



This has been quite a year so far. With this centennial year of manned flight, there was the tragic loss from our nation's space program of the second entire Space Shuttle crew. It is unfortunate when these dangerous missions using leading edge technology become commonplace until a disaster makes the news. These brave men and women were anything but commonplace, and we all mourn their loss.

With the war in Iraq displacing just about all other news, with networks providing round the clock news coverage, we were privy to "you are there" views of battle from the cockpits of military aircraft on combat missions, from tank turrets in the desert, and from rooftops overlooking ground skirmishes below. The aftermath has been more subdued, as most of the big names in broadcasting have taken off their desert fatigues, combed their hair, put on business attire and returned to their talking head role behind a desk with hot coffee at their side.

These are just two instances that have brought telecommunications technology advances to the cornea of the public eye. Telecommunications plays a key role in the transfer of data to space program technologists monitoring system performance, to battle commanders—and to the public. The public knows more now about the mechanisms used for data transfer from the space shuttle systems to ground controllers. They have witnessed the firing of missiles from ships at sea toward the shore battle area during the actual event—quite different from the news reporting mechanisms used during the last gulf war, in which cell phones played such a major role. Now, from around the world, we can see real-time action snapshots/video to go with the reporter's sound bites—quite different from heretofore traditional after-the-fact media reporting.

Unfortunately, U.S. viewers are so tuned to the special effects nature of TV entertainment, that telecommunications technology sometimes appears geared to sensational entertainment vice reporting the total facts for viewer interpretation. In the case of the Iraqi war, for example, a more balanced, objective reporting of Iraq's leadership atrocities might have helped temper worldwide opinion at a time when the U.S and England were forced to go it alone. Among other charges against network reporting of the war, at least one reporter was fired when it was found that one of the photos he sent back for publication had been altered by digitally merging two photos to show quite a different picture from the less spectacular original. Unlike the Iraqi news service, which continued to falsely report the situation in the news to its people, we in the free world could have used our telecommunications superiority to present more even reporting.

Unfortunately, it's not the technology that's at fault. Technologists have little influence on how new advances in telecommunications and digital video, for example, will be applied by the media. That's when our role changes from technologist to public, consumer advocate to change the *misuse* of technology. Food for thought.

## Photo Ops

Pictures included in our anniversary issue and on page 14 of this issue show NARTE in action. In future issues, we'd like to provide more up to date photos of members at work (and play). Share your (captioned) pictures and we'll review for possible publication in future issues. No advertising content, please.

## Vote! Vote! Vote!

It's that time of year again. Don't delay—carefully detach the double-sided page 9-10 of this issue, vote for the candidates of your choice, fill in the membership information required, and get your ballot back to NARTE headquarters lickity-split! It must be postmarked no later than May 31, 2003 to be counted in the election tally for selection of your leadership up for election. We are counting on you!

## In This Issue

### Articles:

Editorial: <i>Proper Use (and Misuse) of Telecommunications Technology</i> .....	2
<i>Spectrum Wars</i> , by Garry R. Gorr, NCE .....	5
<i>Teaching Wireless Technology</i> , by Kees Kaper, NCE .....	6

### Features:

Feedback: <i>Letters to the Editor</i> .....	2
Headquarters Highlights, <i>Spring 2003</i> .....	3
Column: <i>EMC Postcards: From the Wireless Side</i> , by David Case, NCE .....	4
**2003 NARTE BALLOT** .....	8-10
NARTE/Japan EMC Committee of KEC .....	11
List: <i>NARTE New Certifications in 2002</i> .....	13
"For NARTE Members Only", by Louis T. Gnecco, MSEE, NCE .....	14

# Feedback

## Letters to the Editor

### "Static Crashes" or Short Wave Sky Wave Propagation?

Dear Editor:

A note on Donald Kimberlin's article on Marconi's *Mystery in the Winter 2002-2003 NARTE NEWS*.

Before Guglielmo Marconi was born, Mahlon Loomis had demonstrated wireless telegraphy over approximately a 14 mile path and had written about spanning the Atlantic with wireless telegraphy. He received a US patent for his wireless on 30 July 1872. So the ideas and concepts are not new. But let's address Marconi's demonstration.

In the May, 1985 *Ham Radio Magazine*, Bill Orr (the proliferate writer of many books and articles on antennas and radios, and the editor of the *Radio Handbook*), addressed the issue of Marconi's trans-Atlantic test. As we all know and Mr. Kimberlin points out, it is highly unlikely that propagation at 820 or 850 kHz (the estimated fundamental frequency of the Poldhu transmitter) would be detectable with Marconi's receivers. The description of the events in Bill Orr's article indicated that Marconi and Mr. Kemp did not hear just three dots (the letter "S"), but rather a series of three repetitive clicks in the static clashes. It was this rhythmic sequence of repetitive clicks that apparently convinced Marconi and his assistant that they had received the signals. So how was this possible?

Consider what the emission spectrum of Marconi's spark gap transmitter must have been. In particular, what levels were being radiated at the 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup> and higher harmonics. If these harmonic levels were, say, -20 to -15 dB, there would have been several hundred watts radiated at "short wave" frequencies. Also, it is noted that the reception was on an untuned receiver. Mr. Orr's suggestion is that what occurred is that Marconi was receiving harmonics of his transmitters possibly in the 3 to 5 MHz range. Of course he had no idea what was happening, and radio developments in the short term after his experiments went to longer wavelengths for enhanced range. The "experts" in the 1901-1915 era considered wavelengths less than 200 meters as useless. Kimberlin in his article states that "the chances of any HF transmission from Poldhu have been rather effectively ruled out." This seems to be based on the modeling of the antenna based

Continued page 4 . . .



# NATIONAL ASSOCIATION OF RADIO AND TELECOMMUNICATIONS ENGINEERS, INC.

## Headquarters Highlights: Spring 2003



Some readers maintain that our approach to telling you what has been going on at headquarters is too sterile and dull. With this issue we are changing our approach. For example, we have two headquarters sites. The first and most widely known is the Medway site. Because I work in Olympia (thus covering both coasts) my office can be con-

sidered a satellite headquarters site. Things have not been well at my site. I recently returned from a meeting with our accreditation agent, ICAC. I confirmed that we would have to begin preparations for resubmitting our program definition for audit to maintain our accreditation. That was expected.

What was not expected, was that one of our two cats got sick while I was gone. I don't mean a "gag on a hairball" sick I mean really sick. She had stuff coming out both ends onto the dining room rug. My wife took her to the vet, concerned that she may have to be put down (a solution I heartily endorsed). The vet said it looked like a bug, did some tests and gave my wife two medicines to clear up the cat's problem. The cat was to get two pills twice a day for eight days.

