This Is GB1SS Listening and Standing By.....

ARISS Principia Mission
Jan – May 2016
Final Report

In association with
AMSAT UK
Figure 1 - The ARISS UK Operations Team with the UK Space Agency Astronaut Flight Education Team

Clockwise (from rear left)

Carlos Eavis – G3VHF
Graham Shirville – G3VZV
Frank Heritage – M0AEU
Noel Matthews – G8GTZ (HamTV Lead)
Phil Crump – M0DNY
John Cariss – G7ACD

Front (from left)

Libby Jackson – UK Space Agency, Astronaut Flight Education Programme Manager
Susan Buckle - UK Space Agency, Astronaut Flight Education Programme Support Manager
Ciaran Morgan – M0XTD. ARISS UK Operations Team Lead

Front cover image © NASA.
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Introduction

Following the ARISS/UKSA schools competition “This is GB1SS Listening and Standing By...” the following ten schools were selected to form the UK shortlist of schools that would host an ARISS Scheduled Schools contact with Tim Peake whilst he took part in the Principia Mission on board the International Space Station:

• Ashfield Primary School, Otley, West Yorkshire
• The Derby High School, Bury
• The Kings School, Ottery St Mary
• Norwich School, Norwich
• Oasis Academy Brightstowe, Bristol
• Powys Secondary Schools Joint, Powys
• Royal Masonic School for Girls, Rickmansworth
• Sandringham School, St Albans
• St Richard’s Catholic College, Bexhill-on-Sea
• Wellesley House School, Broadstairs

The schools were required to demonstrate their commitment to space, communications and STEM (Science, Technology, Engineering and Mathematics) subjects during the school year 2015/2016 by seeking opportunities and extra-curricular activities for their students. These schools, ranging from State funded Primary school to public and private middle/secondary educational institutions, would subject to ARISS scheduling take part in a live, scheduled ARISS amateur radio contact with astronaut Tim Peake on board the International Space Station as he orbited above the UK during normal school hours (approximately 0900-1600 local time).

Additionally, knowing that the level of interest in the Tim Peake Principia mission was high, and ARISS contact opportunities were limited, all the shortlisted schools had to demonstrate a considerable outreach commitment to other local/regional schools and educational institutions so that as many students as possible could be involved in the Principia Mission.

ARISS UK Operations proposed that the schools should host a two day Space STEM event where their work and activities could be displayed and promoted to students, teachers and members of the public/local community and during which, the live ARISS contact would additionally take place.
ARISS – Amateur Radio on the International Space Station

ARISS lets students, worldwide, experience the excitement of talking directly with crew members of the International Space Station, inspiring them to pursue interests in careers in science, technology, engineering and math, and engaging them with radio science technology through amateur radio.

The ARISS programme was created and is managed by an international consortium of amateur radio organizations and space agencies including the National Aeronautics and Space Administration (NASA) in the USA, Roscosmos in Russia, Canadian Space Agency (CSA) in Canada, Japan Aeronautics Exploration Space Agency (JAXA) in Japan and the European Space Agency (ESA) in Europe.

ARISS itself is managed by an international working group, including several countries in Europe as well as Japan, Russia, Canada, and the USA. The organization is run by volunteers from the national amateur radio organizations and the international AMSAT (Radio Amateur Satellite Corporation) organizations from each country. Since ARISS is international in scope, the team coordinates locally with their respective space agency and as an international team through ARISS working group meetings, teleconferences and webinars.

What does ARISS aim to achieve?

ARISS, through its worldwide network of volunteers, has at its core a set of goals that govern the program. These are:

- Inspire an interest in science, technology, engineering and math (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 satellite communications;

- Provide an educational opportunity for students, teachers and the general public to learn about wireless technology and radio science through Amateur Radio

- Provide an opportunity for Amateur Radio experimentation and evaluation of new technologies.

- Provide a contingency communications system for NASA and the ISS crew.

- Provide crew with another means to directly interact with a larger community outside the ISS, including friends and family.
ARISS Operations

The ARISS Operations Team is made up of ARISS Technical Mentors, scheduling/technical representatives, and an orbital prediction specialist. An ARISS Operations Lead is selected from within the ranks on a periodic basis. This group meets weekly by telephone conference and much more frequently via e-mail and telephone. ARISS Technical Mentors are the experienced radio amateur volunteers who work with the schools, teachers, and local Amateur Radio groups that actually make the contacts with the ISS. Scheduling/technical representatives work within the space agencies, primarily NASA in the USA and the Russian Space Agency, to secure the final schedules for the contacts. These scheduling representatives also coordinate training of the Astronauts in the use of the equipment on board the ISS and procedures for its use. The orbital prediction specialist does the long and short term predictions necessary to support the scheduling of all of the contacts.

ARISS Scheduled Schools contacts

Scheduled ARISS Amateur Radio contacts with the ISS are conducted either by direct contact, or by telbridge contact. The method used will depend on the radio station equipment and experienced radio amateur volunteers available to support the contact as well as technical issues related to the orbit of the ISS over the contact location.

Within the UK, there exists a team of volunteers who are experienced and specialise in space/satellite communications. These volunteers mostly come from the AMSAT-UK (Amateur Satellite community) and have a dedicated set of equipment that meets, or in many cases exceeds, the recommended ground station configuration for direct contacts.

