

Quarter 1

NEWSLETTER

January - March 2023



CEO Corner

This quarter's message from President and CEO, Jeff Wells



As we enter the 2023 year, NuWaves RF Solutions is incredibly excited for what the future holds. We have been working hard over the past several years to bring innovative technology and solutions to the market, and we are now positioned to take advantage of the growing opportunities in the industry. With our cutting-edge engineering capabilities and deep industry knowledge, we are confident that we will continue to deliver groundbreaking products and services to our customers. In

addition, we look forward to building strong partnerships with our customers to enable them to achieve their business goals. We anticipate great success in our 2023 year, and we look forward to continuing to push the boundaries of what is possible in RF engineering.

Jeff Wells

What We're Talking About



Upcoming Technologies and Catalog Additions



The Development of Automation



Upcoming Events



Life-Saving Range Extension



Employee Spotlight

RF Innovation



Range Extension Solutions through Ku-Band

The NuPower™ KU-20-C01-S01 is a powerhouse of a power amplifier, ideal for uncrewed aerial systems (UAS), electronic warfare, and tactical communications systems with its lightweight design and low power draw. This solid-state PA extends your operational communication range and provides 43 dB of power gain from 14.5 GHz to 15.5 GHz for continuous waveforms.

The NuPower™ KU-20-C01-S01 accepts a nominal +10 dBm RF input and provides 33 dB (min) of power gain for continuous wave (CW) and near-constant envelope waveforms. Based on the latest gallium nitride (GaN) technology, the power and form factor of the NuPower KU-20-C01-S01 make it ideal for size, weight, and power-constrained RF telemetry, tactical communication systems, and electronic warfare systems.

Other benefits include improved link margin, reduced size for space-constrained systems, and an optional fan-cooled heatsink!

[View Product Data Sheet](#)



Spatial Combiner Development

NuWaves has been working on some exciting innovations in the world of spatial combiners and is ready to announce our latest new technology, COREPOWER™. Designed to combine several solid-state power amplifiers (SSPAs) into a compact form factor with high power and low loss, this piece of technology is perfect for aerospace applications. In a fast-paced environment like space, you can see why we are excited to bring this to the table.



With a usable frequency range of 1 GHz to 8 GHz, a maximum combining power of >2 kW, and a multiplication power handling of >1 kW, it is an excellent fit for tons of end uses that require consistent, low-maintenance, and highly reliable RF technology.

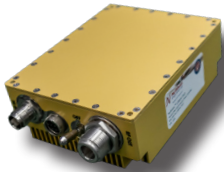
Our team is happy to answer any questions you may have about this upcoming technological development. Please reach out to our Business Development team to learn more at sales@nuwaves.com!

Reach out to learn more about our custom design services!

sales@nuwaves.com

New Product Additions

NuPower™ 11B02A-TAC2 Mini Multi-Octave Power Amplifier



The NuPower™ 11B02A-TAC2 is a highly ruggedized power amplifier designed for applications within S-Band frequencies between 200 MHz and 2600 MHz. Providing 10 Watts of RF power, this module is ideal for man-portable tactical radios. It's IP67-rated chassis with integrated heat sink allows the system integrator or operator to easily incorporate the unit into a platform operating in harsh environments with limited space, such as a tactical vehicle or manpack.



[View product data sheet](#)

Product Spotlight

NuFilter™ 04BPCV-4695-SFSF-M01 Bandpass Cavity Filter



The NuFilter™ 04BPCV-4695-SFSF-M01 provides superior harmonic and noise filtering of SCISR Radio (C-Band), as demonstrated by the rejection levels of greater than 40 dB at 2500 and 6890 MHz. This high-performance module accepts input power levels up to 35W CW, with only a minimal 0.2 dB of insertion loss in the passband frequency range of 4400 to 4990 MHz. Though designed to support the NuPower Xtender™ SCISR-20, with standard SMA connectors, this filter can be quickly and easily added to any RF system.



