

PIONEERS OF STEALTH™

NEWSLETTER

Ufimtsev Recognized as a Pioneer of Stealth

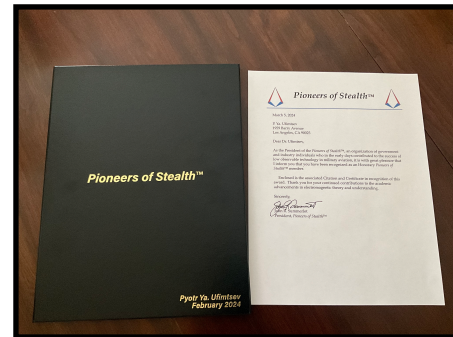
By John Summerlot

Since 1990, the inception the of the Pioneers of Stealth™ (POS) organization, there have been eight individuals recognized for Honorary Membership. Seven of these recognitions were based on the individual’s outstanding service to the continued success of the POS organization.

Early January 2024 Ken Mitzner, retired Northrop EE PhD working low technology, wrote to the Pioneers of Stealth asking if Pyotr Ufimtsev was a member of the POS organization “...if not, he definitely ought to be.”

Pyotr Ya. Ufimtsev was a Russian electrical engineer and mathematical physicist who authored a 1962 paper translated into English by the Foreign Technology Division in 1971, **Method of Edge Waves in the Physical Theory of Diffraction**. A Lockheed engineer, Denys Overholser, read the article and realized Ufimtsev had created the mathematical theory to accomplish finite analysis of radar reflection from geometrical flat plates. Denys with other Lockheed engineers proceeded to develop ECHO I, a computer code capable of the predicting the RCS of complex aircraft size targets, such as Have Blue.

In 1990, Pyotr (Peter) joined the faculty of the University of California (Los Angeles, Irvine) as a visiting professor of electrical engineering. Since then he has continued to publish books on the Physical Theory of Diffraction.



The POS Steering Committee unanimously agreed to recognize Dr. Peter (Pyotr) Ufimtsev. Dr. Ufimtsev is the first individual to be recognized with a POS Honorary Membership for significant contributions to the advancement of Stealth, also known as Low Observables Technology, in military aviation. He is considered by the POS members to be *Primus inter pares*, Latin meaning “first among equals”, a phrase typically used as an honorary title for someone who is formally equal to the other members of their group but is accorded unofficial respect owing to their standing.

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LETTER FROM THE PRESIDENT



Greetings Pioneers,

An element of my platform when running for President was to establish a POS Newsletter by which the leadership could maintain periodic contact with the members and provide a media for feedback. We hope this first POS Newsletter meets that criteria by providing you with up-to-date status, relevant information, and useful resources. Your feedback is essential in order to evolve this newsletter into one that adds value to you as a member and the organization as a whole.

These last 5 months have been nothing short of busy, mostly due to transitioning into office, but also new POS business. The team has (1) had a request to honor a individual who is almost a legend in the low observables academia, (2) recognized and honored our friends and comrades we have recently lost, (3) voted to initiate a request with the United States Patent and Trademark Office (USPTO) to formally and legally trademark the Pioneers of Stealth organization name, (4) and initiated the planning for the POS 2025 Reunion to include asking the members their opinion as to type of reunion format, a traditional typical gathering or a cruise.

Over next several months, I anticipate maintaining the focus on the 2025 reunion planning process, and beginning discussion on what I referred to as the 2025 POS Website Project in my platform objectives. This later item will be challenging in mutually agreeing on an end state let alone developing a web

product. But, if we can build an almost invisible airplane, anything is possible.

So, while your leadership team is focusing on the POS business, you can contribute to the organization in one of several ways. First and foremost we are a volunteer participation organization. If you see an area that you think you can be of help and would like to help, let us know. Second, give us your feedback, tell us what you think we are doing well and that which we could do better (remember the first item). Third is to participate... the POS 2025 Reunion should be one of the best taking advantage of the Florida weather. We hope to see you there in the Fall of 2025.

Cheers,

John Summerlot

Dr. Ufimtsev wrote to the Pioneers of Stealth on March 7, 2024

Dear President of Pioneers of Stealth.