As a result, and when local conditions permit, the UK Operations team advocates direct only contacts within the UK. This does place an enormous burden on these volunteers but their experience since the first ARISS contacts in 2001 is such that schools, students teachers and the local community achieve greater benefit from the build-up and eventual direct contact from their own school.

Getting the “correct” message across

One of the key requirements for any school or educational institution is to help “spread the word” about space, STEM and the ARISS program. This usually involves having to engage with the general public through local and national print and television media – the press.

Unfortunately, it is sometimes difficult to control the message with some media and the UK has certainly encountered negative media headlines in the past when telbridge contacts have ended up being reported as nothing more than a “phone call to space”. As a consequence, the UK Operations team are structured in such a way as to promote direct contacts over telbridge contacts and assist the school in their direct contact and
dealing with the press media. To date this has proved very successful and has resulted in predominately positive outcomes. The Tim Peake Principia Mission is one where national/local knowledge was critical and a managed and coordinated approach was needed to ensure that the core messages of Space, STEM, education and career opportunities are protected and correctly reported on.

ARISS Equipment on orbit on the International Space Station

Amateur Radio has existed in space since the STS-9 Space Shuttle mission in 1983. Since then, amateur radio has flown on 25 shuttle missions, has been used on the MIR space station (and was a key communications facility after the collision of a Progress resupply craft with MIR in June 1997) and was one of the first payloads activated on the ISS when it became permanently occupied in 2001.

There are two separate installations of amateur radio equipment currently on-board the International Space Station.

Russian Segment

The UHF/VHF Kenwood D-700E & D-710 amateur radio transceivers are located in the Service Module, which is towards the rear of the ISS as it flies. This equipment is managed by the Russian ARISS representatives and is predominately used for school voice contacts with Russian schools and at times of no licensed radio amateurs in the US segment, schools contacts with schools worldwide.

The Kenwood radios are also the ones that are used to transmit SSTV – slow scan television – pictures and are much anticipated by radio amateurs worldwide.

US Segment

On the US segment of the ISS, there are two different types of amateur radio installed.

For voice contacts, and packet radio at all other times, a VHF Ericsson handheld transceiver is located in the COLUMBUS module. Also located in the COLUMBUS module is a “HamTV” transmitter – this is a relatively recent addition to the ISS ARISS station and consists of a dedicated unit that takes an input from one of the pool video cameras used by the crew for video downlinks. The camera is not a permanent feature as it may be required for other roles on the ISS. The video pictures are digitised and then transmitted via antennas located on the nadir (earth facing side) of COLUMBUS for reception, decode and display by amateur radio operators worldwide.
ARISS Principia School Contact Setup

UK School involvement in scheduling.

Following significant interaction between the ARISS team lead in the UK and the ARISS worldwide operations team, all ten shortlisted schools were scheduled to take part in a live ARISS link up with Tim Peake. Each school knew, approximately four to six weeks in advance the planned week of the contact, the week within which the contact would occur and a set of approximate times that the contact would start/finish.

One key factor that the schools were aware of, was that the confirmation of the actual date and time of the contact would not occur until approximately 7 to 10 days in advance of the actual chosen date. This was simply due to the astronaut task planning processes employed within the national space agencies responsible for coordinating and managing the astronaut activities.

As the schools were required to organise a two day Space STEM event with the ARISS contact a key part of that event, some schools decided to organise the event in two distinct blocks – mostly due to the fact that securing participation from external presenters and organisations was difficult at short notice. Other schools organised the two day event in such a manner that they could handle the short notification of the actual date/time.

The key point here with all the UK schools, was that the ARISS UK Operations team wanted the schools to concentrate on the Space STEM event and providing the enrichment opportunities for their students. All other aspects of the ARISS contact, specifically the contact itself, were handled by the UK team.

ARISS UK Operations

Members of the UK Operations team visited each school, usually several months in advance of the contact, to scout the school site, confirm the location of the antennas and the radio station itself and talk through with the school the planned timetable of the day of the contact.

This approach proved vital as in one specific case, the site of the contact was moved from the original provided by the school, to one of its other sites nearby where the visual take off from the West through South and East proved to be actually more favourable for a low elevation pass, which the UK team were expecting due to the school location and the time in the ISS orbit cycle that the contact was anticipated.
UK Operations Ground Station Configuration

The ARISS UK Operations team are fortunate to have at their disposal a complete and dedicated ground station that is classed as a complete OSCAR Satellite Ground Station. This kit also doubles as the portable AMSAT-UK ground station and is used at AMSAT-UK and ARISS events within the UK.

Primary Transceiver

For the Principia mission, JVC Kenwood loaned the UK team a Kenwood TS-2000X transceiver. This is the preferred transceiver of the ARISS UK operators for satellite communications, not just because the operators have extensive knowledge of the radio, but because it is also capable of Doppler correction of both the uplink and downlink whilst transmitting. Full computer control of the TS-2000X was achieved through use of a program called PSTRotator which also controlled the antenna rotators.