NuFilter™ 08BPCV-1600-SFSF-M01 Bandpass Cavity Filter



The NuFilter™ 08BPCV-1600-SFSF-M01 provides superior harmonic and noise filtering of SCISR Radio (L-Band), as demonstrated by the rejection levels of greater than 40 dB at 1175 and 2025 MHz. This high-performance module accepts input power levels up to 35W, with only a minimal 0.6 dB of insertion loss in the passband frequency range of 1350 to 1850 MHz.



NuFilter™ 08BPCV-2262.5-SFSF-M01 Bandpass Cavity Filter



The NuFilter™ 08BPCV-2262.5-SFSF-M01 provides superior harmonic and noise filtering of SCISR Radio (S-Band), as demonstrated by the rejection levels of greater than 40 dB at 1850 and 2830 MHz. This high-performance module accepts input power levels up to 35W, with only a minimal 0.4 dB of insertion loss in the passband frequency range of 2025 to 2500 MHz.



Product Pairing Suggestion:

NuPower Xtender™ SCISR-20 Multi-Channel Amplifier

Tri-Band Bidirectional Amplifier is a unique and versatile amplifier designed to support secure CDL ISR (SCISR) software-defined radio communications but can be used in any L-, S-, and/or C-band application.



[View product data sheet](#)





The Development of Autonomy

By Jaime Jones, Karalee Jerse-Woodward

Reading About Robots

Eighty-three years ago, Isaac Asimov published the first of nine short stories that would explore the complexities of machine intelligence alongside human civilization. Robbie, both title and focal character of the 1940 short story, depicts a young girl's relationship with her robot companion as she learns that he is capable of feeling emotions and forming strong human bonds. Ultimately, the tale is about accepting Robbie for who he is despite his lack of humanity and that he should be treated with respect and kindness as any other sentient being would.

Before the atomic age had even begun, society was already grappling with the idea of a future where autonomous machines worked, coexisted, or, in some ways, even surpass humanity.

One essential component that the philosophers and science fiction writers of the mid 20th century glossed over was the complexity of creating a thinking, reasoning, and fully autonomous artificial intelligence in the first place.

The unprecedented global R&D investment during both World Wars had convinced people of the age that technological advancement came in leaps and bounds. The same year that Robbie's tale was first printed on the pages of the Super Science Stories Magazine, the world was introduced to the first color television, polyester fabrics, and the jet engine. The average person in the 40s would have believed that growth was ever accelerating like space infinitely expanding faster than light – why wouldn't there be a human equivalent machine intelligence by 2000?

Though, as you and I know, the progress during the greatest generation would not be sustained, at least not how they would have expected.

Rather than in giant leaps, technology moves in smaller, continuous increments. Our modern perspectives are flooded with constant new discoveries and inventions, but few revolutionary products like the generations before us. Immediate, life-changing technologies are rarer today – we do get the iPhone 15 or the next Windows reskin, which is nice – but progress marches on behind the scenes.

For today, at least. Issac Asimov was ahead of his time but by how much? Sure, he was off by at least half a century, but maybe not by an entire century.

UxS – Uncrewed Systems

Today, Uncrewed Systems (UxS) are employed across various industries and applications. An unmanned system consists of unmanned aerial vehicles (UAVs), autonomous underwater vehicles (AUVs), remotely operated vehicles (ROVs), and connecting ground stations and satellites that facilitate the extraordinary data transmission required for these systems to function.

These systems are used for surveying large land areas quickly and efficiently, monitoring wildlife populations, tracking storms, measuring ocean temperatures, mapping coral reefs, deep-sea exploration and mapping of the seafloor, collecting samples from the seafloor, and national defense.



These large abstract systems bear little resemblance to our biological information processing. Still, they perform data processing, environmental analysis, and deduction to the degree that begins to blur the line between machine vs. animal instinct.

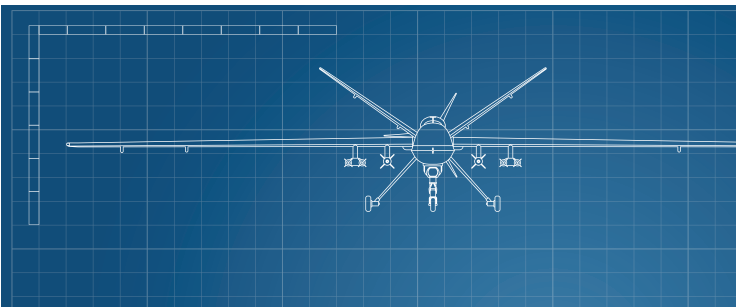
As Alan Turing postulated in his 1950 paper: *Computing Machinery and Intelligence*, Can machines think?

