

KEYNOTE ADDRESS: AARDVARK ROOST AOC CONFERENCE - 13 SEP11. MILITARY TECHNOLOGY –SHAPING THE NEW GENERATION

President of the Aardvark Roost, Mr G. Radloff, the International AOC Vice President, Mr L. Buckout, General and Admirals, Officers and delegates. It is an honour to be requested to present a keynote address for the AOC Conference. A conference such as this is arranged to share knowledge amongst specialists. I am not a specialist in this field and am humbled to be in your presence. What I however can try to do is to give some context that I feel is to be noted at a conference such as this. I will therefore dwell on a few related issues and hopefully would leave you with some food for thought.

BACKGROUND OF AOC

The AOC (Association of Old Crows), was founded in 1964, as a not-for profit international professional association with its main goal to promote Electronic Warfare (EW). The organization's head office is in the USA and the current membership stands at 14,500 from 47 countries that include 69 branches or chapters in 20 countries all around the world. Membership of the AOC is voluntary and the majority of members usually come from the Armed Forces, the EW Industry and Research Establishments. The local South African chapter is called the Aardvark Roost, and was established in 1995.

The aim of the AOC is to provide an organization for individuals who have a common interest in EW and who wish to foster and preserve the art of EW, promote the exchange of ideas and information in the field of EW and to recognize the advances and contributions to EW. The AOC furthermore encourages research, professional development and strives to improve public understanding of the EW profession and its contributions.

THE HISTORY OF EW

I would briefly like to take you back to the beginning of it all by looking at the history of EW; and I do this at the hand of information obtained from sources found on the internet, including publications of the Association of Old Crows and Instruments of Darkness by Alfred Price. I quoted from these liberally.

The history of EW to jam radio waves dates to 1901; however it was not for a military purpose, but for commercial application. In order for a news source to report the results of a yacht race, a powerful radio transmitter was used to effectively overpower other radio transmitters seeking to broadcast reports about the same event. Though primitive, it was quite effective.

In 1902 the British Navy first incorporated deliberate radio jamming into a fleet exercise in the Mediterranean. One year later the US Navy experimented with a jamming exercise with less than notable results.

During World War I, radio jamming was occasionally attempted, but it was generally more important to receive enemy radio signals for intelligence purposes, so jamming was seldom attempted.

Following the development of radar, the inevitable attempt to jam a radar signal followed. The British first experimented with an airborne jammer in 1938. Shortly after jamming experiments began, electronic counter-countermeasures, or protection of systems from jamming, also began. The first wartime use of a ground based jammer was along the French coast overlooking Calais, directed against British air defence radars, with a radiated power of one kilowatt.

With war looming for the United States, President Roosevelt created the National Defence Research Committee (NDRC), which oversaw the development of radar systems, receivers and jammers. US efforts took place in research laboratories in the Navy and the Army, with information freely shared between the labs. The Naval Research Laboratory was the first to develop an accurate high frequency direction finder.

In September 1939, the British decided to assign a scientist to the Intelligence section of the Air Ministry. No scientist had previously worked for an intelligence service so this was unusual at the time. R.V. Jones was chosen for this task. During the course of the Second World War he was closely involved with the scientific assessment of enemy technology, especially in the field of electromagnetic and the development of offensive and counter-measures technology.

World War II

By 1942 research began in earnest, and the NDRC established a Radiation Laboratory at the Massachusetts Institute of Technology (MIT), simultaneously establishing a countermeasures lab named the Radio Counter Measures project. The project was held in the strictest secrecy. Sharing of data between the two labs was limited as well. Both labs competed in recruiting the best scientists, who were honoured to support such an important effort.

The first jamming incident in World War II occurred on February 12, 1942, when two German warships, Scharnhorst and Gneisenau, sailed through the English Channel to Germany. As part of the elaborate preparations for the operation, one or more jammers were set up on the north coast of France to counter each radar on the south coast of England. Just before the warships came within range of the British radars, the jammers were switched on simultaneously. The jamming caused considerable confusion and slowed the British reaction, and as a result the German warships had passed through the Strait of Dover before the first attacks were launched against them. The attacks were unsuccessful.

The British solved a number of tough Scientific and Technical Intelligence problems during World War II through mostly the effort of R.V. Jones and his colleagues. It is generally considered that R.V. Jones is the "father of S&T Intelligence". His book "The Most Secret War" is an excellent portrayal of the role of science in WW II.

Modern Wars

The importance of EW was by now well recognised and I will highlight the innovative application of EW in modern warfare. Many regional conflicts followed, in which the role of EW is well known. The most recent of these are the United States and coalition forces operations in Iraq. The “traditional” campaign was successfully executed; it wasn’t until the stabilization phase began that EW began a new chapter and went to the forefront. Insurgents and combatants began using Improvised Explosive Devices (IEDs) to attack US and coalition forces to include using radio controlled (RC) triggers to detonate the IEDs. The Air Force and Navy worked quickly to equip the EC-130 and EA-6B with capabilities to perform counter IED roles.

The traditional mission of the EC-130H, flying in a standoff orbit, is to disrupt voice and data communications essential for the command and control of enemy forces, particularly for coordination within integrated air defence networks during tactical air operations.

