

NEWSLETTER

Contents

DEVELOPMENT OF PCI BUS BASED PC ADD-ON CARDS FOR WAVEFORM ANALYSIS & VIDEO IMAGE CAPTURE

V.M. Joshi, S.R. More, P.D. Motiwala, Alok Agashe, S.K. Lalwani,
T.S. A. Krishnan and S.K. Kataria
Electronics Division

The most valuable feature offered by IBM compatible Personal Computer (PC) since its introduction is an "Open architecture". This feature allowed the designers to configure plug-in boards which could be installed right into the PC for realisation of advanced but cost effective computer based instrumentation systems. However, the plug-in boards had to conform to the "bus architecture" stipulated by the PC manufacturers. In earlier PCs, Industry Standard Architecture (abbreviated as ISA) bus was provided on the PC motherboard for interfacing application specific hardware with the host computer. However, with the increase in CPU speed and increasing demands from users of PC based instrumentation, limitations of ISA bus became a serious bottleneck. After a series of upgradations and innovations, the Peripheral Component Interconnect bus (popularly known as PCI bus) has been introduced. It enables extremely high speed data transfer between the plug in boards and the host memory and also provides many other useful features. PCI bus has now gained wide acceptance and it is expected to remain an accepted standard for at least a few more years to come. The PCI-SIG (PCI Special Interest

1. Development of PCI bus based PC add-on cards for waveform analysis & video image capture 1
2. FOTIA : a new ion beam accelerator commissioned 8
3. Dr M.S. Swaminathan visits BARC 9
4. BARC helps cyclone hit farmers of Orissa 10
5. 22nd RCA meeting of national representatives 10
6. National Safety Day observed 12
7. Course on quality management and assurance 12
8. Workshop on advanced application of radio tracers 13
9. BARC Hospital anniversary day celebrated 14
10. Women's day at BARC 15
11. BARC scientist honoured 16

Group) has given very careful considerations to requirements such as data width, throughput rate, processor independence, plug and play facility, scope for expansion and others before proposing the PCI bus standard

Some of the major advantages offered by PCI bus are

- i) *Extremely high-speed data transfer* 32-bit wide data transfer @ 33 MHz gives a maximum throughput of 132 Mega bytes per second Data transfer @ 66 MHz with 64 bit wide data is now being offered
- ii) *Plug and play facility* This circumvents the need for an explicit 'address' for a plug in board A PCI board inserted in any PCI slot is automatically detected and the required I/O and memory resources are allotted by the system Thus, there is no risk of clash of resources
- iii) *New approach* It moves peripherals off the I/O bus and places them closer to the system processor bus, thereby providing faster data transfer between the processor and peripherals
- iv) *Processor independence* The PCI local bus fulfills the need for a local bus standard that is not directly dependent on the speed and structure of the processor bus, and that is both reliable and expandable It is for the first time in PC industry that a common bus, independent of microprocessor and manufacturer, has been adopted
- v) *Full multi-master capability* This allows any PCI master to communicate directly with other PCI master/slave
- vi) *Parity on both data and address lines* This allows implementation of robust system
- vii) Support for both 5V and 3.3 V operated logic

- viii) Forward and backward compatibility between 66 MHz and 33 MHz PCI

Development of PCI Bus Compatible Cards

In order to meet the need of very high speed PC based instrumentation systems, Electronics Division has planned to develop a variety of PCI compatible boards as a part of IXth five-year Plan proposal Ultrasonic Instrumentation Section of Electronics Division has successfully developed PCI bus based cards suitable for

- i) Acquisition of fast repetitive and non-repetitive electrical signals at sampling rates of 100 Million Samples Per Second (MSPS)
- ii) Capturing video images for further processing/analysis

Technical specifications, hardware features and potential applications of these boards have been outlined in this article

1. Dual Channel 100 MSPS Transient/ Repetitive Waveform Digitizer

Capture and analysis of fast electrical signals (repetitive or non-repetitive types) is necessary in various scientific and industrial applications Analog storage oscilloscopes (based on storage CRTs, scan converter tubes or CCDs) have been the initial instruments used in such requirements Today, with the availability of high speed ADCs (with sampling speeds ranging from 50 to 1000 MSPS), direct digitization followed by storage and analysis is a far superior approach It may be noted that in PC based digitizers, the data transfer rate between the digitizer (card) and the host memory also becomes a major consideration because the on board memory (i.e., the record length) is always limited The PCI bus

based Digitizer Board developed at Ultrasonic Instrumentation Section allows simultaneous capture of two electrical signals (repetitive or non-repetitive) at a highest sampling rate of 100 MSPS on each channel. Features such as pre and post trigger, programmable gain and offset, selectable sampling rate and others, offer flexibility and permit optimal data acquisition. The control and display

software for this digitizer card has been developed under Lab Windows (cvi) platform. A highly noteworthy feature of this board is its ability to display the acquired signal waveforms along with their amplitude spectra (computed using FFT technique) in near real time. Thus the board serves both as an oscilloscope as well as a spectrum analyzer.