If you have never had to medicate a cat, let me tell you it is not good. The vet, anticipating problems, offered my wife an eight-inch long pill insertion tool to help. The tool consisted of a soft cup to hold the pill on one end and a plunger on the other. I was to place the pill in a soft cup, approach the cat, slide the insertion tool in her mouth and then push a plunger on the other end, thus depositing the pill in the cat's throat. Good in theory – bad in practice. Nobody told the cat how well this was supposed to work.

My wife told me to medicate the cat and to take the carpet to the cleaners, then she promptly left on a one-week trip to play with our grandkids. I immediately tossed the tool in favor of an old, proven technique of coating the pill in butter, pushing the cat's jaw open at the back, inserting the pill and then closing her jaw (which she offered to do around my finger more than once), and holding her head up while she swallowed.

That technique worked well. She has begun to get better. I can tell she is on the mend because she is becoming paranoid of me sneaking up on her. When I approach, she is gone like a shot. Another way is that she finally asked to go outside – at 3:30 in the morning.

### NARTE's PO Box is Closing!

We have the most clever office staff. When NARTE moved to Medway, we rented a post office box until we could find a permanent home. I think we became permanent when we bought the building we are in. Even so, we just never thought about dropping the post office box. Twice every day, in spite of rain, snow, sleet or hail we trudged to the post office to get mail. Someone noticed that a post office guy comes right by our office everyday. He gave mail to the operations on both sides of us. Then a light went on. We could drop the PO box and recover a lot of time wasted in the running back and forth. You will be seeing our 167 Village Street on everything from now on. Of course the post office will deliver if you send to the post office box – but why bother. Send it direct. There is a guy just waiting to bring it on over.

### Calling All E-mails

Yes, the NARTE News is going electronic. This is the year that the long-awaited electronic NARTE News will go on line. The NARTE e-news will be hot on the heels of our nifty new web site. In order to notify you the instant the News is published on line, we'll need your e-mail address. Please provide us your e-mail address by fax, snail mail, via the NARTE web site, or by calling us or even dropping by Headquarters in person (we especially like the last two options). If you have already provided us with your e-mail address, THANK YOU. Please be assured that your e-mail address will remain confidential, for NARTE use only.

### NARTE in Turkey at the IEEE EMCS International Symposium

NARTE is still on track to participate in the IEEE International EMC Symposium in Istanbul, Turkey May 12 through 16. You may remember that the site was moved from Israel to Turkey to avoid problems. In light of the current situation, that wisdom may be questioned. However, NARTE is committed and will be there. We will run a workshop on passing the NARTE examination and proctor an examination.

### New Larger Return Envelopes Are In The Mail

It is a small matter of business—TOO SMALL!! In surveying our members, we have had many helpful suggestions come our way. Our most mentioned suggestion or complaint, however you toss the coin, has been that our current return envelope is too small for regular size paper! Well NARTE members, we have heard you and we are taking action! We have increased the size of our return envelopes and window envelopes. The larger return envelopes, featuring our street address, are on their way. NARTE Headquarters would like to thank you all for your patience in this matter.

### New NARTE Web is Coming This Spring

Engineers can be really dull. For example, once we solve a problem like developing a web site, we are content to leave it. Thankfully we have artistic talent on staff who not only get bored with the same old stuff but energetically want to change to a newer, more interesting format. NARTE has engaged KMX

*Continued next page . . .*

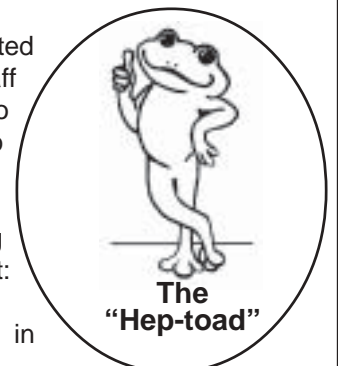
### SPRING HEPTODE AWARD

The "Heptode Award" is granted by NARTE Headquarters staff to properly recognize those who lighten their burden or who otherwise represent NARTE in an outstanding manner.

Congratulations to the Spring 2003 Heptode Award recipient:

**Ron Wade**

for outstanding participation in the NARTE FCC Program.



## Headquarters Highlights *continued . . .*

Corporation to help revamp and revitalize our web site. The new site will have easier navigation, more features, including a member-only password-protected area, as well as:

a) On-line Membership Directory—a database of members including member name, city, state, certification expiration date, discipline, and areas of interest. This database will be searchable by field or by a character string.

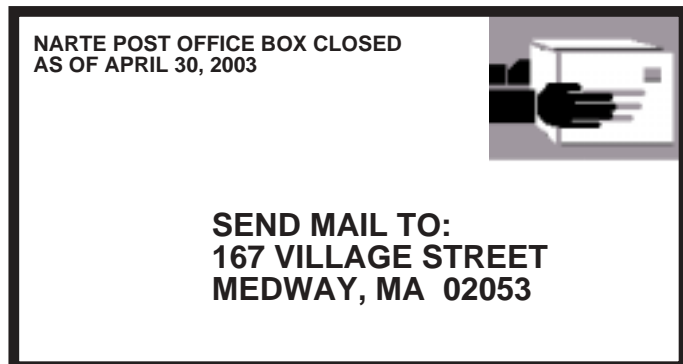
b) Personal information update—members will be able to change/update their own contact information and control how this information is shared with others.

c) Resume Postings—members will be able to post their resumes on-line and maintain their own consultant listing.

d) Bulletin boards—to facilitate the exchange of information.

There are a lot more things going on that I should pass along but I have to get a carpet to the cleaners. ☹

Russ



## EMC Post Cards—From the Wireless Side

by David A. Case, NCE

If you have not heard the great news, NARTE has been officially recognized to exist. Just like in the Miracle on 34<sup>th</sup> Street where the U.S. Post Office recognized the old gentleman as Santa Claus and forwarded to him mail addressed to "Santa Claus," the U.S. Post Office now has recognized NARTE and will deliver mail to us at our Headquarters location in Medway, Massachusetts.

For those NARTE engineers who live in Texas, you will be required to use a new designation NCEEIT (NARTE Certified Engineer Except in Texas).

On February 27, the official terrorist alert code was lowered from orange to yellow. However, it is my understanding that the code has been raised to "Red Ultra Alert" on the 8<sup>th</sup> floor of the FCC building (where the commissioners reside) after the recent FCC vote on the contentious issues regarding telephone company access and sharing of broadband and voice services!

All kidding aside – it has been an interesting and busy several months.

