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HIGHLIGHTS

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Institute of Electrical and Electronic Engineers
Group-ElectroMagnetic Compatibility
Pacific Area Committee

Subscriptions

Free to IEEE/GEMC members in the Pacific Area.
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Articles up to eight typewritten pages invited about any subject as it relates to EMC. Spec testing, field problems, suggested procedures, propagation, technical writing, frequency management, EMC predictions, etc., all are potential GEMC PAC articles. Authors will be acknowledged in this publication and will enjoy priority retention rights to remain on the mailing list of free subscribers. No other compensation has been proposed.

Especially welcomed would be notification of new specs, new books, meeting announcements, hints and kinks, short bits of humor and excerpts from good usable references of almost any sort.

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Anniversaries:

August 1973 is the 100th anniversary of the birth of Lee DeForest. All of us know of the audion (triode) tube and its affect on radio. Many may not know he was one of the first to create and be victimized by RFI. Marconi and DeForest tried to broadcast yacht race results simultaneously. Since neither had tuned receivers (or transmitters), the race reports were sent by wig wag flags (certified RFI proof!). Year 1901.

1923 was the beginning of the National Bureau of Standards WWV broadcasts. The first station was in the NBS radio building in Washington, D.C. Originally, frequencies between 200 and 545 kHz were transmitted at up to 1 kW power output and the grand accuracy of one part in 10,000. Today we have several good frequencies up to 25 MHz all with an accuracy approaching one part in 10,000 billion.

August 1973 was the 15th anniversary of our nemesis "CB." Now we have 80,000 licensees and about 4,000,000 stations on 22 channels. They have over a billion dollars invested in equipment. A lot of RFI has been generated - good test frequencies (for vehicular noise tests) are wasted on a lot of idle chatter and illegal DX contacts. Don't get me wrong, we don't really believe that more than 10 to 20% of the rigs are being illegally operated, but those that are sure create problems. Also to be fair about it we have to admit that the CB'ers are doing a good job of emergency service that used to be covered by the Radio Amateurs (who are too busy rag chewing or working contests now).

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Anyone want to bet I get comments on the above?

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142857: Many of the EMC engineers seem to come equipped with pocket calculators these days. An interesting number to play with (oops - meant to say "fascinating numerical exercise for operational checkout of sub-miniature digital computers") is 142857. Multiply it by 2, by 3, by 4, by 5, and by 6. Note the digits and their order. Some fun? Try 7 for another surprise. If you have a 16 (or more) digit readout, the same results can be obtained from 0, 588, 235, 294, 117, 647. Multipliers from 2 to 17 are usable.

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JJ to a friend on departing Korea: "Of course I understand what's happening to the US dollar, it's getting away from me!"

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85 dB Gain Antenna for 150 MHz!

Yes indeed! 73 Mag for July 1973 has an article by George F. Ledoux K1TKJ - Full description of an 85 dB gain 2-meter antenna formed on a standard SO-239 connector - four copper radials from each mounting screw hole and a "46.99 cm" piece of #10 wire vertically out of the center pin. Then he tests it: HP-608 signal generator into a vertical test antenna to set up the standard field and the above described antenna into a receiver (or field intensity meter), note level! Then replace this antenna with a

50Ω load and raise the signal generator output to get the same response. Result 85 dB gain!

Of course, the test is valid; the gain figure is probably valid - but hardly what you expected! See Newsletter #8 for the article on dB. It and Mr. Ledoux make the point of establishing references. Antenna gain should be 10 $\log_{10} \frac{G_{test}}{Isotropic}$ or 10 $\log_{10} \frac{G_{test}}{Dipole}$ but could be 10 $\log_{10} \frac{G_{test}}{Dummy\ Load}$ - BE SPECIFIC.

The referenced article makes more good points. If readily available, it is recommended reading.

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Ignorance is a form of environmental pollution.

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Navy Reducing RFI: Both ships and aircraft are being rewired. The A-7 attack aircraft will have 302 wires replaced by 52 fiber optic cables.

	Length	Weight	Cost	RFI
Wire	4832 ft	82 lbs	$7900	Yes
Fiber Optic	832 ft	13 lbs	$2100	No

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One sure way of keeping people from jumping down your throat is simply to keep your mouth shut.

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Visitor from NASA: Mr. Ralph Taylor from NASA (Goddard Space Flight Center, Greenbelt, Md) stopped by to visit ye ed while on a vacation trip with his family. We enjoyed the visit and discussed mutual friends on the East Coast [as I usually say, "Farther East than the Far East"]. We also discussed IEEE Project Number P475 - preparation of IEEE Standard: Measurement Procedures for Field Disturbance Sensors. The first draft was published 15 May 1973.