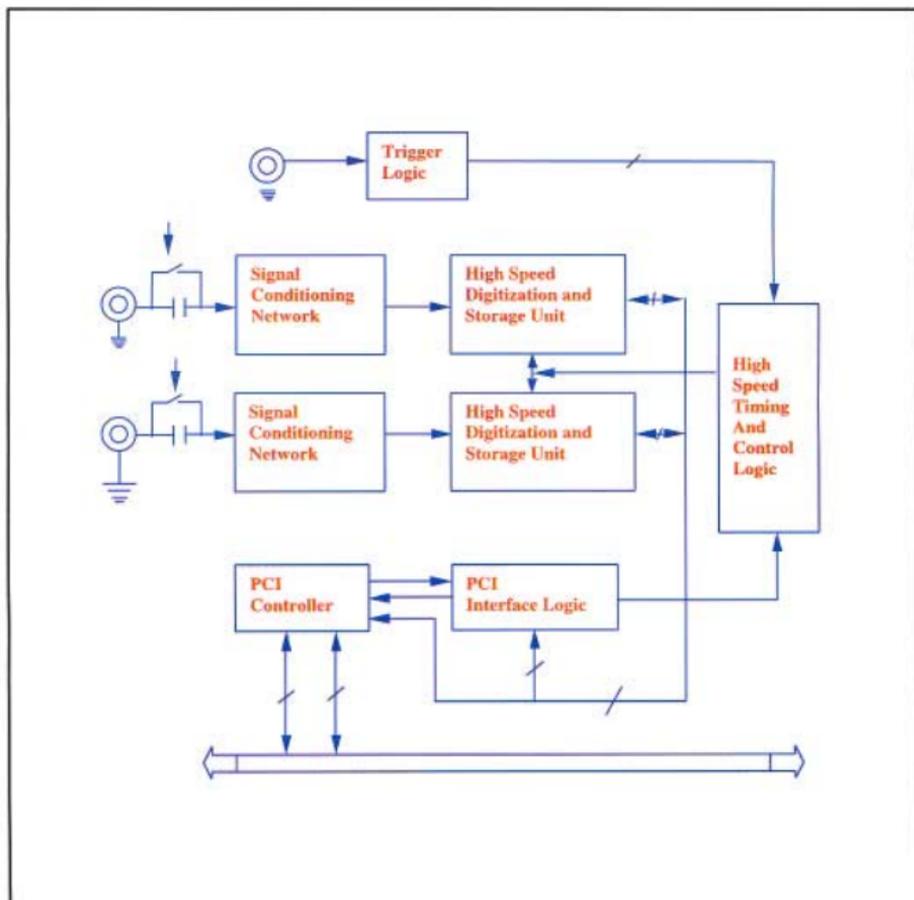


Fig.1 Functional block diagram of PCI bus based dual channel 100 MSPS waveform digitizer.

SALIENT TECHNICAL FEATURES

Data Acquisition

Digitizer Section

Sampling rate	:	100, 50, 25, 12.5, 6.25, 3.125, 1.56 MSPS and 781 KSPS (User selectable)
Resolution	:	8 bits
Record length	:	64 K samples/channel

Analog Input

Input voltage	:	Channel A d	:	± 100 mV to ± 5 V in standard 1, 2, 5 sequence
		Channel B	:	± 100 mV and ± 1 V
3dB B/W				50 MHz (each channel)

Trigger Features

Source

External	:	TTL compatible - level triggering
Internal	:	User selectable threshold over the entire input range

Mode

Pre or post trigger delay	:	0 to full record length (user programmable)
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Acquisition Modes

Continuous	:	Suitable for acquisition of periodic/repetitive signals
Single shot	:	Suitable for acquisition of transient signals
Multiple acq.	:	Suitable for statistical analysis of triggered events
Envelope	:	Suitable for analysis of jitter in signals
Averaging	:	Running average up to 256 waveforms for SNR improvement

Display

Screen	:	User selectable display windows for Ch.A only, Ch.B only, Ch.A & B, Ch.A & FFT, Ch.B & FFT, Ch.A & B with respective FFTs.
Size	:	Single slot full length 32 bit PCI board 13.33" x 4.75"

Software Support

Windows95 based software package has been developed for data acquisition and display. The monitor screen features a familiar 'oscilloscope like' panel for parameter selection and information display in Time & Frequency domains. Suitable 'soft knobs' are provided for selection of parameters in an on-line manner. Cursors have been provided to enable measurement of signal amplitude and time/frequency related measurements.

