK and the Radio Society of Great Britain (RSGB) have a limited number of opportunities for schools across the whole of the United Kingdom to speak to Tim whilst he is on orbit in the International Space Station. These opportunities are enabled by the ARISS (Amateur Radio on the International Space Station) program and involve the use of amateur radio stations that are established in schools and which link directly to the ISS as it passes overhead, at a speed of 17,500 miles per hour. Each contact lasts approximately ten minutes and leaves those involved with a lifelong memory of a truly outstanding event.

What is ARISS?

Amateur Radio on the International Space Station (ARISS) is a cooperative venture of the Radio Amateur Satellite Corporation (AMSAT), the American Radio Relay League (ARRL), the National Aeronautics and Space Administration (NASA) in the United States, ESA in Europe and other international space agencies and international amateur radio organizations around the world, including AMSAT-UK and the Radio Society of Great Britain (RSGB). The primary purpose of ARISS is to organize scheduled contacts via Amateur Radio between crew members aboard the International Space Station (ISS). With the help of experienced amateur radio volunteers and coordination from the ARISS team, the ISS crew members speak directly with large group audiences in a variety of public forums such as school assemblies, science centres and museums, Scout camporees, jamborees and space camps, where students, teachers, parents, and communities learn about space, space technologies and Amateur Radio.

The goals of the ARISS Amateur Radio program include:

- Inspire an interest in science, technology, engineering and mathematics (STEM) subjects and in STEM careers among young people.
- Provide an educational opportunity for students, teachers and the general public to learn about space exploration, space technologies and Amateur Radio as preparation for the event.
- Provide an opportunity for amateur radio experimentation and evaluation of new technologies.
What is an organised ARISS Amateur Radio Contact?
An ARISS Amateur Radio contact is an opportunity for students and teachers to interact with the crew aboard the International Space Station (ISS) through a question and answer session. ARISS contacts are conducted using amateur radio.

Scheduled ARISS Amateur Radio contacts are usually conducted either by direct contact or telebridge contact. For ARISS Contacts during the Tim Peake Principia mission, these contacts will be “Direct” – by this ARISS UK will, at the selected establishments, provide the all the necessary radio equipment (for example, low earth orbit satellite tracking antennas, radios), establishing a fully functional satellite earth station and some of the most nationally and internationally recognised amateur radio operators to ensure the best possible outcome.

ARISS Amateur Radio contacts are large-scale, public events and are ideal for a variety of forums such as school assemblies, science centres and museums, scout jamborees and camps.
It is important to understand that, although approximate details of when an ARISS Amateur Radio contact will occur may be known several weeks ahead of time, the final confirmation of the scheduled contact occurs with only seven or so days’ notice. This time period is dictated by the NASA planning cycle and is not alterable.

What is involved?
Schools that wish to be considered for one of these limited opportunities are asked to host a two day event which is aimed at exploring space and STEM activities related to space as well as activities related to Tim Peakes’ Principia mission.
It is expected that the hosting school would provide outreach to other schools in the geographical area that they are based, as well as primary schools and other schools of special interest.
A typical breakdown of the two days would be as follows:-

**Day 1**
On the first day there would be a number of activities taking place. The idea of these activities would be to explore space related topics, take part in exercises that are based on the outreach programs that Tim Peakes’ Principia mission have championed, or even receive data from educational satellites and interpret it once received and decoded. There is also scope for schools to display the work that they have been involved in and to explain to visitors and other schools, what they have been learning about.
There will also be a group of personnel from ARISS UK who will be bringing a significant amount of equipment on site for the purpose of the live contact that would occur on Day 2. The ARISS personnel will spend most of the first day setting this equipment up, testing it and starting the rehearsals for the contact with the pupils asking the questions to Tim Peake.
Day 2

Day 2 is similar in context to Day 1, possibly allowing for a larger/different number of schools to take part in the activities.

