



PROFESSIONAL  
GROUP ON  
RADIO  
FREQUENCY  
INTERFERENCE

# NEWSLETTER

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## EIGHTH TRI-SERVICE CONFERENCE ON ELECTROMAGNETIC COMPATIBILITY

Electronic News, Nov. 5, 1962, carried the following write-up on the 8th Tri-Service Conference on Electromagnetic Compatibility conducted by the Armour Research Foundation, in Chicago, October 30th to November 1st, 1962:

"Chicago. - The military electronics industry already has the ability to support Defense Department requirements for electromagnetic compatibility.

"Factors needed to actuate this support generally speaking, are adequate financing, knowledge of the environment for which new systems are to be developed, and increased acceptance and confidence on the industry's part, of interference prediction techniques at the design stage.

"This sums up the feelings expressed by industry compatibility engineers at the eighth Tri-Service Conference on Electromagnetic Compatibility here last week, at the Museum of Science and Industry. The 3-day conference, jointly sponsored by the Army, Navy and Air Force, was conducted by Armour Research Foundation of Illinois Institute of Technology in cooperation with the Institute of Radio Engineers' Professional Group on Radio Frequency Interference.

"Over 40 technical papers were presented, including separate sessions on various aspects of the EMC problem, such as instrumentation and techniques, analysis and prediction, antennas and propagation, spectrum signature measurements, suppression devices and shielding-bonding problems.

"After hearing a speech on the Government's view of EMC requirements by James M. Bridges, director, Office of Electronics, Office of Defense Research and Engineering, Washington - a speech which Mr. Bridges was unable to deliver in person - speakers following the keynote address had the opportunity to tell of progress being made in the production of compatible equipment.

"One industry speaker, Richard Stoddart, president of Stoddart Aircraft Radio Co., Hollywood, Calif., declared that in the field of REI instrumentation 'The industry presently has the talents and techniques to support all Government requirements for compatibility, sensitivity, constant bandwidths and gain, and broadband antennas.

"Given a clear picture and understanding of these requirements," he said, "the industry will be able to meet them, provided adequate Government funding and planning is incorporated in the national EMC program."

"He added that the long list of Government requirements necessitates the spending of a 'tremendous' amount of money.

"In retrospect, Mr. Stoddart's remarks were considered highly significant, because the Government official's speech at the beginning of the program cited the need for firm compatibility requirements in contracts, 'if we are to obtain needed improvements in our new electronic systems.'

"Such requirements, which Mr. Bridges said need the support of improved instrumentation and test equipment, environmental data files and other requisites, 'must be carefully considered in terms of cost, equipment complexity, and other factors.

"These factors', he added, 'must be weighed carefully in determining the direction of our EMC program.'

"Nevertheless, he predicted that the program would follow a course similar to that of systems and equipment reliability in recent years, so that, 'before long, contracts for... equipments and systems that radiate or receive electromagnetic energy will include definitive requirements for compatibility, both within the specific equipment and its specified operational environment.'

### Urges Close Liaison

"He urged increased cooperation between industry and the Government including continuous programs to educate responsible people, 'from management levels down, concerning all aspects of the EMC problem.'

"Remarking on Mr. Bridges' call for basic data files on environment which has become one of the principal tasks of the Annapolis center, Mr. Hiebert said he interpreted this to mean that 'the Government must supply industry with information on what the desired equipment is to be compatible with,' before industry can develop such equipment.

"Presumably, environmental data of the type referred to would be furnished to a contractor, and would include information on encounterable signals, terrain profiles, etc.

"In the session on analysis and prediction, Lawrence W. Beard of Sprague Electric Co., North Adams, Mass., cited another problem. Speaking on the use of Fourier analysis for obtaining predicted interference levels, Mr. Beard urged design engineers to adopt more confidence in the use of existing prediction techniques. 'These techniques,' he said, 'are capable of resolving EMC problems inherent in the complex electronic systems of the present and future.'

"He discussed Fourier analysis in the general cases of radiated and conducted interference, and showed how the usefulness of the method has been substantiated by laboratory measurements. Judging from the response to his talk, which ranged from heavy demand for copies of the paper to specific questions on various types of interference, the problem of reliable prediction methods, or rather, the problem of accepting such methods continues to prevail.

### Financial Factor

"The first two problems mentioned, lack of financial support and environmental data, also were discussed frequently in the sessions of the conference and in informal discussions between sessions.

"Eventually, industry may take a middle ground on these problems. Such a stand would speed the adoption of contractual requirements for compatibility (and perhaps also underscore the problem of costs), but might also lead to new development and applications opportunities.

"Other problems were brought out as affecting the progress of the EMC program. Even if industry has the talent available now to meet Government requirements, as Mr. Stoddart and others believe, a number of engineers said more meetings such as the tri-service con-



ference are needed to help pool the knowledge of the industry for full support of the Government program."

#### RFI INSTRUMENT DESIGN: PACE QUICKENS:

Electronic Design, November 22, 1962, carried a resume of the 8th Tri-Service Conference. The sub-title and the first five paragraphs are as follows:

"Wideband spectrum analyzer with visual display and a complex system for collecting spectrum signatures to 40 Gc illustrate growth of field.

"A firmer military policy on radio-frequency interference and an infusion of research funds are quickening the engineering pace in this field.

"Two advanced instruments resulting from this heightened activity were described at the recent Tri-Service Conference on Electromagnetic Compatibility. These were:

"A wideband spectrum analyzer for frequencies up to 1 Gc, which provides a visual display of all simultaneous signal frequencies and amplitudes in its band.

"A mobile unit for collecting spectrum signatures to 40 Gc almost automatically and in accordance with most of the requirements of the military specification on such data, Mil-Spec 449-A.

"Both systems reflect the need to automate RFI data processing to ease the burden on engineers. This burden is increasing rapidly as more and more requirements for electromagnetic compatibility are being written into contracts."

#### A FINANCIAL NEWSLETTER Now RECOGNIZES RFI PROBLEMS:

A financial newsletter had this to say about the "holes" which the military would have to plug up as a result of the Cuban affair:

"Communications traffic threatened to overload channels. Movement orders came thick and fast to get troops into position. This was complicated by urgent reports on U.S. - USSR negotiations. "We were not sure the big messages would get through the clutter".

#### WILL INTERFERENCE SPECS Get TOUGHER?:

Electronics, November 16, 1962 has a two-page article by Sy Vogel, Associate Editor, under the above title. The sub-head and the first few paragraphs are as follows:

"Industry and government agree that costly RFI problems must be solved.

"Chicago - The Department of Defense is just getting going on its recently intensified program to reduce radio-frequency interference (rfi). But it was evident at the Eighth Tri-Service Conference on radio frequency interference two weeks ago, that a five-point industry-government program is shaping up:

"Closer cooperation between industry and government to set realistic specifications and to develop better instrumentation and techniques for obtaining rfi data.

"Getting repeatable measurements of rfi, now a major problem

"Speed up rfi measuring - present methods are too slow

"Cut the cost of rfi - estimates of what it costs industry to combat and control rfi now range from one percent of total systems costs to three percent of total industry dollar volume, directly and indirectly.