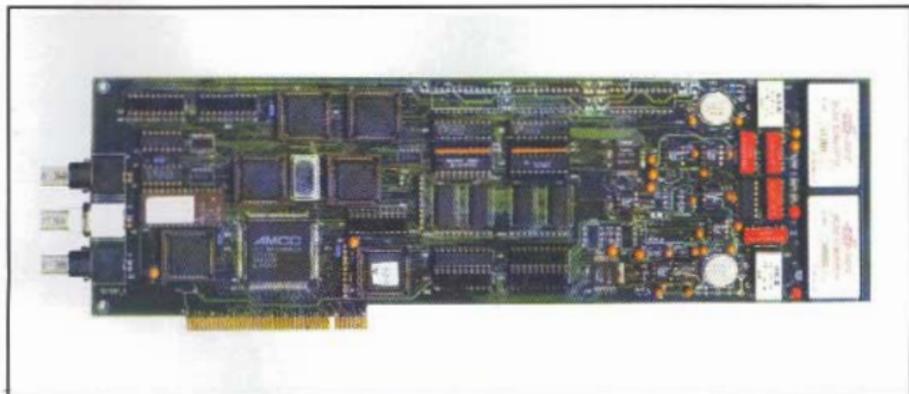


Fig. 2 Component side of PCI bus based dual channel 100 MSPS waveform digitizer.

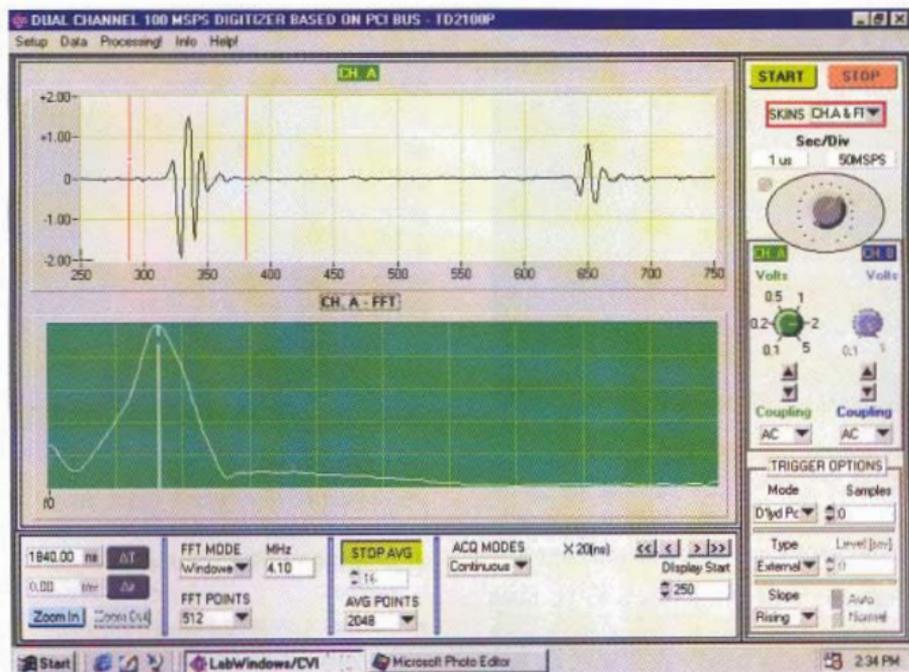


Fig.3 Simultaneous display of acquired test signal in time and frequency domains. (Top trace shows ultrasonic A-scan of test block and bottom trace shows corresponding frequency spectrum.)



Fig. 4 PCI bus based video image capture card.

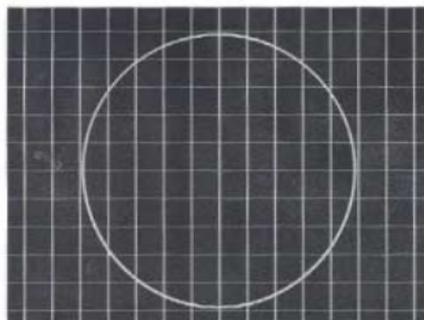


Fig. 5 A video image (PAL standard) captured with the above card.



Fig. 6 A video image derived from S-video source, captured with the above card.

Applications

This board is particularly suitable for PC based acquisition and analysis of electrical signals which have fast rise/fall times or those which are non-repetitive in nature. Some application areas where the advanced features of this board can be exploited are :

- ◆ Ultrasonic characterization of internal defects in materials.
- ◆ Resonance ionization mass spectrometry.
- ◆ Laser wavelength studies.
- ◆ Laser induced fluorescence studies.
- ◆ Laser plasma investigations.
- ◆ High-pressure impact studies.