An important element of Day 2 will be the live contact (the “ARISS Amateur Radio Contact”) that would take place with Tim Peake as he flies overhead at 17500mph! This is where selected pupils are able to ask searching questions of Tim Peake on topics as diverse as life in space, to the work he is doing and how it will affect us, the human race, in the future. Tim will answer these questions as soon as they are asked with everyone in the audience able to hear the reply. It is also possible that a live video feed, received at the schools and other locations in Europe, will be available for some or all of the contact.

Although the ARISS Amateur Radio contact takes only ten minutes from start to finish, the preparations and practices will take the vast majority of Day 1 and a significant part of Day 2 depending upon the scheduled time of the contact.

Why do we have to apply to host a contact?

ARISS Amateur Radio contacts use the unique experience of human spaceflight to afford audiences the opportunity to learn first-hand from space explorers what it is like to live and work in space.

These events are designed to encourage students to study and pursue careers in STEM based subjects.

As such, we place great emphasis on the quality of the educational element of the application and it is this that will drive the selection process.

In addition, ARISS provides an opportunity for students, teachers and the general public to learn about wireless communications technologies and the capabilities of amateur radio, encouraging students to further explore these technologies.

There has always been a high level of interest in speaking to an astronaut on board the MIR Space Station, the US Space Shuttle and now the International Space Station – in fact, demand for a contact greatly surpasses the availability of the astronauts’ time whilst in space. To manage this demand for contacts, the ARISS International Operations Committee meet weekly (by telephone) to discuss opportunities given the availability of licenced astronauts, the orbit of the ISS and any other events that are occurring on the ISS – for example the arrival and departure of crew members and Extra Vehicular Activity (EVA or spacewalks).

All of this information is then fed into the NASA planning teams via the ARISS representative at NASA, and the outcome is usually an agreed (but very importantly, approved) timeslot is placed into the astronauts work schedule to allow him/her to talk to the students selected for the contact.

So, if we are selected, our contact will definitely happen?

Yes and no! Once an ARISS Amateur Radio contact is scheduled, it is committed to the astronauts work program for a particular day. However, emergency conditions in space can,
and do, occur and contacts may be postponed at very short notice. In such events, attempts are made to reschedule at the earliest opportunity, which may be on the next orbit or on an alternative day. ARISS personal on site for the scheduled contact, maintain contact with the ARISS representative at NASA for this reason.

Also, although the contact is scheduled by NASA into the astronauts work timetable, NASA do not provide any of the communications facilities involved in making the contact. The amateur radio equipment on board the ISS has been provided by ARISS members worldwide and tested to meet strict NASA requirements. The equipment on the ground (i.e. your school) is provided by ARISS members or experienced amateur radio operators.

In reality, an ARISS contact should be regarded as a significant science experiment. In what other facet of education can an experiment involve two radio stations, one on board a space station travelling at 17,500mph in low earth orbit and a ten minute window in which contact has to be established, and maintained, between these two radio stations?

Experiments can go wrong and this is why sometimes, the contact does not happen. However, by using the skills of some of the UKs best amateur radio operators, we aim to reduce the chances of failure and provide you with a “once in a lifetime” memory.

Why can’t I set this up and do it myself? I have my own amateur licence.
The astronauts on board the International Space Station use the UTC/GMT time zone to organise their days. Between the hours of approximately 0800hrs until 1930hrs, Monday to Friday, the astronauts are considered to be “at work” carrying out experiments, station maintenance, EVAs etc. and the time allocated to individual activities is mandated by the national Space Agencies.

During these times, it is normal for the amateur radio equipment to be switched to a mode that allows the relaying of digital messages between Radio Amateurs – the so called “Packet” mode. The radios are therefore not monitored by the astronauts.

Saturdays are often times of catching up with activities not completed, cleaning etc. and Sundays are generally reserved for as a rest day for the astronauts. Although the astronauts have some free time allocated for them to relax, some astronauts choose to use the amateur radio equipment for contacts with other radio amateurs on earth. These are random in nature and completely depend upon the astronaut, the ISS orbit and the time!