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There are no great men; there are only great challenges which ordinary men are forced by circumstances to meet.

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IEEE Standards for EMC: We constantly complain about poor standards and specifications or outdated ones. The GEMC standards committee needs help. If you can spare even a little time to review or more time to write and review or even more to test, report, write and review - you can help solve the very problem you complain about. How about some volunteers? Pick your own subject within the EMC specialty!

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Until you try, you don't know what you can't do.

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Electronic Pollution: Can't guarantee this one but heard about a rancher in Oklahoma recently that had trouble with tunable RF pulses around 1490 kHz. It took some time to trace it back to an electric fence two miles away.

Puzzle: Can you use all the digits 1 through 9 to get a result equal to 100? We have about 35 answers on hand - expect many more are possible - your new ones could add to the confusion. Send answers with all of the RFI news we keep expecting to be sent in.

$1 + 2 + 3 + 4 + 5 + 6 + 7 + (8 \cdot 9) = 100$

ITEM 1973: You probably remember my rave notice in the last newsletter for the Interference Technology Engineer's Master. It resulted in the biggest response from the readers we have experienced since the first couple of issues. All responses were answered with Bob Goldblum's address. He also sent me a letter of thanks. For the use of others not interested enough to write this newsletter you can get a copy by writing: ITEM, P.O. Box 328, Plymouth Meeting, Pa 19462. Write on a letterhead and explain your relationship with the EMC field. Cost to the general public $5.00 per copy. Cost to Qualified Engineers, Engineering Managers, or Purchasing Agents is $0.00. (I guarantee it is worth more than that!) We should warn you to lock up your copy, ours disappeared shortly after publication of the previous announcement and only recently was recovered.

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In Hawaii we use the word Aloha for both hello and goodbye because half the time we don't know if we are coming or going.

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Format: The comments appear favorable. This issue is carrying on with the same format. It works well at the U.S. Post Office, but didn't help in Japan. It appears we still must stuff envelopes over there.

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$1 + (2 \cdot 3) + (4 \cdot 5) - 6 + 7 + (8 \cdot 9) = 100$

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Membership: Come on fellows you are not following through as well as we were believing. The latest GEMC Newsletter contains a list of all GEMC members. A number of people on our distribution list have not yet joined. The benefits for EMC people are quite worthwhile. We have published several articles earlier enumerating the benefits and don't forget it is a tax deductable expense. For application blanks see me or write (to me or IEEE). Briefly from the 1973 Membership Information and Services Booklet:

Publications - Many good ones.

a. Proceedings - General coverage and very technical.
b. Spectrum - General and easy reading; highly informative.
c. GEMC Transactions - Quarterly; EMC only, very good.
d. GEMC Newsletter - Always good and up-to-date.
e. GEMC PAC Newsletter - This old rag.

Meetings - We try! Most others are in the CONUS.

Educational Services - Correspondence course - Cassettes, special publications, etc.

Personal Contributions - "Gives personal satisfaction of accomplishment," etc. Allows you to donate your services to IEEE.

Personal Recognition - Status symbol stuff.

Other Benefits - IEEE Group flights program, travel discounts if going with an IEEE Group (usually start in New York or Los Angeles).

NSPE - Special rates on National Society of Professional Engineers, publications and services.

IEEE Insurance - Life, health, etc., at big discounts.

Library Services - If you happen to be near HQ IEEE, New York, New York.

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$$57 + 42 + \frac{9}{18} + \frac{3}{6} = 100$$

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Chapter Chatter: The ex-editor of Chapter Chatter for the GEMC Newsletter wrote his parting shot - very lyrical; we are quoting his first paragraph.

"In the beginning the frequency bands were unformed and void, with no intelligence on the receivers of sound and music, and naught save static was heard through the land. A voice came from the deep saying, 'Let there be EMC,' and there was EMC, and it was good. And EMC separated the intelligence from the static and noise, and the people rejoiced in their cities and their tents."

Three pages later (big pages) he completed with Pacific Area Committee (us) and said goodbye after five years in EMC. We miss you already Marty, hurry back!

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$$81\ \frac{7524}{396} = 100$$

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Automotive Electronics: We have reported the EMC problems on braking systems, electronic ignition, etc. The other day an announcement was made by Volkswagen that the buckle in their new seat belt will contain an IC. It is interesting to contemplate what happens if it gets jammed by RFI. Put the transmission in neutral, turn off the ignition - unfasten the belt - get out of the car - get back in - fasten the belt - turn on the ignition - then restart (unless RFI is still present, in which case you push).