• On January 31, the U.S. Radio LAN industry and DoD reached a compromise on acceptable Dynamic Frequency Shift (DFS) levels that will allow Radio LAN to operate in the 5250-5350 and 5470-5725 MHz band while protecting radar. This agreement was quickly incorporated into the U.S. position papers for CITELE (Inter-America Telecommunications Commission) and the World Radio Communications Conference. The DFS level is part of the recently approved CITELE Inter-American Proposal.

## Letters *continued from page 2*

*on some conflicting data about its design details as presented in a comment on Belrose's website entry: "But for our model the antenna is inductive for all frequencies greater than the fundamental resonant frequency response of the antenna system. One must conclude therefore that the Poldhu spark-transmitter system radiated efficiently only on the fundamental oscillation frequency of the tuned antenna system – about 850 kHz."*

*Since none of us were there and the record is ambiguous, we will never know if Marconi and Kemp actually heard the click of the "S" transmitted from Poldhu. However, I think based on the descriptions I have read, that perhaps it was not static crashes as proposed by Mr. Kimberlin - if what was heard was a rhythmic series of three clicks at a constant interval as described in other articles. Rather, perhaps it was the early (but unrecognized) demonstration of short wave sky wave propagation from the harmonics of the Poldhu transmitter. Food for thought.*

Donald Lee Garlock, Jr.  
Fairfax, VA

Comments, Don? (Ed.)

## Looking For EMC Horror Stories

*Ladies and Gentlemen of the EMC Community: I am searching the internet for good examples of EMC related incidents and/or accidents. Have you got any good tips on where to look?*

Robert Edlund, Kockums Submarine Systems  
IEEE-member EMC-Swedish Chapter  
[rkithil@ix.netcom.com](mailto:rkithil@ix.netcom.com)

Based on the above agreement between the U.S. Government and industry, the FCC is preparing a Notice of Proposed Rulemaking on opening up the 5470-5725 MHz band for Radio LAN devices. It is almost 110% likely that Radio LAN devices operating in this band will be required to operate under the requirements as proposed in the U.S. World Radio Conference proposal, including mandatory use of DFS.

• The FCC released a Notice Of Intent (NOI) addressing adoption of possible receiver specifications on March 13. This action is a part of the actions being addressed by the Spectrum Policy Task Force Report.

• The comment periods for both NOIs addressing rural broadband access and opening up additional unlicensed spectrum below 900 MHz and in the 3650 – 3700 MHz band have come and gone. These actions resulted partly from the Spectrum Policy Task Force Report.

• The State Department has started the preparation meetings to form the official U.S. delegation for the upcoming World Radio Communications Conference to be held from June 9 – July 5 in Geneva, Switzerland.

• Hong Kong has just adopted 5GHz requirements for Radio LAN. This information can be accessed via the Office of Telecommunications Authority web site at [www.ofta.hk](http://www.ofta.hk)

• Canada has released an update to RSS-210 Rev 5. This is Amendment 1 and removes the requirement for processing gain measurements for Direct Sequence Spread Spectrum devices.

Please send comments, thoughts, or opinions to me at [davecase@cisco.com](mailto:davecase@cisco.com) ☹



# SPECTRUM WARS

I'm sure many of you are aware of the "Consensus Plan" that Nextel, APCO and other public safety and telecommunication organizations have submitted to the

FCC's Wireless Telecommunications Bureau (WTB). The proposed plan attempts to solve the interference problems that Nextel and other Commercial Specialized Mobile Radio (CSMR) licensees have inflicted on 800 MHz Public Safety Radio Systems.


Basically, the FCC allowed CSMRs to operate outside of the FCC's Part 90 rules and regulations that restrict the operation of CSMRs near Public Safety Radio Systems. That lack of enforcement opens the door to CSMRs (in particular, Nextel) to place "low site", "high power" transmitters within coverage areas used by 800 MHz Public Safety Radio Systems. When police and fire units respond near these sites, their radios are desensed and become inoperable. The plan's solution, in part, is to migrate public safety licensees 15 MHz down in spectrum to the lower portion of the 800 MHz band. Nextel will exchange their current band allocation with public safety and pay for the move. Other "interleaved" Land Mobile Radio (LMR) Systems such as private radio, business/industrial land transport and other non-cellular Specialized Mobile Radios will also be required to move. Oh, by the way, Nextel is requesting new allocation in the 1.9 GHz band.

Public safety communications are vital to the health and welfare of the public to which they serve. With the war on terrorism being a major concern to public welfare, I am appalled that such a widely publicized plan would be supported by public safety organizations. A disruption in public safety communications would open the door to those that

wish to inflict terror in our communities. Nextel is the source of the problem so why not move them to other spectrums? Other licensees, interleaved within the spectrum, are not interfering with public safety, so leave them alone. Maybe Nextel just needs to lower their power levels and add new filtering schemes to their systems. There must be a better solution to this interference problem that does not impact public safety.

Other parts of the Consensus Plan include options for non-public safety licensees to relocate in the 900 MHz band and new "interference standards" for LMR licensees and designers of LMR radios and systems. I totally agree with the proposed interference standards. The old standards only address co-channel interference, not adjacent channel or out-of-band interference. Along with these new standards, the WTB should reinstate mandatory FCC certification for LMR technicians and engineers. The certification would ensure that the new interference standards are met.

Don't get me wrong, what the parties of the Consensus Plan are attempting to do is eliminate interference to public safety radio systems and believe me, it is appreciated. Now all they need to do is eliminate the need to move public safety in the process.

More information on the Consensus Plan can be found on the FCC web site at <http://wireless.fcc.gov/publicsafety/>. 

## 2003 IEEE Symposium on EMC

17-22 August 2003

Hynes Convention Center, Boston, MA

NARTE EMC Examination Session

Friday, 22 August

For more information about the symposium:

<http://www.emc2003.org>

Tel 800-810-4333 Fax 732-981-1203

email: [v.feuerstein@ieee.org](mailto:v.feuerstein@ieee.org)

## NARTE GOOD LINKS NARTE

"GOOD LINKS" will inform members of web sites that are useful or contain new information relating to telecommunications, EMC and ESD. We welcome recommendations from NARTE members.

### Good Supplier Links

<http://www.tempest-inc.com/suppliers.htm>

Tempest, Inc.'s EMC Suppliers Directory



### Got Good Links?

E-mail suggestions to [narte@narte.org](mailto:narte@narte.org) and look for more recommendations in future issues of the NARTE News. Visit [www.narte.org](http://www.narte.org) for job bank, consultant listings, education & training, news, and more....