"Make rfi control as much a part of an electronics organization as quality-control engineering."

#### FIFTH NATIONAL SYMPOSIUM ON RADIO FREQUENCY INTERFERENCE - CALL FOR PAPERS-

The Fifth National Symposium on RFI, sponsored by the IRE Professional Group on Radio Frequency Interference, will be held on June 4-5, 1963 at the Bellevue Stratford Hotel in Philadelphia, Pa. The theme for this 1963 Symposium will be: NEW DIMENSIONS IN RFI.

The planned technical program will include Instrumentation, Suppression, Measurement Techniques and New Products for EMI/RFI and associated fields covering the increased measurement spectrum

(30 cps to above 10 kmc) and the growing number of areas in which EMI/RFI has played an important role in the design of reliable, "quiet" and compatible equipment.

In keeping with the Symposium theme, technical papers in the following areas are specifically invited:

New Dimensions in RFI Instrumentation

New Dimensions in RFI Suppression

New Dimensions in System Compatibility Analysis

New Dimensions in Communications

Special Problems above 10 kmc

Measurement Problems in the VVLF Range

An abstract of about 250 words of your proposed paper should be submitted on or before March 1, 1963 to the Technical Program Committee. After selection of the paper, the author will be requested to submit a 1000-1500 word summary for publication in the PGRFI Symposium Transactions. No formal printed paper need be prepared, unless the author finds it necessary for presentation. The main object is a clear presentation at the Symposium of material that is worthwhile.

As soon as possible, we urge you to submit either an abstract of the paper or an indication of subject matter to: Albert R. Kall, Technical Program Chairman, c/o Ark Electronics Corp., 624 Davisville Rd., Willow Grove, Pa. Tel: Oldfield 9-4121 (Area Code 215).

If you require additional information, contact Mr. Kall, or Vice-Chairman Dr. Ralph Showers (University of Pennsylvania, Moore School of Electrical Engineering, Phila., Pa.)

#### CHAPTER MEETINGS

##### Cape Canaveral Chapter

May 1, 1962 - "Radio Frequency Management for Test Ranges" - by Richard E. Jones, Area Frequency Coordinator for the AMR, U S Government.

May 22, 1962 - "Mil. Std. 449" - by Frederick Tabor, Armour Research Foundation.

June 26, 1962 - "Determining the Vulnerability of Equipment to Electronic Countermeasures" - By R.H. Sugarman, A.E. L. of Philadelphia, Pa.

##### Fort Worth, Texas, Chapter

September 11, 1962 - "Microwave R.F.I. Measurements"

- by Bob Friedman, Polarad Elec. Corp., Long Island City, N. Y.

##### Los Angeles Chapter

July 19, 1962 - "Spectrum Signature of Complex Electronic Systems" - by Hollice A. Favors, Hughes Aircraft, Culver City, Calif., and "Film - Aircraft Electromagnetic Compatibility" by John Eckert, Norair Division, Hawthorne, Calif.

##### Philadelphia, Chapter

October 16, 1962 - "GEEIA's Role in the Air Force RFI Reduction Program" - by Douglas Clark, GEEIA RADG, Rome, N. Y.

##### J. M. Bridges to Speak in New England

James M. Bridges, Director, Office of Electronics, Office of the Director of Defense, Research and Engineering Washington, D. C., will speak before a group sponsored by PGML, PGCS and the Lex/Concord Chapter of AFCEA. All members of PGRFI are invited.

The meeting will be held at the Officers' Club, Hanscom Complex, Bedford, Mass., on January 16, 1963 and will start at 8:00 p.m.. Those who wish to attend the dinner previously should make reservations through the Boston Section, IRE, 313 Washington St., Newton, Mass., LA 7-515.

Mr. Bridges' subject will be the DOD Compatibility Program's application of definitive specifications for EMC on



new electronic systems developments and the steps that must be taken by the government before such contractual stipulations can be made. It would make the lives of local PGRFI members easier if they could bring their management with them.

#### INTERFERENCE IN PARAMETRIC AMPLIFIERS:

Airborne Instrument Laboratory, Deer Park, L. I., N. Y., has taken a full-page ad in the November 1962 issue of the Proceedings of the IRE, page 4A, to discuss RFI problems associated with parametric amplifiers and other solid-state devices.

#### HOW TO ECONOMIZE WHEN SPECIFYING FILTERS:

Under the above title was a single page article by Walter Bein, Project Manager, Kenyon Transformer Co., Inc., 1057 Summit Ave., Jersey City 7, N.J., in the September 1962 issue of Electronic Products Magazine. A check list for use when specifying filters is mentioned.

#### NEW YORK PACKAGING CONFERENCE To Have RFI EXHIBIT:

The National Electronic Packaging and Production Conference, or NEP/CON, to be held in the New York Hilton Hotel, June 4-6, 1963, plans to have a symposium on RFI. It is understood that at time will be arranged to fit in with the 5th PGRFI Symposium in Philadelphia. Further information about NEP/CON can be obtained from National Electronic Packaging and Production Conference, 222 West Adams Street, Chicago 6, Ill.

#### MISSILE EXPLODES AT CAPE CANAVERAL:

The following news item appeared on August 13, 1962 as follows:

"Cape Canaveral, Fla. - An advanced Minuteman missile designed for Wing II exploded into flaming wreckage about 24 seconds after a successful silo launch here Thursday.

"According to reliable sources, the malfunction occurred in the airborne computer of the Autonetics guidance system, causing the missile to pitch over out of control and explode."

#### NO A-TEST JAMMING OF POLARIS COM:

Electronic News, May 21, 1962, carried the following news item under the above title:

"Paris. - Communications and missile tracking interference from highaltitude nuclear blasts is no longer a problem in the Polaris missile program, a high-ranking U.S. Navy officer said here.

"Speaking before newsmen, Rear Adm. Ignatius J. Galentin director of the Navy's special project office, said very low frequency radio communications equipment 'tested under actual explosion conditions,' were found free from interference."

#### REQUIREMENTS For RFI SPECIALIST (Not to be Shown to Management):

1. Must be nuts or rapidly on the way.
2. Must have taken readings on a receiver. This makes him an expert.
3. Should know the difference between plus and minus but will do if he can recognize peaks and valleys.
4. Must be able to interpret R. F. I. language such as: We have no rfi problems means we know we have but have been scared to find out" "In rfi design we use good engineering practice means we haven't done a damn thing and don't intend to."
5. Must have skin like an alligator so he can stand being boiled in oil or hauled over a carpet of spikes and still maintain a smiling, pleasant appearance.
6. Must be able to explain rfi in one syllable terms to

management and project engineers.

7. Ability necessary to conduct rfi tests and apply fixes without manpower and no loss of schedule time.

8. Be capable of reducing rfi without doing anything. (leave it alone and maybe it will go away.)

9. Able to design power line filters in miniature modules.

#### WHERE DOES COMPATIBILITY START?:

Beale Air Force Base, Calif. (AP) - A cow gave aircraft navigators and electronic experts the fits here.

For weeks, Base monitoring equipment would periodically go on the blink despite intensive maintenance checks.

The bewildered experts finally discovered the trouble was caused by a cow who habitually used the same antenna post as a back scratcher.