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New book: Index to IEEE 1972 Periodicals is now available. 290 pages, 28,000 index entries, cost $12.50 members or $25.00 for those too cheap to join IEEE.

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Hawaii Radio Amateurs: Late July and early August radio propagation between Hawaii and California was slightly unusual. Lee Wical (KH6BZF and IEEE GEMC PAC member) made contact with California on 432 MHz. He was not using super gain or hi power - Prop was UNUSUAL. A lot of others have been talking continuously (or seem to) on two meters and some on 50 MHz. TV Channel 12 in Hilo, Hawaii, came in good in Santa Maria, California. All sorts of unusual movements of the signals have everyone curious. Have any of the readers noticed unusual prop conditions 50-500 MHz around that period? If so, please write to Bob Ford.

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$$1 + 95 + 3 + \frac{4}{28} + \frac{6}{7} = 100$$

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The main difference between a man and a boy is simply the price of their toys.

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Design Chart for Intermods: Electronics Magazine, 2 August 1973, carried an article by Helmut Lobenstein of GE Aircraft Equipment Division, NY. Several of the oldtimers will remember the approach. This particular article was well written. It covers the intermod problems in superhetrodyne receiver mixers primarily and does add qualifications for single-balanced mixers and full wave double balanced mixers.

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Just tried to send an FIM back for service and was told, "Yes it is guaranteed for 12 months but August isn't one of them."

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Meetings:

15th Japan Electric Measuring Instrument Automation Exhibition: Osaka, Japan, 26-30 October 1973 at the Osaka Municipal Exhibition Hall. Tokyo, Japan, 20-24 November 1973 at the Tokyo International Trade Center, Harumi.

14th National Radio and Electronics Engineering Convention (IREE, Aust), August 20-24 1973, Melbourne Exhibition Buildings, Melbourne (late but interesting).

Fall 73: National Electronics Conferences have announced Professional Growth Seminars in Chicago, October 8-9-10. Expensive but looks good.

October 10, 1973 EMC Seminar in Anahiem, California: SAE Comm AE-4, EIA, IEEE, and WEMA co-sponsor the seminar at the Grand Hotel. Topics: 1) Spectrum Management, 2) Control of EMI, and 3) Military EMI Operational Problems.

ICC74 will be held in Minneapolis, Minnesota, June 17-19, 1974. IEEE Comm Society sponsoring. Call for papers has been issued. If you want EMC on the program, write a paper and get it to Dr. M.S. Ulstead, ICC74, P.O. Box 353666, Minneapolis, Minn 55435 before December 17, 1973.

EMC Transactions for November 1973: Watch for it. It will be a special on "Ground Currents."

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$$97 + \frac{5+3}{8} + \frac{6}{4} + \frac{1}{2} = 100$$

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Power Line Noise: Norman Metz sent in a memo he has issued to Hawaiian Electric Company maintenance crews. Excerpts follow:

The cause of practically all radio/TV interference is spark gaps in the leakage current paths of our overhead systems. To prevent, or cure, interference problems we then need to eliminate spark gaps by one of two methods: (1) Power line components which are touching each other must be maintained electrically bonded to each other at all times. (This means that there must be a good conductive path at the points of contact for the leakage current.) (2) Power line components not touching each other must be spaced sufficiently far apart to avoid a sparking condition.

Suspension insulators used on overhead systems are mechanically secured with a shackle consisting of clevis, eye and pin. These metal parts must remain electrically bonded to each other, but over a period of time the surface corrosion can build up a nonconductive film sufficient to create a spark gap. When this occurs, the leakage current will cause Radio/TV interference due to the multiple successive sparks which result each alternate cycle of power line high voltage. Sparking at suspension insulator shackles is most commonly found when the insulator supports slack spans, since the line pull is insufficient to maintain a bonded condition at the shackles.

Dow Corning (DC-41) grease consists of a silicone grease base to which carbon black has been added. It has been found to be very effective in cure of sparking at the shackles of suspension insulators, acting as a bonding agent which effectively "shorts out" the spark gaps. In general, the grease is applied at all points of contact on all shackles which are not bolted together.