2. PCI Bus Based Video Image Capture Card

Importance of Video Image Capture (also referred to as frame grabber) cards is very well established in scientific and industrial applications. In conjunction with video cameras (monochrome or colour) and relevant Image Processing / Analysis software, frame grabber boards have found enormous use in numerous applications. With frame grabber boards based on the ISA bus, the data transfer rates are too slow to permit direct usage of PC RAM for the purpose of image data storage. Consequently, on-board memory is needed. Further, the type, speed and size of the on-board image memory impose design constraints. This also increases the hardware complexity and cost. PCI bus enables direct transfer of digital data from image digitizer to PC RAM resource. Consequently, PCI bus based image capture cards provide higher speed and performance at a significantly lower cost. Ultra Instrumentation Section over last few years has successfully developed a variety of cards for video image capture and processing. The latest development is a PCI bus based card that permits acquisition of video images (colour as well as monochrome) in PAL / NTSC / S-Video compatible signal format.

Technical specifications and salient features of the card are as follows:

- Image display directly on SVGA monitor (no separate video monitor necessary).
- Image resolution: Max. 768 x 576 pixels (PAL) & 640 x 480 (NTSC).
- Image size scalable down to icon.
- User selectable Region Of Interest (ROI).
- Auto NTSC/PAL format detection.

- Selection of video input from either three composite or two composite and one S-video sources.
- On-line image enhancement (by manipulation of brightness, contrast, saturation and hue).
- Image storage in standard BMP format (24 bits for colour & 8 bits for monochrome).
- Intensity profile plots corresponding to (overlay) horizontal and vertical cursors.
- Capture of image sequence.
- Compact size : 122 mm x 80 mm.

Applications

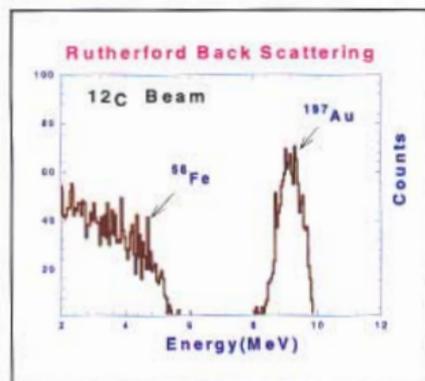
The PCI bus based video image capture card is a low cost solution for PC based video image processing or analysis. Hardware features make this card suitable in a wide variety of fields such as Video Microscopy, Laser beam studies, Radio Fluoroscopy, Medical Imaging, Image Archiving, etc. PCI bus compatibility makes it suitable for web based monitoring applications.

Conclusion

PCI is the latest and widely accepted bus standard for personal computers. Its features such as processor independence, extremely high throughput rate and plug & play facility are ideally suited for development of high performance, PC based instrumentation systems. Electronics Division, BARC, has developed PCI compatible boards for (i) High-speed data acquisition and display, and (ii) Capture and processing of monochrome/colour video images in PAL, NTSC or S-video format. These boards are highly suitable for a variety of scientific and industrial applications. Attempts are underway to further improve the performance features of these boards.

FOTIA : A NEW ION BEAM ACCELERATOR COMMISSIONED

An indigenously built Folded Tandem Ion Accelerator (FOTIA) has been set up at Nuclear Physics Division, BARC. The first beam of ions was delivered from it at 9:30 p.m. on Friday, April 21, 2000. The beam was of ^{12}C ions at 12.5 MeV beam energy. It was characterized by performing the Rutherford Back Scattering (RBS) on Gold, Tin, and Iron target nuclei. The accelerator has the capability of delivering heavy ion beams upto $A=40$ and beam energy upto 66 MeV with a maximum terminal voltage of 6 MV. These beams will be used for research in basic and applied sciences in the field of nuclear physics, astrophysics, material science, accelerator mass spectrometry, atomic spectroscopy, etc.



At a function organised on April 27, 2000 on the occasion, Dr. Anil Kakodkar, Director, BARC, appreciated the tremendous efforts put in by several scientists and engineers from different Divisions of BARC to make the project a success. He identified it as a landmark achievement in the development of accelerators in BARC. Dr. Pitamber Singh, Head, FOTIA Section, made a technical presentation on