I am very thankful to you and Pioneers of Stealth for choosing me as an honorary member. This is a great honor for me.

I am still continuing research in this area. Together with my colleagues we submitted the book "*Electromagnetic Surface Waves in Microwave Absorbing Layers*" to Cambridge Scholars. This is currently in the process of publication. We hope that it may be of interest to Pioneers of Stealth.

Sincerely,

Pyotr Ya. Ufimtsev



Trademarking the Pioneers of Stealth™

By Peter Knauth

From its beginning in the early 1990's, the Pioneers of Stealth social group has informally commemorated and celebrated the accomplishments of those DoD and aerospace industry participants who were specifically briefed into one or more of the first four SENIOR HIGH family of Low Observables development programs launched and managed by the Low Observables SPO within Aeronautical Systems Division, Wright-Patterson AFB. "Pioneer" status and thus POS group membership eligibility has always been cut off on December 17, 1993, when the first B-2 "Spirit" was delivered to the Air Force.

The high point of the group's 33-year celebratory journey occurred with the dedication at the USAF Museum Memorial Garden of the monument commemorating all the professionals, POS members, and non-members alike, who materially contributed to the past development of Stealth over the years and continue to do so today.

The unveiling of the actual granite, steel, and marble Memorial and its emotional dedication and celebration on July 17, 2023, renewed our awareness of the unique achievement of all the early stealth pioneers and a special pride in the Pioneer of Stealth group and the 120+ donors who conceived and produced this important tribute.

So, just as the Memorial was to be a permanent celebration of all the pioneers of stealth, so should the Pioneers of Stealth group have a permanent niche in the rich early history of early LO development capped by their role in the Memorial's creation.

Thanks to the early work that had been done by Bob Gilmore on the question of possibly trademarking Pioneers of Stealth, we were able to retain a specialized patents and trademark attorney, Alonzo & Associates, Redondo Beach, CA, and submitted a Collective Membership Application to the U.S. Patents and Trademark Office in Washington, D.C., where it has been accepted and is undergoing review and processing as we speak.

Our USPTMO application notes the first use of the term Pioneers of Stealth in the context of an unincorporated association back in the early 1990's and states it "... indicate(s) membership in a nationwide social club organization for persons who worked in certain clearly defined aspects of aviation low observables technology development and exploitation until December 17th, 1993."

We have been told we can expect the USPTMO to complete their review of our application sometime this coming Summer.

PIONEERS OF STEALTH®

Upon approval of the Pioneers of Stealth trademark, the title will be then be designated as shown above.



Excerpt: Living In The “Black World”

Conversations With The Early Pioneers Of Stealth

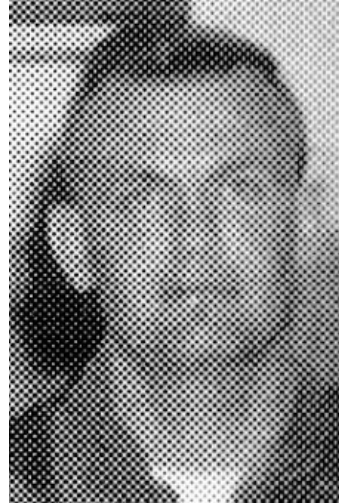
Interview with Eldred “Don” Merkl

It was about the second year into the program and we had a pretty big cost growth and the way you got the money is you'd have to go brief all the way up the chain with hat in hand and take a severe butt-chewing from the generals and if they wanted to give it to you, you could get it. Alan Brown¹⁵ was a program manager out at Skunk Works and after he found out that he had this overrun he told me, “You know, I hate it, but we've got to have the money,” So I prepared to go up to brief General Slay.

Commander, System Command?

Yes. He was the four-star at Systems Command. So, I got that done on Friday and I was supposed to do the briefing on Monday, and I thought, well, I better relax. I was sweating that briefing. Slay had a reputation—they didn't call him Alligator Al because he had tough skin. He chewed butt. So I was trying to relax a little that weekend and I decided I'd play some tennis with a Colonel Reddenbocker—he and I would play a little bit. We were out playing tennis and I stopped real fast, rolled my foot and broke it. I had a walking cast put on it and could hobble a little bit.