Tap the pins so as to create maximum clearance between one side of the eye and clevis, and the part of the pin protruding from the opposite side of the clevis. Use a grease gun to apply a small quantity of DC-41 to exposed portions of pin. (Application on the end beyond the cotter key is not required, nor is application to the cotter key required.) Tap the pins in the other direction so as to create maximum clearance on the opposite side of the eye. Apply a small quantity of DC-41 to each of the exposed portions of the pins. Work the grease into all points of contact between pin and mating part of the shackle by alternately tapping the pin back and forth (and/or rotating pin). If you observe that the grease is not worked into place, add an additional small quantity as needed and/or rotate the pin to work it into place. It is not necessary to apply the grease to any area except where the shackle parts come in contact with each other. It is not necessary to apply the grease to the cotter key. Avoid getting large quantities of the grease on the insulator porcelain surface (use grease conservatively).

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If there don't seem to be enough hours in the day for you, try to quit smoking. Then the days will seem endless.

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123 + 45 - 67 + 89 = 100

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Cardiac Pacemakers: July 1973 issue of Microwaves had a good article on malfunctions in Pacemakers caused by RF (specifically the 2450 MHz, microwave oven frequency). They mentioned problems all across the spectrum but concentrated on 2.45 GHz. Seven manufacturers and ten models were covered. The most susceptible was one model at a field intensity of 40 volts per meter while some were exposed to fields of up to 610 V/m without effect. The key to these problems as we see it is - the manufacturers are sensitive to these problems and are working hard at trying to reduce susceptibility. As they are replaced (approximately every 2-3 years) better pacemakers are being installed. Soon we hope, there will be no significant problems left.

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A tip for those going overseas: In an underdeveloped country, don't drink the water. In a developed country, don't breathe the air.

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Noise Immunity: Dr. H.M. Schlicke (twice past President, GEMC) and Dr. O.J. Struger of Allen Bradley wrote an excellent article on "Getting Noise Immunity in Industrial Controls" for the June 1973 edition of Spectrum. If you haven't seen it and don't get Spectrum, write to IEEE, 345 East 47th St., NY, NY 10017. Send remittance of $1.50 for the first copy and 50¢ each for all added copies of article Number X73-062 you want. Well worth the money! They also speak of a Noise Guide in progress; the first draft of which will be available in 1973. About 16 organizations are assisting. I would like to recommend one change - The proposed title is too long - .

DOMSAT Holdup: Yes indeed, EMI is delaying the initiation of the Domestic Communications Satellite programs. Everyone wants to put one up it seems, but FCC wants assurances that no EMI will result to or from other vital services. Some applications have been in for over two years and will probably be active for several more months before receiving the green light. An excellent article covering a lot more than the RFI aspects was in the July 1973 Microwaves.

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(1 + 2 - 3 - 4)(5 - 6 - 7 - 8 - 9) = 100

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Technicians: IEEE has established an Ad Hoc Committee to identify problems and solutions pertaining to technicians and technologists. Needs to be addressed are membership, services to be provided by various boards, employment status and opportunity, and education related services. Now is your chance! Join IEEE - Then provide Mr. Jack Kinn, IEEE Headquarters with your desires and (if you are so inclined) volunteer to serve on his committee.

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Don't put off for tomorrow what you can do today, because if you enjoy it today you can do it again tomorrow.

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Power from Garbage: The Environmental Protection Agency has initiated a five-year pilot program for a plant to convert 80 tons of garbage a day to produce one million watts of power. (Do not submit old copies of this newsletter to that program - we deny any connection.)

An Interesting Number Oddity: Multiply 999,999 by 2 through 9. Each result (a seven-digit number) should be written directly below the preceding number.

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Math Problem: If A can locate EMI in three hours, B in two hours and C in one hour - then why don't they let C do it?

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August 1973, IEEE Transactions on EMC: The first article is a favorite topic so it was with some keen anticipation that we started reading "Man-Made Noise Levels at 150 kHz to 32 MHz Near a Large Antarctic Base" by Drs. Stuart and Sites. It reminded me of old comic books - one of which had a regular feature: Count the number of mistakes. This study was made with untrained (PhD's) men using inadequate equipment (but blaming an FIM instead of their own lack of foresight on antenna choice). They made incorrect assumptions regarding both good and bad references. Their data shows 10 to 20 dB jumps of noise and signal amplitude corresponding somehow (unexplained) exactly with band changes on the FIM in use. They don't bother to explain how they managed to obtain good man-made noise data continuously across the spectrum, from 100 kHz to 20 MHz; that is 10 to 25 dB below the average background atmospheric noise (that certainly would mask it). Also mixed is data taken in peak detector position and data taken in average detector position. To add insult to injury - data was included from an article by Ed Skomal who in turn got it from several other sources, then they state, "The levels given by Skomal (2) for welders are comparable to the observed levels but it is not known whether any were operating at the time of the noise survey" (underline by Ye Ed). We will keep a copy on hand for an example of "how not to."

