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To interested individuals for participation
on seminar

„Radar & EW, Weapon Systems Fundamentals“

Seminar „Radar & EW, Weapon Systems Fundamentals“ (10 days)
at MEDAV, Ilmenau, Germany, on June 7-18, 2010

Dear Sir or Madam.

Objective of the seminar is to provide fundamental Radar theory training and an encompassing knowledge of the principles of Radar fundamentals. During the course the student carries out Radar ESM operations participating in both 1st Line and 2nd line analysis of Radar Intercept in order to better understand Radar principles.

Radio Detection And Ranging (RADAR) is an object detection system that uses electromagnetic waves to identify the range, altitude, direction or speed of both moving and fixed entities.

A radar system has a transmitter that emits microwaves or radio waves. These waves are in phase when emitted, and when they come into contact with an object are scattered in all directions. The signal is then partly reflected back with a change in its wavelength (and therefore its frequency) if the target is moving. The signal returned is usually very weak and so is amplified in the receiver. This enables radar to detect at ranges and formulate speed of objects where other emissions, such as sound or visible light would be too weak to detect.

Radar uses include meteorological detection of precipitation, measuring ocean surface waves, air traffic control, and civilian police detectors. Radar’s importance in military applications remains and is the primary asset in active electromagnetic emissions in the Battle space.

The course encompasses Radar theory and fundamentals. Beginning with core radar principles and progressing to modern complex radar signals, the course incorporates examples of current military applications. Designed as a facilitative learning course, the modules allow for individual participation so as to achieve a better understanding of Radar principles.

Please note that this seminar is conducted under a collaboration agreement between Abacus EW Consultancy Ltd., Wellingore, UK, www.abacusewc.com, and MEDAV GmbH, Uttenreuth, Germany, www.medav.de.

Topics

1. Radar Principles

Propagation incorporating: optical horizon; Radar horizon; and anomalous propagation. Radar kilometre. Primary Radar systems and the production of a pulse incorporating: timing circuit; modulator; transmitter; duplexer; Radar Receiver and amplifier; and antenna.

2. **Measurable Pulsed Radar Properties**

Radio Frequency (RF) incorporating: factors that affect RF; wavelength and RF conversion; factors that can degrade RF signals; RF band allocation; and bandwidth vs. pulse duration. Pulse Repetition Frequency (PRF) and its reciprocal Pulse Repetition Interval (PRI) & Maximum Theoretical Unambiguous Range (MTUR) incorporating: PRF explained; PRI explained; MTUR; Maximum Unambiguous Range (MUR); and Range Folding. Pulse Duration incorporating: Minimum Range; Range Resolution; Bandwidth vs. Pulse Duration; Duty Cycle; Peak & Average Power; Beamwidth; Radar Cross Section (RCS), Polarisation.

3. **Electromechanical Scans**

Search Scans incorporating: circular; sector; Precision Approach Radar (PAR); raster irregular; and steady. Tracking scans incorporating: functions, main categories; lobe switching; conical; monopulse; Uni-Directional Sector (UDS); and indiscrete. Electronic scanning methods incorporating: electronic beam steering; elements transmitting in phase; elements transmitting out of phase; Electronic Scanning Antenna (ESA); and Active ESA vs. Passive ESA. Track-Wile-Scan including: automatic detection and tracking; and the track-while-scan process. Frequency Scanning. Combination Scans.

4. **Antenna Theory**

Antenna Feeds. Antenna types incorporating: parabolic, cosecant, cassegrain, planar array, and phased array. Sidelobe suppression. Sector blanking.

5. **Multi-Pulsing**

Multi-Pulse characteristics incorporating: Pulse Position Modulation (PPM),Pulse Coded Modulation (PCM). Multi-pulse applications including: Identification Friend or Foe (IFF); and air traffic control beacon system; and missile guidance.

6. **Continuous Wave**

Un-modulated continuous wave, Frequency Modulated Continuous Wave (FMCW).

7. **Moving Target Indicator (MTI) Techniques**

Coherent Radar, non coherent Radar, cellular phones, MTI blind speeds.

8. **Interpulse Modulation**

Pulse stagger incorporating: element & position; identification of false targets; system blind speeds; and stagger ratios.

9. **Pulse Doppler**

PRF spectral lines, PRF compromise, ranging beyond the MUR.

10. **Interpulse Modulation**

Pulse compression, Frequency Modulation on the Pulse (FMOP), Phase Modulation on the Pulse (PMOP).

Referent

Nile Blanchard

Nile joined the Royal Navy in 1995 as an Electronic Warfare Specialist. Nile's early appointments included HMS Birmingham and HMS Exeter. This provided Nile with extensive operational experience in analyzing and identifying radar operating parameters, modes of operation and function types whilst deployed in operational area's which included the Adriatic and Arabian Gulf. During Air Operations Iraq, Nile acted as a leading ELINT Analyst providing Electronic Support and Electronic Attack data to the UK Maritime Component Commander at both 1st and 2nd Line Analysis.

From 2000 as a Leading Electronic Warfare Specialist aboard HMS Liverpool and HMS York, Nile managed and supervised the submission of ELINT collection and analysis parameters. Nile has operated on radar and EW systems in various theatres of operations including: Sierra Leone, Adriatic, Northern Arabian Gulf and Indian Ocean. Nile is regarded as a "Subject Knowledge Expert" in Anti-ship Missile Defense acting as Command Threat Advisor during active Operations incorporating 'soft' and 'hard' kill weapon systems.