As a background for this story, General McMullen, in the meantime, had left TAC where he was working for Creech and had gone up to Systems Command Headquarters and he was working for General Slay. And they told me that when



Don Merkl was an MOL-2 and MOL-3 astronaut candidate - Late 1960s.

General McMullen left (I had seen him down there—I had gone over to give an F-16 briefing), he was all bent over with a catch in his back. It was the doggonedest thing. He walked just like that, real crippled like that. Slay had this ritual that he would do with all his new generals. He would find some fault just so he could get them in his office and chew them out to let them know who was boss. It was a known fact he did that. With that background, let's get back to my broken foot.

I go in there with this broken foot and I hobble up to the front of the room and this is all business because I have got to give him this bad news. I start into my briefing and Slay says, “Merkl, are you going to tell me how you hurt that foot or am I going to have to ask you?” I said, “Well, sir, actually there's nothing wrong with my foot, somebody told me you take it easy on



Don Merkl Interview - Continued from Page 4.

cripples, and I just put this cast on here because I've got some bad news to tell you." General McMullen said, "Well, I don't know who that son-of-a-gun was that told you that but he didn't know what the heck it was he was talking about." But somehow or another that struck Slay as being funny and here he is a four-star and he's doing his best to keep a stern look on his face and I'm up there, "Sir, I got a 30-million dollar hike here", and he goes [laughter], "...and I got another \$15 million...". And I went all the way through my briefing and every time I mention one of those big numbers, Slay would laugh about thinking about my cast story and General McMullen's reaction—appreciating him getting his

butt chewed. So, we skated right through that and didn't get a bite mark for the whole briefing!

Boy, that injury worked out well.

Very good. That broken foot was worth it.

(For the complete interview with Eldred "Don" Merkl and others, visit ***Living In The "Black World"*** at www.pioneersofstealth.org).

[Our friend and 2000 POS Honoree, Don Merkl, passed January 2024.]

Sherm and Skip's Stealthy Book Corner

BOOK REVIEW: "Shooting Down The Stealth Fighter - Eyewitness Accounts From Those Who Were There." Authors: Lt Col D. S. Anivic, Deputy Commander of the Battalion which did the shoot down, and physicist and engineer Mike Mihajlovic, who was on active duty during the 1999 war in Bosnian.

Published by Air World (Pen and Sword Books), Yorkshire, England, 2021, 364 pages.

The shoot down of the F-117 in March 1999 by a mobile Yugoslav surface to air missile battalion is detailed in about fifty pages. The rest of the book is a mini encyclopedia, covering radar systems, RCS, stealth, air defense systems, Have Blue, F-117, and post 1999 Russian air defense radars and missile systems. The book is well illustrated and very detailed. The writing style is in clear English.

The core substance of this book is how a well trained highly motivated Yugoslav mobile antiaircraft missile battalion shot down an F-117 stealth fighter over Serbia on March 27, 1999. The F-117 was flown by Lt Col Dale Zelko, who had flown many combat missions during Desert Storm. He ejected, landed safely in a farmer's field, and was rescued by a combat search and rescue helicopter crew. The book includes a bibliography of about 150 books and other documents. This a significant book by two very capable authors.