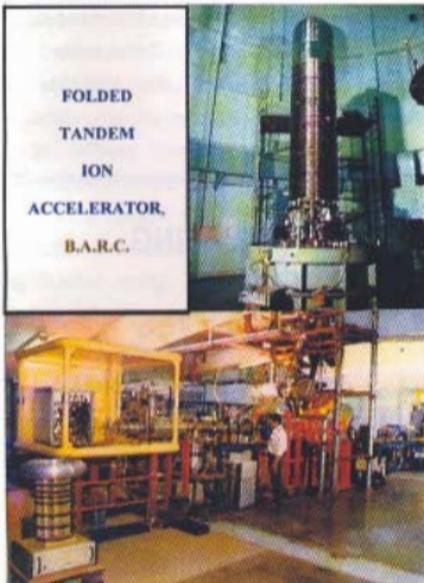
the accelerator. Dr. B.K. Jain, Head, Nuclear Physics Division, emphasized the unique work culture at BARC and the total commitment of the BARC management for the success of this project. Dr. S.S. Kapoor, Director, Physics and E & I Group, traced the history of the accelerator development in the country. Since the Chairman of the Atomic Energy Commission, Dr R. Chidambaram, could not be present at the function his message was read by Dr. S.S. Kapoor, in which he congratulated the FOTIA team. Later, after the inaugural function, the ion beam was injected into the accelerator column by Dr. Anil Kakodkar by pressing a button on the control console.



Dr Anil Kakodkar, Director, BARC, pressing a button on the control console of FOTIA to release the first beam of ^{12}C ions into the accelerator column.

The FOTIA is an accelerator of its own kind amongst a few in the world. Its construction involved development of the state of art technologies of several vital components like dipole magnets, high voltage generator, SF_6 gas handling system, vacuum systems, magnetic and electrostatic lenses, computer control system and front line electronics, etc. In the present accelerator, the components in the high voltage areas are subjected to electric field gradients of hundreds of kV/cm and therefore this region is enclosed inside a pressure vessel filled with SF_6 insulating gas at 90 psig. At present, however, in the commissioning phase the

**FOLDED
TANDEM
ION
ACCELERATOR,
B.A.R.C.**



accelerator is being run with N_2+CO_2 mixture. An accelerator of this type, if at all available to BARC from outside, would cost around Rs. 18 crores. However, due to availability of the expertise at BARC and utilisation of infrastructure from the earlier Van-de-Graaff accelerator at the Nuclear Physics Division, it has been possible to set up the facility in a very cost effective way at about 3 crores. A number of scientists, engineers and technical personnel, from different disciplines, worked together to accomplish this goal.

Dr M.S. SWAMINATHAN VISITS BARC

M.S. Swaminathan who holds the United Nations Educational, Scientific and Cultural Organization's Cousteau Chair in Ecotechnology and leads the M.S. Swaminathan Research Foundation (MSSRF),

Chennai, which is dedicated to using science to foster the development of sustainable agriculture, visited BARC on February 23, 2000. Dr Swaminathan is an internationally acclaimed plant geneticist and is widely credited for making India self-reliant in food production. Dr Swaminathan spent a busy day at BARC. In the morning, he delivered a BARC Special Lecture at the CC Auditorium on "Hundred Years of Mendelian Genetics" to an enthusiastic audience of scientists and engineers. His lecture dealt with the application of principles of genetics in increasing agricultural productivity. He described the progress of agricultural research based on the applications of genetics and planned research efforts both in India and abroad. He gave examples on the dramatic transformation of agricultural productivity in the sixties when dwarfing genes were used in cereals to tailor plant architecture suited for high input agriculture. The so-called green revolution brought sufficient food to hungry population but it had its foot prints of destruction of soil and environment on the very production system on which the entire system was dependent upon.

Dr Swaminathan stressed on the importance of sustainability of agricultural production with emphasis on preserving biodiversity, environment and human dignity of the millions of impoverished people. He categorically mentioned that we need a production system by the masses and not mass production. It was necessary to employ appropriate and efficient technologies which at the same time did not take away jobs required for the livelihood of millions of Indians. He strongly believed that next decades of agricultural research and development would be based on comparative genomics and genetic manipulation. However, he added that efforts were to be made so that the benefit of

recombinant DNA based technology should not go entirely to profit making private establishments.

Later in the afternoon, Dr Swaminathan spent about 2 hours with the scientists of Biomedical Group. Dr (Mrs) A.M. Samuel, Director, Biomedical Group, BARC, welcomed Dr Swaminathan and introduced the speakers who presented the research activities. Dr R.K. Mitra, Head, Nuclear Agriculture & Biotechnology Division, Dr D.R. Bongirwar, Head, Food Technology Division, Dr N.C. Verma, Head, Radiation Biology Division, Dr K.B. Sainis, Head, Cell Biology Division and Dr S.K. Mahajan, Head, Molecular Biology & Agriculture Division, presented highlights of research of their respective Divisions. Dr S.K. Apte of Cell Biology Division also spoke on the occasion.