#### ITEMS OF INTEREST from ELECTRONIC INDUSTRIES, SEPT. 1962:

"Electrical Engineering is in a state of crisis because of its increasing emphasis on scientific theory and corresponding decreasing emphasis on background knowledge of 'ordinary things, materials, facts and principles.' This warning was voiced to the AIEE Education Committee from University of Michigan Professor A. D. Moore. Simple lab demonstration equipment should be developed, he said, to present the simplest principles of electronics and physics. Experimentation should be encouraged, he said, and the chief encouragement will come from being exposed to simple, easily understood, experiments." Page 4.

#### Possible "Radio Blackouts" Investigated

"Army scientists at Fort Monmouth, N. J., have created a flashing column of 'plasma.' They are beaming radio signals through it to explore a communications problem that may plague inter-planetary space ships of the future.

"Plasma is difficult to produce in high concentrations on earth. It makes up 99.9% of the substance in the universe. It can distort and block radio waves - even cause a radio blackout that could isolate a space ship from communicating with civilization for extended periods.

"An eight-foot-tall condenser bank that delivers a 10,000,000 amp jolt of electricity that lasts for a millionth of a second is used to create high-concentration, high-temperature plasma for the experiments.

"The experiments not only give valuable information on communications phenomena, but also give new basic knowledge about the structure of plasma, and how it forms and decays." Page 7.

#### Soviets Oppose U.S. Satellite Frequency Plan

"The problem of allocating frequencies for global satellite communications, made a practical one by the advent of America's Telstar, has become another bone of contention between the United States and the Soviet Union.

"Both nations are trying to influence members of the International Telecommunications Union, the body which controls such matters, in favor of their respective and opposing plans.

"This 113-member body will meet in Geneva in the Fall of 1963 to take up the whole problem of determining satellite frequencies.

"The U.S. plan would set aside almost 3,000 MC for satellite communications. The Russians, who have not yet entered the space communications field, would allocate only 950 MC for this purpose.

"In devising their plan, the Soviets have included frequencies which 'accidentally' fall within bands presently used by U.S. military radar.

"World nations outside the Communist bloc have generally favored the U.S. proposal. Some, however, have questioned setting aside so much of the radio spectrum for this use.

"One reason for this is that the U.S. Defense Dept. is developing its own satellites. Some countries object to setting aside the 3,000 MC asked by the U.S. when part of it would be used by the U.S. military.

"Under the U.S. plan the following frequencies would be set aside: 3,700 to 4,200 and 5,925 to 8,400 MC. These bands would be shared with ground microwave systems, except for two small portions: 7,650 to 7,700 and 8,350 to 8,400 MC. The Soviets would set aside



the following bands: 3,550 to 3,650, 4,350 to 4,700 and 5,670 to 6,170 MC.

"U.S. and Soviet scientists agree on one thing: that there can be sharing of frequencies by communications satellites and ground microwave point-to-point radio and telephone systems. A radio-quiet area would be needed around the ground receiving stations for the satellites.

"International agreement is needed, however, to prevent frequencies assigned satellites from being used for such other purposes as high-powered radar and tropospheric scatter communications. Page 11.

#### Beacon Equation Put into Nomograph:

Under the title "#63 ECM Nomograph", Richard Lipnick, Lockheed Electronics Co., Plainfield, N.J., has put the beacon equation into a nomograph. The first two paragraphs of his article state:

"In the study of RFI problems, whether they be caused by electronic countermeasures or other sources, it is often necessary to compute received signal strength, signal-to-noise ratios, range ratios, etc. All are related by the general beacon equation.

"The beacon equation is not simple, and much time can be spent in rearranging terms and computing. Also, if a number of variables are varied to obtain a particular plot, the computational task can be very time consuming. Therefore, the beacon equation can be put to better use if an alignment chart or nomograph is used for the solution of problems." Page 115

#### ITEMS of INTEREST from ELECTRONIC DESIGN, SEPT. 13, 1962:

##### Boomerang

"A radiation belt created by the high-altitude U.S. nuclear test in July has damaged solar cells aboard most American satellites. Only Telstar, which orbits considerably above the man-made belt, had escaped damage. The new radiation has forced postponement of the launching of Anna, the geodetic flashing-light satellite. Scientists are confident that the radiation belt will disappear within a year." Page 13.

##### Noise

A 2-page article by Alice Mary Hilton which describes the different kinds of noise encountered in electronic phenomena such as Gaussian, Thermal, Shot, Rayleigh and Receiver Noise. Page 85.

#### Absorption and Transmission of Electromagnetic Waves

"Reduction of the reflection coefficient of dipole absorbers for oblique incidence of electro-magnetic waves is reported on. To complete the theory of reflection by the additional system of dipoles, the propagation of electro-magnetic waves in an artificial absorbing medium consisting of infinitely long parallel wires with small conductivity was studied. Measurements were made with centimeter waves, using a parallel-plate-transmission line to determine the equivalent propagation constants of the medium, by scanning the electric field with respect to amplitude and phase. Absorption and Transmission of Electromagnetic Waves, Phase H. Dipole-Resonance-Absorber for Wide Angles of Incidence, Göttingen University (Germany), Sept. 30, 1961, 47 pp. \$4.60. Order AD 271 615 from OTS, Washington 25, D.C." Page 120.

#### Space-Charge-Limited Diode Noise Phenomena

"Whinnery's approximate analysis of the high-frequency effects of the potential minimum on noise is developed in greater detail. Additional numerical computations are presented to evaluate the effects of several parameters. General agreement is found between these results and those of other approximate analyses and more exact Monte Carlo studies, although more detailed agreement, as in the case of the Tien dip, is not found. High Frequency Noise Phenomena in the Space-Charge-Limited Diode, Electronics Research Laboratory, University of California, Berkeley, Aug. 2, 1961, 27 pp, \$3.60. Order AD 272 659 from OTS, Washington 25, D.C." Page 122.

#### Bibliography of the Ionosphere

A Bibliography of the Ionosphere has been prepared by Laurence

A. Manning, Stanford University Press, Stanford, Calif., 613 Pages. Copies may be obtained from the Stanford University Press, for \$15.00.

#### ITEMS of INTEREST in ELECTRONICS, OCTOBER 12, 1962:

The following two items show how interference may influence the design of Navy ships and how the lack of interference is attracting radio facilities to Australia:

#### Reason: Too Many Hitches in Systems Integration

"Behind the proposal to set up the single Navy contracting agency are complaints about the lack of system integration in Navy weapon system development. One Navy official tells Electronics that serious problems in mating the Tartar, Terrier, and Talos anti-aircraft missile system with the vessels that carry them have raised modification costs and delayed their operational status. The problem, he says, stems from lack of planning coordination between BuShips, in charge of shipbuilding, BuWeps (and previously the now-defunct Bureau of Ordnance), responsible for the missile systems.

"The Polaris program avoided this sort of problem by combining development of the missile, its electronic systems and the submarines under a single office headed by Adm. Raborn. In effect, the new agency would extend the Polaris concept to all naval weapons development.