Antenna Rotator and Antennas

The antennas of choice used in the ARISS UK station are X Quad antennas made by Wimo in Germany. These antennas permit reception of vertical, horizontal, circular right and circular left polarised signals and are selected by a switchbox located beside the main transceiver. The picture on the left shows the VHF antenna on the left and an equivalent UHF antenna on the right. During some of the latter contacts, we replaced the UHF antenna for a 10-element Crossed Dipole VNF antenna, again from Wimo, fixed with circular right polarisation to provide additional gain so that the signals at AOS/LOS could be received. Signals from orbiting satellites, including the ISS, can be very weak when the distance from the satellite to the ground station is large. To help in this situation, we use “mast head signal pre-amplifiers” – these basically increase the level of the signal (and noise!) that we can hear. The pre-amps (and polarisation switches) can be seen as the small grey boxes at the back of the antennas in the picture.

The antennas are connected to a Yaesu G-5500 Azimuth/Elevation rotator (seen here in the middle of the picture). These rotators are very popular in the amateur radio community and
are well supported by not only Yaesu but also amateur radio equipment suppliers in the UK. This proved crucial as the team suffered a complete failure of one rotator system approximately 36 hours before a scheduled contact. A replacement was sourced, installed and calibrated within 24 hours and the contact proceeded to plan.

Making sure that the antennas had a good clear view of the sky was an important element of the setup. Sometimes this required the antennas to be mounted on the roof of the building where the contact was due to take place and this often required significant safety precautions to be put in place. At one site, the Royal Masonic School for Girls, the school elected to build a special platform, with secure access, in order to accommodate the antennas. This platform can be seen with the access steps on the sloping roof. Access was via a narrow spiral staircase in the bell tower!

However, as was often the case, placing antenna systems on the roof of a school was either not feasible or safe. In these circumstances, we made use of a 20m extendable VersaTower – basically a portable lattice tower that could be transported from site to site, secured and then erected with the antennas on top – as in the picture to the left.

The primary transceiver and the antennas are connected together via a 50m bundle of coaxial and control cables. The coax cables used (Ecoflex 15 Plus) are extremely low loss thus ensuring that the weakest signals received at the antennas can be heard with some certainty.

In essence, this setup comprises the absolute basic configuration that is required for satellite communications. However, much more equipment was used for monitoring and control including a laptop (for Doppler and rotator control), power meters, spectrum analysers (to make sure we were aware of any strong transmitted signals near to the operating frequencies, and that our transmitted signals were within expectations) and filters
that are designed to remove any nearby transmitted signals that could cause interference to the signals from the ISS.

The picture to the left shows a typical desk for the radio operator during the ARISS Principia contacts.

HamTV Reception

One unique feature of the ARISS Principia mission was the desire to use the HamTV system currently on-board the COLUMBUS module of the ISS. This is a facility that allows live video pictures of the astronaut to be transmitted to earth whilst he/she is conducting an ARISS voice contact. The equipment on COLUMBUS has been successfully commissioned 18-24 months previous to Principia but due to resource constraints had never been activated by astronauts during school contacts.

The ARISS UK team were eager to include HamTV in the Principia contacts and the team lead had many email exchanges with the NASA lead for planning and with Tim Peake himself. Tim, once safely on-board the ISS, set about in his own time configuring the HamTV system and enabling it for seven out of the ten contacts that were carried out.

To receive the HamTV signals at the schools, a specially configured Land Rover vehicle was used. This Land Rover (colloquially known as “Landie”) was a self-contained reception facility and included its own antenna mast, satellite dish and receiving equipment as well as a 5GHz network link to stream the received video from Landie to the contact site, as can be seen in the picture.
Audio Visual and Network Streaming

An important part of every ARISS contact is making sure that the audience can firstly hear the exchange between the students and the astronaut and secondly that the wider community, both locally and worldwide, has the opportunity to watch the contact as it happens in real time.

Within the school, all the audio and video feeds from cameras, HamTV radios and backup station in the Netherlands fed into one mixing desk. Here the whole ARISS contact was mixed and streamed to the BATC web streaming facilities.

The ARISS UK Operations team wanted this to be a professionally looking production and enlisted the help of some members of the BATC (British Amateur Television Club). These colleagues not only managed all the HamTV elements of the Principia mission but also leant their considerable expertise in webcasting events. A dedicated streaming server was setup and integrated into the ARISS Principia website (http://principia.ariss.org) to produce an uncluttered display.

Backup facilities

Any ARISS contact requires that there are sufficient backup facilities available such that if there was equipment failure during the contact, the operators could switch to the backup equipment and continue the contact – remembering that this is the only scheduled availability of the astronaut and it is not possible to have a “second go” on the following orbit.

To that end, the ARISS UK Operations team had spares of radios, antennas, power supplies, coax cables and connectors as well as other connecting leads. On every contact, the team had to make repairs on several coax cables, replacing the connectors, in very hurried situations. This was usually due to the fact that radio stations like the one the ARISS team
were using are not designed to be assembled/disassembled in short timescales and transported hundreds of miles only to go through the same assemble/disassemble cycle again. Fortunately, the UK team have extensive experience of this type of operating and have developed a very good understanding of the possible failure modes of the station and are able to quickly react to solve any issue.