BARC HELPS CYCLONE HIT FARMERS OF ORISSA

In response to an appeal made by Mr M. Rajamani, IAS, Commissioner-cum-Secretary, Govt. of Orissa, to Director, BARC, Nuclear Agriculture and Biotechnology Division provided nucleus and breeder seeds of three Trombay mungbean varieties, one Trombay blackgram variety and two Trombay groundnut varieties to Orissa University of Agriculture and Technology, and Orissa State Seeds Corporation (OSSC) as resource materials for the cyclone hit farmers. In addition, 10,000 tissue culture grown banana plantlets were supplied in test tubes which could be hardened at Bhubhaneswar for supplying as plant material after 6 months to Orissa farmers. The Managing Director of OSSC in a communication of March 22, 2000, expressed his gratitude to BARC for supplying 150 kg of Trombay

groundnut, 53 kg of Trombay mungbean and 30 kg of blackgram breeder seeds. These seeds have covered over 9.65 ha for the production of foundation seeds.

22ND RCA MEETING OF NATIONAL REPRESENTATIVES

The 22nd RCA meeting of National Representatives was hosted by India, under the auspices of the International Atomic Energy Agency (IAEA), at Mumbai, from February 28 to March 3, 2000, in co-operation with BARC.

The meeting was attended by 30 participants from 16 member states, including 6 from India. The IAEA was represented by Dr Adnan Shihab-Eldin, Director, Division for Africa and East Asia and the Pacific (TCPA), Technical Cooperation Department, IAEA, Mr M.N. Razley, Head, East Asia & the Pacific Section (TCAPS), IAEA and Dr C.R. Aleta, RCA Coordinator, IAEA.

Dr R. Chidambaram, Chairman, Atomic Energy Commission and Secretary to the Govt. of India, Department of Atomic Energy, inaugurated the meeting at BARC, Trombay. Dr Anil Kakodkar, Director, BARC, presided over the function.

In his inaugural and keynote address, Dr R. Chidambaram expressed his happiness over the meeting being held in India under the auspices of the IAEA. He pointed out the pleasant coincidence of the meeting being inaugurated on February 28, which is celebrated in India as 'Science Day' in honour of the Nobel Laureate, Dr C.V. Raman. He said that a series of programmes had been arranged as part of the

Science Day celebration. (*Report on Science Week celebration published in BARC Newsletter, No. 194, March 2000*). He recalled India's relations with RCA activities since its inception. He emphasized that India believes from its own experience that development in the field of nuclear power sector acts as a catalyst and provides the impetus for accelerated development of non-power applications of nuclear energy in medicine, agriculture and industry directly and generates spin-off technological benefits. Human resource development has been an important component of India's programme. India is strongly committed to use the benefits of science and nuclear energy for social development. Electric power is the prime mover of the national economy and social development. With increasing size and the standard of living of the population and the growth of industries, the demand for energy in the Asia-Pacific region is growing. With the rapid depletion of conventional fossil fuels and the growing concern of the environmental issues, nuclear energy has become an inevitable option to many of the developing countries.

Dr Anil Kakodkar, Director, BARC, welcomed the delegates to India. He recalled RCA's genesis in the tripartite agreement of India-Philippines-Agency (IPA) project in 1963, involving the supply of neutron diffractometer by India and its installation in the Philippines research reactor, used for the training of scientists from a number of countries in the region. Beginning from its formation on June 12, 1972, RCA has successfully celebrated its 25th anniversary in 1997 with 17 countries as member states. RCA has contributed much to the sustainable development of this region using nuclear technologies in the fields of energy, agriculture, health and industry. He emphasized that India is always willing to play an active role in the RCA

matters and has been participating in all the thematic and UNDP programmes.



Mr A.K. Anand, Director, RP and TC&IR Groups, BARC, briefing the participants of the meeting.



Participants of the meeting.

Dr Adnan Shihab-Eldin addressed the delegates on behalf of the IAEA, conveying the greetings from the Director General of IAEA. He conveyed his deep appreciation to India for organizing the meeting at BARC. He welcomed the delegates on behalf of the IAEA and the Director General, and conveyed the greetings and best wishes of Mr Qian Jihui, Deputy Director General of the Department of Technical Cooperation, for a most successful meeting. He expressed his happiness to be in India and lauded the role of BARC in the development of nuclear technology. He added that India's achievements and potential were not limited to nuclear

technologies, but cover other important fields ranging from agriculture and energy to computer and information technology.

Mr A.K. Anand, Director, Reactor Projects and Technical Coordination & International Relations (RP and TC&IR) Groups, BARC & RCA National Representative, proposed the vote of thanks.

NATIONAL SAFETY DAY OBSERVED



Display of safety exhibition at Plutonium Plant, Trombay, on the occasion of National Safety Day.

As a part of continuing effort to promote and inculcate safety consciousness among the plant personnel, National Safety Day was observed at Plutonium Plant, Fuel Reprocessing Division, BARC, on March 3, 2000. On this occasion, a safety exhibition along with other safety related programmes were conducted in which plant personnel from all sections participated. The programme was inaugurated by Mr V.P. Kansra, Associate Director (Operation), Nuclear Recycle Group, BARC. In his address, Mr Kansra stressed on the necessity of inculcating safety culture in the plant. He said that the plant management was committed to ensure top most priority for the safety of plant personnel and environment.