The idea of inanimate machines has long been theorized, even before the first physical models were conceived and built. Through the timeline depicted below, we will explore the where the initial automation seedlings sprouted in history, all the way to the fruition of these machines and robots that we now see in our day-to-day lives.

Classical Age

Automation

The earliest references to Automaton can be found during the Pre-Classical Age in the stories of Hephaestus around 700 BC. The god of fire and metalworking was known to the Ancient Greeks as an expert creator of self-operating machines that could perform tasks without human intervention.



18th Century

Autonomous Machine

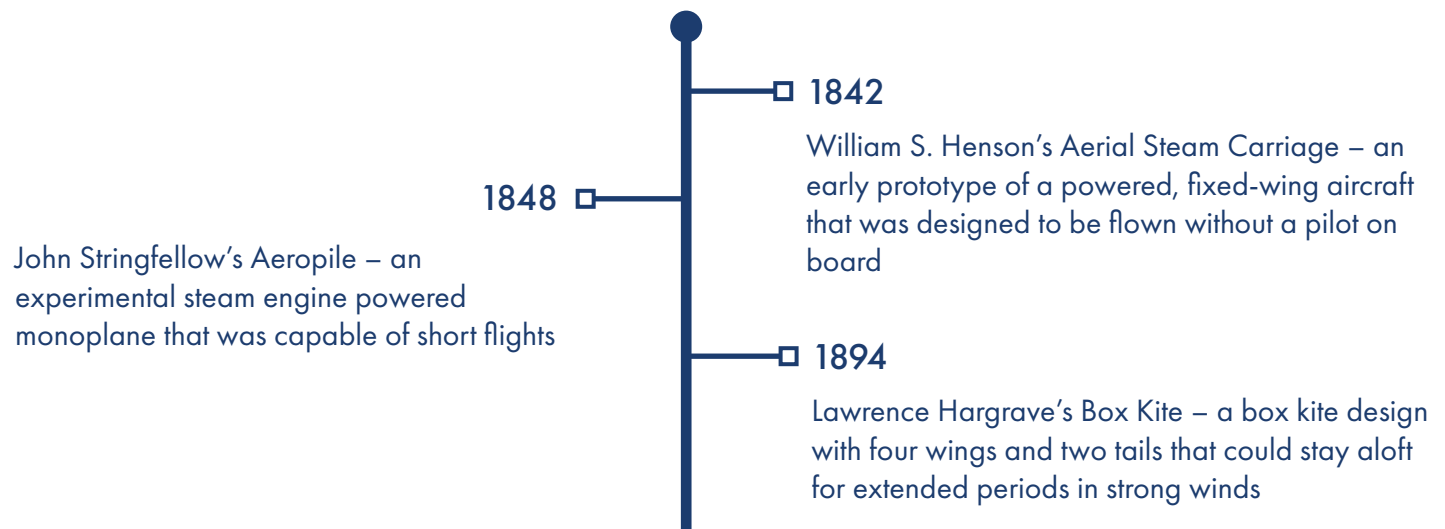
Jacques de Vaucanson was a French inventor who created the first autonomous machine in the late 18th century. His most famous invention was a mechanical duck that could quack, flap its wings and even eat grain.

The mechanical duck amazed people from all over Europe when they saw it for the first time; some thought it had been brought to life by magic, while others were convinced that Jacques had unlocked the secrets of nature itself with his creation. Whatever their opinion, everyone agreed that this remarkable feat of engineering marked an important milestone in human history - one which would pave the way for further advancements in automation and robotics.

19th Century

Unmanned Aircraft

The late 1800s kicked off a new medium for technology, flight.