Additionally, schools in the UK are usually in session Monday-Friday, 0800 to approximately 1600hrs which falls within the defined “working day” for the astronaut. The only way to secure a contact with the ISS during the astronauts “working day” is through an ARISS scheduled contact which has been approved by NASA.
SECTION 1: BASIC REQUIREMENTS

How to know if we are able to host an ARISS Contact?

To help you decide if you wish to apply for an ARISS Scheduled Contact with Tim Peake, please consider the following:-

- Are you a registered educational organisation?
- Do you have a strong emphasis on STEM subjects?
- Does your proposed location for the contact lie below 55° 30’ North?
- Are you flexible on date and time changes for ARISS?
- Can you secure a large student and teacher audience?
- Can you host such an event in an auditorium that can accommodate the audience?
- Can that auditorium be shielded from external noise (e.g. school bells, external noise?)
- Are you willing to take on the responsibility of organising the event, setting up or inviting space related activities into your school and defining a series of curriculum based tasks centred on these activities?
- Are you willing to provide significant outreach to other schools in your area, especially primary schools, schools of special interest and the community?
- Are you willing to take part in national and international publicity related to the ARISS contact?
- Are you willing to take part in pre- and post- ARISS contact educational activities, including reporting?
- Can you meet the technical requirements (see Section 2)

What is the next step?

Deciding that you want to take part in a hosted ARISS Contact with Tim Peake will be a major commitment for you and your organisation. Please read this guide carefully and if you are confident that you would like to proceed, please use the forms included in this document to register your interest. For those institutions that have registered their interest, the actual process to selection will be in two stages:-
• Stage 1 will require the completion of an application which includes details of your educational proposal and how you will meet it.
• Stage 2. If selected to proceed to Stage 2, you will be required to develop your application into a detailed plan that will be approved by ARISS (UK) and the UK Space Agency.

Institutions that successfully pass Stage 2 will then be put on a waiting list for an ARISS Scheduled Contact. The final selection for one of the limited number of opportunities will be announced via the UK Space Agency.

How will the selection process work?

Once the closing date for Stage 1 has passed, ARISS (UK), the UK Space Agency, AMSAT UK, the European Space Education Resource Office (ESERO) and the Radio Society of Great Britain will meet to review the applications and prioritise those applications that can meet the requirements.

A key element to this prioritisation will also be that the location in which you propose to hold the contact must be suitable. Because the contact will involve both transmitting and receiving radio signals, the accessibility of the location, the amount of radio interference in the vicinity as well as clear and unobstructed views of all the horizons will be assessed by ARISS personnel and whose decision on the suitability of the proposed location will be final and binding.

Key areas of assessment will include:

Education
• Is the ARISS amateur radio contact and surrounding comprehensive education plan beneficial to the education community?
• Does the plan advance (enhance) the students’ engagement in science, technology, engineering and mathematics (STEM)?
• Does the education plan include STEM and amateur radio activities?
• Does the education plan include Principia mission-related content?
• Is the plan developed to extend over a period of time to increase and extend the impact of the ARISS contact for students in your audience?
• Will the ARISS radio contact and surrounding education plan make a demonstrable contribution to attracting diverse students to careers in STEM?

Logistics
• Does the proposal demonstrate flexibility should an ARISS radio contact shift dates and/or times?
• Does the proposal provide a clear overview of the contact including location that accommodates a large number of students, audience, transportation (if needed), and technology?
Outreach

- Does the proposal include a detailed media/outreach plan?
- How does the proposal plan to involve the community in the ARISS radio contact and/or education plan?

What are the timescales involved with this opportunity?

Eligible institutions are invited to apply in order to register their interest.

Stage 1 application forms, available from the European Space Education Resource Office web site (http://www.esero.org.uk/) and in particular the “Tim Peake - Space resources and inspiration” site (http://www.esero.org.uk/timpeake), must be returned no later than Friday 24th April 2015.