The second article on "Distribution of Peaks in Atmospheric Radio Noise" by S.N. Gupta is the most readable and comprehensive report of his series of studies on this subject. Very well done.

The remaining articles are all very good - quite theoretical but readable. EXCEPT - for the article, "On Cyclic Autocorrelation and the Walsh-Hadamard Transform." Ye Ed promises to study when time becomes available but in the interim would appreciate it if someone (in the Pacific Area Committee that understands Walsh functions) would abstract Walsh function literature and provide us readable resumes of same. It would help cultivate a greater interest if we could see practical applications for immediate use.

Specialist: Looking through Esar's Comic Dictionary recently we ran across several definitions of a "specialist:" 1. One who is called in at the last minute to share the blame. 2. A doctor who gives the family the satisfaction that the patient died cured. 3. One whom a doctor calls in to make sure, when he doesn't think the patient will recover. 4. A medical man to whom a doctor sends the troublesome patients that he can't otherwise get rid of.

Sorely tempting was the thought of inserting the words "EMC engineer" for "specialist." Note the similarities.

Problems: In case you're wondering, we just finished several EMC tasks that really fit the above. In one case a receiver site used for many years was lost to encroachment from man-made noise (see definition 3 above). Another case involved a new facility already complete in design and having a required completion date less than 90 days away. It must be installed in the chosen location - just a few feet away from two high powered radars. (See definition 1 above). Many months of effort were expended to get a group of fixes added to a wideband comm system. The fixes worked and the station closed (see definition 2 above). Almost every day brings examples of definition 4 above. We needn't list them.

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I wish I were what I was when I wanted to be
what I am now.

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Calculators: A recent article quotes Bowmar/Ali Inc., president as saying every home will soon have two calculators. Our comments on EMI must be amplified. Some are very noisy. Hewlett-Packard knocked off 25% on the cost of the noisy HP-35 and announced the 45 (haven't seen it yet). Competitors are reportedly trying to market equivalent units between $100 and $200. Maybe we will wind up with two per home.

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Neat sequence $(111,111,111)^2$. Try it!

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Ace Screen Rooms: Reports have it that they are going out of business. Sorry about that - they were good rooms.

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Have you heard about the new foam mattresses?
You take a waterbed and fill it with beer.

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Abolish FCC? Congress has three separate bills up for consideration that would in effect abolish the FCC as we know it. This won't mean the end of spectrum regulations but only replacement of one group of offices with others. HR 3251, HR 3252 and HR 3254 are the bills introduced by Congressman Dingell.

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If the world is getting smaller, like they
say, why do they keep raising the cost of
postage stamps?

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Earthquake Changes Prop: The Honolulu Star Bulletin, 13 August 1973, carried a good article entitled, "April Earthquake Was Connected with Science Fiction-like Event." Sometime last year ye ed heard an interesting paper given to the Hawaii Section of IEEE at a monthly meeting. It appears the University of Hawaii has a program in progress for monitoring WWVH signals from Maui at a test site near Ewa Beach on Oahu. Ionospheric reflections are zero beated against a stable local standard and recordings kept.

One of the siesmologists checked old records and found drastic fluctuations occurred just before some of our earlier earthquakes. As a possible earthquake predictor the program was continued. Now, back to the Star Bulletin - .

"An hour before the earthquake rocked the coastal town of Hilo" - "the ionosphere suddenly disappeared" (the paper to IEEE earlier - said, "The ionosphere starts oscillating at a slow rate but with very high amplitude). "The Navy's Omega Navigation System" --- "began drifting and not making any sense." (Maximum drift was just about the time of the earthquake - then recovery came back slowly.)

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Why is it that a heavy rain washes away tons
of topsoil but doesn't remove an ounce of dust
from your car?

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Power Line Noise: JJ recently had the delightful chore of solving an EMI problem at a very remote site near the sea (salt water atmosphere). Several hundred yards of power line was creating a lot of noise at a receiver site. He has been lucky using an ultrasonic leak detector to locate sources but this time he really didn't need it. If hardware was arcing, you could hear and see it. He recommended conductive grease (similar to the DC-41, Norm Metz uses) but the local (foreign) power company decided to fix the problem by changing hardware to a higher voltage spec. We believe problem will still exist, albeit at a lower amplitude, and we'll then re-explain why the conductive grease works.