The NARTE News  
is going  
**ELECTRONIC!**

Contact NARTE with your email address at  
[www.narte.org/email](http://www.narte.org/email) or 1-800-89-NARTE



# TEACHING WIRELESS TECHNOLOGY

*Kees Kaper was born in Holland. Beginning at about age 14, Kees attended technical school. He moved to Canada in 1980 where he has lived ever since. Among his many life experiences, Kees has had the opportunity to teach "non-technical" students a thing or two about wireless technology through a course at a local college. He shares some of his experiences in this article.*

In December, 2001, I noticed that a college in Alberta offered a Telecommunications Certificate Program. The program consisted of 5 sections: Fundamentals of Telecommunications, Telephony, LANs, Public and Private WANs, and Wireless Communications.

I contacted the college and talked to the program director as I was interested in giving a lecture about wireless applications as part of the Wireless Communications segment of the course. She was amenable to the idea and after further conversation, she asked me to consider teaching the entire wireless communications segment of the program. I said that yes, I would like to do that. "This will be a piece of cake!" I thought. After all, I had previously lectured at three universities, various schools, and at many ham radio clubs. I had also given lectures to co-workers at two of the companies where I had previously worked. So I thought teaching this wireless communications course would be easy. But was I wrong.

As the program director explained, most, if not all, of the students who would be enrolled in the course would not have a technical background. They wouldn't know much about the field of telecommunications and wouldn't know anything about, or even have heard of, Marconi, Tesla, or Armstrong. So, I had to gear my lectures to a new kind of audience compared to the lectures I had previously given.

I found that the equipment I used in my lectures was particularly helpful to the students. Some of the equipment I use on a regular basis includes a spectrum analyzer, an oscilloscope, a function generator, antennas, wireless cameras, and my "artificial head."

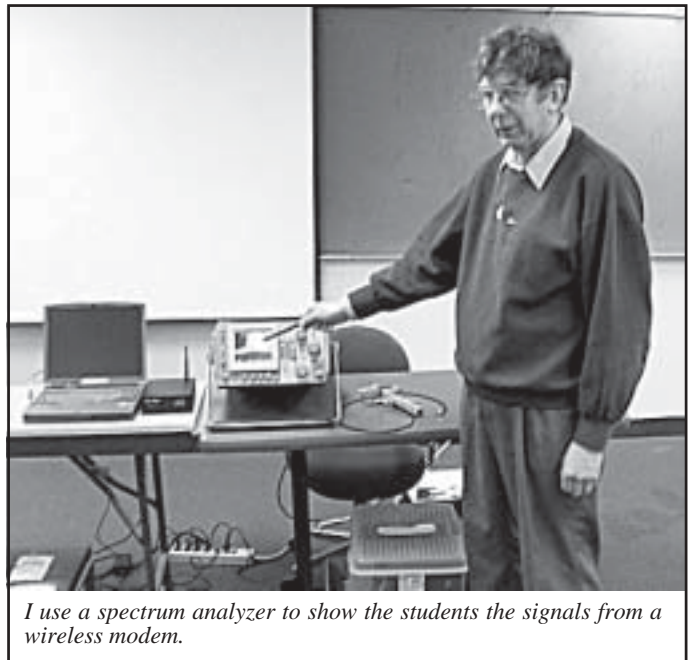
## The Adventure Begins

My adventure in teaching non-technical students began on February 21, 2002. I was prepared for this first class with my equipment set up on two long tables and my overheads ready to

go. As I looked at the students, though, they appeared to have glazed eyeballs. They had never seen this kind of equipment before in their lives and some of them appeared to be overwhelmed, so I had to be sure to thoroughly explain the basic functions of the equipment so that they would understand.

I began by showing the radio spectrum from the cell phone base stations on the spectrum analyzer. That seemed to go well, so I went on to demonstrate sinewaves and pulse on the oscilloscope. Then, on to a discussion about Hertz and the difference between frequency and wave length. The students would have learned about frequency and wave length in the Fundamentals of Telecommunications classes that they took prior to this class.

So, after one hour and fifteen minutes, we took a coffee break.



*I use a spectrum analyzer to show the students the signals from a wireless modem.*

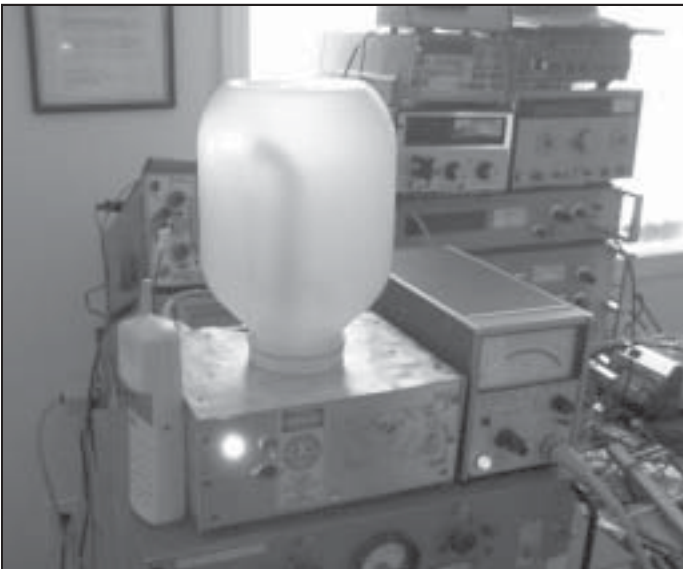
Four of the fifteen students did not come back.

I was feeling badly about those four students, but the other eleven stayed, and I continued to demonstrate the equipment.

Next on the agenda was the "artificial head." (See photo) The head (plastic bottle) is used to demonstrate that there is a magnetic field created in a person's head. Inside the bottle are a probe and a light. If a wireless or cordless phone comes in close proximity to the head, the probe will pick up the RF signal from the phone. The probe is connected to a power meter and also to a light bulb in the head. The closer the phone gets to the head, the brighter the light, which is a representation of the electromagnetic field in the head. The power meter was calibrated so that if a person held a phone 2 inches from the artificial head, the power meter would display 0 dbm where 0 dbm represents 1 mW. Since there is 20 dB attenuation between the phone and the probe, the power output from the phone is actually 100 mW.

The students loved it. The artificial head was a hit. Each student then used his or her own phone to interact with the head.

After some additional demonstrations with the equipment, it was time to conclude for the night and the students left.



*This is the "artificial head" that I use to demonstrate the electromagnetic field in a person's head and the effects of a wireless or cordless phone in proximity to the head.*

The next day, I phoned the program director and told her that four students had left my class at the break. Her response was that that wasn't bad at all; if all of the students had left, that would have been bad. That made me feel much better. At least the other eleven students persevered through the end of the semester.