Schools/Institutions that are to be invited to proceed to Stage 2 will be notified in the week commencing 11 May 2015.

Stage 2 applications must be submitted and received by the 26th June 2015.

There will then be an appraisal process involving the UK Space Agency, ESA, ARISS and the RSGB. From the applications that are judged to be the most promising, a final list of ten schools, ranked in priority order, will be compiled. The ten successful schools will be announced at the UKSA Space Conference on 13th July 2015.

Once the schools are announced, the ARISS scheduling process will start to take place. Approximately six months ahead of the time when an ARISS Amateur Radio contact takes place, ARISS will identify the approximate weeks that the ISS will be visible from the UK. This information will be used to identify which school from the winning ten is best suited. This will be determined, starting with the first school, by comparing the approximate week with any exclusions that the school has identified. If the first school is not an acceptable choice, then the process continues with the next school on the list until a match is found. Once a match is identified, the school is placed on the ARISS Scheduling list and four weeks prior to the contact, a number of contact/time options are be identified that the school will be asked to place in order of preference.

This ordered list is then submitted to the NASA planners and the chosen option will be identified no later than the Monday of the week BEFORE the ARISS Amateur Radio contact takes place. ARISS will notify the school immediately and the schools plans will come into action.
How do I maximize this opportunity?

Think of the ARISS contact as part of a much larger vision. Use the ARISS contact to:

- Bring STEM subjects alive for students through an educational plan that includes investigation of multiple topics dealing with space exploration, space research, space and communications technologies leading up to and following the event,
- Enhance or create new partnerships with local and national businesses and community leaders as well as other educational organisations,
- Attract widespread attention to your educational institution,
- Support local education objectives and initiatives,
- Encourage your students to take on STEM based hobbies such as Amateur Radio. *Could one of your students actually be in charge of the radio, making contact with Tim Peake on the ISS? The student would have to hold a Full UK Amateur Radio licence – further details are available from ARISS-UK and the RSGB.*
- **ABOVE ALL - BE REALISTIC** with the weeks that you can/cannot support on the application form. If an offer to host an ARISS Amateur Radio contact is declined by the school, there will be no guarantee that that school will be offered another opportunity.
SECTION 2 : THE EDUCATIONAL PLAN

The Educational component of your application is the most crucial element that you will have to assemble. Without a clear proposal in place, you will not make it to Stage 2.

Creating an ARISS Education Plan

An ARISS education plan describes how you will utilise the ARISS Amateur Radio contact to enrich STEM learning activities, support local education objectives and the goals of the ARISS program.

The plan should describe how the pre- and post-contact activities tie into the 10-minute live contact with the ISS crew members. For example:-

- How can you integrate this activity into the school curriculum?
- Can you match planned activities with the National Curriculum?
- Can you use an interdisciplinary approach to lesson development?
- Do you engage in multiple age level participation?
- Do you partner with local science-oriented organizations, such as museums, clubs, and industry?

What are some tips to completing a strong education proposal?

- Brainstorm with your colleagues in different subject departments, creative ways to maximize the ARISS contact reach and experience for students. You will want to consider how you plan to integrate outreach to other educational establishments, especially
- Determine your educational objectives and plan a comprehensive educational program of which the ARISS contact is only one component.
- Incorporate partnerships that have a lasting impact on the community.
- Integrate NASA/ESA Education/ESERO UK and amateur radio content with educational activities (links to a variety of NASA, ESA ESERO UK and RSGB resources are provided in this guide).
- Establish an evaluation plan that will help you determine whether you are accomplishing your objectives and the goals of the ARISS program.
- Keep date flexibility in mind. ARISS contact dates are driven by ISS mission requirements and are tentative due to the nature of human spaceflight.
- How can you incorporate the educational aspects of Tim Peakes mission with your proposal?
- Have you explored which Space related companies are in your area and what they offer in terms of outreach?
- Proof read your proposal to make sure the information is complete and relevant.
The Education Plan must include information about the instructional activities and lessons you will engage with your students as part of the learning and preparation for the ISS contact. The more advance preparation you make with educational plans, the more learning and value the ARISS event will have for students.