However, the rules of an ARISS contact require that a fully functional backup station be available during the contact and the UK team made a decision to employ a station located in the Netherlands, operated by Wouter Weggelaar, PA3WEG. The logic behind this was twofold – first Wouter is a well know colleague who has worked with AMSAT-UK on the FUNcube CubeSAT projects and secondly, knowing that the ISS would be having a record number of visiting supply vehicles attached to the docking ports during Principia, the UK team were very aware that reception towards the end of a contact could be difficult with antenna obscuration from the ground station at the school. Using Wouter’s station at a different latitude and longitude would mean that he would be within the footprint of the ISS as the ISS was coming to the end of its scheduled pass with the UK school. The audio signals from Wouter were streamed across the internet to the school and the UK team had the choice to use them when the received signal at the school was not audible or intelligible. This operating approach was used many times during the Principia contacts and worked perfectly every time, to the delight of the audience at the school as it typically featured the good bye and sign off from Tim at the end of the contact.

Finally, the historical satellite ground station at Goonhilly in Cornwall collaborated with the ARISS UK team and with the Catapult Applications – Satellite organisation, provided access to one of the 3.8m low earth orbiting satellite tracking dish. This dish was equipped with the additional hardware to receive and decode the HamTV signals and networking equipment to stream the video signals across a secure internet connection to the school so that the video could be displayed for the contact. The Goonhilly dish is over three times larger than the one installed on Landie – the result being that it was able to acquire the HamTV signal earlier in the pass compared to Landie and retain that signal until very close to the end of the planned contact.
Summary of UK School ARISS Contacts

The following pages give a summary report on each of the ten schools in the UK that held successful contacts with British ESA Astronaut Tim Peake during his Principia Mission to the International Space Station.

Peeps at a school in St. Albans have just made history by holding a live radio call with astronaut Tim Peake on the International Space Station (ISS).

Excited Sandringham School students spoke with Major Peake just after 8:47am, asking him a series of impressive questions on the likes of cooling liquid metals and helium balloons in microgravity.

A student looking chuffed after Tim Peake answered her question live (SciencegrablyPrincipia)

One student, called Jessica, had the massive responsibility of formally establishing contact with Peake, having to pass an amateur radio exam just before Christmas in order to do so. She is now the first amateur ever to speak to an astronaut on the ISS.

EMILY, 13: WHAT WOULD YOU SAY TO ANYONE WHO FINDS SCIENCE DIFFICULT? OVER.

TIM PEAKE: KEEP TRYING! OVER.
Contact #1 : Sandringham School, St Albans (ARISS#982 )

School

Sandringham School
The Ridgeway,
St Albans,
Hertfordshire
AL4 9NX

Highlights

This contact has been recognised as the first contact between a UK licensed Radio Amateur and a British astronaut on board the International Space Station. Due to the time of the contact (before 0900hrs) the BBC, Sky and Channel 5 covered the contact as part of their morning Breakfast programme.

http://www.sandringham.herts.sch.uk/?q=news/well-done-we-have-spoken-tim

Audience Participation

<table>
<thead>
<tr>
<th>Preschool (&lt;4 years)</th>
<th>Primary (4-11 years)</th>
<th>Secondary (11-18 years)</th>
<th>Others (University students, guests etc)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,462</td>
<td>1,982</td>
<td>924</td>
<td>2,332</td>
<td>6,700</td>
</tr>
</tbody>
</table>

Media & Social Media Coverage

This school carried out significant analysis of the viewing figures from local/National TV and Radio stations as well as social media. Their analysis gave the following:-
Media Viewing figures:
- BBC - 6 million breakfast viewers,
- Sky news - 7 million global viewers,
- ITV News - 2.91 million,
- Heart FM - 1.3 million listeners nationally,
- CBBC (Newsround) 350,000,
- Channel 5 news - 768,000,
- 3 counties radio - 159,000.
- Herts Advertiser - 45,000,
- RSGB Radcom - 22,000.

Social Media #Sandspace - 898,795 impressions, 817 posts, 240 users, 408,253 reach. 63% female
(Social media figures via http://keyhole.co/)

On line news articles:

ARISS Principia Web Stream Viewing Details

More than 1300 concurrent connections were observed during the contact.

Partner Schools & Organisations

Sir Frederic Osbornes - Welwyn Garden city
The Priory school - Hitchin
Wheatfields infants school - St Albans
Wheatfields Junior school - St Albans
Skyswood Primary school - St Albans
Contact #2 : Royal Masonic School for Girls, Rickmansworth (ARISS#998)

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**School**

Royal Masonic School for Girls
Rickmansworth Park,
Rickmansworth
WD3 4HF

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**Highlights**

HamTV video was successfully received after about 30-60 seconds from the start of the voice contact with Tim and has been acknowledged as a world first where the HamTV has been used within the 10 minutes of the normal ARISS Schools contact.


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**Audience Participation**

<table>
<thead>
<tr>
<th>Preschool (&lt;4 years)</th>
<th>Primary (4-11 years)</th>
<th>Secondary (11-18 years)</th>
<th>Others (University students, guests etc)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>45</td>
<td>187</td>
<td>373</td>
<td>240</td>
<td>845</td>
</tr>
</tbody>
</table>

---

**Media & Social Media Coverage**

Local Media presence: BBC 3 Counties Radio Broadcast their drive time show live from RMS and streamed the whole contact on their show.