"An electronics industry source here claims that Navy's lack of system integration has had serious results. He charges that if all electronics systems on a major vessel were exercised at the same time, one system would knock out or interfere with others. He complains that the Navy thinks in terms of 'accommodating electronics equipment to a ship rather than of integrating the vessels into a system. 'Selecting shipyards, rather than electronic companies, to manage construction of missile tracking vessels is a typical deficiency, he says."

#### Another U.S. Radio Facility in Australia

"Melbourne - The number of U.S. radio facilities planned or installed in Australia continues to grow.

"The USAF has established its third communications research station at the RAAF base at Pearce, in southwestern Australia. Others are at Alice Springs and Laverton, near Melbourne.

"Jet Propulsion Laboratory is seeking a site for a deep space tracking station. The southwest corner, with its freedom from manmade radio interference, is the likeliest site.

"U.S. Navy and NASA are also planning new facilities."

#### ITEMS of INTEREST in PROCEEDINGS of IRE, OCT. 1962:

Page 2113, Intermodulation Noise in FM Troposcatter Links a letter by W. Sichak and R. T. Adams, Sichak Associates, Nutley, N.J. The first paragraph states: "The purpose of this note is to give an approximate formula for the intermodulation noise produced by tropospheric scattering."

Page 2121, Noise Measurements on Tunnel Diodes, D. C. Agouridis and K. M. van Vliet, Dept. of EE, Univ. of Minnesota, Minneapolis, Minn. The second paragraph states: "The present note will report noise spectra between 100 kc and 30 Mc on several diodes, for currents in the low-voltage positive-conductance region. . . ."

Page 2133, Demodulation Effect of an Envelope Detector at Low Signal-to-Noise Ratios, by Alex Grumet, Republic Aviation Corp., Farmingdale, L.I., N.Y. The first paragraph states: "An envelope detector suffers an effective loss of percentage modulation when the signal-to-noise ratio (SNR) approaches unity. The mechanism responsible is discussed, and the degradation of the percentage modulation is computed for different SNR. A method for partially correcting this condition is suggested."

Page 2135, Noise Figure for Negative Source Resistance,



by H.A. Haus, Res. Lab. of Electronics, M.I.T., Cambridge, Mass. The first paragraph states: "When parametric amplifiers and Esaki diode amplifiers are used as the first stage in a cascade of twoport amplifiers, it sometimes happens that the stage following such an amplifier 'looks' into a source impedance (the output impedance of the preceding stage) with a negative real part. For brevity, we shall call a twoport that exhibits an output impedance with a negative part 'negative resistance twoport'".

#### ITEMS of INTEREST from ELECTRONIC INDUSTRIES, NOVEMBER 1962:

Page 5, Spacecraft Radio Blackouts: "Spacecraft Radio Blackouts experienced by astronauts as they re-enter the atmosphere may be eliminated by a new high-power amplifier developed by Hughes Aircraft Co. The new TWT operates in a range between microwaves and light waves, producing a millimeter wave beam which combines many of the desirable properties of both microwaves and coherent light beams. Because of the high frequency, the tube can maintain continuous communications throughout the re-entry phase when the plasma sheath around the space vehicle completely silences ordinary radio."

Page 96, Radio Frequency Radiation Hazards, by O.M. Salati, A. Anne, and H.P. Schwan, University of Pennsylvania, Philadelphia, Pa. The subhead states:

"The presently known harmful effects of excessive radiation are strictly thermal in nature, and a rise in body temperature of 1° is taken as intolerable. In analyzing the amount of radiation that can be withstood, the considerations are the amount of heat that the human body can dissipate, the dosage rate and the length of time of exposure."

Page 219, International Electronic Sources: Signal Reception With Correlated Interference, V.F. Nesteruk, "Radiotek" 17, No. 6, 1962, 5pp. "Signal waveform is determined which will guarantee that the specified probability of correct detection will be exceeded in the case of normal mixed interference. An example of the Markoff-type interference is illustrated. (U.S.S.R.)"

Page 224, The Measurement of Small Signals in the Presence of Common Mode Interference, L.V. Mayhead, "Elec. Eng." July 1962, 3pp. "Article deals with the problems encountered when data processing equipment is required to measure signals of a few microvolts from strain gauges, thermocouples, etc. (England)"

Page 252, "Dimples" Blamed for Flying Saucer Reports: "Invisible dimples in the sky may have caused radar reports of flying saucers according to the Air Force. The Office of Scientific Research believe that the dimples may stem from the same process that creates some types of clouds."

"The dimples are concave and reflective, and set in undulating layers of the atmosphere at altitudes up to 6000 ft. Radar beams are reflected back to earth by the turbulent air, and give the appearance on a radarscope of an object moving swiftly across the sky. The Air Force said this apparently was what caused the unexplained radar sightings."

P.J. Harney of the Cambridge Research Laboratory at Bedford, Mass., developed the dimple theory from Weather Bureau and AF observations."

Page 264, RFI Engineers: "RFI engineers are gradually dropping the term RFI in favor of 'Electromagnetic Compatibility'. People active in the field feel that the latter term represents a more broad concept and more clearly defines their area of interest. The term RFI was dropped from the title of the 8th Armour Conference held in Chicago recently. This is one of the two major 'electromagnetic compatibility' meetings held each year."

#### THE OLD FARMER'S ALMANAC Brings up Some EMC QUESTIONS:

The 1963 Old Farmer's Almanac brings up some interesting questions on electromagnetic compatibility under the title "Geomagnetic Storms Ahead". Anybody interested in what lies ahead for EMC as a result of geomagnetic storms should turn to page 49.

#### ANALOG Discusses "INTELLIGENT NOISE":

ANALOG - Science Fact-Science Fiction, for December

1962, contains an article by Alfred Pfanstiehl on "Intelligent Noise". The sub-head states:

"No matter what the technical definition of 'noise' may be, the practical fact is that any messages that you can not interpret is noise to you. But when it looks like noise, sounds like noise, acts like noise, and can't be recognized as a message....that's the latest technique in telecommunications!"

Other approaches to conservation of our radio frequency spectrum besides PRNG are discussed.

#### FIELD-INTENSITY METERS for MICROWAVE SPECTRUM-SIGNATURE COLLECTION

Electronic Design, November 8, 1962, carries an article under the above title by O. Dudley Stewart, NANEP, Patuxent River, Md. The sub-titles states:

"The requirements of the MIL-STD-449A spectrum-signature collection plan have intensified interest in RIFI meters. O.D. Stewart surveys the meters in the 400-Mc to 12-Gc range, based on many years of experience evaluating such equipment at NANEP. A future article will survey RIFI meters in the range below 400 Mc."

#### BUDOCKS RESEARCH SUPPORTS DESIGN ENGINEERS:

Under the above title, Comdr. Edward M. Saunders, manager of the Atomic Energy In Applied Science branch of BuDocks, has written an article in the October 1962 issue of the Naval Civil Engineer. He states: "Today's sensitive radio receivers and radio telescopes do not function if exposed to electromagnetic noise from switches, gears, electronic test equipment and the like. Investigation on development of construction techniques planned in specifications for shielded enclosures is underway at the Naval Civil Engineering Laboratory at Port Hueneme, California."

