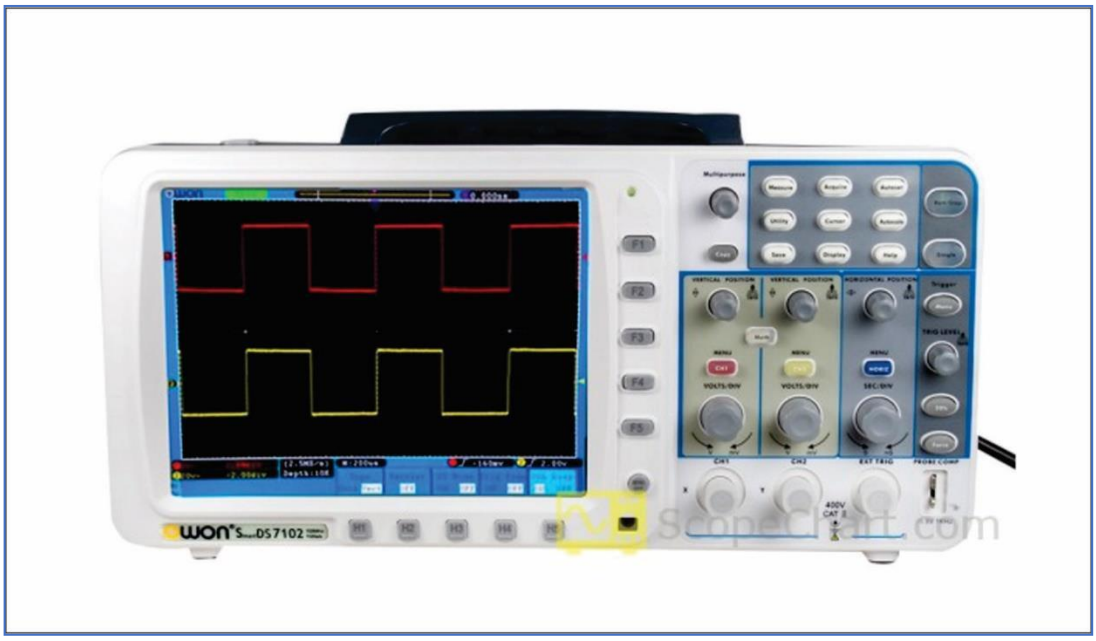
Advanced EMF Instrumentation Workshop 2021



June 22 through June 25, 2021
(Note: This is a Zoom virtual class)

This is a class that teaches you how to apply advanced techniques to utilize advanced instrumentation not typically taught in other Building Biology Classes in assessments and surveys.

Included in your workshop tuition, each student will learn to use an OWON SDS7102V 2 Channel 100 MHz Bandwidth Oscilloscope with battery and case, a PICO Scope, a Stetzer Ubiquitous filter (High Pass Filter) for detecting MEP/DE signals. Also, there is instruction in the use of the Extech Model 382252 Earth Resistance Tester for checking for Stray/Earth Voltage and Earth System Ground resistance with all the training to operate and create reports from the measurements made with these devices. There is also instruction in the use a Hantek brand amp probe with an oscilloscope. You obtain this equipment prior to class at your own expense and you will gain all the skills to run them. We provide the full list of equipment specs and sources to purchase them.

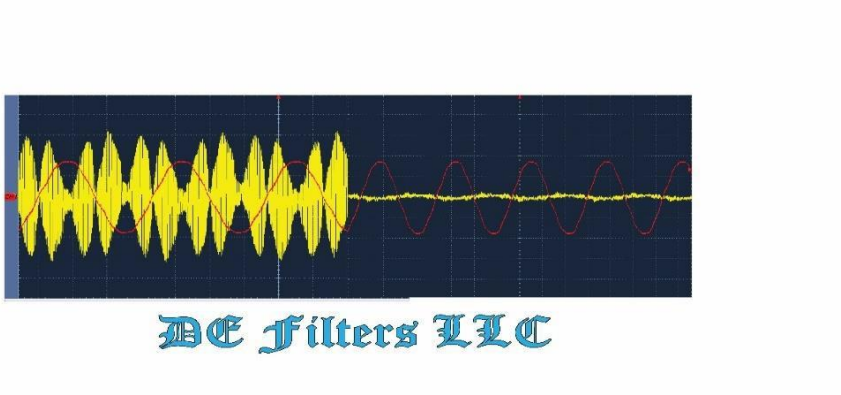
There will be a demonstration on the implementation a “Ground Antenna” to aid in improving ground systems and improving MEP/DE. This is a unique solution to some bad grounding system. We will show to check for ground current and measure frequencies commonly found on the ground system.