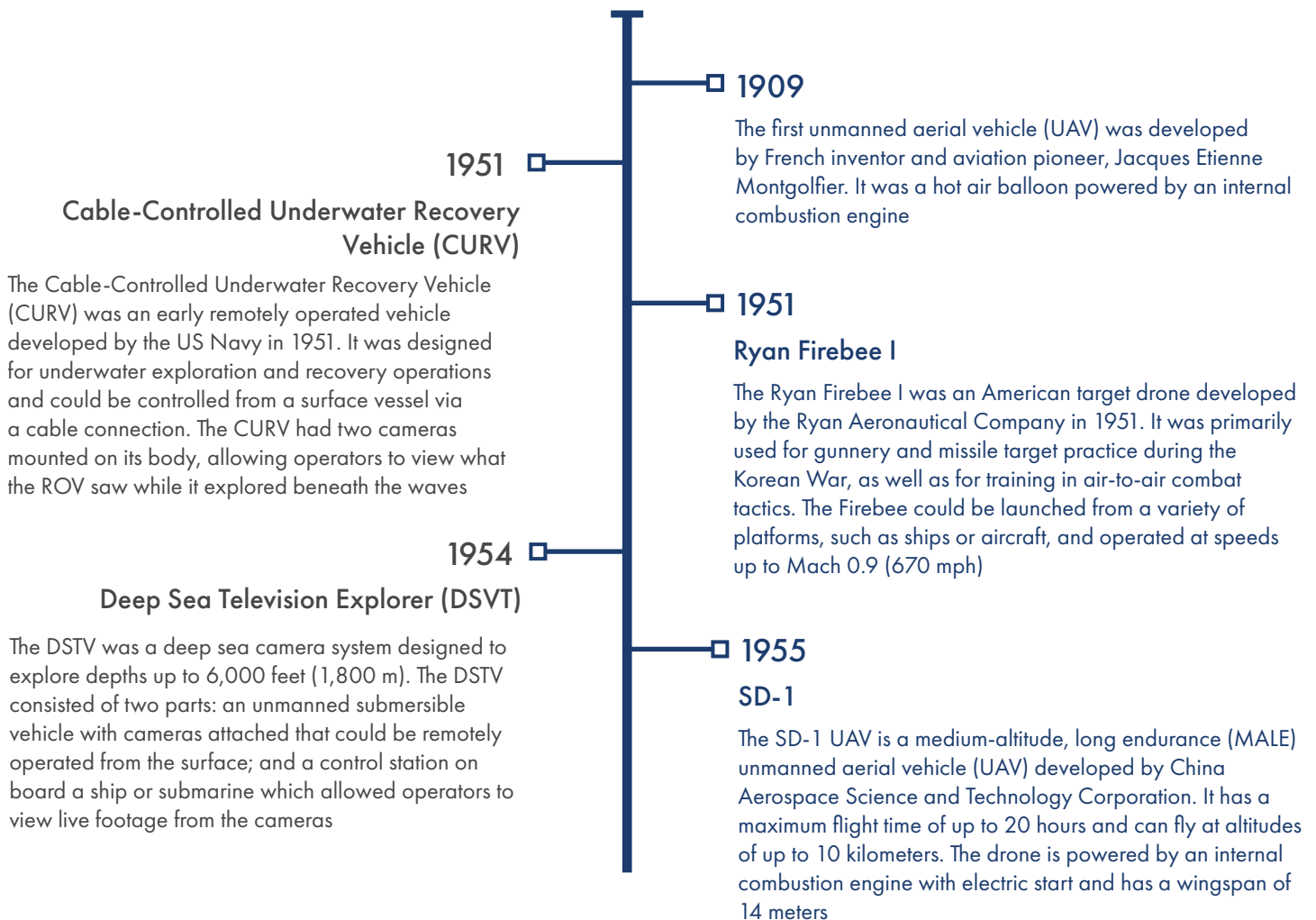


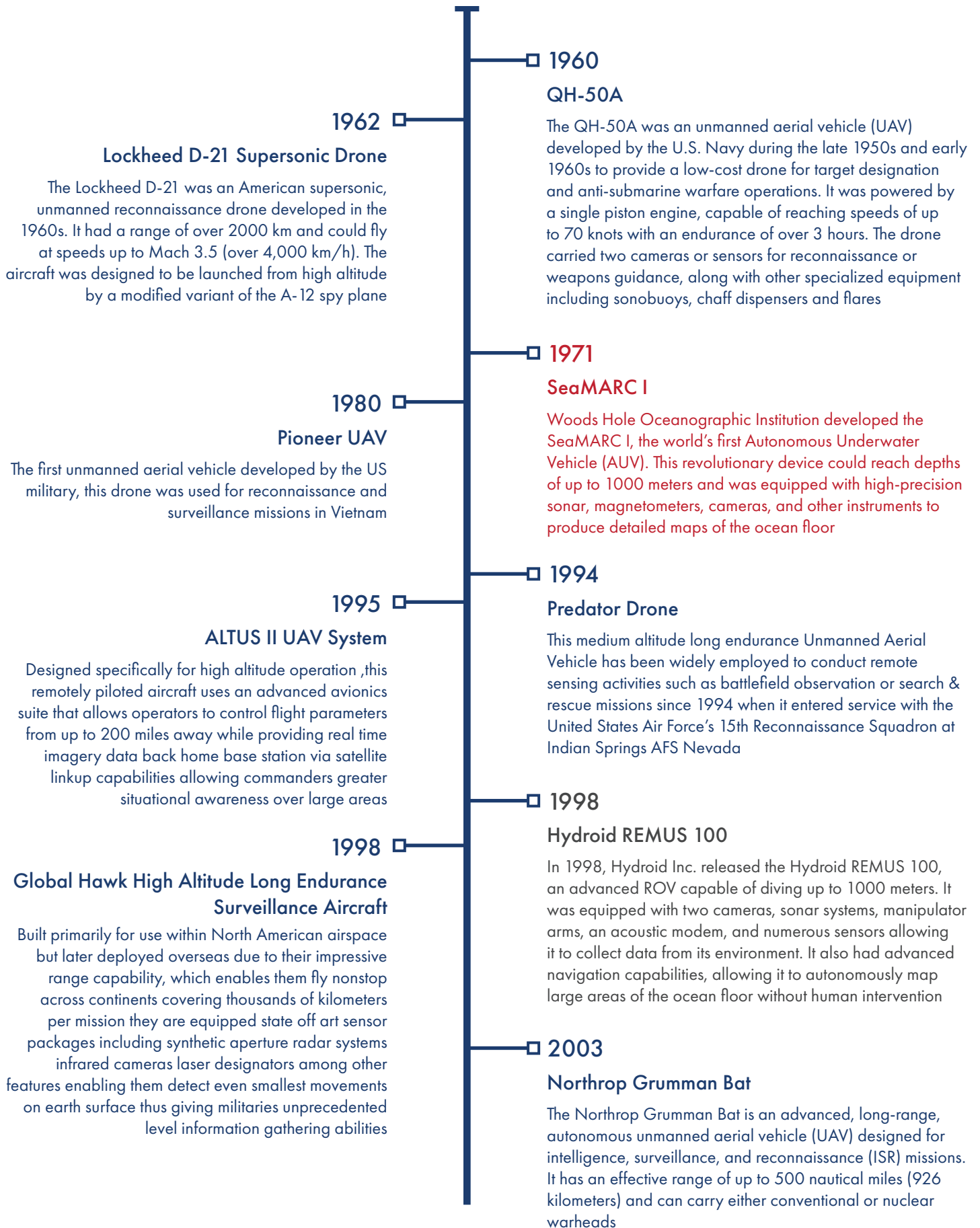
20th Century

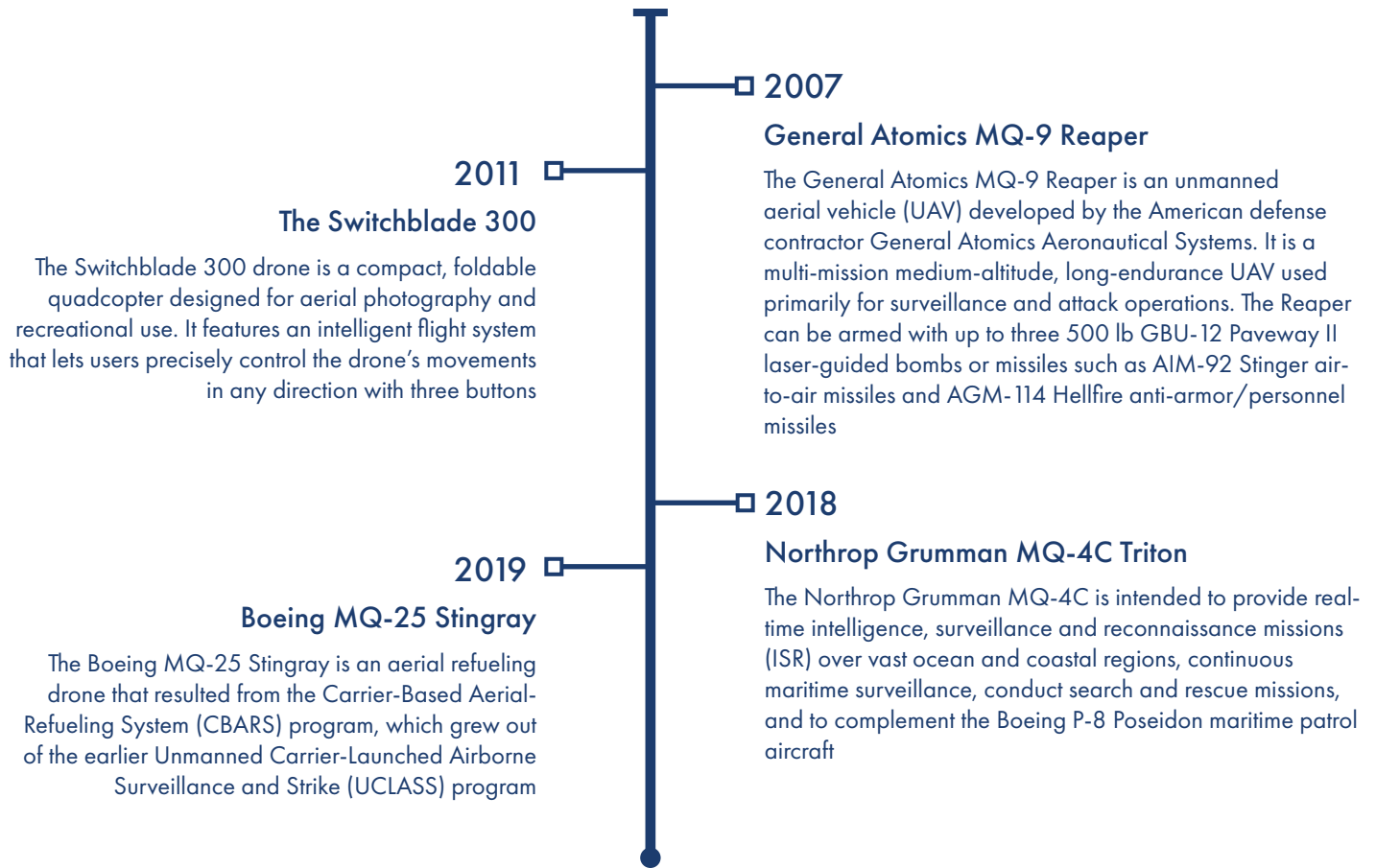
Remotely Operated Vehicle (ROV)

Autonomous Underwater Vehicles (AUV)

Unmanned Aerial Vehicle (UAV)







As it was in 1940, military funding remains the primary driver of innovation, but consumer developments are not far behind the curve. As current technology matures and pressures for automation rise, the age of thinking machines may have already arrived.

NuWaves RF Solutions designs and develops a multitude of range-extending modules to help improve the data link and communication systems within uncrewed vehicles. The NuPower Xtender™ 12B04A is a small, lightweight, and power-efficient bidirectional amplifier ideal for extending the communication range of half-duplex L- or S-band transceivers running constant-envelope or near-constant-envelope waveforms. The bidirectional amplifier generates 10 Watts of RF power from 1000 to 2500 MHz in transmit mode and the integrated low-noise amplifier provides a minimum of 13 dB of gain in receive mode. This module is ideal for Unmanned Aircraft Systems (Group 2 and Group 3), Unmanned Ground Vehicles (UGV), and RF Communication Systems.