What else can you include in your educational plan?

Tim Peake has established a number of educational activities that have already been advertised by the UK Space Agency and ESA. Astro-Pi, Mission X: Train Like an Astronaut, Design a meal for Tim are but just a few examples but there are many other areas that you can involve the students not only in your own school but in the other schools that you provide outreach to.

We are all very familiar with NASA and the achievements they have made in space and space exploration since the 1950/60s. But how much do students in the UK know about the European Space Agency? ESA has an equally proud history in space and has been at the forefront of some of the most daring deep space missions in recent times. This could form an important area of knowledge gathering and presentation by students.

Other suggestions include:-

- Can students identify current research projects that are being carried out on the ISS? (Hint NASA and ESA websites are full of such information).
- Develop student projects related to a research project in the ISS.
- Learn about other ESA space projects such as Rosetta, Huygens, Mars Express, IXV, ExoMars, Bepi Colombo.
- Learn about NASA space projects, both past, present and future.
- Research the biographies of astronauts. Tim will be one of a number of astronauts on the ISS between November 2015 and May 2016. Who are the others and why are they there?
- How do international partners operating the ISS keep in contact with the Station?
- Research and present a daily space fact to all age groups in your school.
- Investigate the many uses of the radio spectrum and how it is managed.
- Can you visit or even establish an amateur radio club
- Learn about satellite orbits and orbital mechanics
- Build an antenna for satellite communications
- Find out when the ISS will orbit over your town and watch it pass overhead
- Invite guest speakers who work in science and technology fields
- Investigate radio science fundamentals
- Investigate electronics fundamentals
- Explore careers related to space exploration and space technologies
• Use satellite-tracking software to track orbits of man-made satellites.
• Write a story about life in space or how the present day space industry has its roots in the Cold War.
• Create posters about space
• Create informational videos, podcasts and other media products that chart the run up to the contact, the contact itself and the post contact events/outreach.

Other suggestions for activities that could be included in the plan are:-

• **FUNcube-1** CubeSAT – this is a tiny (only 10cm cube!) educational satellite designed and built by radio amateurs from the UK and the Netherlands and launched into space on 21 November 2013. FUNcube-1 includes a science experiment ("Leslies Cube" - heat absorption and radiation in a vacuum) and approximately 50 other channels of useful data from space that can be analysed in a variety of ways. The data is freely downloadable from space via a very simple and relatively cheap radio solution, designed and available from AMSAT-UK. All the data collected worldwide, since FUNcube-1’s launch, is also available from a data warehouse on the internet. More details at [http://funcube.org.uk/](http://funcube.org.uk/)

• **Group for Earth Observations** – this is a group of individuals, many radio amateurs, who download data from weather satellites and other earth observation satellites More details at [http://www.geo-web.org.uk/](http://www.geo-web.org.uk/)

• **HAMVideo** – This is the latest addition to the range of amateur radio equipment supplied by ARISS and installed on the ISS. It is designed to provide a video downlink that can be received by ground stations located either at the school undertaking the ARISS contact or, alternatively, distributed on the path that the ISS will take during the contact. More details at [http://www.ariss-eu.org/](http://www.ariss-eu.org/)
SECTION 3 : THE TECHNICAL REQUIREMENTS

As ARISS UK will provide all the equipment necessary for the radio contact, the actual technical requirements required are somewhat reduced compared to a typical ARISS contact.

The primary requirement for potential hosts is essentially the location and the area set aside for the ARISS Amateur Radio contact. As stated in the Basic Requirements section, this needs to be able to house the audience of VIPs, students, teachers and community guests that will observe the actual contact itself.

The stage area needs to be visible to all attendees as well as to the media organisations that will be present on the day. The stage area will also house all the radio equipment, the radio operator and the students chosen to ask the questions of Tim Peake. The area behind the stage and to the sides should be filled with posters and displays created by the students.