During a short period working as part of the UKMCC, Nile issued new guidance for ELINT requirements, collection, analysis and technical instructions for the force.

Appointed as the Fleet Information Management Unit manager from 2005, Nile supervised production of EW databases for Royal Navy Command Support Systems. Production required collation of material using various databases including: ELINT obtained material and open source

information. As Fleet Information Management Unit manager Nile ensured the validity and identification of modes of operation & function type of all received radar parameters against national UK databases.

Whilst on his final appointment as Petty Officer onboard HMS Gloucester as Electronic Warfare Manager, Nile was the recognized Subject Knowledge Expert in Electronic Warfare. His duties included conducting onboard EW training of Radar and ESM operators in all EW disciplines. Further duties included acting as the Ships Maritime Intelligence Officer following accreditation of the UK RN Maritime ISTAR Staff Officers course and RN Maritime Joint & Naval Intelligence courses. Nile provided the lead in designing and implementing the ships Maritime Security Operations policy IAW UK doctrine. Manager of all EW equipment onboard Nile also designed Force Radio Frequency Plans (FRFP) for Electronic Defence within a complex Electromagnetic Battlespace.

Upon Leaving the Royal Navy in 2009, Nile accepted the post of instructor of EW Theory & Equipments at the Royal Naval Lead Training School, MWS Collingwood. Whilst in post, Nile was responsible for delivery and design of the Royal Navy ratings Radar and ESM training both theoretical and practical. The post included instruction, explanation and demonstration of all EW spheres.

During a successful career with the Royal Navy, Nile received the Royal Naval ‘Herbert Lott’ award for best student on two occasions. Moreover on two separate occasions he received a citation for exemplary standards in EW. Nile is currently a BSc (Hons) undergraduate in Political Science.

Nile joined Abacus EW in 2009 as RESM Specialist Consultant. Since his appointment, Nile has recently become a UK member of the AOC and has just enrolled on a Masters Degree course of study (the MSc Intelligence Systems (EW) Programme) with the University of Lincoln and plans to graduate in July 2010.

All contributions will be conducted in English, corresponding files as well. We provide copies of the slides presented.

Agenda

	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
0900-1030	• Course Introduction • Administration • Aims & Objectives • Radar Principles (1)	• Measurable Pulsed Radar Properties (3)	• Antenna Theory	• Intrapulse Modulation (1)	• Typical Analysis Tool (TALON demo)
1030-1100	**BREAK**				
1100-1230	• Radar Principles (2)	• Electromechanical Scan Types	• CW Radar • MTI Techniques	• Intrapulse Modulation (2)	• Typical RESMDB (Abacus RESMDB)
1230-1330	**LUNCH**				
1330-1500	• Radar Principles (3) Measurable Pulsed Radar Properties (1)	• Scan Types • VIEWS Demo	• Interpulse Modulation (1)	• Basic Calculations	• Tactical & Strategic Collection purposes • Collection Assets
1500-1520	**BREAK**				
1520-1640	• Measurable Pulsed Radar Properties (2)	• SCAN TYPES (EWSS Demonstration)	• Interpulse Modulation (2)	• Typical RESM System (VIEWS demo)	• End of phase discussion

	DAY 6	DAY 7	DAY 8	DAY 9	DAY 10
0900-1030	• RESMBD Practical • Syndicates issued assignments	• EWSS • Syndicate Prep Time	• VIEWS	• Case Study	• TALON practical
1030-1100	**BREAK**				
1100-1230	• VIEWS Operator Intro	• Syndicate Prep Time	• VIEWS	• Case Study	• Learner led tuition
1230-1330	**LUNCH**				
1330-1500	• VIEWS	• Syndicate Presentations	• EWSS ELINT Operator	• TALON Operator Introduction	• Learner led tuition
1500-1520	**BREAK**				
1520-1640	• EWSS Intro	• Syndicate Presentations Discussion / Assessment	• EWSS ELINT Operator	• TALON practical	• Wash-up

Coffee breaks (30 minutes) are scheduled after each lesson.

A sight seeing trip to Nuremberg is planned with a short stop at MEDAV headquarter in Uttenreuth for Saturday, June 12. MEDAV takes care for the bus transfer Ilmenau – Nuremberg (free of costs for attendees).

Fee

Fee for attendance the seminar is graduated for the number of attendees from the same organisation.

1st attendee Euro 3.800 ,
additional attendees Euro 3.400, inklusive VAT (19%) each.

Fee includes:

- Attendence on the seminar, inclusive catering
- Copy of presentation slides, in digital (pdf file format), and paper copy
- Lunch on seminar days
- A sight seeing trip to Nuremberg is planned with a short stop at MEDAV headquarter in Uttenreuth for Saturday, June 12. MEDAV takes care for the bus transfer Ilmenau – Nuremberg.

Fee is payable immediately after invoice receipt.

There is no obligation for MEDAV to conduct the seminar. A re-payment of fees is accepted by cancellation of the seminar by MEDAV only.

Please refer to the registration form concerning the location the seminar will be conducted.

It would be a pleasure for us to welcome you as attendee of our seminar. If you need further information or if you have any questions, please do not hesitate to contact us.

You may find additional information for Electronic Warfare and on related seminars on our homepage www.medav.de or on Abacus homepage www.abacusewc.com.

Best regards

MEDAV GmbH

Horst Jonuscheit

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You find our hotel recommendation on www.medav.de – keyword Location / Hotels. We have a reservation of some rooms under our seminar title – please ask for them.

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