#### NEW RELIABILITY-SCREENING TECHNIQUE for RESISTORS:

Corning Glass Works, 3900 Electronics Drive, Raleigh, N.C., has prepared a 4-page folder on the reasons for resistor noise/performance relationships of metal-oxide film resistors. Extracts from the folder are as follows:

"Why is a quiet resistor quiet?"

"Why is a noisy one noisy?"

"Why are there variations in noise within styles of resistors?"

"There were lots more questions than we had answers when we started a program to define the anatomy of current noise in tin-oxide film resistors."

"We began by checking noise mavericks visually and by electrical test for construction differences."

"We quickly learned that there were unexplained variations in the current noise indices exhibited by apparently identical resistors."

"Microscopic examination of noisier units showed that physical deformities were responsible for excessive noise in these samples."

"In the noisiest resistors, we found such defects as a chip in the current path, Figure 1; a scratch, Figure 2, or a bridge between paths, Figure 3; plus seven more defect modes."

"The defects found by our noise tests - scratches, film porosity, checks in the substrate glass, wide chips, excessive cap-film contact resistance, ragged path edges, bridges, foreign matter bridging cuts - are the kind most likely to affect resistor performance."

#### ULTRASONICS AND THE FCC:

Louis M. Manning, Technical Research Division of the FCC, Washington, D.C., presented a paper with the above title at the Annual Membership Meeting of the Ultrasonic Manufacturers Association at the Hotel Statler Hilton, New York City, on June 12, 1962. Extracts from Mr. Manning's paper are as follows:

"... The ultrasonic energy used in your machines comes from electrical power which is first converted into radio frequency energy. Most of this radio frequency energy is then converted into ultrasonic energy. However, some of the RF energy squirts out of its enclosure or leaks back into the power line and is radiated into the surrounding space where it may cause interference to airline radio navigation facilities, and to radio communications in general. RF generators in



the ultrasonic machine and the side effects of this RF energy are the prime concern of the Commission."

"Since operation of RF energized ultrasonic equipment may interfere with interstate communications, it might appear that a radio station license would be needed. However, if the radio emissions of ultrasonic machines can be kept within certain limits so that there is no interference to other radio users and if there is no interstate transmission, licensing by the FCC is obviated....."

"Type approval for ultrasonic equipment may be requested by a manufacturer proposing to make five or more units. In this procedure, the manufacturer sends a prototype equipment to the Commission's Laboratory at Laurel, Maryland for testing. If the Laboratory finds that emissions from the equipments are within the permissible limits, and that the construction is such that the machine can reasonably be expected to continue to comply with these limits under the conditions of normal operation and maintenance, an FCC type approval number is assigned and the manufacturer is authorized to display this number on subsequent production units and so indicate that they have been type approved. Type approval is granted on the basis that production units will be exactly like the prototype and will exhibit the same emission characteristics."

Copies of the paper may be obtained by writing to Ultrasonic Manufacturers Association, Inc., 271 North Avenue, New Rochelle, New York.

#### FREQUENCY-SELECTIVE LIMITERS REDUCE INTERFERENCE and JAMMING:

The September, 1962, issue of Micro Waves has an article with the above title. The first three paragraphs are:

"More versatile RFI suppression in communication and radar receivers is made possible through newly developed frequency-selective limiters such as the WJ-519.

"These devices will limit any signal within their bands despite the presence of other inputs in the band. The limiters thus respond discretely to the power level of each simultaneous input signal, rather than to the total input power. A large saturating signal in the pass-band will not suppress a small signal separated by a few megacycles.

"The WJ-519, made by Watkins-Johnson, Palo Alto, Calif., operates in C band with a limiting threshold of 1 mw. Below this threshold, the unit behaves as a bandpass filter with an insertion loss of about 1 db and a 3-db bandwidth of 500 Mc. Its center frequency, fixed by an integral permanent magnet, can be set anywhere between 4.5 and 6.5 Gc."

#### POSSIBLE RF DETONATING of SQUIBS:

Scientific Ballooning, July 1962, carried the following item:

##### Stratoscope II

"The fourth test flight of the Princeton University Observatory's Stratoscope II system, launched on 2 July from Hope, Arkansas, ended prematurely after approximately 25 minutes of flight when cut-down squibs fired, releasing the parachutes and payloads from the balloon. The system carried a dummy payload, of about 9,100 pounds, including ballast, and had a gross lift of about 14,000 pounds. This compared with a payload weight for its previous test flight of about 8,132 pounds and a gross lift of about 12,150 pounds.

"The accidental activation of the cut-down squibs is believed to be due either to a malfunction of the balloon-borne control package or to a spurious signal. To observers on the ground, the system appeared to be functioning well; the additional payload weight apparently had no effect on performance. The system had reached an altitude of between 18,000 and 20,000 feet at the time of cut-down. At this height, the system is under its greatest amount of stress. The balloon was not destroyed, however, and probably turned upside down, continuing to rise to about 60,000 or 70,000 feet before bursting."

#### PRACTICAL DESIGN GUIDES for INTERFERENCE REDUCTION in ELECTRONIC EQUIPMENT

Copies of the above paper by Rocco F. Ficcki, at the 4th Annual Symposium of PGREFI, are available by writing to the author at 25 Upland Way, Haddonfield, New Jersey. The paper contains 31 pages

of text and 14 figures and diagrams. It is suggested, by your editor, that requests be accompanied by 20¢ in postage as Mr. Ficcki is making these copies available personally.

#### MODULATION TECHNIQUE COMBATS IMPULSE NOISE:

Electronics, Sept. 21, 1962, has a 2-page article under the above title. The first two paragraphs are as follows:

"Swept-frequency modulation can reduce impulse noise effects on communications systems. The technique can be used singly or with other methods for combating noise, and it can be applied to a variety of communications systems. The concept of swept-frequency modulation (SFM) was reported by J. C. Dute, Institute of Science and Technology, University of Michigan, where it is being investigated under Air Force contract.

"SFM does not require additional average power or increased bandwidth, although there is a fixed time delay. The effect of the technique is to spread the energy of impulse noise over a longer time. In the laboratory SFM system, an optical matched filter that can integrate over long periods of time is used to recover the original signal."

#### INTERNAL IONIZATION and RF MEASUREMENTS ON POWER and INSTRUMENT TRANSFORMERS

The 19th annual meeting of CIGRE (International Conference on Large Electric Systems) May, 1962, was presented with Report 111 - Internal Ionization and Radio Interference Measurements on Power and Instrument Transformers. A brief description of the contents of the Report is as follows:

"Measurements on insulating oil show that the breakdown strength does not depend on the type of electrode (bare or coated). The influence of gas in the oil was also investigated and the results are evident in figures 1, 2, 3, and 4. Tests with artificial faults are presented, the influence of variations in the measuring circuit is evaluated, and corona detection experience in transformers is outlined."

#### PGAP NEWSLETTER COMMENTS ON SUGAR GROVE:

The following comments on Sugar Grove appeared in the August 1962 issue of the Newsletter of the Professional Group on Antennas and Propagation:

##### 600 Foot Dish Cancelled

It was sad to read of the cancellation, due to rocketing cost, of the 600-foot parabolic dish under construction at Sugar Grove, W. Va. This big dish would have enhanced U.S. scientific prestige, would have been most useful in a variety of deep space exercises, and was to demonstrate a new technique: adjustable surface panels under closed loop control.