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Education is oftentimes like a vaccination...
sometimes it takes and sometimes it doesn't.

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TVI: Herb N. just had a nice visit to northern Thailand on a TVI complaint (among other things). HF transmitters nearby were part of the problem as proved by keying them and watching TV. Unfortunately, the problem disappeared when the TV station personnel changed out their transmitter the same day Herb got there to fix the TVI. We figure a spurious was being generated in the transmitter in response to a resonant susceptibility to the HF transmitters. Admittedly a guess - we didn't want them to re-install the old transmitter just to prove a point. (Herb didn't mind - he likes Thailand.)

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I don't know of anything better than a woman
if you want to spend money where it will show.

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RFI on 20 Meters: The ARRL is asking members to send complaints to FCC about the second harmonic of jammers, in Havana and Moscow. Also it seems RTTY stations at the same locations are seen with spurious outputs every 4 or 5 kHz. We wish them luck!

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A radio amateur is "a ham that can't be cured."

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KLEP: Most of you know LTC I.C. Klepper. He was EMC Chief for CINCPAC up till about a year ago. Then he went to Dept of Army for a while and now he is Deputy Director for the Army (ACX) of ECAC. He said, "Your EMC newsletter is read cover to cover and passed around the shop both here and at DOD ECAC as well as at Department of the Army. The Army goofed and decided to keep me a few more years on active duty, so I'm now Commander of the Army Element and a Deputy Director of ECAC (ACX). In your July issue, you mention one of ECAC reports (TR-68-103). There are many more which would

be of interest to the operational community. Since arriving 1 February the 'job' is like being turned loose in a candy store, and we all here would like your readers to share the wealth of knowledge contained in this windowless building. Enclosed is a new 'shopping list' and it contains the address for access to the 'store.' Please extend your readers a cordial invitation to drop us a line."

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A friend is a person who knows all about you-
and still likes you.

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Len Thomas, Sr, Secretary GEMC, consultant on EMC, previously with ECAC and US Navy (BuShips) before that; old friend of almost 20 years, keeps us informed about meetings, visits, conferences, Ad Comm news, etc., and - provided a lot of assistance in starting GEMC PAC. His latest letter had some tidbits we would like to pass on.

"The 1973 IEEE EMC Symposium was held as scheduled, and was a great success, both technically and financially, to the great surprise of many people who had knowledge of the many problems that the Symposium Committee had to overcome. At the conclusion of the Symposium, Tony Zimbalatti told me there was approximately 300 paid admissions, with their break-even point at 200. It is regretted that none of the members from the PAC were able to attend.

The EMC FOM Committee held several meetings during the Symposium. Of primary concern was a planned one-day symposium on the EMC FOM to be held on October 18th at ECAC. Attendance would be by invitation only due to the limited space at ECAC. An interim report on the FOM effort is planned prior to the symposium, and copies of the report are to be made available to symposium attendees prior to the symposium. Further information concerning the planned symposium and interim report will be published in the EMC Newsletter."

"On June 18 & 19 I attended the closing Plenary sessions of the International Special Committee on Radio Interference (CISPR). There were representatives in attendance from many foreign countries, including Canada, UK, USSR, Poland, France, Germany, Italy, Japan, Netherlands, Norway, Spain, Denmark, Sweden, Yugoslavia, Switzerland, etc. This is the International body which is the ultimate as far as EMC Standards and Specifications are concerned. The USA has been an active member of the CISPR since 1946, and has greatly influenced Standards for EMC instrumentation and measurement procedures. Recently there has been worked out an agreement on international levels of interference from ignition systems of motor vehicles, and work is proceeding in many other areas, including ISM apparatus, electrical appliances, radio receivers, power transmission lines, uniform statistics of interference, and safety aspects of electrical devices. The USA access to the CISPR is via the U.S. National Committee of the International Electrotechnical Commission (IEC), which is another "hat" worn by the American National Standards Institute (ANSI). ANSI Committee C63 on Radio-Electrical Coordination, chaired by Dr. Ralph Showers of the U of PA is the group thru which we work. I am a "Member-at-Large" of ANSI C63, and also Chairman of ANSI C63 Subcommittee No. 3 on International Liaison. The ultimate in any proposed IEEE Standard is that it be written with the view that it become first an American Standard via ANSI, and then an international EMC standard via CISPR, which is the IEC body concerned with international EMC standards. Ralph Taylor and I have written the draft of P475/D1 with this in mind.

