W6SBA South Bay Amateur Radio Club

Special Service Club

ARCOver

October 2020

A Community Service Organization Dedicated to Amateur Radio Since 1970

In this issue:

President's Message

I hope everybody is staying healthy during this ongoing COVID virus time. I see a lot more traffic on the 405 at the 4PM rush hour. I think that's a sign of getting back to normal. Except the virus is still on going and we have to be careful not to get to dismissive about the potential risk. I expect at some point we will have a vaccine for the virus and things will get back to normal. But normal times are tough to deal with on the 405 at rush hour. I have many of those memories. That's where ham radio can break up the monotony.

We are making a transition in the club. We have moved some of the antennas and supporting gear to a storage facility. This is the gear used at field day. Over time the storage facility cost will add up. I would like to ask some members to step forward to take a few items. This will not place a storage burden on any one individual. You can do your part for the club helping out here.

The other place you can help out your club by is taking on a council position. I can't encourage you enough on this opportunity to support your club. We are looking for a few good members to fill positions on the SBARC Council. For President, you need to have been on the council for a year to qualify to run for the office of President. For all positions, you must have a valid amateur radio license and be a member in good standing (paid dues). We are very much interested in your suggestions and or ideas so please let us know. We wish to offer the slate for 2021 at our next meeting. Nominations from the floor will be accepted at the November meeting. Please let our Election Committee Chair for the South Bay ARC, Joe-WB6MYD, know your intent as soon as possible.

Tom, KI6RC and Bruce, KK6BJ, had another balloon launch from TMMC on August 29th, 2020. Under the call sign KI6RC-12. I think this one has made two orbits. This balloon may set a record for time on orbit. Last contact was a few days ago headed east towards NK. When there are no reachable ground stations it becomes a wait and see activity. This is probably the hard part for Tom. The anxiety of never hearing from it again or the excitement of a new ground contact. For now were are still hopeful of another check in from KI6RC-12.

The October meeting will be held on Zoom. The club leadership will send out a Zoom invite. Click on the link, enter the password, and you should be good to go. This month we will present Ned Stearns-AA7A, Southwestern Division Vice Director. "Ned will be presenting construction of automated remote operator stations in Arizona." Ned is a very accomplish armature with many awards. You don't want to miss this presentation. Please join us on Zoom.

Upcoming monthly club activities include, the SBARC club meeting on October 15th on Zoom, and at the time of writing this, the TRW/NGC swap meet remains cancelled. After the swap meet a few of us use to head over to Denney's. This has been suspended until after the COVID shutdown.

Thanks for your club participation, stay healthy, stay in touch, and see you at the next SBARC virtual meet up in October!

73's…
Scott-N6LEM

October 15th at 7:30 p.m. on Zoom

Expect an email with the invite to the meeting. Click the link in the email and Zoom software launches and you join.

Topic: Ned-AA7A will give a presentation on Remote Station Construction/Setups

Edward "Ned" Stearns, AA7A - is an accomplished DXer, DXpeditioner (he's been on 32 of them and led 8) and technical innovator. He introduced the use of switchable vertical dipole array antennas on island DXpeditions and designed "dual-band discone" antennas for use with the Northern California DX Foundation's worldwide beacon network. Ned also worked with 2019 DX Hall of Fame inductee Joe Taylor, K1JT, on developing the "Fox/Hound" mode for FT8 used by DXpeditions.

Ned also maintains two remote stations in Arizona, has made presentations at many technical conferences and has served in a variety of leadership roles in the hobby. On the air, he is at the Top of the Honor Roll for DXCC Phone and Mixed, was the first recipient of 11-band DXCC and has worked over 160 countries via EME (Earth-Moon-Earth).

This years induction ceremony was scheduled to be conducted online on Wednesday, May 20, on the Ham Nation podcast (<https://twit.tv/shows/ham-nation>).

The CQ DX Hall of Fame was established in 1967 to recognize those amateurs who have made major contributions to DXing and DXpeditioning. This is the 54th annual induction, and the first to be conducted online.