There will be a live demo of the Blue Box and mitigation of wiring errors such as “Net Current”. There will be demonstrations of MEP/DE scenarios and MEP/DE filter comparisons against known MEP/DE Generators. There will be comparisons of various light bulbs, i.e., Fluorescents, LED’s and Incandescent for Current, Voltage Transients, and Light Spectrum.

There will be a live demo of a spectrum analyzer and how to identify power density from dB to $\mu W/M^2$. we will also do a field test of shielding paints and you can see real results of the shielding effectiveness on a spectrum analyzer.

Your tuition also includes full instruction materials and a series of books for the class including the full series of the Andrew MacAfee books, the Mike Holt Grounding and Bonding book and a copy of the NEC Code Book. All sessions will be recorded if you need a refresher of what was covered and need to replay any section of the course.

The daily schedule includes lectures, instrument demonstrations, group labs with recommended instrumentation techniques, interactive discussions of lab results and, finally, a full assessment of the course. Enrollment is open only to students who have successfully completed Building Biology Institute’s electromagnetic radiation seminar (IBE 212); exceptions can be made for candidates with professional real-world experience by applying directly to the seminar organizers.
(bill.bathgate@defiltersllc.com 734-627-7610)



All material is authored and presented by William S. Bathgate and his team (please see page 6 for bios), except where third-party sources are cited expressly.