NuWaves also specializes in quick-turn modification of our commercial off-the-shelf products. Our dedicated team of engineers can rapidly develop a custom solution to fit your system's needs. The NuPower Xtender™ 12B04A series has a number of variations including the NuPower Xtender™ 12B04A-D27, which accepts a +27 dBm RF input and provides more than 15 dB of transmit gain.

[View Product Data Sheet](#)



NuPower Xtender™ 12B04A

Upcoming Events

Event	Date	Location
Satellite 2023	March 13 - 16, 2023	Washington, D.C.
Space Symposium	April 14 - 17, 2023	Colorado Springs, CO
Army Aviation Mission Solutions Summit	April 26 - 28, 2023	Nashville, TN
SOF Week 2023	May 8 - 11, 2023	Tampa, FL
AUVSI Xponential	May 9 - 11, 2023	Denver, CO
Modern Day Marine	June 27 - 29, 2023	Washington, D.C.
Air, Space, and Cyber 2023	September 2023	National Harbor, MD
AUSA	October 9 - 11, 2023	Washington, D.C.

Life-Saving Range Extension



CENTUM's Lifeseeker System is an Airborne Phone Location for Search and Rescue, capable of accurately locating missing persons through their mobile phones – even in areas with no network coverage and under adverse weather conditions. It can be used on both manned (planes and helicopters) and unmanned aerial platforms (UAVs/drones). This device turns phones into emergency beacons that quickly guide Search and Rescue teams to the exact location of the missing person.

Lifeseeker maximizes missions in which every second counts by efficiently locating the person in need.

NuWaves RF Solutions is proud to support Lifeseeker through the development of a custom power amplifier that assists in increasing the range of the system in even the most remote of locations. Taking one of our off-the-shelf commercial products, we were able to quickly tailor it to provide the required performance for the SAR mission needs.

Our team is thrilled to play a role in this system that has saved countless lives and we look forward to our continued partnership with CENTUM research and technology.

Interested in quick-turn, custom modifications? Contact our team! sales@nuwaves.com

Employee Spotlight – Quality

Get to Know Adam

Adam Barnhardt is NuWaves RF Solution's Quality Control Supervisor and has been with the company for over five years. Starting at NuWaves as an electronics assembler, Adam was quickly selected for his talent at managing complex quality requirements and his deep knowledge of the industry. He excels at his current role by owning the AS9100 process and guiding the company toward delivering defect-free, on-time products and supporting our supply chain in doing the same.



Adam Barnhardt
Quality Control Supervisor

How Did Your Career in Quality Start?

I have been part of the electronics industry for nearly two decades. During my time involved in electronics assembly, I always had an interest in managing the outputs of processes and fine tuning what we're doing to better serve its end use. Continuous improvement has always been a critical component of electronic manufacturing in the defense industry, and I like to optimize and develop new methods of effectiveness.

What has been the most rewarding project you have worked on at NuWaves?

I helped lead the quality team during the transition from AS9100 Rev C to Rev D this is when I realized my true passion for quality. This experience allowed me to work with all the stakeholders at NuWaves to understand where they are at, where they need to be, and what it would take to get there successfully. We were able to adopt the new changes at a very rapid pace due to great teamwork throughout the company.

What is your favorite part of working in the military/defense industry?

What we do matters. In this industry, somewhere along the supply chain, every piece has considerable impact on its mission. The thing that I have built over a decade could still be in service flying around the world today, and it is important to me that it is the best quality possible.

What motivates you?

I like to improve myself over time, as well as help my kids improve and grow. Seeing myself get better at something I am passionate about scratches an itch.

What are your hobbies outside of work?

I really love to bowl, I am a part of four leagues and play three days a week. I also really enjoy restoring old cars, playing instruments, and spending time with my wife, two daughters, and our dogs.

Join our team! great.careers@nuwaves.com