ARISS to Celebrate 20 Years of Ham Radio on the International Space Station

ARRL.com 10/05/2020

Amateur Radio on the International Space Station (ARISS) will soon celebrate 20 years of continuous ham radio operations on the International Space Station (ISS). NASA is commemorating the milestone with a newly produced infographic highlighting the educational contacts via amateur radio between astronaut crew members aboard the ISS and students. Over its 20 years, ARISS has supported nearly 1,400 scheduled ham radio contacts with schools, student groups, and other organizations.

Planning for ARISS began in 1996 as a cooperative venture among national amateur radio and amateur satellite societies, with support from their respective space agencies. The ARISS ham radio gear actually arrived on the station before the Expedition 1 crew, headed by Commander Bill Shepherd, KD5GSL. The FCC issued ham radio call sign NA1SS for ISS operations. After Expedition 1 arrived on station, some initial tests with ARISS ham radio ground stations and individual hams confirmed the ham gear was working properly. The first ARISS school contact was made with students at Luther Burbank Elementary School in Illinois on December 21, 2000, with Shepherd at the helm of NA1SS on the ISS, and ARISS operations team mentor Charlie Sufana, AJ9N, guiding the operation on the ground.

NASA produced a video of students talking with astronaut Chris Cassidy, KF5KDR, during an ARISS contact in May 2020.

Before and during scheduled ham radio contacts, students, educators, parents, and communities learn about space and related technologies, and radio communication using amateur radio. ARISS has inspired thousands of students, promoting exploration through educational experiences spanning science, technology, engineering, the arts, and mathematics.

ARISS relies on a large network of amateur radio operator volunteers, many associated with radio clubs in the communities where students and groups participating in the contact reside. ARISS volunteers support satellite ground stations, serve as technical mentors, and provide additional help in the areas of education, community outreach, and public relations.

While student-to-astronaut radio contacts are a primary objective for ARISS, the capability has also inspired further experimentation for amateur radio in space and evaluation of new technologies. In September, ARISS announced that the initial element of its next-generation ham radio system had been installed in the ISS *Columbus* module. The new radio system replaces equipment originally certified for spaceflight in mid-2000. The onboard ham station also provides a contingency communications system for the ISS crew. Several astronauts have also enjoyed using NA1SS to make casual contacts with — and delighting — earthbound members of the ham radio community.

In the US, ARISS sponsors include ARRL, AMSAT, and NASA, the ISS National Lab-Space Station Explorers, and NASA's Space Communications and Navigation program. Global organizing partners include International Amateur Radio Union (IARU) member-societies as well as AMSAT organizations, and space agencies in Canada, Europe, Russia, Japan, and elsewhere.

The next proposal window for US schools and educational organizations to host an amateur radio contact with a crew member on board the ISS opened on October 1 for contacts that would take place from July through December 2021.

Like many educators who have coordinated ARISS radio contacts for their students, teacher Rita Wright, KC9CDL, an ARRL member, described the first ARISS school contact as inspirational and having a lasting impact on their community. Five months after their contact, nearly 500 students greeted Bill Shepherd when he visited Luther Burbank School. Wright said it was "like tossing a pebble into a stream."

"The ripple effects are still occurring, and I suspect will continue to occur for a long time," she said. "We have a young staff, and witnessing these events has inspired some to look for other interdisciplinary projects. They are beginning their dream. Many of our students are looking forward to careers associated with the space industry."

UNDERSTANDING NVIS

Paul Denisowski | Version 1.0 | 07.2020
ROHDE&SCHWARZ
Make ideas real

[Understanding NVIS will be covered over several issues of the newsletter breaking down the paper into smaller segments]