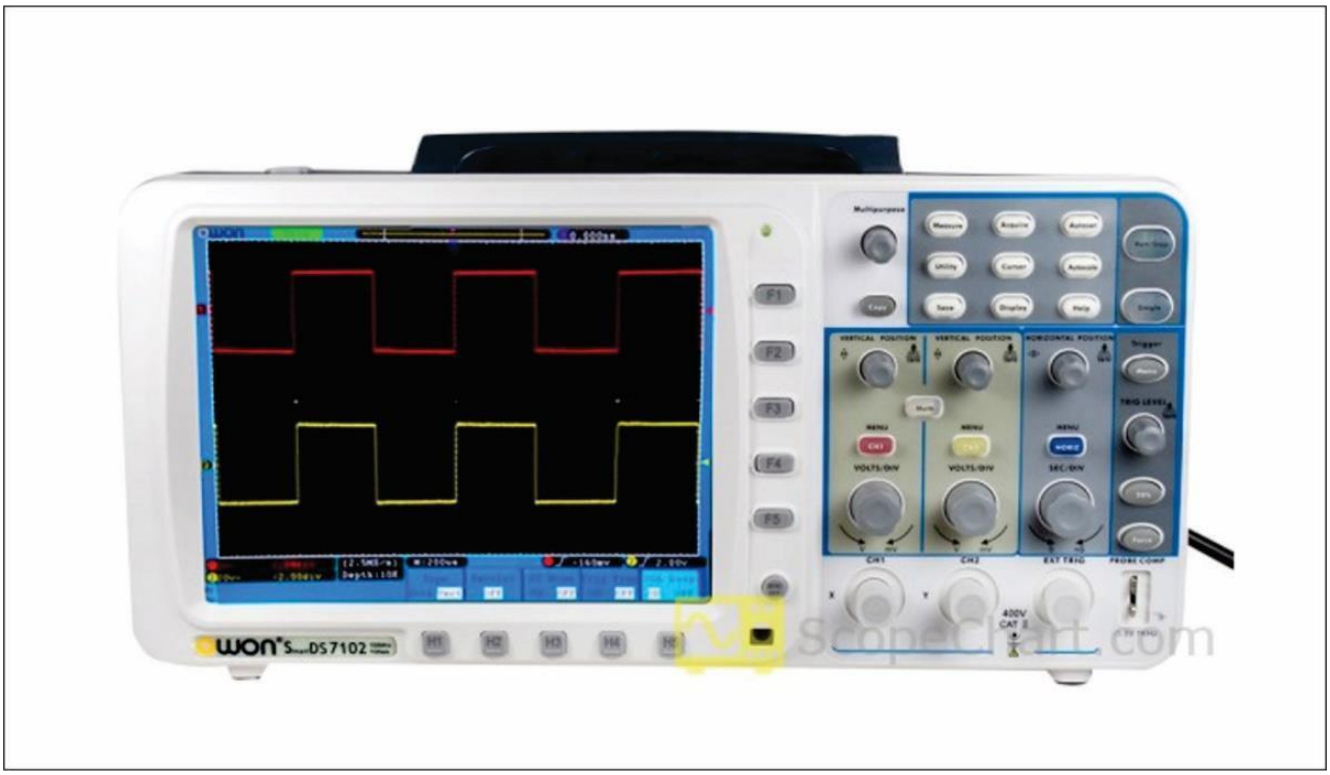
Contents

Prerequisites

The software required to download and analyze OWON data runs on Windows 10 laptops only (Apple PC products will not run the OWON software). *Students are therefore required to attend class with a Windows 10 laptop - no exceptions.* If you do not have one, basic Windows 10 laptops are available from Wall Mart for less than $300.00.

Participants are required to review the prerequisite course work for IBE 212 as this fundamental material will not be reviewed. It is assumed that participants know this information are totally familiar with it, and able to make measurements with the basic instrumentation used in IBE 212.

Participants are also required to purchase and read prior to arrival *Tracing EMRs in Building Wiring and Grounding*, by Karl Riley: Available at Less EMF, Barnes & Noble and Amazon for about $28.



OWON SDS7102

Seminar Synopsis

Course Fee: $1,300.00

This advanced seminar amplifies the measurement and remediation techniques information learned in the Building Biology Institute seminar IBE 212: Electromagnetic Radiation. The seminar will include more detailed information on power systems, grounding, magnetic and electric fields, power system VLF fields and radio frequency radiation.

The seminar will more fully explore remediation techniques and materials along with remediation planning, costing and installation. Along with use of basic instrumentation to assess environments for EMF/EMR, advanced measurement techniques and instrumentation will be introduced. The *IBE Protocol for Measurement of Non-ionizing EMR in Low Rise Residential Buildings* will be used throughout the seminar to guide measurement technique.

Although there will be lectures to introduce new concepts and instrumentation, this seminar will be heavily devoted to lab work. In a team setting, basic and advanced equipment will be used by attendees to assess realistic environments and models constructed to produce typical problems found in buildings. Team members will discuss findings and produce remediation plans to be shared with the other teams during debriefing sessions.

This seminar conveys 24 Continuing Education Credits (CEUs), accepted by the Building Biology Institute, for which the successful completion of a comprehensive written exam will be required.

Seminar Objectives

1. Understand complexities of measuring EMR in low rise buildings including power system ELF magnetic and electric fields, Power system VLF electric fields and radio frequency radiation.
2. Understand/use specific instruments to measure specific EMRs; learn/practice how meters can be used to measure and map EMR in buildings; learn/practice data and its uses in the assessment.
3. Study and understand the Building Biology Institute EMR Measurement Protocol for Low Rise Buildings.
4. Learn about various methods of shield/blocking EMR and the application criteria for each type of RF shielding.
5. Learn how to construct and cost a remediation plan for each of these energies.
6. Each student will need to obtain as part of the course an OWON SDS7102V 2 Channel 100 MHz Bandwidth Oscilloscope with battery and case, a Pico Scope 2204A-D2 10 MHz 2 channel Oscilloscope, a Hantek CC-65 Scope ready Amp Probe , a Stetzer Ubiquitous filter (High Pass Filter) for detecting MEP/DE signals and an Extech Model 382252 Earth Resistance Tester for checking for Stray Voltage and Earth System Ground resistance with all the training to operate and create reports from the measurements made with these devices.