To help visualise the activities taking place, a projectors and screens, or large televisions, need to be available to the ARISS team. This will be used to help display the orbit of the ISS as well as pictures from the HamVideo system, if available. ARISS UK will provide advice and support on the location and proposed setup.

The ARISS team will also need access to

- The auditorium from a car park to enable the movement of equipment into and out of the auditorium.
- A roof, or other structure that will house the (large) antenna system needed for the contact. This should be no more than 40m from the area set aside for the radio systems.
- Route several cables to the antenna system which will be positioned on a nearby roof. The maximum cable run that can be supported is approximately 40m.
- A fast, unfiltered and (preferably) wired network connection that provides fast internet access. This is required to obtain updated data on the ISS orbit prior to the contact taking place, receive HAMVideo transmissions from other radio stations in Europe and to provide a web stream of the event.
SECTION 4: PREPARING THE MEDIA COMPONENT

Can I invite VIP guests?
Host organizations are encouraged to invite VIPs and elected officials to observe the ARISS contact. If a VIP wants to address the participants, they should do so following the contact due to time constraints preceding and during the ARISS contact. The invitation to attend the contact is issued by the host organization but it is expected that ARISS-UK and the UK Space Agency will advise on other VIPs that will be attending.

Issuing Press Releases
The ARISS Amateur Radio contact host organization issues a press release to local and national media once the contact date and time have been confirmed. ARISS UK and the UK Space Agency will provide assistance in the formulation and issue of press releases.

How can you get as much media coverage as possible?
- Contact local, regional and national media outlets, i.e. newspaper, television, radio, etc.
- Use the school website.
- Develop a website unique to the event.
- Distribute flyers for students to take home.
- Invite public & elected officials, i.e. school governors, politicians, etc.
- Produce a video of the event.
- Develop a webcast and podcast of the event.
- Produce t-shirts.
- Write a school newspaper article.
- Email a special edition newsletter.
- Host family movie nights for viewing space-related movies, both educational and entertaining.
- Implement projects led by community artists who use space as part of their themes.
- Use PTA members to spread the word.
- Broadcast notice of the event via amateur radio transmissions, websites and social media.
- Display posters in local stores, banks, businesses, restaurants, museums, and libraries.
- Sponsor “Community Night” to educate the community about involvement with space, ESA, the UK Space Agency and other national Space Agencies.
- Hold a student-run, student-led news conference.
SECTION 5: ACCESSING ESA AND UK SPACE

RELATED INFORMATION

What kind of space related resources are available?
The UK Space Agency and ESA have numerous resources available to help the public learn more about the ISS. Use the resources listed below to get students and educators familiar with the space and space exploration from a European perspective.

- **ESA Activities in the United Kingdom**
  [http://www.esa.int/ESA_in_your_country/United_Kingdom](http://www.esa.int/ESA_in_your_country/United_Kingdom)
  [http://www.nationalstemcentre.org.uk/timpeake](http://www.nationalstemcentre.org.uk/timpeake)

- **ESA Activities**
  [http://www.esa.int/](http://www.esa.int/)

- **ESA Education**
  [http://www.esa.int/education](http://www.esa.int/education)
  [http://www.esa.int/Our_Activities/Human_Spaceflight/Education](http://www.esa.int/Our_Activities/Human_Spaceflight/Education)

- **European Space Education Resource Office (ESERO UK)**

- **ESA Astronaut Biographies**
  [http://www.esa.int/Our_Activities/Human_Spaceflight/Astronauts/European_astronauts](http://www.esa.int/Our_Activities/Human_Spaceflight/Astronauts/European_astronauts)

- **UK Space Agency**
  [https://www.gov.uk/government/organisations/uk-space-agency](https://www.gov.uk/government/organisations/uk-space-agency)

- **space:uk magazine**

- **MissionX: Train Like an Astronaut**

- **Your code in space – Astro-Pi**

- **The Great British Space Dinner**
SECTION 6: ACCESSING INTERNATIONAL SPACE STATION RESOURCES

What kind of ISS resources are available?
ESA, NASA and the other international partners have numerous resources available to help the public learn more about the ISS. Use the resources listed below to get students and educators familiar with the ESA, the ISS and our international partners.