Frequency and Incidence Angle

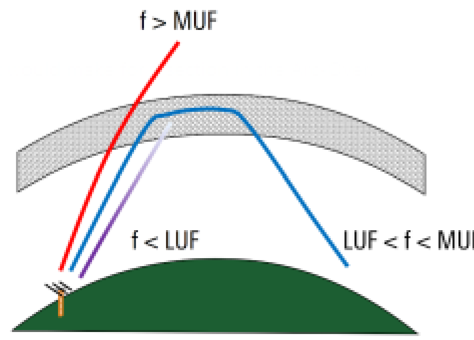

Figure 6 - MUF and LUF

MUF and LUF: The degree to which the different layers of the ionosphere refract and/or absorb radio frequency signals is partly a function of that signal's frequency. The general rule for HF skywave communications is to always use the highest possible frequency that will reach a given station or destination. This is called the maximum usable frequency (MUF). Signals whose frequencies are higher than the MUF will not be refracted by the ionosphere, but will instead penetrate the ionosphere and continue to propagate into space without being returned to Earth. Generally speaking, the MUF increases with increasing ionization. Another important frequency threshold is the lowest usable frequency (LUF). When the signal frequency is at or below the LUF, communication becomes difficult or impossible due to signal loss or attenuation. In HF skywave communications, frequencies should therefore be chosen such that they fall between the LUF and MUF, and this is true for both "traditional" HF skywave propagation as well as for NVIS. It should also be noted that there is a very important difference between MUF and LUF. Because the LUF is mostly determined by noise, using higher transmit powers, better antennas, etc. can improve or lower the LUF. MUF, on the other hand, is entirely a function of the ionosphere. Higher transmit power or a better antenna will not improve or increase the MUF.

Critical Frequency: The maximum usable frequency is usually estimated based on the critical frequency. The process for measuring the critical frequency is as follows: pulses at various frequencies are transmitted vertically by equipment called ionosondes. Depending on the frequency of the pulse, these pulses are returned by different layers of the ionosphere and the return time can be used to estimate the heights of different ionospheric layers. Once a certain frequency is reached, pulses are no longer returned by the ionosphere and instead continue on into space – this is the critical frequency. Critical frequency is a function of both the current ionization level as well as the measurement location: critical frequency is measured regularly at hundreds of locations around the world. Mathematically, the maximum usable frequency is the critical frequency divided the cosine of the angle of incidence: if a signal is transmitted vertically at 90°, MUF and critical frequency are the same. As a practical matter, the maximum usable frequency is usually estimated at 3 to 5 times the critical frequency for traditional skywave communications using a low incidence angle.

Incidence Angle: The incidence (or incident) angle is the angle at which a signal reaches the ionosphere, and incidence angle plays an important role in determining how far a skywave signal will propagate. The radiation or "takeoff" angle of an antenna is primarily a function of both the type of antenna and the location at which the antenna is installed. Higher placement of an antenna usually lowers the take-off / incidence angles and the lower the incidence angle, the greater the distance covered by skywave propagation. A consequence of low incidence angles is the creation of skip zones. In these skip zones, HF signals cannot be received either via skywave or via groundwave propagation. One way to provide coverage within a skip zone is the use of higher incidence angle signals, since a very high incident angle causes signal to be returned to Earth closer to the transmitter.

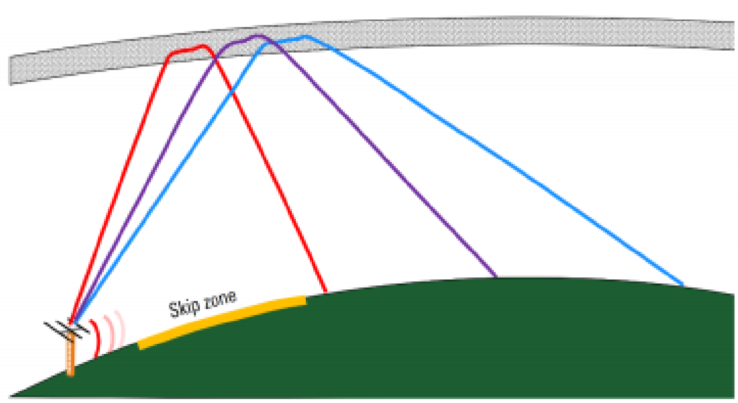

Figure 7 - Incidence angle and skip zone

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NVIS Principles and Applications