### The Basics of Cellular Networks

At the beginning of the second class, I conducted a quick review of the content I presented during the first class and then moved on to the basics of cellular networks. The discussion included information about cell coverage areas, the geography of the region, cell phone towers, and antennas. I included an explanation about the function of an antenna based on its size versus its wavelength, as well as the function of the antenna feed or feedhorn and transmission lines. Some of the antennas I displayed included telescopic, yagi, and parabolic in the 46 MHz to 47 GHz range. I also demonstrated directivity and antenna gain by using 860 and 915 MHz yagis connected to the spectrum analyzer.

Some of the concepts about cell phones included the basics about the transmitter and receiver in each cell phone or cordless phone as well as in the base station, and their functions. Again, the spectrum analyzer came in handy to demonstrate the frequencies between the phones and the base stations.

Another topic of discussion was attenuation, including an explanation of line of sight or lack thereof and what affect that has on the higher frequencies (above 1 GHz). This was an opportunity to present a real-life situation from my pioneering days 28 years ago, of which I have a tape recording for posterity. I had designed a 10 GHz receiver in 1975 and used it in 1976 to make the first 10 GHz transmission from Belgium to England conducted by super refraction propagation. Of course, first I had to explain super refraction propagation to the students. Once I took care of that little detail, I played the recording, explaining that the transmission had traveled over 60 miles when a ship interrupted the link about 4 miles outside of Dover. The ship was a large oil tanker, so the massive size of the ship blocked the transmission path for a minute or so. Once the ship sailed past a certain point, the transmission successfully continued to its final destination. I still use that receiver, mostly for demonstration purposes.

By the end of the second evening, the students seemed to be feeling a little more comfortable around the equipment and appeared to enjoy the demonstrations. They even asked over a dozen questions, so I knew that, not only were they listening, they were comprehending.

To top off the night, I told the students to meet at a satellite ground station for the next class the following week – everyone

likes field trips! During the tour, most of the students seemed to be truly impressed with the size and amount of equipment at the station and they recognized several pieces of machinery, including a spectrum analyzer and the feedhorns from the parabolic dish antennas. After our two-hour tour, we thanked our guide for an interesting evening and everyone went home satisfied customers.



*This is the satellite ground station we visited during a class field trip....*



*...and here we are inside the ground station.*

### Speakers and Quizzes

During the fourth evening of class, I invited a guest speaker from Telus Communications to address the students. The gentleman discussed the company infrastructure and answered many questions the students had about cell phones. Some of the other topics covered that evening included a review of our tour at the satellite station, Bluetooth and very short-range connections, the IEEE 802.11b wireless standard regarding spread spectrum, and interference in the ISM band, and then finished with a 15-question quiz.

A guest speaker was also on the agenda for the fifth evening of class. The speaker talked about what it takes to plan and set up wireless internet. As a demonstration, he and I set up wireless modems at 915 MHz and 2.4 GHz using two laptops and a spectrum analyzer. The students were able to see what the spectrum looks like during frequency hopping and direct sequence spread spectrum. After the demonstration and a coffee break, we reviewed all of the subjects from the previous four classes and finished with a short quiz.

For the sixth and final class, the students endured a final exam. The exam was open book and included

thirty-one questions, such as, "If a frequency is high, what is the wavelength?" After two and a half hours, all of the students had completed, and passed, the exam.

### The Adventure Continues

Since that initial semester, I have taught the course for a second and a third semester. I have found teaching to be very challenging, particularly when dealing with "non-technical" people, but I have also found teaching to be a very satisfying experience.

I learned later that the four students had taken the wireless course on the internet. They found the internet course to be more difficult, particularly since they missed out on the equipment demonstrations, not to mention the field trip to a Canadian satellite ground station where the students were able to see some of the equipment being used in a real-life setting.

I'm happy to report that after that first coffee break in both the second and third semesters, not one student walked out. Not bad!



*Kees can be reached via email: kaperk@3web.net and welcomes the opportunity to appear as a guest speaker in the U.S. or in Canada.*



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NATIONAL ASSOCIATION OF RADIO AND  
TELECOMMUNICATIONS ENGINEERS, INC.

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## 2003 ELECTION

Dear NARTE Certified Member:

In accordance with NARTE bylaws, Article VI, Section 2 (Election), Section 3 (Term of Office), and Section 6 (Vacancies), three (3) Directors shall be elected to fill expiring and appointed positions. The Board of Directors or the Executive Committee may appoint a Nominating Committee which may submit candidates for the position of Director. NARTE members may also nominate candidates meeting the requirements of Article VI, Section 17.

In accordance with Article VIII, Section 2, Officers shall be elected every two years by a majority vote of the members casting ballots. Candidates for an Officer position must meet the requirements of Article VIII, Section 11.

On this ballot, the three Directors elected to serve the NARTE membership for new four-year terms will take office on 1 July 2003 and serve through 30 June 2007. The one Officer elected to serve as President will serve from 1 July 2003 through 30 June 2005.

Brief background information on the Director and Officer candidates appears on the ballot.

Ballots must be postmarked no later than 31 May 2003 in order to be validated. **To ensure one vote per member, please identify your membership certification number on the return address portion of the ballot mailer.**

Sincerely,

Russell V. Carstensen, NCE, PE  
Executive Director, NARTE

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### IMPORTANT INSTRUCTIONS:

1. In order that a "one member-one ballot" count can be validated in accordance with NARTE Bylaws, please include your membership number in the space allocated in the return address on this ballot. Your current membership standing must be confirmed before your vote can be counted.

2. Ballot must be postmarked no later than 31 May 2003 in order to be validated.

3. Detach the next page, fold in half on dotted line so that NARTE's address is exposed, tape closed, apply proper postage, and please mail in time to ensure that required postmark date is applied.

***THANK YOU FOR EXERCISING YOUR RIGHT TO VOTE!!***



# NATIONAL ASSOCIATION OF RADIO AND TELECOMMUNICATIONS ENGINEERS, INC.

## 2003 OFFICIAL BALLOT

### DIRECTORS (Vote for 3 to serve FOUR Year Terms: 1 July 2003 to 30 June 2007)

- Dick Ford, NCE
- Michael Hayden, NCE
- Roger H. Hottmann, NCE

Or insert write-in candidates:

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

### OFFICERS (Vote for 1 to serve TWO Year Term: 1 July 2003 to 30 June 2005)

Office of President

- James O. Wickham, NCE

Or insert write-in candidate:

- \_\_\_\_\_

### CANDIDATE BACKGROUND INFORMATION

#### Dick Ford, NCE

NARTE certified Engineer since 1989. More than 40 years of government and private industry experience in systems design, acquisition and integration specializing in electromagnetic effects. Led NAVAIR's T&E efforts on DoD's UAV/RPV programs for Pioneer, MAVUS, and Predator. Served on the IEEE EMCS Board of Directors for 14 years. "Plank-owner" on the Navy's Shipboard EMC Improvement Program. Serves on the IEEE USAB's R&D Policy Committee (1988-present). Worked with Hughes on the Mk 23 TAS radar, Lockheed on the MK 86 Radar, and presently with LM, NG, Boeing and Raytheon on the Advanced Multifunction RF Concept demonstration. Senior member IEEE, member Old Crows, Naval Institute and Navy League. Past Special Assistant for Military Affairs to Senator Orrin Hatch; Technical Editor for EMC Technology magazine; contributing advisor to ITEM magazine. Taught short courses for nearly 20 years in the U.S. and other countries. Liaison to NATO's Special Working Group 10. "Plank-owner" on original committee set up to establish NARTE as the engineer/technician certification agent for Naval community.