Sherm Mullin



Sherm and Skip's Stealthy Book Corner - Continued from Page 5

Stealth, A Selected Bibliography

1. Louis Ridenour, Editor, *Radar System Engineering*, McGraw -Hill, New York, 1947 See radar cross section and absorbent materials, polar plot of B-16 RCS
2. Peter Westwick, *STEALTH - The Secret Contest To Invent Invisible Aircraft*, Oxford University Press, New York, 2020
3. David Aronstein & Albert Piccirillo, *HAVE BLUE And The F-117A - Evolution of the Stealth Fighter*, AIAA, Reston VA, 1997. Best book on the beginnings.
4. Lt Col William B. O'Connor USAF, *STEALTH FIGHTER – A Year In The Life Of An F-117 Pilot.*, Zenith Press, Minneapolis, 2012.
5. David Aronstein, Michael Hirshberg, Albert Piccarillo, *Advanced Tactical Fighter Origins Of The 21st Century Air Dominance Fighter*, AIAA, Reston VA, 1998
6. James Stevenson, *The \$5 Billion Misunderstanding – The Collapse of the Navy's A-12 Stealth Bomber Program*, Naval Institute Press, 2001
7. Ben R. Rich and Leo Janos, *SKUNK WORKS – A Personal Memoir Of My Years At Lockheed*, Little Brown, 1994
8. M. Mihajlovic and Djordjes Anicic, *Shooting Down The Stealth Fighter – Eyewitness Accounts*, Air World, Yorkshire, 2021
9. Jay Miller, *Lockheed's Skunk Works - The First Fifty Years*, Aerofax Inc, Arlington TX , 1993
10. John M. Griffin, Editor, *The Pioneers of Stealth*, Lulu Publishing, 2017
11. Peter W. Merlin, *Dreamland: The Secret History of Area 51*, Schiffer Military History, 2023

Passed Pioneers

POS is sad to report the loss of the following pioneers over the last two years:

Leslie B. "Skip" Anderson III	80	January 17, 2022
Martin J. "Marty" Biancalana	74	January 31, 2022
Irving Theodore "Irv" Waaland	94	May 16, 2022
Alan Charlton Brown	92	May 25, 2022
JoAnn Therese Colligan	80	November 6, 2022
Jack O. Pearson	81	February 28, 2023
Barbara Ellen Nipper Simcox	79	September 14, 2023
Philip Dennis "Phil" Wetzel	89	October 13, 2023
Alan Reed Wiechman	74	November 13, 2023
Colin A. "CA" Smith		November 19, 2023
Eldred Donald "Don" Merkl	87	January 16, 2024
Thomas Patten Stafford	93	March 18, 2024



The Experimental Survivable Test (XST) Program

By Skip Hickey

1964 - 1975 Vietnam: The Soviet Union supplied radar directed anti-aircraft guns (AAA) and SA-2 surface-to-air missiles (SAM) to North Vietnam. The SA-2 was a Command Guided missile, i.e., the trajectory of the target aircraft was tracked by radar and transmitted to a computer in the control van. After the SA-2 was launched, the computer controlled the missile to intercept the target. The USAF countered with wing mounted Electronic Countermeasure (ECM) pods for jamming, Chaff, and "Wild Weasels" to suppress the SAM sites. Approximately 60% of USAF/ Navy aircraft losses were due to Radar Directed AAA, 30% to SAMs and 10 % to MiG fighters.

1973 - Yom Kippur War - Egypt and Syria vs. Israel: Soviet supplied radar-guided AAA, the SA-2, SA-3 and the SA-6 SAMs to Syria and Egypt. The SA-2 and SA-3 SAM sites were fixed. The SA-6 system was mobile with three tracked vehicles each carrying three SA-6 missiles, a Radar Command Vehicle and trucks carrying SA-6 missiles. The SA-6 used a Semi-Active Homing Radar system, i.e., after launch, the Radar Command Vehicle would illuminate the target. The radar in the missile would lock on the illuminated

signature to intercept the target. The Israeli ECM was effective against command guided SAMs but ineffective against the SA-6.

The Israeli Air Force lost approximately 102 airplanes to AAA and SAMs mostly in the first three days of combat. A significant number of these losses were due to the SA-6.

The Pentagon Summer Studies focused on the Central European Theater. Extrapolating the results of the Vietnam and the Yom Kippur war, it was projected NATO forces would be defeated if there was a full scale war against the Integrated Air Defense System of the Soviet Bloc.

1974 ASD/WPAFB - The Remotely Piloted Vehicle Systems Office (ASD/RPV): Tests conducted by the RPV SPO revealed that certain drones could not be tracked by radar directed guns. As a result of these tests, it was surmised there may be a threshold value of Radar Cross Section (RCS) that seriously degraded radar performance.

In 1974, the Defense Advanced Research Agency (DARPA), in cooperation with the RPV SPO, initiated studies to see if there was such a threshold. It requested a study from several aircraft companies to discern if:

- There was a threshold value of radar cross section that could degrade radar performance over a large range of frequencies.
- A manned aircraft could be designed to meet this threshold.