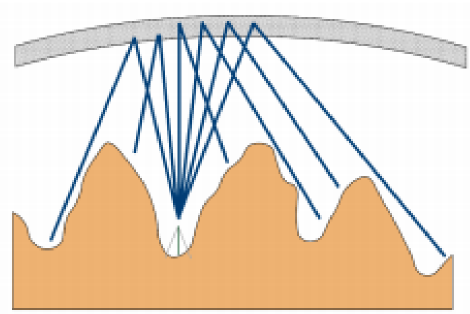

Figure 8 - Near vertical incidence skywave

NVIS Overview: As the name implies, near vertical incidence skywave (NVIS) is a special case of HF skywave propagation that enables both skip zone coverage as well as coverage in challenging terrain, where groundwave or low angle skywave signals might be blocked. NVIS is implemented using an antenna with a very high take-off angle, typically 75° or more, with transmission taking place on lower HF frequencies to ensure that signals are returned from ionosphere. The nearly-vertical take-off angle of these signals cause them to be returned to Earth relatively close to the transmitter. Coverage is often fairly uniform within a radius of up to several hundred kilometers from the transmitter. This local or regional coverage, combined with the easy setup of most NVIS antennas, makes NVIS very well-suited for applications that require ad hoc communications or communications in challenging terrain, such as military operations or disaster relief, where the existing communications infrastructure may have been damaged or destroyed.

NVIS: Technical Advantages NVIS has a number of purely technical advantages. The first of these is that NVIS is more resistant to fading than traditional skywave propagation and provides a more constant signal level. The near vertical incidence angle of NVIS means a shorter path through the D-layer and therefore less D-layer absorption. In addition, a shorter overall path length reduces the attenuation between transmitter and receiver. Attenuation of the signal due to terrain or obstructions is minimal because there is line of sight propagation between the transmitter and the ionosphere as well as between the ionosphere and the receiver(s). This line of sight propagation also helps to reduce fading due to multipath because a near-vertical take-off angle reduces the opportunities for the signal to be reflected from objects. The combination of these factors means that NVIS works well at relatively low transmit power levels, which is particularly important for portable or batterypowered operation in the field. The roughly omnidirectional coverage pattern created by a NVIS antenna makes antenna orientation or azimuth less critical in providing coverage to the desired locations, which in turn permits a great deal of flexibility in the setup and siting of NVIS antennas.

NVIS Operational Advantages: In addition to these purely technical benefits, NVIS also provides many operational benefits, particularly in a military environment. NVIS signals generally have a lower probability of intercept than conventional HF skywave signals. This lower probability of intercept comes from the fact that NVIS can operate at lower power levels and also from the vertically-focused radiation pattern. Both of these make it significantly more difficult to locate a NVIS station using direction finding (DF) techniques, particularly when the DF stations are ground-based: the energy from a NIVS antenna propagates primarily upwards and returns from the ionosphere with roughly equal strength over the coverage area. Furthermore, properly implemented NVIS Figure 8 - Near vertical incidence skywave Rohde & Schwarz | Educational Note Understanding NVIS 10 antennas do not have a strong groundwave signal component and this makes it difficult to take a bearing on a NVIS station. Additionally, groundwave-based jamming is less effective when applied against NVIS stations. NVIS antenna patterns are designed to have very low or poor gain at traditional groundwave angles and therefore do not receive groundwave jamming signals as strongly as antennas with lower incidence angles. Another operational benefit of NVIS is that NVIS antennas are mounted comparatively low to the ground, making them discrete and difficult to notice. Being low to the ground also makes NVIS antennas easy to erect, and many can be set up by a single person. Finally, since the radiation pattern from a NVIS antenna is largely vertical, there is no need to “control the high ground” to make effective use of a NVIS antenna: obstructions in the horizontal plane, such as trees, mountains, buildings, etc. are much less important in NVIS compared to traditional skywave or line of sight propagation.

NVIS Disadvantages: There are, however, also some disadvantages when using NVIS. One of the most important of these is that NVIS only works at lower frequencies: the reasons for this are discussed below. The nature of NVIS antenna patterns and propagation limits the maximum range of NVIS to the low hundreds of kilometers, compared to the thousands of kilometers that can be achieved using traditional, low-incidence angle skywave propagation. Optimum results require the use of NVIS antennas on both the transmit and receive stations, although this requirement is somewhat looser for receive-only stations. An additional potential disadvantage of using NVIS is that both atmospheric and man-made noise levels tend to be higher at the lower frequencies that are used in NVIS-based communications.