International Space Station (ISS) Homepage
http://www.esa.int/Our_Activities/Human_Spaceflight/International_Space_Station
This site serves as the main homepage for the ISS. You can find the latest news on missions, ISS activities and resources.

A Day In The Life Homepage
http://www.nasa.gov/audience/foreducators/teachingfromspace/dayinthelife/index.html
This site provides a series of videos that explain the daily routine of astronauts on the International Space Station. Learn where they sleep, and how they eat, exercise, work and spend free time. Compare life in space with life on Earth.

ISS Research/Experiments
http://www.esa.int/Our_Activities/Human_Spaceflight/Research
http://www.esa.int/Our_Activities/Human_Spaceflight/Columbus/
These sites contain detailed information on science experiments conducted for each expedition crew. Columbus is the principle European research laboratory on the ISS. What experiments are taking place in Columbus and what benefit do they bring to life on Earth?

ISS Sightings by City
http://www.esa.int/Our_Activities/Human_Spaceflight/International_Space_Station/Where_is_the_International_Space_Station
Find out when the ISS can be seen over your town or city. Additional information includes current tracking information and sighting tips.

Interactive Reference Guide to the ISS
http://www.nasa.gov/externalflash/ISSRG/
Take a virtual tour of the orbiting outpost.

European Space Missions
http://www.esa.int/Our_Activities/Space_News
Find out about European space missions, the vehicles used to lift payloads into orbit and the spaceports used to launch space vehicles.
Reference Guide to the International Space Station
An online brochure that provides detailed history on ISS construction, assembly and systems information.

Gateway to Astronaut Photography of Earth
http://eol.jsc.nasa.gov
View digital images of Earth taken by astronauts from the Mercury Program up through current missions.

ISS Timelines
View crewmember expedition timelines from the current mission.

Astronaut Biographies
http://www.esa.int/Our_Activities/Human_Spaceflight/Astronauts
The astronaut biography homepage provides information on the members of space flight crews and candidates for future missions in ESAs’ space flight programs. Can you find biographies of other nations astronauts?
SECTION 7: FREQUENTLY ASKED QUESTIONS

Who sponsors ARISS?
Amateur Radio on the International Space Station (ARISS) is a cooperative venture of the National Aeronautics and Space Administration (NASA), the American Radio Relay League (ARRL) the Radio Amateur Satellite Corporation (AMSAT) and other Amateur Radio organizations and space agencies in Russia, Canada, Japan and Europe. Within the UK the principal organisations involved in the ARISS program are AMSAT-UK and the Radio Society of Great Britain.

Is there a cost?
No. The ARISS Amateur Radio contact is provided at no cost to the host location. The host location will probably incur costs ranging from acquiring the technical equipment to transporting students. Additional items to consider are media promotions, give-aways for participants and other miscellaneous items.

Is it possible to schedule a contact for a specific event or date?
ARISS Amateur Radio contacts are typically not suitable for events that take place on a specific date. ARISS contacts are subject to real-time mission operations and often move around on the schedule. Host organizations must be flexible and prepared to reschedule their ARISS event.
We do ask a question on the application form regarding the suitability of holding a contact on a Saturday. Historically, Saturday contacts can be planned with greater notice than Monday to Friday contacts but generally suffer from significantly lower audience numbers. If you choose to offer Saturdays as an option, you will be expected to guarantee student/teacher participation. The structure of the contact will remain broadly identical to that outlined in this document with the contact taking place on “Day 3”.