Extech 382252 Earth Resistance Tester

Seminar Schedule

Classes will convene at 9:00 AM EDT and end between 5:00 and 6:00 PM EDT, daily. Lunch break will be from 12:00 PM to 1:00 PM, and there will be breaks at 10:30 AM and 3:00 PM, daily.

Day One, Tuesday, 22 June Grounding Concepts

1. Learning Objectives & Seminar Overview
2. Grounding Systems Design and NEC Code Compliance
    a. System Ground Design Purpose and Principles
    b. System Ground Measuring Techniques & Tools
    c. Earth Voltage Measurement Protocol and sources/remediations
3. Grounding optimization and its effects on MEP/DE
4. The Ground "Antenna" Concept, principles and results
5. Lab – Exercises – Extech Earth Resistance Tester Training and Ground Antenna Exercise
6. OWON Oscilloscope initial set up and initial readings

Day Two, Wednesday, 23 June

Advanced Oscilloscope Testing, Measuring for Primary Voltage and identifying transients, peak to peak voltage and waveforms

1. Measuring for MEP/DE using a high pass filter and an Oscilloscope
2. Observing the Spectral Image of frequencies above 60 Hz
3. Source Identification techniques at the breaker panel
4. Effects of Dimmer Switches on the wave form
5. Effects of LED lights on the wave form, electric field and retina (eyes)
6. Effects of various SMPS on the wave form
7. Introduction to the PICO USB Scope, functions and limitations

Day Three, Thursday 24, June

Spectrum Analyzers, MEP/DE Advanced Filtering, Wiring Error Detections, 5G Mitigation

1. Lab – Testing and recording of readings (including how to recover your scope to the correct settings, once you have screwed it up by pushing all the wrong buttons!)
2. Introduction to the RF Spectrum Analyzer
    a. Conducing a field survey for cell tower radiation patterns and exposure
3. 5G Radio Frequency Radiation Shielding Paints, the types available, application, efficacy and demo
4. Advanced Smart Meter Mitigation Techniques
5. MEP/DE advanced filtering products and applications, Sine Tamer, DNA, Green Wave, Stetzer, SATIC, Maher Designs, and the Miracle Watt. This will be done in controlled experiments against known MEP/DE sources. Measurements for Current, Voltage Transient suppression, and Spectrum amplitudes Suppression. This will include against a simulated Solar application source.

Day Four, Friday 25, June

Net Current, Spectrum Analyzers, MEP/DE Advanced Filtering, Wiring Error Detections, 5G Mitigation

1. Net Current Testing, and remediation with the "Blue Box"
2. Reporting Templates and the "5G Protection Plan", business model and financing
3. Lab - RF Measurement using a spectrum analyzer and introduction to an inexpensive Spectrum Analyzer.
4. Final Exam

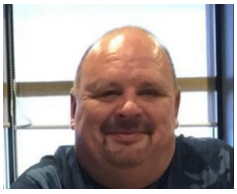
Meet the Instructors

Bill Bathgate

William S. Bathgate is a retired senior management professional and engineer with 40 years' experience in several high-tech industries. Mr. Bathgate is currently a Certified BBEC with an EMRS Certification by Fall 2021. Bill is also an IEEE Certified Radio Frequency Safety Officer (RFSO) doing antenna site surveys for certification of FCC compliance. Mr. Bathgate previous employers include Sundstrand Corp. leading a project to modernization to the commercial aircraft "Black Box" recorder, flight controls, crash avoidance systems and aircraft power systems. Bill was also employed by IBM corporation leading engineering efforts for the S/390 Mainframe CPU and peripherals, networks and PC distributed systems. While at IBM Bill lead efforts to modernize the NASA Space Shuttle launch systems using the new PC technologies as part of the original IBM PC engineering team in Boca Raton, Florida. After IBM, Bill worked for Hewlett-Packard Co. leading instrument development of Oscilloscopes, Power Supplies, and Spectrum Analyzers, very large data center support systems (Microsoft and Amazon) and leading consulting services teams to Fortune's Top 100 corporations. After Hewlett-Packard, Bill worked for Emerson Electric as a Senior Program Manager for new product development of large utility grid grade power distribution systems. In his last work before retirement Bill lead a team of engineers in the development of autonomous navigation vehicle controls and communications at one of the "big three" auto makers. Bill holds a USA patent and has several trademarks and trade secrets in his name.
Bill currently owns two private companies, VAL-IT, Inc and DE Filters LLC. As President of VAL-IT, Inc., he and his affiliates perform consulting work for the DoD across the Globe at military installations and field deployments in the USA and foreign countries. Bill holds a DoD Top Secret clearance in performance of this work. This business was formed in 2009 and is still going strong. There are 6 affiliates currently delivering consulting work as part of Val-IT, Inc to the DoD.