COURSE ON QUALITY MANAGEMENT AND ASSURANCE

Technology Transfer & Collaboration Division (TT&CD), BARC, had organised a one-week course on "Quality Management & Assurance" for the officers drawn from various Divisions of BARC. The course was inaugurated by Mr A.K. Anand, Director, Technical Coordination & International Relations Group(TC&IRG) and Reactor Projects Group (RPG), BARC, on March 6, 2000 at TT&CD Conference Room, Central Complex, BARC.



Mr A.K. Anand, Director, TC&IRG and RPG, delivering the inaugural speech.



Participants from various Divisions attending the lecture series.

The course was conducted by Defence Institute of Quality Assurance (DIQA), Bangalore, and co-ordinated by Dr A.K. Kohli, TT&CD. The course covered quality management system concepts, ISO-9000 quality system requirements, its certification procedure and details on likely revisions it may undergo in the near future. The course also covered TQM techniques, motivation for quality consciousness, principles of Kaizen and laboratory quality system. The course was concluded with a presentation by Brig. R.N. Radhakrishnan, Director, DIQA, on "Quality Culture Education", and an overview on quality systems and their requirements in BARC by Mr P.G. Kulkarni, Head, AFD. A compilation on projections and lecture notes has also been brought out and distributed to all the participants.

WORKSHOP ON ADVANCED APPLICATION OF RADIOTRACERS

An IAEA/RCA Regional Training Workshop on Advanced Application of Radiotracers was organised by Isotope Group, BARC, in Hotel Days Inn, Vashi, Navi Mumbai, during April 24-29, 2000. 12 overseas participants from Bangladesh, Indonesia, Korea, Malaysia, Philippines, Sri Lanka, Thailand, Vietnam, 2 Indian participants and 2 observers attended the workshop. The local participants and observers were from National Environment Engineering Research Institute (NEERI), National Institute of Oceanography (NIO) and BARC.

In his inaugural address, Dr Anil Kakodkar, Director, BARC, stressed the importance of understanding dispersion of effluents in marine environment



Dr Anil Kakodkar, Director, BARC, inaugurating the IAEA/RCA Regional Training Workshop.

using radiotracers and modelling techniques. Mr A.K. Anand, Director, Technical Coordination & International Relations (TC&IR) Group, BARC and RCA National Representative, Dr Rakesh Kumar, Head, Mumbai Zonal Lab., NEERI, and Dr S.V. Navada, Head, Isotope Hydrology Section, Isotope Applications Division (IAD) & Workshop Director, also spoke during the inaugural function.

The faculty consisted of 5 lecturers from BARC, one from NEERI, and an IAEA nominee, Mr Brett Miller from Water Research Laboratory, Sydney, Australia. Lecture topics included (a) Advances in tracer technology – choice of tracers, nuclear detectors, safety aspects, etc., (b) Offshore dispersion processes, pollution in surface waters – physical and chemical processes, (c) Hydrodynamic and water quality modelling, and (d) Tracer application for studying dilution and dispersion of effluents. A compilation of lecture notes of all the topics covered in the training workshop was provided to the participants.

A radiotracer demonstration experiment was organised at the newly constructed 3.4 km long Worli Outfall and participants were shown tracer injection, tracer monitoring, data acquisition and interpretation.



Participants of the Workshop at the BMC Sewage Treatment Plant, Love Grove Pumping Station, Worli, for the demonstration experiment.



Boat used for monitoring the radiotracer during the demonstration experiment of the Workshop.

Demonstration and hands on training of RMA-2 Hydrodynamic model and RMA-11 Water Quality model for the Worli Outfall were made by IAEA expert, Mr Brett Miller.

At the end of the training workshop, there was a feedback session wherein the participants expressed their impressions and suggestions. One of the suggestion was that IAEA should arrange to provide licences to the participants for the use of the software which were demonstrated during the workshop. The workshop concluded with a valedictory function and Mr Brett Miller delivered the

valedictory address and distributed the certificates to the participants.

BARC HOSPITAL ANNIVERSARY DAY CELEBRATED

BARC Hospital and its administrative wing was shifted to its present beautiful premises at Anushaktinagar in January 1976 from the earlier premises at the J.J. Hospital complex.

Every year, 16th January is celebrated as the annual day of the Hospital. This year the annual day celebrations were held during January 17-20, 2000. Academic programmes like lectures on subjects of interest to all medical and para-medical personnel were held.

On 17th January, there was a talk-cum-role play on communication skills in medical profession by a senior psychologist and communication expert of Mumbai, Ms Shubha Thatte.

Application of lasers in medical profession was another subject which is important to the medical community. This topic was covered by Dr D.M. Pareekh, Chief of Neck Surgery, Tata Memorial Hospital, on 17th January.