Two local papers journalists

One local radio journalist
One Facebook post by the “BBC Three Counties Radio” team is believed to be one of the biggest views that any ARISS Principia social media posting has received ([https://www.facebook.com/BBC3CR/videos/1299409430076432/](https://www.facebook.com/BBC3CR/videos/1299409430076432/)).

The contact took place on 11 February and by the 18 February had received over 39,000 separate views. A screen grab of the Facebook video is included below this table.

---

### ARISS Principia Web Stream Viewing Details

<table>
<thead>
<tr>
<th>Over 2,750 unique users over the course of the day</th>
<th>Within the UK the top areas were:</th>
</tr>
</thead>
<tbody>
<tr>
<td>** 92% UK ** 1.4% France ** 0.95% USA ** 0.85% Germany ** 0.75% Netherlands ** Remaining &lt;0.3% each.</td>
<td>* 34.1% London * 5.8% Watford * 5.1% Potters Bar * 4.4% Norwich * 3.2% Rickmansworth * Remaining &lt;3% each.</td>
</tr>
</tbody>
</table>

We observed over 960 concurrent viewers during the latter half of the contact itself

---

**Partner Schools & Organisations**

St Clement Danes School  
Rickmansworth School  
St Joan of Arc School  
Dr Challenors High School  
John Hampden Grammar School  
Watford Girls School  
Watford Boys School  
Parmiters School
Tim Peake talks from the ISS

Astronaut Tim Peake talked to pupils at The Royal Masonic School for Girls in Hertfordshire live from the International Space Station.

The ROYAL MASONIC SCHOOL are the first in the world to make video contact with the ISS.

42,282 Views

500 shares

View 86 more comments

Arianne Say: I should have brought my radio! 14 February at 14:32

David Foster: That's my girl, well done... 14 February at 14:32

Write a comment...
Contact #3 : Oasis Academy Brightstowe, Bristol (ARISS#989)

School

Oasis Academy Brightstowe
Penpole Lane,
Shirehampton,
Bristol
BS11 0EB

Highlights

http://www.oasisacademybrightstowe.org/content/space-day-oasis-brightstowe-previews-tim-peake-radio-link

http://www.oasisacademybrightstowe.org/content/tim-%E2%80%98follow-your-dreams-and-work-hard%E2%80%99

http://www.oasisacademybrightstowe.org/content/tim-peake-%E2%80%93-air-brightstowe-and-inspiration-throughout-country

http://www.oasisacademybrightstowe.org/content/gb1oab-calling-major-tim

Audience Participation

<table>
<thead>
<tr>
<th></th>
<th>Preschool (&lt;4 years)</th>
<th>Primary (4-11 years)</th>
<th>Secondary (11-18 years)</th>
<th>Others (University students, guests etc)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>90</td>
<td>188</td>
<td>612</td>
<td>178</td>
<td>1,068</td>
</tr>
</tbody>
</table>

Media & Social Media Coverage
**ARISS Principia Web Stream Viewing Details**

<table>
<thead>
<tr>
<th>Over 1,860 unique users over the course of the day</th>
<th>Within the UK the top areas were:</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Of which the countries were:</td>
<td>* 27% London</td>
</tr>
<tr>
<td>** 88% UK</td>
<td>* 7.5% Wigan</td>
</tr>
<tr>
<td>** 1.9% USA</td>
<td>* 7.2% Bristol</td>
</tr>
<tr>
<td>** 1.6% Netherlands</td>
<td>* 3.3% [Unknown]</td>
</tr>
<tr>
<td>** 1.2% France</td>
<td>* 3.1% Stafford</td>
</tr>
<tr>
<td>** Remaining &lt;1% each.</td>
<td>* 2.1% Birmingham</td>
</tr>
</tbody>
</table>

| Remaining <0.9% each.                          |

**Partner Schools & Organisations**

The Contact Day consisted of:
- Shirehampton Amateur Radio Royal Signals workshops
- Explorer Dome: 3 workshops on Tim’s mission
- Thales workshops & talks
- Art: planet-related artefacts with Y9
- Uni of Bristol Engineering Dept talks
- School Band & choir performed
- Tim’s picture on screen!
- Seema Tawaokoli’s Q&A
- #oabspace trending
- MP Charlotte Leslie

Prior activities:
- Weather balloon into near space day before
- Whole School day of space related cross-curricular 5th Feb
Contact #4 : City of Norwich Schools, Norwich (ARISS#994)

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**School**

City of Norwich School  
Eaton Road  
Norwich  
Norfolk  
NR4 6PP

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**Highlights**

http://www.cns-school.org/Successful-live-radio-link-up-with-Tim-Pease

http://www.cns-school.org/Tim-Pease-Photo-Gallery


---

**Audience Participation**

<table>
<thead>
<tr>
<th>Audience</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preschool (≤4 years)</td>
<td>3,294</td>
</tr>
<tr>
<td>Primary (4-11 years)</td>
<td>9,291</td>
</tr>
<tr>
<td>Secondary (11-18 years)</td>
<td>9,961</td>
</tr>
<tr>
<td>Others (University students, guests etc)</td>
<td>53</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>22,599</td>
</tr>
</tbody>
</table>

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**Media & Social Media Coverage**


http://www.cns-school.org/Successful-live-radio-link-up-with-Tim-Pease
ARISS – Amateur Radio on the International Space Station

http://www.cns-school.org/Media-links-for-Tim-Peake-radio-call

**ARISS Principia Web Stream Viewing Details**

* Over 2,112 unique users over the course of the day
* Of which the countries were:
  ** 86.7% UK
  ** 4.6% Germany
  ** 1.9% USA
  ** Remaining <0.8% each.