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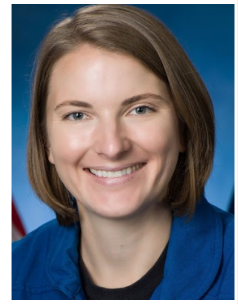
NVIS Continued

NVIS Frequencies: To make effective use of NVIS, the operator must choose frequencies that are low enough to be refracted by the F-layer of the ionosphere when arriving with a very high incidence angle. Signals with too high of a frequency will simply pass through the F-layer into space and will not be returned to Earth. In addition, NVIS requires the use of frequencies that are high enough to avoid excessive D-layer attenuation: recall that Dlayer absorption is higher for lower frequency signals. In order to balance out these two somewhat conflicting requirements, NVIS operation uses frequencies in the range of approximately 2 to 10 MHz. Like all other skywave propagation, the maximum frequencies depend on the level of atmospheric ionization, and this in turn depends on factors such as sunspot number or solar flux index, the time of day, the season, and any "abnormal" solar events. For example, during solar minima, the maximum usable frequency for NVIS may only be 6 to 8 MHz. On average, however, NVIS frequencies range from 2 to 4 MHz during the day and 4 to 8 MHz at night, but this can vary significantly. The specific frequency used for NVIS operation can be manually chosen by an operator based on experience and various ionospheric measurements or predictions, or the frequency can be automatically chosen using techniques such as automatic link establishment (ALE).

More to come on this topic next month.

Two More Astronauts Earn Amateur Radio Licenses

ARRL.com 10/06/2020



Although the lockdown of Johnson Space Center (JSC) postponed amateur radio training and licensing over the past 7 months, NASA ISS Ham Project Coordinator Kenneth Ransom, N5VHO, was able to work with all of the new astronaut-class graduates, as well as offer some refresher courses with already-licensed astronauts. Licensed astronauts on the International Space Station (ISS) may operate the on-station ham radio equipment without restrictions.

Astronauts often participate in Amateur Radio on the International Space Station (ARISS) contacts with schools and groups on Earth.

NASA Astronaut Kayla Barron, who completed her introductory course in June and received basic ham radio operations training in late September, recently tested and received the call sign KI5LAL.

European Space Agency astronaut Matthias Maurer passed his amateur radio exam on July 30, and he got his basic ham operations training in July. He now is KI5KFH.

Astronauts Shane Kimbrough, KE5HOD, and Shannon Walker, KD5DXB, completed the refresher course earlier this year. Two other new astronauts are in the queue to take the Technician license exam. — *Thanks to Rosalie White, K1STO*

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FCC Orders Amateur Access to 3.5 GHz Band to "Sunset"

ARRL.com *10/08/2020*

Despite vigorous and continuing opposition from ARRL and others, the FCC has ordered the "sunsetting" of the 3.3 – 3.5-GHz amateur radio secondary spectrum allocation, effective on November 9. The decision allows current amateur activity on the band to continue, "grandfathering" the amateur operations subject to a later decision. The FCC proposed two deadlines for amateur operations to cease on the band. The first would apply to the 3.4 – 3.5 GHz segment, the second to 3.3 – 3.4 GHz. The FCC will establish the dates once it reviews additional comments.

"We adopt our proposal from the *Notice of Proposed Rulemaking* to remove the amateur allocation from the 3.3 – 3.5 GHz band," the FCC said in its *Report and Order* (*R&O*) and *Further Notice of Proposed Rulemaking* in WT Docket No. 19-348, adopted on September 30 and published October 9 in *The Federal Register*, *R&O*. "[W]e adopt changes to our rules today that provide for the sunset of the secondary amateur allocation in the band, but allow continued use of the band for amateur operations, pending resolution of the issues raised in the *Further Notice*."

The September 30 *R&O* followed a 2019 FCC *Notice of Proposed Rulemaking* (*NPRM*) in which the FCC proposed re-allocating 3.45 – 3.55 GHz for "flexible-use service" and auctioning the desirable "mid-band" spectrum (generally defined as between 1 GHz and 6 GHz) to 5G providers. These and other recent spectrum-repurposing actions stem from the MOBILE NOW Act, enacted in 2018, in which Congress directed the Commission to make additional spectrum available to auction for mobile and fixed wireless broadband. The FCC action is consistent with worldwide allocations adopted by the ITU for these frequencies.