#### EVALUATION OF TRANSISTOR LOW FREQUENCY NOISE CHARACTERISTICS:

The Semi-Conductor Division of Sperry Rand Corporation, Norwalk, Connecticut, has brought out Technical Application Bulletin No. 2110 under the above title. The first paragraph states:

A large number of present day applications for low noise amplifying devices fall into the "less than one hundred cps" portion of the frequency band. Unfortunately, most transistor specifications (including the standard EIA noise specification) provide no information in this range. The usual noise specification is a measure of noise figure in decibels at a center frequency of 1Kc, with an effective noise bandwidth of 1 cps and with a 1K source impedance. For the design engineer concerned with low noise D. C. amplifiers, operational or differential amplifiers for microvolt signals, this type of specification is virtually useless. This becomes obvious on examining Figure 1. No reliable correlation exists between noise measured in the flat portion of the noise-frequency spectrum and noise generated by the transistor in the low



frequency or 1/f portion of the spectrum.

#### CONTRACT for ENVIRONMENTAL FILE on EMC:

Electronic Industries, August 1962, carries the following news item: "An environmental file which will enable the military services to study, predict and recommend solutions to the growing problem of compatibility of combat electronic equipment, will be compiled by Bell Aerosystems Co., Buffalo New York. Types of information, known as environment file data to be gathered by Bell engineers under the Army contract includes data about geographical locations, terrain characteristics, atmospheric effects, schedules of operation, antenna orientations and operating frequencies."

#### PAPERS on RF SHIELDING and GASKETING AVAILABLE:

The following papers are available from O.P. Schreiber, author, Technical Wire Prod., Inc., 129 Dermody St., Cranford, N.J., "Some Useful Analogies for RF Shielding and Gasketing" - No. RF-17 "Radio Frequency Interference Control Using RF Gaskets" - No. RF-18

#### PAPERS AVAILABLE on EMC in WEAPON SYSTEMS:

The following papers are available from Genistron, Inc., 6320 W. Arizona Circle, Los Angeles 45, Calif.: AIEE Paper No. CP 62-1132 - "Electromagnetic Compatibility in Weapon Systems" - by Fred J. Nichols and James C. Senn "Management Responsibility in Obtaining an Electrical/Electronic Compatible Weapon System" - by Fred J. Nichols.

#### INFORMATION About the U.S. RADIATION BELT:

Electronic Design, November 8, 1962

Electronic Design, November 8, 1962, has this to say on page 13: "Ominous Hiss - The core of a radiation belt created by the U.S. High-altitude nuclear blast last July is so intense it is causing an audible hiss in ground radio receivers at frequencies between 18 and 210 Mc."

#### LUNAR RADIO COMMUNICATIONS:

Signal, November 1962, has the following material provided by the Office of Technical Information, National Bureau of Standards. The first paragraph states:

"When space travel becomes a reality and man lands on the moon, one of his first needs will be for reliable communication means. Factors affecting point-to-point communications on the moon are being studied at the National Bureau of Standards by L.E. Vogler of the NBS Central Radio Propagation Laboratory, Boulder, Colorado. The Jet Propulsion Laboratory is sponsoring this study, which has predicted that a 16-watt input to a wave antenna at ground level on the moon could be used to maintain reliable lowgrade radio telephony communication over 100-km distances on the moon's surface."

The following paragraph is titled: "Signal-to-Noise Ratio" and is as follows:

"Reception of radio signals is hampered by noise along with the signal. Man-made interference will be almost absent from the moon, but reception will be limited by signal loss in the antenna circuit and masking by noise originating in the receiver and external sources. The external noise will consist of galactic, solar, and earth noise as well, possibly, as some noise from the surface of the moon. In this phase of the study the signal level needed at the receiver to obtain an acceptable signal-to-noise ratio was evaluated, based on the level of noise expected to be present."

#### TROUBLES OF PIONEER RFI GROUP DISCUSSED:

The troubles which Tobe Deutschmann's RFI pioneering group, as far back as 1929, had in trying to get recognition of RFI problems in the Armed Services are discussed by S. W. Metcalf, Stoughton, Mass., a member of that group. His discussion appears as a letter to Electronic Design, November 8, 1962 starting on page 56.

#### USE of BURIED ANTENNAS to REDUCE MAN-MADE INTERFERENCE

The October/November 1962 issue of Ground Support Equipment has an article titled "Earth Probe Antennas" by P.E. Martin and A.W. Straiton, Electrical Engineering Research Laboratory, Univ. of Texas. The first paragraph states:

The use of earth probes as antennas for VLF reception may seem a paradox because of the vertically polarized nature of the transmissions. However, experimental comparisons of an earth probe antenna with two overhead wire systems indicate that the earth probe system may be successfully used for detection of stations in the 10 to 20 kc range with signal-to-noise ratios superior to those of the overhead systems. Background sferic radiation from 50 cps to 20 kcps also appears on the earth probes, but with some reduction of man-made interference, such as 60 cps from power lines."

#### INTERFERENCE STILL a THREAT to ASTRONAUTS:

TIME, November 9, 1962 has the following to say about the interference problems of astronauts:

"Experience in the actual navigation of spacecraft right from the cockpit is almost nonexistent at present. The Mercury capsule, which has made three orbital flights, is largely controlled from the ground. Mercury astronauts can partially shut off ground control by flipping switches; they are, in fact, told to do so in order to eliminate the remote possibility that a stray electronic impulse (or an enemy-sent signal) might fire their retrorockets prematurely. But eventually they must flip that vital switch back on again. Only a signal sent from the ground at the proper instant can bring them safely down."

#### LASERS ALSO NEED OPTICAL INTERFERENCE FILTERS:

Space/Aeronautics, November 1962, page 66, Part 2 has the following about lasers:

"The laser is analogous to radio's from end -

"The laser is a frequency-selective, low-noise optical amplifier analogous to the low-noise RF front end of a radio receiver. As in laser oscillators, only those discrete frequencies that correspond to the available laser materials have shown laser action. Filtering (with optical interference filters) is relatively simple."

#### COOLED DIODE CUTS NOISE in PARAMETRIC AMPLIFIER:

Electronics, October 26, 1962, page 66, carries a two-column item under the above title. The first three paragraphs are:

"Noise figure of a parametric amplifier is comparable to the noise figure of maser amplifiers engineered for systems applications. A commercially available gallium-arsenide varactor diode operating at liquid-helium temperature is used in the L-band amplifier."

"The amplifier resulted from a discovery about varactor diode behavior at very low temperatures made at MIT's Lincoln Laboratory. The research is jointly sponsored by the U.S. Army, Navy and Air Force."

"The amplifier being tested operates at 1,300 Mc and uses a 13.5-Gc pump. However, comparable operation is believed possible at signal frequencies up to at least 15 Gc. In practice, receiver noise temperature (including circulator) of about 20 degrees K appear possible. Gain and bandwidth of the amplifier are essentially independent of temperature."