NATO reporting name: SA-6 "Gainful"



Track command vehicle and "Straight Flush" radar



The XST Program - Continued from Page 7

Contracts for \$100K were awarded to Northrop and McDonnell Douglas to identify the RCS threshold. McDonnell Douglas identified the threshold. However, their proposed configuration could not meet the desired RCS Levels. It was recommended that McDonnell Douglas team with Teledyne Ryan who had experience designing low observable drones. Lockheed was not invited to participate. To convince DARPA that Lockheed had experience with low observable aircraft, the Skunk Works obtained permission from the CIA to brief DARPA on their highly classified efforts to reduce the radar cross section of the A-12 and D-21 Drone. Lockheed was allowed to buy into the program.

Based on the results of these studies, DARPA with the assistance of the RPV SPO established the RCS threshold.

The Experimental Survivable Test (XST) Program: By 1975, DARPA realized that both Northrop and Lockheed were predicting a breakthrough in RCS Reduction. A decision was made to have a two phase program:

Phase 1: Design an aircraft that met the RCS goals then verify it by testing a full scale pole model at the Radar Target Scatter facility (RATSCAT). The company's design that met the RCS goals would proceed to the second phase.

Phase 2: Design, build and fly two test aircraft against the radar test range to demonstrate that a low observable test vehicle could be built with satisfactory flying qualities

Proposals were requested from McDonnell Douglas/Teledyne Ryan, Lockheed and Northrop.

Only Lockheed and Northrop were selected to proceed with Phase 1. During Phase 1, both Lockheed and Northrop continued to optimize their designs. Their intense level of effort can only be summarized here.

- Lockheed's computer program ECHO 1 was used to optimize the RCS of their configuration. It was validated at the Grey Butte Microwave Measurement Facility.
- Northrop used their GENSCAT program and the Grey Butte test facility to optimize their design.

(As a footnote, both Echo 1 and GENSCAT incorporated the findings presented in 1962 report on edge wave diffraction by Dr. P. Ya. Ufimtsev).

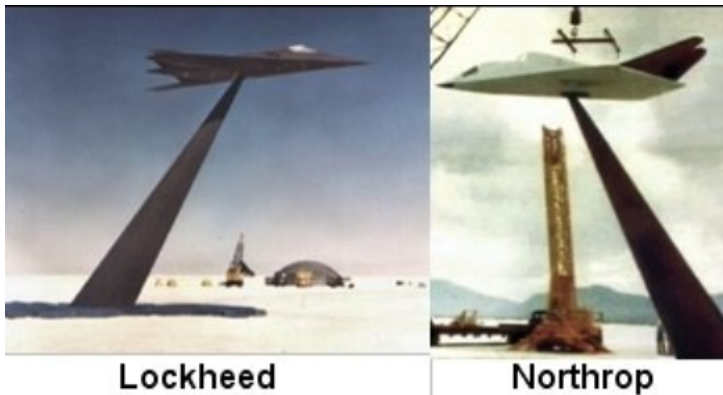
RATSCAT Mounting Pole: Prior to Phase 1, it was determined that the mounting pole at RATSCAT would have a larger radar cross section than the model. Therefore, a new pole had to be built for the Phase 1 tests. This was accomplished through joint efforts of the RPV SPO, Northrop and Lockheed. Lockheed designed the 40 foot pole and Northrop designed the mounting system for the models.



Installation of 40 foot RCS Pole at RATSCAT

The EST Program - Continued from Page 8

Phase 1 Pole Test: RATSCAT confirmed that BOTH configurations met the RCS goals but Lockheed was slightly better. Therefore, Lockheed was selected to proceed to Phase 2. Northrop was encouraged to keep their design team together.