<table>
<thead>
<tr>
<th>The top areas were:</th>
</tr>
</thead>
<tbody>
<tr>
<td>* 25.5% Norwich</td>
</tr>
<tr>
<td>* 17.1% London</td>
</tr>
<tr>
<td>* 3.6% Dortmund (DE)</td>
</tr>
<tr>
<td>* 2.3% [unknown]</td>
</tr>
<tr>
<td>* 2% Thetford</td>
</tr>
<tr>
<td>* Remaining &lt;1.5% each.</td>
</tr>
</tbody>
</table>

Over **1,050 concurrent users** during the contact itself.

**Partner Schools & Organisations**

32/33 separate schools throughout the East Anglia geographical region.

University of East Anglia
Contact #5 : Powys Combined Schools, Builth Wells (ARISS#997)

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**School**

Builth Wells High School  
College Road  
Builth Wells  
Powys  
LD2 3BW

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**Highlights**


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**Audience Participation**

<table>
<thead>
<tr>
<th>Preschool (&lt;4 years)</th>
<th>Primary (4-11 years)</th>
<th>Secondary (11-18 years)</th>
<th>Others (University students, guests etc)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>750</td>
<td>545</td>
<td>170</td>
<td>1,491</td>
</tr>
</tbody>
</table>

---

**Media & Social Media Coverage**

Press releases/media interest

www.itv.com (HTV wales)  
www.bbc.co.uk (BBC Wales)  
youtube  
www.walesonline.co.uk  
southgate radio news
BBC radio wales interviews
Brecon and Radnor post

ARISS Principia Web Stream Viewing Details

Over 1,162 unique users over the course of the day
* Of which the countries were:
** 84.9% UK
** 2.5% USA
** 1.7% Germany
** 1.6% Netherlands
** 1.2% Italy
** Remaining <1.0% each.

The top areas were:
** 14.1% London
** 5.0% [unknown]
** 2.5% Cardiff
** 1.9% Birmingham
** 1.6% Bridgend
** 1.5% Manchester
** 1.4% Oxford
** 1.4% Southampton
** Remaining <1.0% each.

Over 330 concurrent users during the contact itself.
We peaked at about 350 before the contact begun, however the audio issues caused a fall down to ~200 at the time that they were resolved

Partner Schools & Organisations

Builth Wells High School
Gwernyfed High School
Brecon High School
Crickowell High School
Contact #6: St Richard’s Catholic College, Bexhill on Sea (ARISS#1010)

School

St Richard's Catholic College
Ashdown Rd,
Bexhill-on-Sea,
East Sussex
TN40 1SE

Highlights

Audience Participation

<table>
<thead>
<tr>
<th>Preschool (&lt;4 years)</th>
<th>Primary (4-11 years)</th>
<th>Secondary (11-18 years)</th>
<th>Others (University students, guests etc)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>166</td>
<td>257</td>
<td>669</td>
<td>107</td>
<td>1,199</td>
</tr>
</tbody>
</table>

Media & Social Media Coverage

Strong social media response with 80+ facebook congratulations within 48 hours of contact and, as of one week later, 36780+ views and shared 499 times for the BBC South East 30 minute video clip
ARISS Principia Web Stream Viewing Details

<table>
<thead>
<tr>
<th>Over 1,172 unique users over the course of the day</th>
<th>The top areas were:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Of which the countries were:</td>
<td>21.3% Sidmouth</td>
</tr>
<tr>
<td>** 93.2% UK</td>
<td>10.1% London</td>
</tr>
<tr>
<td>** 0.9% USA</td>
<td>7.3% Hastings</td>
</tr>
<tr>
<td>** 0.7% Spain</td>
<td>6.1% Whitstable</td>
</tr>
<tr>
<td>** 0.6% Belgium</td>
<td>5.4% Glasgow</td>
</tr>
<tr>
<td>** 0.6% German</td>
<td>4.4% Scampton</td>
</tr>
<tr>
<td>Remaining &lt;0.5% each.</td>
<td>3.6% Havant</td>
</tr>
</tbody>
</table>

Over **700 concurrent users** during the contact itself.

Partner Schools & Organisations

Tim Peake Primary Project Partners (Joolz Durkin Space Ambassador): Dallington Primary; Vinehall Preparatory; Parkfield Infants & Pebsham Primary.