The IEEE has just issued a new Standard, No. 430-1972 "Measurement of Radio Noise from Overhead Power Lines, Procedures for." I did quite a bit of work on that standard with Verne Chartier of Westinghouse in East Pittsburgh, who is the Chairman of the IEEE committee that produced it. You may be interested in obtaining a copy. Coupled with a realistic set of limits, this would make a good document with which to assess the quality of overhead power lines."

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D.B. heard of a small Neighbor Island village
so trusting that if you pay cash you aren't
asked to show your ID card.

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Book Review: Topics in Intersystem Electromagnetic Compatibility; Woodrow W. Everett, Jr.; published by Holt Rinehart and Winston, Inc., New York; 563 pages; $21.00. Reviewed by Capt Richard D. Snell.

Dr. Everett's stated audience is practicing engineers, technical managers, and students at the upper undergraduate or lower graduate levels. The emphasis is on compatibility between a new system and existing ones rather than various components (subsystems) in a single system co-existing compatibly. Nine authors contributed to the seven part book.

Dr. Everett wrote the Introduction and Part Two titled, "Systems." In the brief chapter (3) on transmitters he discusses spectral energy distribution in pulsed systems and points out that spurious outputs of high power devices cause most problems. The treatment of receivers (Chapter 4) is more complete. He wisely points out that it is not in an operator's or engineer's nature to "throw away" the sensitivity of a superhet even when a simpler "direct-detection" receiver would suffice without interference. Therefore, he discusses common interference problems associated with the superhetrodyne receiver; selectivity, co-channel and adjacent channel interference, desensitization, cross-modulation and intermodulation. This part of the book is scholarly.

Part 3 (Chapters 5 and 6) is Signal Generation and Amplification. Dr. A.S. Gilmour, Jr., has done an excellent job in describing the more common and important microwave tubes. He gives numerous equations and diagrams, but Maxwell's equations are as complex as the math becomes. Dr. L.A. MacKenzie wrote Chapter 6, "Microwave Bulk Solid-State Devices." A rather comprehensive physical electronics treatment on the Gunn effect and the avalanche transit-time effect phenomena. He gives us a direct link for intersystem EMC by concluding with both intra- and inter-system noise and compatibility properties of these devices. The discussion is excellent.

Part 4 (Chapters 7-10) is called Filters and Nonreciprocal Elements. In Chapter 7, Integrated-Circuit Synthesis, Dr. R.E. Thomas discusses synthesizing analog baseband filters using integrated circuits, resistors, and capacitors (inductorless filters). He discusses the four main active elements (operational amplifier, controlled source, negative-immittance converter, and the gyrator) useful in filter synthesis and the performance requirements in terms of gain, RC product, sensitivity, and bandwidth. Dr. E.F. Johnson wrote Chapter 8 on passive nonreciprocal elements. He begins with a brief and general discussion of the gyrator, isolator, and three port circulator, including possible circuit applications. He then gives a very thorough treatment of both the principles of operation and the non-ideal aspects of the helicon isolator. He concludes with a brief summary of several of the ferrite non-reciprocal devices and an excellent presentation on the performance of actual devices. Dr. Johnson has struck an

appropriate balance between the theoretical and practical presentation. Dr. Benjamin J. Leon covers the fundamentals of digital filters in Chapter 9. He points out that digital filters are low frequency devices (baseband) and are limited by the speed of the analog to digital converters. The chapter is almost entirely mathematics; difference equations, Z transforms, and other approximation methods for realizing a digital filter. Heavily theoretical, the individual who likes practical applications will find little enjoyment in Chapter 9. Dr. A.T. Adams wrote Chapter 10 on microwave filters to conclude Part Four. He begins with a basic presentation of the types of filters (low pass, stopband, etc.) and their realization with lumped constant elements. He then points out areas where actual performance differs from lumped constant predictions, and concludes with a brief section on the performance characteristics (power capability, attenuation level, suppression bandwidth ratio) for several types of high power microwave filters.

Part Five (Chapters 11-13) is on Signal Processing and Detection. Dr. J. Perini wrote Chapters 11 and 13. His Chapter 11 on modulation and detection begins with an excellent presentation on modulation and detection schemes (AM, AMSC, SSB, FM, PAM, PCM, etc.). It is one of the best summaries I've run across; clear and concise and yet complete enough for full understanding. He also included an intriguing section on the possibility of using a time sharing scheme to allow several transmitters and receivers to operate compatibly in a confined area; for example, on ships and aircraft. Dr. Perini concludes Chapter 11 with a brief discussion on the characterization of noise and the signal/noise performance of the various modulation schemes described earlier. Dr. Perini's other chapter (13) on the elements of information theory provides the fundamental concepts associated with channel capacity and efficiency, information content and capacity, and encoding. Again he presented his topic concisely and clearly. Chapter 12 is about phase-locked loops. It was written by Dr. Leon and, like his previous chapter, leans towards the mathematical presentation. He deals with phase-locked loops as independent components, describing their operation and performance in detecting signals in noise. The value of this chapter is general; it gives a basic understanding of the capabilities of a practical device for controlling oscillators.