#### Michael Hayden, NCE

NARTE certified since 1985, NARTE Director since 1992. NARTE liaison to the Global Wireless Education Consortium. Manager, Broadcast Systems Development for the Equity Broadcasting Corporation. Master of Science degree in Engineering Management. Member of the IEEE and past Chairman of the Broadcast Technology Society, New York Section. Adjunct Professor and lecturer with expertise in fiber optics, analog and digital microwave systems, broadcast RF systems and local area networks. NARTE Engineer Class 1 with Master endorsement in RF systems.

#### Roger H. Hottmann, NCE

NARTE certified since 1989, NARTE Director since 1991. Senior staff scientist/manager at L-3 Communications with more than 37 years at Heritage Companies, including UNISYS Defense Systems. Heavily involved in EMC/EMI and Tempest technological development, including digital communications. Holds BSEE and MSEE degrees. Member of NARTE's EMC certification review board. Participant and contributor to several on-going NARTE actions to include examination development, endorsement standardization and currency. Certified as an EMC engineer and as an Engineer Class I with MASTER endorsements in RF and non-RF. Active in a host of associations to include AIAA, AOC, and the IEEE.

#### James O. Wickham, NCE

NARTE member since 1984, elected as a director in 1986, President since 1999. Chief Technology Officer for Arctic Slope Telephone Association Cooperative in Anchorage, Alaska with nearly 40 years of industry experience. Telecommunications and radio professional with strong management credentials and expertise in engineering, design and operations. Has worked for the past 17 years to make NARTE recognized as the premier independent certification organization providing a standard of excellence for Telecommunications, EMC, ESD and Access Engineering Specialists. Believes in the value of NARTE Certification and its achievement through the measure of experience, education and ethical professional practices. Certified as a NARTE Engineer with MASTER endorsements in RF and Non-RF.

### NOTES REGARDING VOTING FOR CANDIDATES AND/OR WRITE-INS ON THIS BALLOT:

There are THREE open Director positions for four-year terms, and ONE open Officer candidate for a two-year term identified to stand for election on this ballot. Alternate and/or additional write-in names should be posted

and checked in empty positions provided across from standing candidate's name. A total combination of FOUR checked candidate and/or write-in names is allowable.

DETACH THIS PAGE AND RETURN TO NARTE

# OFFICIAL BALLOT

Membership Number \_\_\_\_\_

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**167 VILLAGE STREET**

**MEDWAY, MA 02053**

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**National Association of Radio  
and Telecommunications Engineers, Inc.  
167 Village Street  
Medway, Massachusetts 02053**

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DETACH THIS PAGE, FOLD ON DOTTED LINE SO THAT NARTE ADDRESS FACES OUT, ADD APPROPRIATE POSTAGE AND MAIL

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# NARTE/Japan EMC Committee of KEC

The Japan EMC Committee met February 21, 2003, to discuss activities for the remainder of the 2003 calendar year. Dr. R. Sasaki, Chair, and Dr. T. Ikeda, Professor Emeritus, conducted the meeting. Other committee members are Mr. S. Seto, NCE, Chief of CRC Members, Mr. K. Ishihara, NCE, Chief of Education and Exam, Mr. K. Yanagisawa, NCE, Mr. T. Yanagisawa, NCE, Mr. M. Nakai, NCE, Mr. T. Shiomi, NCE, Mr. K. Ogawa, NCE, Mr. A. Shinozaki, NCE, and Mr. E. Hariya.

Two new activities are the "EMC Engineer/Technician Educational Course" and the "Practice Examination" for EMC Engineer and Technician candidates.

The EMC Engineer/Technician Education Course will cover the basics of EMC and will be taught by experts in EMC principles and will include practical experience.

The goals of the course include:

- 1) improving the comprehension of EMC, especially for newcomers;
- 2) standardizing the EMC curriculum to ensure that the electrical engineering curriculum explicitly addresses EMC; and
- 3) acquiring NARTE EMC Engineer/Technician certification as a prerequisite for course completion. The staff who will teach the course will include professors emeritus, professors, and EMC experts who currently work in the business world.

The practice examination will be given on December 11, 2003 in Osaka.

The committee is also devoting their efforts to ensure wider recognition and promotion of EMC Engineering as a recognized discipline in Japan. ♪

## EMC CURRICULUM AT OSAKA

Date	Course	Hours	Instructor
Jun 12, 2003	EMC Principles I: Introduction to EMC	3	Dr. Reiichi Sasaki, Chair, NARTE/Japan EMC Committee
	EMC Principles II: Basic Electrical Circuits	3	Dr. Tetsuo Ikeda, Professor Emeritus, Nagoya Institute of Technology
Jun 13, 2003	EMC Principles III: Electromagnetic Field Theory	3	Dr. Nobuo Okamoto, Professor, Kinki University
Jul 10, 2003	Measurements and Testing I: Measuring Techniques	3	Toshimichi Ohmori, NCE, Manager, Kitagawa Industries Co., Ltd.
	Measurements and Testing II: Testing Systems and Tools	3	Eizo Hariya, NCE, Associate Director, Kansai Electric Industry Development Center
Jul 11, 2003	EMC Standards and Regulations	4	Fujio Amemiya, Director, EMC Center, NTT Advanced Technology Corporation
Sep 11, 2003	EMC Control I: Control and Suppression Devices	3	Hidetoshi Yamamoto, Section Manager of EMI Group, Murata Mfg. Co., Ltd.
	EMC Control II: Shielding and Grounding	3	Kazuyuki Ogawa, NCE, Team Leader, Yazaki Corp.
Sep 12, 2003	Managing EMC in the Manufacturing Industry	4	Katsuo Ishihara, NCE, Group Manager, Matsushita Electric Industrial Co., Ltd.
Oct 9, 2003	EMC Principles IV: EMI From Signal Transmission	3	Dr. Minoru Okada, Associate Professor, Nara Institute of Science and Technology
	EMC Design I: EMC Circuit Design Principles	3	Dr. Osami Wada, Associate Professor, Okayama University
Oct 10, 2003	EMC Design II: EMI Control and Suppression Techniques	4	Shinji Seto, NCE, Manager, Mitsubishi Electric Corp.