DE Filters LLC is a relatively new company that does building environmental assessments and remediations helping persons with EHS to recover from their symptoms. This business was formed in 2017. Mr. Bathgate considers this new business to be one of the most rewarding experiences of his career. When a customer says thank you for keeping them healthy and in their home, he feels blessed to have the knowledge to help them restore their health. Building Biology has dramatically enhanced those skills.

Terry Stotyn



Terry is a retired Red Sealed HVAC Refrigeration, Air Conditioning, and Controls Tradesman with over 40 years' experience in the trades. His expertise and knowledge of commercial and industrial HVAC systems, as well as power and control systems are very respected and distinguished. Terry has been an independent business owner and contractor for almost all his career, owning HVAC companies as well as other businesses over the years. Terry has been involved in the Power Testing Analysis for many years and is co- owner of two companies presently that market and distribute the Sine Tamer brand of Surge

suppression worldwide with the focus on North American sales. His expertise involves finding solutions to issues associated with Dirty Power as well performing testing for unwanted and troublesome power entities for many large corporations that have trouble finding solutions to existing problems. Terry was a major speaker at the recent 5G Crisis Summit held on August 26, 2019. Terry presently is co-owner of Cratus Canada Ltd. as well as Cratus America Inc. including the www.PowerEMT.com website.

Andrew McAfee, MM

After becoming electrically sensitive in 2001, Andrew left music after 15 years as Principal Horn of the NC Symphony and earning a master's degree in conducting. He was fortunate to have Charles Keen and Karl Riley as early mentors. Andrew successfully petitioned the NC Utility Commission to order Duke Energy to provide a no-cost, non-emitting meter for its customers. Andrew was featured in a 2014 TIME docu-film "Searching for a Golden Cage" about electro-sensitivity and in the 2021 web course "Staying Healthy in a 5G World." Utilizing electrical training materials from Mike Holt, Andrew earned a Residential Electrician's Career Diploma in Penn Foster's electrician training program. In 2020, he wrote 6 short books as a part of his Killing Current series to raise awareness about the dangers of contact current. He created a device called a Nuisance Current Blocker (Patent Pending), to remove current and noise from grounding systems, yet allows breakers to trip in fault conditions. www.homeEMFtracing.com.

Required Equipment:

1. OWON SDS7102V 100 MHz Scope (Amazon) $435.00
2. OWON SDS 7102V Back Up Battery (Amazon) $64.00
3. PICO scope 2205A 25 MHz Scope or 2204A Scope (SAELIG) $225.00
4. Extech Model 382252 Earth Resistance Tester (Test Equipment Depot) $260.00
5. Hantek CC-65 Scope ready Amp Probe (Amazon) $56.00
6. Hantek HT-201, 20 to 1 Passive Attenuator (Amazon) $20.00
7. A Stetzer Ubiquitous filter (ElectraHealth EMF) $150.00
8. Leviton Plastic Medium Lamp Holder - Item no.30853 (Ace Hardware) $9.49
9. Leviton Plastic Medium Base Socket Adapter - Item no 3161023 (ACE Hardware) $6.99
10. 1 LED Bulb, 1 Incandescent/Halogen Bulb, 1 Fluorescent bulb (Cost Varies by store)

Optional Equipment:
Low-Cost Spectrum Analyzer - RSP1A SDR Radio – RF Range 1KHz to 2 GHz (Ham Radio Outlet) $119.95
Low-Cost Spectrum Analyzer Antenna – SMA Connection – Comet SMA-W100RX – SMA (Amazon) $41.95
Spectrum Analyzer Software - https://www.sdrplay.com/spectrum-analyser

Optional Software for Spectrum Analyzer:
https://www.sdrplay.com/sdruno