#### POST OFFICE DEPARTMENT Warns About MAGNETIC RAD HAZ:

United States Post Office, Boston 9, Mass., October 15, 1962 -

"Dear Patron:

"Military authorities report that some shipments of magnetic materials for military installations, bearing cautionary labels to keep at a distance from compass sensing devices, have been sent by air-mail."

"Permanent Magnetic Materials with unconfined fields are prohibited in airmail under Section 125. 8b, Postal Manual."

"We would appreciate your bringing this matter to the attention of your mailing department. Very truly yours,  
Ephraim Martin  
Postmaster"



The following information may be of interest to those shipping magnetic materials:-

Protecting Magnetic Tape against Accidental Erasure:

Space/Aeronautics, October 1962, page 185, has the following information under the above title:

"Normal external magnetic forces have little change of accidentally erasing magnetic tape signals. Unfortunately, abnormally high magnetic forces exist, too, and these can neatly clean a tape unless special precautions are taken.

"Minnesota Mining & Manufacturing's Magnetic Products Division reports that three inches of bulk spacing is enough to protect tapes against most abnormally high magnetic forces that might occur during shipment or storage. This spacing was determined in tests of the demagnetizing effect on a recorded tape of a 1500-oersted, 60-cycle magnetic source. A tape with a recording of a zero-level, 15-mil+ wavelength signal and a standard bulk degausser were used.

"Extensive tests of accidental erasure of high-frequency data (0.6 mils wavelength) by JPL show that, even with intimate erase-heat to tape contact, there is no discernible erasure of short wavelengths until 50 oersteds are reached. Between 75 and 100 oersteds are needed for three-decibel erasure, and you even have a fair chance of recovering data from tapes exposed to homogeneous fields of 150-200 oersteds.

"An unshielded fiber-board tape reel case, though normally not considered as protection, actually supplies a small amount of protection by virtue of the spacing created by its own thickness and the air space between the tape and the case. Often, this is enough. If fields of 200 oersteds or more are expected, however, or if the least amount of erasure could damage the recorded information, shipping containers should be used.

"Steel containers are better than aluminum ones, Magnetic Products reports. While the steel does not actually prevent the incidence of an external field, it 'shunts' the flux lines safely away from the tape. This reduces the field's erasing power by changing the geometry of the flux pattern. How well it accomplishes this depends (among other things) on the thickness and permeability of the container material and on the strength of the field. A really high external field can be strong enough to saturate even a steel case and cause an abrupt loss of shielding."

(A chart in this article is not reproduced)

UHF HELICAL-LINE ROTARY JOINT:

The following letter was received from Luis L. Oh, author of an article, under the above title, in the November 1962 issue of Micro-waves:

"This rotary joint was designed for high peak power and long life operation. It is true this joint also eliminates spurious electromagnetic energy, however, this was not the primary design objective. I should point out that the helical-line rotary joint is suitable only in the VHF and UHF range. For applications below 50 mc the joint would be too bulky and above 5 kmc it would be too small for high power application. I think the helical-line rotary joint would be advantageous for use in the low-noise VHF/UHF systems where spurious electromagnetic energy will deteriorate the performance of the system.

"Two of my articles on non-contacting switches, entitled, "High Speed Microwave Switch" and "Zigzag-Line Couplers Transfer Microwave Power", published in the July 7, and July 14, 1961 issues of the Electronics might be of interest to you.

"I am sorry to say that neither the helical-line rotary joint nor the non-contacting switches are available commercially. For further information, please contact: M. T. Palmer, Orgn. 1-2700, Boeing Associated Products, The Boeing Company, Seattle, Washington."

SPACE/AERONAUTICS To REPRINT SERIES OF ARTICLES On ELECTROMAGNETIC COMPATIBILITY

Space/Aeronautics informed your editor that the series of three articles on electromagnetic compatibility will be reprinted. However, it is not yet possible to set a price.

PGRFI PUBLICATIONS STILL AVAILABLE:

The following PGRFI publications are still available through Headquarters, IRE, 1 East 79 St., New York 21, New York:

PGRFI Transactions

	Members	Colleges	Others
RFI-1 #1 May 1959	\$2.25	\$3.25	\$4.50
RFI-2 #1 May 1960	"	"	"
RFI-3 #1 May 1961	"	"	"
RFI-4 #1 Feb. 1962	5.00	7.50	10.00
(Note: This is the PGRFI Bibliography)			
RFI-4 #2 May 1962	2.25	3.25	4.50
RFI-4 #3 Oct. 1962	"	"	"

3rd and 4th Symposiums

There are some copies of the 3rd, Washington, D. C., and 4th, San Francisco, Symposium still available. (Offer \$2.00 each and see what happens).

BELL AEROSYSTEMS RFI PAPERS AVAILABLE:

Bell Aerosystems Company, P. O. Box 5894, Tucson, Arizona, has printed copies of the four papers which they presented at the 7th Conference on RFI, in Chicago, November 1961. Interested persons should write to the above address, attention Mr. J. L. Dunn. The papers are entitled:

"A Facility for the Investigation of Radio-Interference Problems"

"Engineering Aspects of the EMTF Interference Prediction Model"

"The Computer Approach to the Interference Prediction Model of the Electromagnetic Environmental Test Facility"

"A Digital Representation of Interference within a Communication Receiver Including the Demodulation Process"

NEW PUBLICATION BY NATIONAL BUREAU OF STANDARDS:

Announcement of a new publication has been made by the National Bureau of Standards as follows:

"Required Signal-to-Noise Ratios, RF Signal Power, and Bandwidth for Multichannel Radio Communications Systems," by E. F. Florman and J. J. Tary, National Bureau of Standards Technical Note 100, issued January 1962, 182 pages, \$1.00. (Order from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.)

TUTORIAL DATA AVAILABLE ON ELECTRICAL CONTACTS:

The Gibson Electric Sales Corporation has two tutorial papers on electrical contacts by C. B. Gwyn, Jr., Special Projects Engineer titled: "Let's Take Some of the Mystery Elements Out of Electrical Contacts" and "How to Use Examples for the Attached Contact Diameter-Ampere Rating Chart". Copies may be obtained by writing to Robert R. Stone, Executive, Vice-President, Old Wm. Penn Highway, Delmont, Pa.

WHAT IS EM SIMULATION?:

White Electromagnetics, Inc., 4903 Auburn Avenue, Bethesda 14, Maryland, in its Technical Bulletin, Volume 2, Number 4, discusses Electromagnetic Environmental Simulation with a sub-title "What is EM Simulation?".

Some Notes on 8th Armour Conference:

Total attendance 576.

Attendance list will not be published as in the past.



EMC engineers need more "hard" facts with which to sell management. These are usually considered Company Confidential, when available, but an attempt will be made to assemble some by next year.

#### FILTRON FORMS "TURN-KEY" SHIELDED ENCLOSURES DIVISION:

Filtron Co., Inc. 131-15 Fowler Ave., Flushing 55, L.I., New York, has formed a new division known as FIL-SHIELD. It will provide complete single "turn-key" responsibility for designing, constructing, testing and certification of all kinds of shielded enclosures and structures. Douglas B. Barker, architectural engineer, has been appointed Marketing Manager of this new division.