### NARTE/JAPAN EMC COMMITTEE COURSES AND EXAMS

Apr 11, 2003	CRC Meeting in Tokyo
May 23, 2003	One-day practical course on EMC
Nov 14, 2003	One-day training for EMC Engineer candidates in Osaka
Nov 21, 2003	One-day training for EMC Technician candidates in Osaka
Dec 11, 2003	Practice examination for EMC Engineer and Technician candidates in Osaka
Feb 6, 2004	NARTE EMC Engineering and Technician examination in Osaka and Tokyo

### KEC HEADQUARTERS COURSES

Oct 2-3, 2003	Eighth Annual EMC Kansai 2003 Arts and Sciences Seminar on EMC in Sizuoka
Oct 15-17, 2003	Lectures and Labs on EMC Measuring Methods at KEC-EMC Measuring Center

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# NARTE NEW CERTIFICATIONS IN 2002

## NARTE CERTIFIED EMC TEST LABORATORY ENGINEERS

Mr. Jerry Oglesby 12/18/2002

## NARTE CERTIFIED EMC ENGINEERS

Mr. Norihiko Akasaka 12/06/2002  
 Mr. Ronald R. Amundson 09/26/2002  
 Mr. Shintaro Aoki 12/09/2002  
 Mr. John Robert Barnes 11/22/2002  
 Mr. Michael J. Bosley 07/05/2002  
 Mr. Carl B. Boyette, III 06/06/2002  
 Ms. Susan L. Brocchi 08/22/2002  
 Mr. James Burgard, Jr. 09/26/2002  
 Mr. Bruce Durwin Conner 03/21/2002  
 Mr. Bruce Curry 01/25/2002  
 Mr. David R. Cuthbert 04/04/2002  
 Mr. Mitchell Funk 08/30/2002  
 Mr. Kenzo Furuta 12/06/2002  
 Mr. Hiroki Goto 12/06/2002  
 Mr. Russel J. Governale 01/10/2002  
 Mr. Tetsushi Hazuku 12/06/2002  
 Mr. Gordon L. Helm 05/23/2002  
 Mr. Jim Hwang 02/06/2002  
 Mr. Masashi Inagaki 12/09/2002  
 Mr. Noriyoshi Kaneko 12/09/2002  
 Mr. Tom Karas 02/21/2002  
 Mr. Yasushi Katayama 12/06/2002  
 Mr. Katsuyuki Kawamata 12/06/2002  
 Mr. Masami Kita 12/06/2002  
 Mr. Takenobu Kobayashi 12/06/2002  
 Mr. Takeshi Kobayashi 12/16/2002  
 Mr. James L. Kohler 07/05/2002  
 Mr. Tomohiro Kourin 12/06/2002  
 Mr. Yonezo Kubota 12/06/2002  
 Mr. Motoharu Mizutani 12/06/2002  
 Mr. Norihiro Morimoto 12/06/2002  
 Mr. Sei Nagatsuka 12/06/2002  
 Mr. Hiroaki Nakaya 12/06/2002  
 Mr. Sumio Nishii 12/09/2002  
 Mr. Yoshitsugu Okuda 12/06/2002  
 Mr. Jack Prawica 09/26/2002  
 Mr. John M. Reske 10/09/2002  
 Mr. Michael A. Roberts 12/18/2002  
 Mr. Yasuhisa Sakai 12/09/2002  
 Mr. Yoshikazu Sakai 12/06/2002  
 Mr. Munehiko Seita 12/09/2002  
 Mr. Hironobu Shimoji 12/06/2002  
 Mr. Takaaki Sone 12/06/2002  
 Mr. Takashi Sonoda 12/06/2002  
 Mr. Raymond J. Stein 10/09/2002  
 Mr. Shingo Suzuki 12/06/2002  
 Mr. Eijiro Takao 12/06/2002  
 Mr. Wataru Takeda 12/06/2002  
 Mr. Yuzo Tanaka 12/09/2002  
 Ms. Quan Yen Truong 09/06/2002  
 Mr. Marius Turculet 06/06/2002  
 Mr. Yasuhiro Umano 12/06/2002  
 Mr. Takanori Uno 12/09/2002  
 Mr. Osamu Watatani 12/09/2002  
 Mr. Minoru Yamanaka 12/09/2002  
 Mr. David J. Zimmerman 12/04/2002  
 Mr. Ronald W. Zimmerman 03/06/2002

## NARTE CERTIFIED EMC TECHNICIANS

Mr. Clay Allred 05/08/2002  
 Mr. Kazuyuki Hayase 12/06/2002  
 Mr. Yukio Kajita 12/05/2002  
 Mr. Hiroaki Kawada 12/16/2002  
 Mr. Yoichi Kubo 12/05/2002  
 Mr. Fumiaki Matsuo 12/06/2002  
 Mr. Samuel I. Nickels 01/24/2002  
 Mr. Jerry Oglesby 09/25/2002  
 Mr. Akio Sato 12/05/2002  
 Mr. William Stokes 09/25/2002  
 Mr. Hiroshi Sugita 12/05/2002  
 Mr. Tim Travis 09/06/2002  
 Mr. Scott L. Woodard 10/23/2002  
 Mr. Hiroyuki Yasuda 12/11/2002

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Mr. Mark R. Been 05/28/2002  
 Mr. Daniel H. Berger 08/21/2002  
 Mr. John A. Chery 05/23/2002  
 Mr. Robert E. Dahlke 10/09/2002  
 Mr. Charlie H. Greenberg 08/06/2002  
 Mr. Christopher L. Griffith 08/06/2002  
 Mr. Craig M. Guilbault 08/06/2002  
 Mr. Kelvin Inluc 10/09/2002  
 Mr. Kevin R. Knight 03/06/2002  
 Mr. Santino Michele Knoll 10/09/2002  
 Ms. Angela Lemons 02/06/2002  
 Mr. Brian A. Lenahan 09/06/2002  
 Mr. Gerald E. McAllister, Jr. 04/18/2002  
 Mr. James T. McMillon 12/18/2002  
 Mr. Mark R. Mundy 06/20/2002  
 Mr. Matthew Alan Nevill 05/23/2002  
 Mr. Chon T. Nguyen, Jr. 08/06/2002  
 Mr. Darrell H. Orton 08/06/2002  
 Mr. Jud Michael Parker 06/10/2002  
 Mr. David O. Patton 12/18/2002  
 Mr. Jason S. Pustejovsky 12/18/2002  
 Mr. Justin P. Richter 05/23/2002  
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 Mr. Gregg E. Heckler 10/23/2002  
 Mr. Patrick Jakeway 03/21/2002  
 Mr. Jim McKeon 11/20/2002  
 Mr. Mark M. Miller 10/23/2002  
 Mr. James E. Smith 02/06/2002  
 Mr. Richard Wilson 11/20/2002