Dr. Adams wrote both of the chapters (14 and 15) on antennas which make up Part Six of the book. Chapter 14 is introductory, pointing out that the difference between antennas and transmission lines is one of degree, and quickly reviewing the mathematics (Maxwell's equations) of plane waves, spherical waves, polarization, etc. In Chapter 15 Dr. Adams leans heavily on the mathematics presented in the previous chapter and combines it with matrix techniques to give a presentation on antenna coupling prediction using matrix inversion methods. He shows how integral equations are replaced by matrix equations, and gives examples of coupling between two wires and also treats antenna arrays. He discusses some of the practical considerations which affect the accuracy of the predictions; the number of subsections of wire chosen, treatment of the shape of the conducting surfaces, etc. He presents the results of several examples of analysis and synthesis problems treated by the method of moments; radiation in the presence of parasitic elements, near field analysis, broadband sector blanking, and others. Dr. Adams concludes Chapter 15 with a discussion of some of the other methods that can be used for coupling prediction and coupling reduction. In summary, Part Six is heavily theoretical and could be a starting foundation for a communications engineer to use in predicting the interference potentials involved in the siting of closely spaced antennas.

The final part of the book (Part Seven) is titled, "Intrasystem Electromagnetic Compatibility," and is mainly concerned with compatibility problems within a system. All three chapters were written by Dr. O.M. Salati. Chapter 16 is on grounding. He discusses the several different types of grounds, earth grounding, control circuits, signal circuits, ground planes, and the different requirements for each type. He also includes details on conductors used in grounding systems, demonstrating the results of skin and proximity effects. Dr. Salati makes liberal use of graphs and tables to give a handbook type flavor to the chapter. He points out that the material is basic, and he has done a good job in presenting it. Chapter 17 is a companion chapter which briefly presents the fundamentals of bonding; he discusses the purpose and theory of the types of bonds and proper techniques for bonding. He continues to make liberal use of charts and graphs. In Chapter 18 on shielding Dr. Salati begins with heavy reliance on mathematics (Maxwell's equations) and eventually (after 192 equations) derives formulas for shielding effectiveness under different situations. He then presents several charts and graphs depicting the shielding effectiveness for different metals. Although this final section of the book deals primarily with intrasystem EMC, I feel that it is a worthwhile addition to the book; it contains information also useful in intersystem engineering situations in that new systems often have to be collocated with existing systems, and proper grounding, bonding, and shielding become very important.

SUMMARY. Dr. Everett has done an excellent job in tying together the authors' contributions. Overall, I think Dr. Everett achieved his goals. I think that the book could successfully be used as a graduate level text for a course in intersystem electromagnetic compatibility. For the practicing engineer and technical manager the book will serve as excellent background material for the topics presented, and its excellent bibliography (298 references) will serve as a source for more thorough information if it should be required.

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He who thinks an inch, but talks a yard, needs a kick of the foot.

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Charlie Anderson is the new Chapter Chatter editor for the EMC newsletter (replacing Marty Berman). He has the idea from our July GEMC PAC Newsletter that we might be fellow QRPers. Sorry about that - I get accused of being a ham every once in a while but have to admit that I've been to lazy to learn 13 WPM morse. I have a lot of ham friends but just never got around to getting a license. Maybe some day --

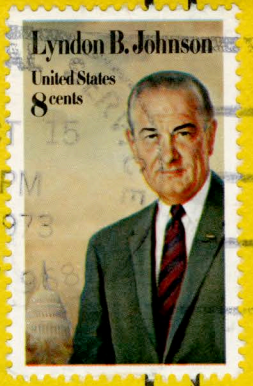
EMC Symposiums

1973 New York. Successfully completed; EMC Symposium record not yet received.

1974 July 16, 17 and 18. San Francisco Hilton Hotel. Theme "EMC Spans the Spectrum." Summaries of proposed papers due by November 30, 1973.

1975 July 22, 23 and 24. El Tropicana Hotel in San Antonio, Texas.

1975 May 20-22, Montreux, Switzerland. Preliminary announcement available.



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