Primary Schools: Battle & Langton Primary; St Mary Magdalene’s; St Mary Star of the Sea; Netherfield CEP: Little Common; Park Mead Primary; St Peters & St Pauls; King Offa Primary; Sacred Heart; St Thomas A Beckett; Chantry Community Primary

Secondary Schools & Colleges: St Paul’s Catholic College; Bexhill Academy; Bexhill College; Uckfield Community College; Cavendish School; Claverham Community College; St Wilfred’s Catholic School; Glenleigh Park Academy

Special Schools: Glyne Gap School; St Mary’s Wrestwood

Universities: STEMSussex at University of Brighton; University of Sussex; University of Greenwich

Organisations:
Physics & Astronomy Outreach (University of Sussex);
Royal Society of Chemistry;
STEMSussex (University of Brighton);
Radio Society of Great Britain;
Hastings Electronics & Radio Club;
QRZ Radio club;
Herstmonceux Science Centre Outreach;
Institute of Physics;
ARISS – Amateur Radio on the International Space Station

East Sussex Astronomical Society;
BBC South East;
BBC South Today;
Meridian TV;
Heart Radio;
Bexhill Observer;
Thisisglobal communications

The Facebook item that is referred to in the above report is at
https://www.facebook.com/BBCSouthEastToday/videos/10154116229478648#

A screen grab confirming the viewing numbers is scown below.
Contact #7 : Wellesley House School, Broadstairs (ARISS#1014)

School

Wellesley House School
114 Ramsgate Road
Broadstairs
Kent
CT10 2DG

Highlights

This was the first ever Scheduled HamTV event held on a Saturday

http://www.wellesley.kent.sch.uk/news/?pid=7&nid=1&storyid=21

http://www.wellesley.kent.sch.uk/gallery/?pid=7&gcatid=1&albumid=27

Audience Participation

<table>
<thead>
<tr>
<th>Preschool (&lt;4 years)</th>
<th>Primary (4-11 years)</th>
<th>Secondary (11-18 years)</th>
<th>Others (University students, guests etc)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>59</td>
<td>215</td>
<td>19</td>
<td>126</td>
<td>419</td>
</tr>
</tbody>
</table>

Media & Social Media Coverage

http://www.bbc.co.uk/news/uk-england-kent-36119790

<table>
<thead>
<tr>
<th>Over 720 unique users over the course of the day</th>
<th>* The top areas were:</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Of which the countries were:</td>
<td>** 20.1% London</td>
</tr>
<tr>
<td>** 91.3% UK</td>
<td>** 6.5% Margate</td>
</tr>
<tr>
<td>** 1.2% Italy</td>
<td>** 4.1% Broadstairs</td>
</tr>
<tr>
<td>** 0.9% Spain</td>
<td>** 4.0% [unknown]</td>
</tr>
<tr>
<td>** 0.9% Russia</td>
<td>** 2.8% Canterbury</td>
</tr>
<tr>
<td>** Remaining &lt;0.5% each.</td>
<td>** 2.0% Dover</td>
</tr>
<tr>
<td></td>
<td>** 2.0% Ramsgate</td>
</tr>
<tr>
<td></td>
<td>** Remaining &lt;1.5% each</td>
</tr>
</tbody>
</table>

Over 350 **concurrent users** during the contact itself.

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**Partner Schools & Organisations**

- Callis Grange Infants
- St Mildred’s Infants
- Bromstone Primary
- Chartfield School
- Christ Church CE Junior
- Garlinge Primary
- Minster Primary
- Palm Bay Primary
- St Laurence Junior
- Pluckley Primary
- Reculver Primary
- River Primary
- Smarden Primary
- Charles Dickens School
- Chatham Clarendon Grammar School
- Dane Court Grammar School
<table>
<thead>
<tr>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>King Ethelbert School</td>
</tr>
<tr>
<td>Junior King’s Canterbury</td>
</tr>
<tr>
<td>Royal Harbour Academy</td>
</tr>
<tr>
<td>St George’s C of E school</td>
</tr>
<tr>
<td>St Lawrence College</td>
</tr>
<tr>
<td>Ursuline College</td>
</tr>
<tr>
<td>East Kent College</td>
</tr>
</tbody>
</table>
Contact #8 : The Derby High School, Bury (ARISS#1016)

Sandringham School
The Ridgeway,
St Albans,
Hertfordshire
AL4 9NX

School

Highlights

School ran a week of events in October 2015 and two weeks of Arts events in April 2016. Weekly Space to Ground NASA catch-up. Enrichment activities included: Into Film Space station 3D, I’m An Astronaut Get Me Outta Here, RSGB Radio Buildathon and Tim Peake launch Day. On the Link-Up day Dr Helen Mason gave a lecture to Y9 Pupils. School now participating in Rocket Science and will be working with Jodrell Bank Observatory.

http://www.derby.bury.sch.uk/D-Langford

Audience Participation

<table>
<thead>
<tr>
<th>Preschool (&lt;4 years)</th>
<th>Primary (4-11 years)</th>
<th>Secondary (11-18 years)</th>
<th>Others (University students, guests etc)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>208</td>
<td>3,247</td>
<td>2,168</td>
<td>26</td>
<td>5,649</td>
</tr>
</tbody>
</table>
# ARISS Principia Web Stream Viewing Details

**Over 713 unique users over the course of the day**
* Of which the countries were:
  ** 93.7% UK
  ** 1.5% USA
  ** 0.6% Belgium
  ** 0.6% Ireland
  ** Remaining <0.4% each.

**The top areas were:**
  ** 18.3% London
  ** 8.0% Bury
  ** 5.0% [unknown]
  ** 4.9% Manchester
  ** 4.2% Bolton
  ** 3.5% Birmingham
  ** 1.4% Southampton
  ** 1.2% Cambridge
  ** Remaining <0.8% each.