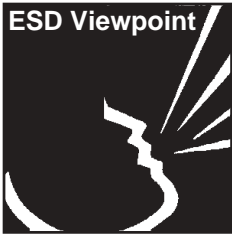
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# “FOR NARTE MEMBERS ONLY” (A Look At Conductive Fabrics)

*It is a privilege to write this new column for the NARTE News. I'll keep it useful and lively. These are my own personal views, not NARTE policy. Comments and dissenting opinions are encouraged. This is how we all learn.*

**E**lectrically conductive fabrics are a fairly new product. While designed for electromagnetic shielding, they have many other potential uses, too. They reflect radar and infrared signals, and one could probably make antennas out of them. They certainly could make handy, fold-up ground planes. BEMA, Inc., a world leader in its field, uses them to make shielded tents.

At TEMPEST INC. we have tested samples of most (possibly all) of the conductive fabrics currently being made in the world. They come in a wide variety.

Some look like satin. Others are stretchy, like T-shirt material, and others feel more like the burlap that is sometimes used for wallpaper.

I won't go into details about their shielding effectiveness in dB, but they can be used to make effective shields at UHF frequencies. Working with them requires special techniques. They are not like metal sheets and foils.

## Fabric vs. Metal Sheets

Why use conductive fabric instead of metal sheets? Fabrics are expensive. No one would argue that a great deal more galvanized steel could be purchased for the same price, and steel makes a better shield. But consider this: fabrics can be folded up. Since they are floppy, they can sustain the effects of vibration better than metal sheets or foils can.

Testing them has some unique pitfalls. This is why the same fabric sometimes gets different results when tested by different, perfectly competent, Electromagnetic Compatibility laboratories.

We have worked out these pitfalls using proprietary techniques. Consequently, we are getting repeatable, consistent results, but I now have a couple of new gray hairs!

## Fabric Production

Most conductive fabrics are made essentially the same way: a standard polyester fabric is plated or coated on the outside with a metal, such as nickel. The surface conductivity is good, but there are questions about the long-term effects of abrasion. There are also questions about allergic reactions for those people who are allergic to nickel. This could be a problem if you are manufacturing something like a shielded vest. Testing for allergenic properties requires special protocols and clinical trials. We have not been asked to do this yet.

One firm makes a conductive fabric that is unique. Using patented, advanced technology they take hair-thin, silver plated copper wires and they wrap them with polyester to form a unique type of thread. (Threads are called “yarn” in the fabric industry.) This yarn is then woven into a fabric that you have to see to believe. Most EMC engineers don't believe it is conductive until they try it. It looks and feels like regular cloth, and comes in a variety of colors. It provides good shielding effectiveness, but like all the other fabrics it is tricky to work with and test.

Just for fun, I washed a sample with detergent in really hot water (190 degrees F). I let it soak for a few hours, let it air-dry, and then re-tested its shielding effectiveness. I found no difference.

The fabric is rugged and, as far as I can tell, nearly fireproof. The only way I have been able to get it to ignite is by dipping it in oil first.

The fabric is made in Switzerland by Snowtex AG, part of a 100-year-old family owned firm that also makes seat covers for high-end cars like Volvo and Mercedes.

We have lots of this stuff left in the lab. If you would like to see a sample, send me an e-mail. I will be happy to send small samples to NARTE MEMBERS ONLY. ☺

Regards,  
lou@tempest-inc.com

## NARTE Prepares for, Tutors and Proctors Tests Around the World



*Shannon Reynolds (left) and Sandy Felone prepare your new certificates for mailing from NARTE headquarters. Photo by Laura Holmberg.*



*Dr. Jim Whalen, a regular and long time NARTE exam development specialist, conducting a tutorial at an IEEE EMC Symposium. Photo by Dick Ford.*



*(Left-right) Arlene and Russ Carstensen, and Don Sweeney, during an EMC exam at IEEE EMC Symposium (Seattle). Photo by Dick Ford.*

## NARTE Certifications, continued from page 13

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# NARTE Administrative Page

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**Kent Mills**  
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- Corporate and Personal Certification Literature
- General Administration

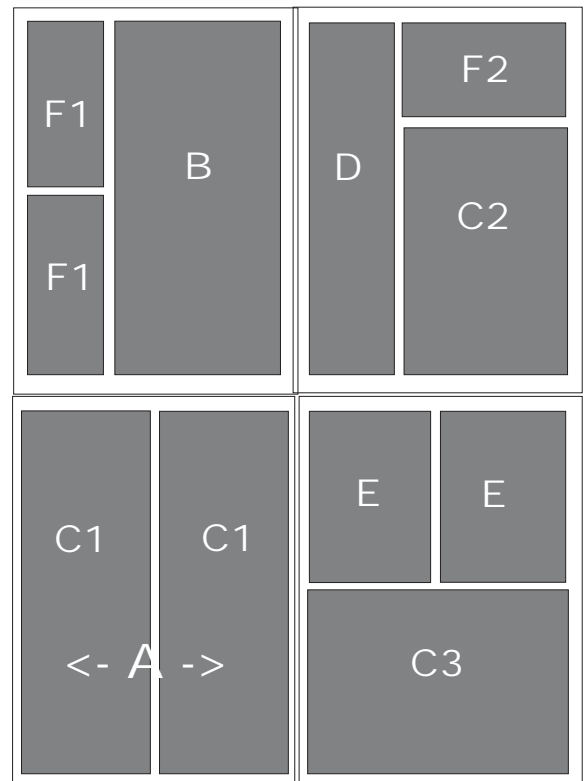
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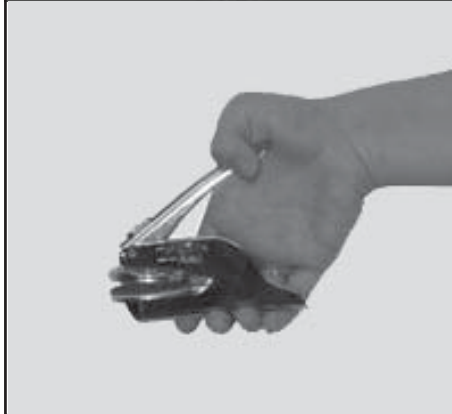


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