Have Blue 1001 Instrumented for Flight Envelop Expansion

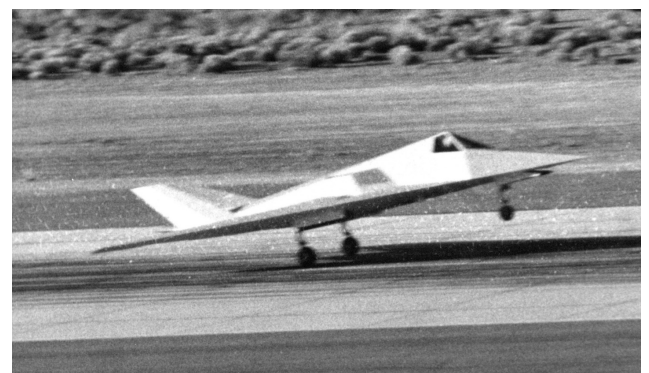
The first Have Blue was lost due to a hard landing. The right main landing gear bent and jammed upon retraction. After many attempts to dislodge the gear, the airplane was almost out of fuel and the pilot had to eject.

Have Blue 1001 completed 36 flights in five months. The first Have Blue airplane proved that the FBW flight control system would provide satisfactory flying qualities for a low observable configuration throughout the flight envelope.

The second Have Blue with the modified aft deck flew on 20 July 1978. It was the first low observable aircraft. Have Blue flew 52 flights in eleven months. The

In 1976 the Air Force Systems Command at Wright-Patterson AFB assumed management of the effort as a special access program. A Classified System Program office was established. Program information was classified Top Secret/Special Access Required (TS/SAR) and the name Have Blue was adopted.

Phase 2 Have Blue Flight Tests. To achieve low observable goals, the Have Blue configuration was aerodynamically unstable. The triple redundant fly-by-wire (FBW) control system used in the F-16 was modified to provide satisfactory flying qualities. The first flight of Have Blue was 1 December 1977. The airplane was not low observable but instrumented for system checkout, optimization of the FBW system and flight envelope expansion. It was found during the course of these tests that the aft deck deformed due to heat from the jet exhaust. This would degrade the low observable characteristics and had to be fixed before the low observable airplane flew.



Have Blue 1002 - The First Stealth Airplane



The EST Program - Continued from Page 9

second Have Blue was lost due to the failure of a spot weld in the engine nozzle. The hot gasses burned through the hydraulic lines to the control surfaces, resulting in the loss of control.

However, the results of the Have Blue flight tests met or exceeded all low observable goals relating to radar cross section as well as additional criteria for Infra-Red, Acoustic and visual signatures. Test results validated the analytical programs, test facilities and manufacturing processes necessary to design and build a low observable aircraft.

The highly successful XST program lowered the technical risk to the F-117A

Nighthawk and revolutionized the design of future aircraft.

References:

- 1) Iron Hand by A.M. Thornborough & F. Mormillo
- 2) Have Blue and the F-117A by D.C. Aronstein, PhD and A.C. Piccirillo, Col.USAF (Ret)
- 3) The Pioneers of Stealth by J.M. Griffin
- 4) HAVE Blue by J.T. Twigg, Col. USAF (Ret)
- 5) 1975 DARPA Experimental Survivable Test (XST) Program Presentation by H.J. Hickey

Traditional POS 2025 Reunion Format

On 8 March, 2024, we sent an email asking you to vote your preference for the POS 2025 Reunion format, a Typical gathering, a Cruise, or Either. Your response, while indicating great support for our Florida 2025 Reunion location selection, clearly indicated a preference for a "Typical" traditional reunion format by more than two-to-one. The votes were 48 for Typical, 11 for Cruise, and 25 for Either, a total of 84 votes

The POS 2025 Reunion team thanks you for your input as we now begin the detailed planning process. Members interested in being part of the Reunion Team can contact: Ralph Salvucci, Social Chairman, at ralph.salvucci@yahoo.com .

2022 Texas Reunion



George W. Bush Presidential Library

F-35 Production Tour
Lockheed Martin Aero
Fort Worth ,TX



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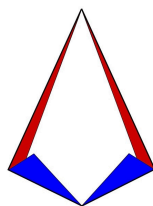
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A Blast From the Past



Alan C. Brown, Lockheed



Early Northrop Design Review

Next Issue.....

- POS Memorial Anniversary**
- Membership Process Update**
- 2025 POS Reunion Update**
- Living in the Black World**