Over **300 concurrent users** during the contact itself.

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## Partner Schools & Organisations

- Radcliffe Hall Primary School, Radcliffe Bury, M26 2GB
- Wesley Methodist Primary School, Bury, M26 4PX
- St Peter’s Primary School, Bury, BL9 9PW
- Holy Trinity Primary School, Bury BL9 0SB
- Bury Grammar Schools, Bury, BL9 0HH
- Greenhill Primary School, Bury, BL8 2JH
- Springside Primary School, BL9 5JB
Contact #9 : Ashfield Primary School, Otley West Yorkshire (ARISS#1018)

School

Ashfield Primary School,
Weston Lane,
Otley,
West Yorkshire,
LS21 2DF

Highlights


http://www.ashfieldprimary.co.uk/space/

Audience Participation

<table>
<thead>
<tr>
<th>Preschool (&lt;4 years)</th>
<th>Primary (4-11 years)</th>
<th>Secondary (11-18 years)</th>
<th>Others (University students, guests etc)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>382</td>
<td>159</td>
<td>165</td>
<td>776</td>
</tr>
</tbody>
</table>

Media & Social Media Coverage

TV AND RADIO BROADCAST REACH: 3,348,002

PRINT AND ONLINE REACH: 1,008,173
TOTAL REACH: 4,356,175


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**ARISS Principia Web Stream Viewing Details**

**Over 1,155 unique users over the course of the day**

* Of which the countries were:
  ** 93.4% UK
  ** 0.9% Poland
  ** 0.8% Australia
  ** 0.6% Belgium
  ** 0.5% Norway
  ** 0.5% Germany
  ** Remaining <0.4% each.

**The top areas were:**

* 24.2% Leeds
* 18.5% London
* 5.8% Cambridge
* 4.4% Bradford
* 3.8% Boston
* Remaining <2.0% each.

---

Over **750 concurrent users** during the contact itself.

---

**Partner Schools & Organisations**

All Saints C of E Primary School
Lisker Drive,
Otley,
LS21 1DF

Westgate Primary School
Scarborough Rd,
Otley,
LS21 3JS

Pool C of E Primary School
Arthington Lane,
Pool-in-Wharfedale,
Otley,
LS21 1LG
Bramhope Primary School  
Tredgold Crescent,  
Bramhope  
LS16 9BR

Prince Henty’s Grammar School  
Farnley Lane  
Otley  
LS21 2BB

The Whartons School  
The Whartons  
Otley  
West Yorkshire  
LS21 2BS

St Joseph’s Catholic Primary School  
Manor Square  
Otley  
LS21 3AY
Contact #10 : The King’s School, Ottery St Mary (ARISS#1020)

---

**School**

The King’s School,
Cadhay Lane,
Ottery St Mary,
Devon.
EX11 1RA

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**Highlights**

This was the first worldwide Scheduled HamTV event to occur during the “normal” working week for the USOS astronauts.

It was also the last ARISS contact with UK schools before Tim Peake returns to Earth.

The lead student, Matthew M6MTI, received his callsign from the UK Regulator Ofcom by phone call on the Friday afternoon before the Monday morning contact took place.

Matthew M6MTI, is also the first student to ask an astronaut to wave on HamTV and see the Astronaut respond to his request.

http://www.thekings.devon.sch.uk/News/King-s-School-to-speak-to-British-Astronaut-from-S/

http://www.thekings.devon.sch.uk/News/Space-Week-at-King-s/

---

**Audience Participation**

<table>
<thead>
<tr>
<th></th>
<th>Preschool (&lt;4 years)</th>
<th>Primary (4-11 years)</th>
<th>Secondary (11-18 years)</th>
<th>Others (University students, guests etc)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>825</td>
<td>1,208</td>
<td>648</td>
<td>718</td>
<td>3,399</td>
</tr>
</tbody>
</table>
Media & Social Media Coverage


ARISS Principia Web Stream Viewing Details

<table>
<thead>
<tr>
<th>Over 780 unique users over the course of the day</th>
<th>The top areas were:</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Of which the countries were:</td>
<td>** 22.1% London</td>
</tr>
<tr>
<td>** 91.0% UK</td>
<td>** 6.3% Exeter</td>
</tr>
<tr>
<td>** 1.2% France</td>
<td>** 2.9% Birmingham</td>
</tr>
<tr>
<td>** 1.1% Italy</td>
<td>** 2.6% Poole</td>
</tr>
<tr>
<td>** 0.8% Germany</td>
<td>** 2.5% Torquay</td>
</tr>
<tr>
<td>** 0.75% USA</td>
<td>** Remaining &lt;2.0% each.</td>
</tr>
<tr>
<td>** Remaining &lt;0.5% each.</td>
<td></td>
</tr>
</tbody>
</table>

Over **600 concurrent users** during the contact itself.

Partner Schools & Organisations

Ottery St Mary Primary School, Longdogs Lane, Ottery St Mary, Devon EX11 1HY

Feniton Church of England Primary School, Station Road, Feniton, Devon EX14 3EA

Payhembury Primary School, Payhembury, Honiton, Devon EX14 3HT

Tipton St John Church Of England Primary School, Tipton St John, Sidmouth, Devon EX10 0AG