In the run-up to the Commission's decision, ARRL met with the FCC's professional staff to explain its concerns and to answer questions. Subsequently, ARRL met with the wireless advisors to the FCC Chairman and two Commissioners. In those meetings, ARRL reiterated that continued secondary status for amateurs will not impair or devalue use of this spectrum by the primary licensees intending to provide 5G or other service. ARRL noted amateur radio's long history of successful coexistence with primary users of the 9-centimeter band, sharing this spectrum with the federal government users and secondary, non-federal occupants.

ARRL pointed out that vital links in amateur television and amateur radio high-speed mesh networks using the band have been especially valuable during such emergency situations as the wildfires currently raging on the west coast. Deleting the amateur secondary allocation will result in lost opportunities for experimentation and public service with no public interest benefit to make up for that. ARRL argued that deleting the secondary allocation would waste the scarce spectrum resource, particularly in areas where commercial services often do not construct full facilities due to small populations. The FCC action means that amateur radio will lose access to the 3.5-GHz secondary allocation even where commercial operations do not exist. ARRL told the Commission that it should not intentionally allow this spectrum to be vacant and unused, wasting the public resource, when amateurs can use some portion of it in many geographic areas with no detriment to any other licensee, just as it has in the past. ARRL argues that amateur operations should be permitted until and unless an actual potential for interference exists.

Deletion of the 3.3 – 3.5 GHz secondary amateur allocation will become effective on November 9, but amateur radio operation as of that date may continue while the FCC finalizes rules to license spectrum in the 3.45 – 3.55 GHz band and establishes deadlines for amateur operations to cease. The FCC proposed allowing amateur operation in the 3.3 – 3.4 GHz portion of the band to continue "pending further decisions about the future of this portion of the spectrum," the timing for which is unknown. The Commission proposed to mandate that operations cease in the 3.4 – 3.5 GHz portion when commercial licensing commences for the new 3.45 – 3.55 GHz "5G" band, which is predicted to begin in the first half of 2022.

"[W]e seek comment on whether it is in the public interest to sunset amateur use in the 3.3 – 3.55 GHz band in two separate phases, e.g., first above 3.4 GHz, which is the focus of [the *R&O*] and later in that portion of the band below 3.4 GHz," the FCC said.
ARRL expressed gratitude to the many members and organizations that joined ARRL in challenging the FCC throughout this nearly year-long proceeding. They included multiple radio clubs, weak signal enthusiasts, moonbounce participants, and the Amateur Radio Emergency Data Network (AREDN), the Amateur Television Network (ATN), AMSAT, and Open Research Institute (ORI).
ARRL will continue its efforts to preserve secondary amateur radio access to 3.3 – 3.5 GHz. Members are invited to share comments by visiting www.arrl.org/3-GHz-Band.

"We recognize that any loss of our privileges will most directly impact radio amateurs who use the frequencies to operate and innovate," said ARRL President Rick Roderick, K5UR. "Such instances only embolden ARRL's role to protect and advocate for the Amateur Radio Service and Amateur Satellite Service. There will be continued threats to our spectrum. So I urge all amateurs, now more than ever, to strengthen our hold by being ceaseless in our public service, experimenting, and discovery throughout the radio spectrum."

CALENDAR

Council Meeting - **4th Wednesday** of the month
Call Joe - WB6MYD (310) 328-0817

Club Meeting - **3rd Thursday of the month**
October 15, 2020 - 7:30 p.m.

Via Zoom
(look for email)

Club Nets - **W6SBA WEEKLY NET**
Every Thursday @7:30pm
(except the night of club meetings)
PVUSD EMERGENCY NET
1st Tuesday of the month
09:30 Hours on the W6SBA repeater

TRW Swap Meet **Cancelled Until Further Notice**

VE Sessions - **Scheduled on Saturday of even months**
Contact Betty, N6VZF, with questions
(All VE sessions are scheduled for Room 4 in the Health Conference Center)

Social Event - **Contact: Joe WB6MYD**
Phone: (310) 328-0817
jmlanphen@gmail.com

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Health & Welfare	Joe - WB6MYD
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South Bay Amateur Radio Club Repeater

224.38 MHz ·PL - 192.8 Hz Offset -1.6 MHz
(See Calendar for Weekly Net Times)

NEWSLETTER SUBMISSION

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