Why does the location of the contact have to be below 55° 30’ N?
The ISS orbits the earth at a height of approximately 330-435 kilometres and at an angle of 51.65° to the equator. The antennas for the Amateur Radio equipment that will be used are located on the Columbus module and, depending upon the actual height, orbital path and orientation of the ISS, sometimes have a restricted view of the earth. Within ARISS, we check the maximum elevation of the ISS to the location of the contact to ensure it exceeds a particular value. This equates to a location within the UK at approximately the 55° 30’ North line of latitude. Attempts to contact the ISS at elevations below this limit have resulted in failure, hence the restriction.

What are my chances of getting an ARISS contact?
Worldwide, ARISS receives many excellent proposals but there are limited number of contact opportunities each year – so the competition is tough.
I would like a contact but don’t know any radio amateurs?
As the contacts with Tim Peake are limited, ARISS UK will provide all the necessary equipment for the actual radio contact and web streaming of the contact itself. They will also provide the expert Radio Amateurs to manage and conduct the contact.

Do students need amateur radio licences in order to speak with the astronaut?
No. The radio operator is required to have a valid amateur radio licence and is permitted to allow the students to speak over the radio under his/her control.

How many ARISS contacts are available?
The exact number varies with each mission, the number of licenced astronauts who take part in the ARISS Amateur Radio program and planning opportunities are limited. Typically, there are one, maybe two, contacts per week.
Note that there are certain periods throughout the year when contacts cannot take place. Typically these centre on the arrival of new astronauts to the ISS and last typically two or more weeks.

If my proposal is selected, what happens next?
An ARISS Mentor will contact you to review your proposal and assist you in preparing for your ARISS contact. You will also have support and access to UK Space Agency staff who can advise on educational activities that are integral to the Tim Peake Principia ISS Mission.

What are my chances of making a random contact with the ISS?
Because the ARISS program supports the testing and installation of amateur radio stations aboard the ISS, astronauts may use the amateur radio equipment to make unscheduled radio contacts with radio amateurs all around the world on a one-to-one basis during their personal time.
Therefore, the work schedules of the ISS crew dictate when they are able to operate the radios, and random contacts are carried out in their own personal free time. There are no guarantees that the astronauts will be available when the ISS is passing over the UK.
The selection committee recognizes the long-standing commitment of the ham radio community in supporting ARISS, and do ask the crew to do as many general amateur radio contacts as possible during their flights. When this does happen, word spreads very quickly throughout the Amateur Radio community and the result is usually a “pile up” as seen from the ISS making confirmed contacts even harder to achieve.
When the astronauts are busy with other activities, a computerized (packet) ham station aboard the orbiting ISS automatically makes contact with thousands more hams.
# Abbreviations and Terminology

## Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tr>
<td>AMSAT</td>
<td>The Radio Amateur Satellite Corporation, the national society in the United States that designed and launched the first “OSCAR” satellite just a few years after Sputnik. AMSAT organisations have been created in many other countries with the same goal – to design and launch satellites. AMSAT-UK is the national society in the UK for Radio Amateurs interested in satellites and satellite communications.</td>
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<tr>
<td>ARISS</td>
<td>Amateur Radio on the International Space Station</td>
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<td>ARRL</td>
<td>American Radio Relay League – the US body that oversees all Radio Amateurs interests. The R.S.G.B. is the equivalent here in the UK.</td>
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<td>EVA</td>
<td>Extra Vehicular Activity – a spacewalk</td>
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<tr>
<td>ESA</td>
<td>The European Space Agency</td>
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<tr>
<td>ISS</td>
<td>International Space Station</td>
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<tr>
<td>JSC</td>
<td>Johnson Space Center – This is where the astronauts are trained on the ARISS equipment and ARISS contacts are planned from.</td>
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<tr>
<td>NASA</td>
<td>National Aeronautics and Space Administration</td>
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<td>NTV</td>
<td>NASA Television</td>
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<td>RSGB</td>
<td>The Radio Society of Great Britain, the national society for radio amateurs in the UK.</td>
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<tr>
<td>UKSA</td>
<td>The UK Space Agency</td>
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