On 18th January, a very eminent medical educationist and senior clinician, Dr O.P. Kapoor, spoke on "The Art of Clinical Evaluation."

All the lectures were well appreciated by the medical and para-medical staff.

To encourage sports and cultural activities among the staff of the Medical Division, there were some sports competitions in which there was enthusiastic



Dr B.J. Shankar, Head, Medical Division, BARC, receiving a memento from Dr (Ms) A.M. Samuel, Director, Bio-Medical Group, BARC, during the BARC Hospital annual day function.

participation by the employees. On 20th January, a cultural programme was organized for the staff of the Medical Division in which many employees of the Division gave excellent performances in dance, music and skits. Even the judges appreciated the talents in some of the participants and encouraged them to participate in DAE national level programmes.



Dr Vijai Kumar, Head, LISD, BARC, receiving a memento from Dr (Ms) A.M. Samuel, Director, Bio-Medical Group, BARC, during the BARC Hospital annual day function. Dr Vijai Kumar was also one of the judges for the poster competition.

A competition in medical poster painting was also organised for the medical staff. The judges were Dr Vijai Kumar, Head, Library & Information Services Division (LISD), BARC, Dr (Ms) Sainis,

Molecular Biology & Agriculture Division (MB&AD) and Dr (Ms) Patkar, Medical Division. Various dispensaries made beautiful eye catching and informative posters. Patients have always appreciated the educative posters put up at the hospital and various dispensaries. This is a novel way of imparting medical education to patients while they are waiting to see the doctors at the dispensaries.

On 20th January, there was a contributory lunch and prize distribution.

WOMEN'S DAY AT BARC

On the occasion of the International Women's Day on March 8, 2000, a seminar was organised by the Women's Cell of BARC, which focussed attention on the gender problem. Ms S.D. Joshi, Secretary, Women's Cell and Medical Social Welfare Officer, BARC, welcomed the guest speakers and the audience and presented the status of the women employees of BARC. She reported that women comprise 12.5% of the workforce at BARC of which 25% hold scientific posts, 28% technical, 32% administrative and 15% auxiliary jobs. She briefly highlighted the multi-faceted activities of the Women's Cell which has been functioning for the overall development of women and for the identification of grievances of women employees. One immediate issue being pursued is the expansion and improvement of the existing Atomic Energy Residents Welfare Association (ARWA) creche facility at Anushaktinagar for the children of BARC employees.

Dr Meena Gopal, Lecturer, Research Centre for Women's Studies of SNTD University, focussed on the new space dimensions of women in the family. She highlighted the triple burden being borne by

working women; that of being a housewife, an employee and a mother which cause her stress of a very high order. She emphasised the need for support structures within the family and the society for the ease of the working woman. She also commented on the strong role played by the media in building the image of the women of the current generation.



Dr (Ms) A.M. Samuel, Chairperson of Women's Cell along with other panelists on the dias on the occasion of the International Women's Day, March 8, 2000

Ms Mrunalini Deshmukh, Professor, Department of Law of Mumbai University, enlightened the audience on the legal rights of women. She talked about the special laws which have been formulated by the constitution to safeguard their rights and to equate their status to that of the men. She lamented that technical snags continued to plague the legal system in its endeavor to deliver justice to women.

Ms Gurmit Hans, Head, Training Orientation and Research for NSS, Tata Institute of Social Sciences, concentrated her attention on the challenges facing working women due to their enactment of multiple roles. She suggested some measures for relieving stress through self care, building up of self-esteem and confidence. She opined that women must give

top priority to protecting and nurturing themselves for an overall healthy development.

Dr (Ms) A.M. Samuel, Director, Bio-Medical Group, BARC, in her presidential address, brought out the fact that women are biologically and psychologically different from men and gender differences are expected. However, working women need to have patience and must strike a balance between managing their homes and offices without being stressed. She said that women must enjoy their state of womanhood and solve the problems as they appear on a person-to-person basis.

Dr (Ms) Susan Eapen introduced the guests and Dr (Ms) V.S. Rao proposed the vote of thanks. A large group of women representing scientific, technical, administrative and auxiliary staff of BARC, attended the seminar.

BARC SCIENTIST HONORED



• Mr Apratim Chakrabarti of Nuclear Agriculture & Biotechnology Division, BARC, has been adjudged for the "Best Presentation Award" for his

paper "PCR-RFLP Analysis of IGS Region of *Fusarium oxysporum* f.sp. *ciceris* - A Method to Study Variability and Race Identification", presented in the Symposium on Biotechnology of Plant Protection held at Centre of Advanced Studies, Department of Botany, Banaras Hindu University, Varanasi, during February 25-27, 2000. The prize carries a citation, memento and cash award.

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