In 2009, 90% of the Compass Call missions flown over Iraq involved defeating IEDs using the EC-130H’s onboard systems. This new role has required Air Force Compass Call personnel to coordinate their sorties closely with Army and Marine Corps ground forces, as well as with Navy and Marine Corps EA-6B Prowler aircraft that also perform IED defeat missions. According to a variety of sources, the Compass Call and Prowler aircraft typically fly what soldiers on the ground have dubbed “courtesy burns.” These are flights along convoy routes that seek to neutralize the IEDs that terrorists and insurgents plant every night along the roads and highways of Iraq and Afghanistan.

Ground EW has also been placed in the spotlight for Counter IED operations. The Army and Marines’ Radio Battalions have worked with industry to develop and deploy jammers for ground units. Counter Remote Control Improvised Explosive Device (RCIED) Electronic Warfare (CREW) systems are designed to provide coverage against RCIED threats.

The continuing challenge is ensuring personnel are available and properly trained to integrate these systems with one another to produce the desired effects and not destructive effects.

The future of EW is vast and will cover “traditional” targets, as well as expanding into “non-traditional” targets as it has against RCIEDs, and will be used throughout the spectrum of conflict from deterrence through major conflict and through stabilization operations.

SCIENCE IN WAR

WINSTON CHURCHILL made three very important speeches in the House of Commons. In one of them named, “Their Finest Hour”, he mentioned something about the application of science in war. He said

During the human struggle between the British and German air forces, between pilot and pilot, between A.A. batteries and aircraft, between ruthless bombing and the fortitude of the British people, another conflict was going on step by step, month by month. This was a secret war, whose battles

were lost or won unknown to the public; and only with difficulty is it comprehended, even now, by those outside the small high scientific circles concerned.

WINSTON CHURCHILL, *Their Finest Hour*

Science and technology are important factors in warfare. Our world, as we have learnt to understand it, has different bodies of knowledge. To achieve excellence in our specific military fields of interest, we have created Military training institutions (Military Academies, War Colleges, etc) and in the field of technology, institutions of higher technology training and research such as Engineering faculties of universities and scientific research institutes (MIT, CSIR etc). It is however when the cream of knowledge of both these bodies of knowledge are **fused (fusion)** that **winning techno-military capabilities are created**. In some cases this fusion has also lead to specialised training and research institutions that focus on this techno-military capability (eg post graduate schools such as, Cranfield University and DPSS that has specialised in explosives ordnance, etc). To solve a military problem effectively and efficiently, you need specialist knowledge to be **fused** into a new and ever stronger synergistic techno-military capability. I see today's session as one of the vehicles we use in this fusion process to improve and hone our techno-military knowledge in a specific field of electromagnetic radiation, namely Electronic Warfare. Understanding this interplay of the different bodies of knowledge can be used to think and plan for the future.

South Africa has a proud history in EW. It stems from work started in about 1975. The first attempt dealt with the requirements for an omni-directional Radar Warning Receiver with a crystal detector receiver. It was soon learnt that the operational requirement was actually for direction information. This in turn led to spiral antennas being developed and integrated into an array. Many more innovations and products followed and today we have a military, industry and scientific body of knowledge that is very capable in the field of Electronic Warfare.

In terms of the fusion of the bodies of knowledge I mentioned earlier, it is clear that we in South Africa have the ability to create new military insights and products through the fusion of bodies of knowledge.

The theme for this bi-annual conference is:

A balanced approach to meet the EW demands of potential future conventional and irregular warfare threats.

The focus of the conference will firstly be on the African situation but views about problems, solutions and lessons learnt in conflicts elsewhere will also be relevant as Africa should not be viewed in isolation or considered unique as far as instability and wars are concerned.

Program:- The speakers will "set the scene" by giving their views on the expected types and nature of possible future conflicts, where-after the EW industry and research establishments will present EW solutions (current and new developments) that could contribute to the control of the Electromagnetic Spectrum and counter the Electronic threats of today and tomorrow.

CONCLUSION

I want to conclude; the model of creating techno-military capability is a perception of how knowledge and insight is created. Everyone present here today has a part to play in this techno-military fusion process of creating new techno military capabilities:

- a. We must hone our specialist knowledge (military knowledge and the knowledge in physical sciences).
- b. We must fuse our knowledge with other specialities to create new insight.

But most of all, all of this will be in vain if we do not

- a. Apply the techno-military insight; and
- b. Spread the techno-military insight to all stakeholders and specifically the new generation of engineers, scientists and military personnel.

My challenge to you is specifically about the latter. Each and every one of us must ensure that the next generation is enthusiastic about our shared techno-military insight. This is especially true for the persons in uniform. We have to get the Staff Sergeants, the Captains and the Majors excited and interested about this field of knowledge. They are the future. I challenge you all to keep on growing your own knowledge and insight and then also create opportunities to share your knowledge with others, especially the up and coming generation. We must get the young generation to be interested in a career in EW, to enjoy it and to be proud to be involved in the field of EW. The AOC has as goal to promote interest in this highly specialised field. The challenge is to establish the notion that is it is "Cool to be a Crow"

All that is left for me to do is to wish you to enjoy the session and to be a Cool Crow!

I thank you.

References:

- [1] AOC Publication - Essentials of EW, 2009
- [2] Authors: Dave Adamy, Joel Harding, Glenn Carlson, Norm Balchunas, Vincent Battaglia,, Terry Cutshaw, Todd Keller, Dr. John O'Hara
- [3] Instruments of Darkness, the history of EW, Alfred Price, 1997.
- [4] AOC website (<http://www.crows.org/>).