#### SERIES OF ARTICLES ON SOLDERING AND RELIABILITY:

Howard H. Manko, Director, Solder Research and Development, Alpha Metals, Inc. 56 Water St., Jersey City 4, N.J., has gathered together three articles, which he authored, in Product Engineering and made them available in a reprint, cost \$1.00. The titles of the articles are: "How to Choose the Right Solder Flux"; "How to Choose the Right Soft Solder Alloy", and "How to Design the Soldered Electrical Connection" Mr. Manko is authoring a book on this subject for McGraw Hill which will appear in about a year.

#### FCC SHUTS PLANT AS AIRCRAFT PERIL

The New York Times, Thursday, November 22, 1962, carried the following article; excerpts are as follows:

The Federal Communications Commission announced here yesterday it had obtained a court order restraining a plastics products manufacturer from using electronic equipment that interfered with aviation radio signals used for navigation.

William L. Kiser, engineer in charge of the FCC's New York office, said that there were more than 400 such plants in the New York metropolitan area and an estimated total of 4,000 machines that were a potential source of radio interference.

The FCC engineer called on the manufacturers to cooperate with the commission by having competent engineers certify that their plants were being operated in compliance with FCC rules on electronic industrial equipment.

The commission noted that pilots relied on radio signals to guide them to airports and runways during poor visibility and bad weather.

Mr. Kiser said that radio signals produced by improperly shielded plastics manufacturing machines, which use radio-frequency energy as a heating source, could cause spurious indications on an aircraft's instrument panel.

The engineer said that interference was worse here than in other areas of the country because of the combination of heavy air traffic over New York and a large amount of "soft plastics" manufacturing.

The electronic heating machines are used to seal and fabricate vinyl products, such as rainwear, shower curtains and pocketbooks.

The shielding requirement of the FCC to guard against the electronic transmissions includes the building of a protective screen around the machines.

Mr. Kiser said his office was able to obtain a court restraining order in an hour's time after the detection of interfering signals.

#### NEW PRODUCTS:

##### Stoddart Brings Out New NM-22A:

The Stoddart Aircraft Radio Co., Inc., 6644 Santa Monica Blvd., Hollywood 38, Calif., has brought out the new NM-22A (150 kc to 32 mc). The characteristics of the above instrument are described, in part, in the Stoddart literature as follows:

"The ALL-NEW STODDART NM-22A (150 kc to 32 mc)

Radio Interference-Field Intensity Measuring Equipment incorporates the advanced requirements and thinking of Government and Industry for RAPID, EFFECTIVE, ECONOMIC and RELIABLE RFI Measurements and Data Presentation for use in electromagnetic compatibility analysis. Measurement workloads are greatly reduced by Automatic Data Recording techniques. These techniques relieve the time and cost burden of measurement services. Better presentation of measurement reports is realized by a continuous graph of frequency vs. amplitude."

"The NM-22A is a dual purpose instrument. It operates as a sensitive, calibrated, special purpose receiver and as a frequency selective, two-terminal microvoltmeter tunable over the 150 kc to 32 mc spectrum."

#### New Epoxy Precision Hand Dispenser:

The Kenics Corp., Box 27, Greenwood Station, Wakefield, Mass. has produced a precision hand dispenser for its conductive silver epoxy. For cold soldering applications, its two "Epoxyer" precision hand dispensers will flow their two liquid epoxies through a 0.20 size needle for the entire pot life of the material. Absolute positive cut-off is guaranteed with no drip.

#### New Densimeter for Measuring Radiated Energy:

Ramcor Incorporated, 190 Duffy Avenue, Hicksville, L.I., N.Y., has developed a small hand-held instrument that provides a simple, positive means of detecting and measuring the amounts of VHF, UHF and microwave energy radiating from high power transmitters and related equipment. Battery operating life in excess of 50 hours.

#### New High-Noise Area Microphone:

Shure Bros., Inc., 222 Hartrey Ave., Evanston, Ill., has developed a microphone called Model 488 Sono-Bar for mobile and fixed station use in areas of high-volume background noise. It has a patented "control reluctance" cartridge for high speech intelligibility and noise discrimination.

#### Metallic Foams for Shielding Purposes:

Emerson & Cuming, Inc., Canton, Mass., is developing a series of new metallic foams for various electronic applications. Eccofoam MD-CU, a copper foam, is an open mesh copper foam which will permit the passage of air and will effectively provide over 100 db of insertion loss from 200 kc to 24 kmc. A Ferrite Foam, Eccofoam FE, can be used in attenuators. Preliminary technical data is available.

#### Twisted Wires to Reduce Interference Becoming Available:

Brand-Rex Division, American Enka Corporation, 31 Sudbury Rd, Concord, Mass., is experimenting with custom twisting of wire to replace shielded wires in several EDP uses. Uniform twist and minimum separation between the conductors is maintained by bonding. Excellent interference-free transmission of signals has been accomplished in the lower frequencies.

#### New Alloy Solves Brazing Problems:

Electronics, November 9, 1962, page 84 has almost a column under the above title. The first two paragraphs state:

"Furnace brazing of electronic components that require extremely low dew point atmospheres presents many metallurgical and furnace control problems. Such problems have been eliminated by an unusual approach. Instead of experiments in controlling furnace atmosphere to enhance the brazability of an existing alloy, a special alloy has been developed that can be brazed in higher dew point atmospheres.

"According to Huntington Alloys' J. L. Shaw and C. L. Ramsey, difficulty in making successive brazes of certain nickel-copper and copper-nickel alloys during the manufacture of large power tubes of the klystron and magnetron types led to the development of the alloy, tailored specifically for the electronics industry."

#### NOTE:

Two questions involving the PGRFI Newsletter came up at the Administrative Committee meeting in Chicago at the time of the 8th Tri-Service Conference.

The first was relative to publishing a list of qualified laboratories in the Newsletter. The original idea was to help members of PGRFI know where rfi consulting and acceptance testing facilities could be obtained. The original response was most gratifying but subsequent



correspondence with many of the laboratories has revealed that "in-house" work would take priority and that qualified engineering personnel was in a more or less fluid state. As a result, it was decided to postpone publishing such a list in the Newsletter until such time as the government could come up with some standards by which such laboratories could be rated.

The second dealt with the place of the PGRFI Newsletter in the new IEEE organization. It was felt that the scope of the Newsletter would have to be expanded to take in the new interests from AIEE and that plans should be made to more or less departmentalize the news so that all interests would find material of value. Your editor, therefore, is sending out a frantic appeal to all members of PGRFI for volunteers

who would like to head up special sections and feed in news items of interest to others in their specialty. Your name will head your specialty whenever you have something to report.

L. V. Berkner writes, in the November 1962 issue of the Proceedings of the IRE, page 2180: "The explosive enlargement of electronics into every realm of human activity is the major technological innovation of our time." The Newsletter to keep pace, has also exploded into every realm of human activity and will welcome pertinent news items from anybody - no matter how far off.

Rexford Daniels, Editor, PGRFI Newsletter, Monument Street, Concord, Massachusetts.