

Techstrum

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OF THE
JAFFNA COLLEGE INSTITUTE OF TECHNOLOGY
VADDUKODDAI
SRI LANKA.**

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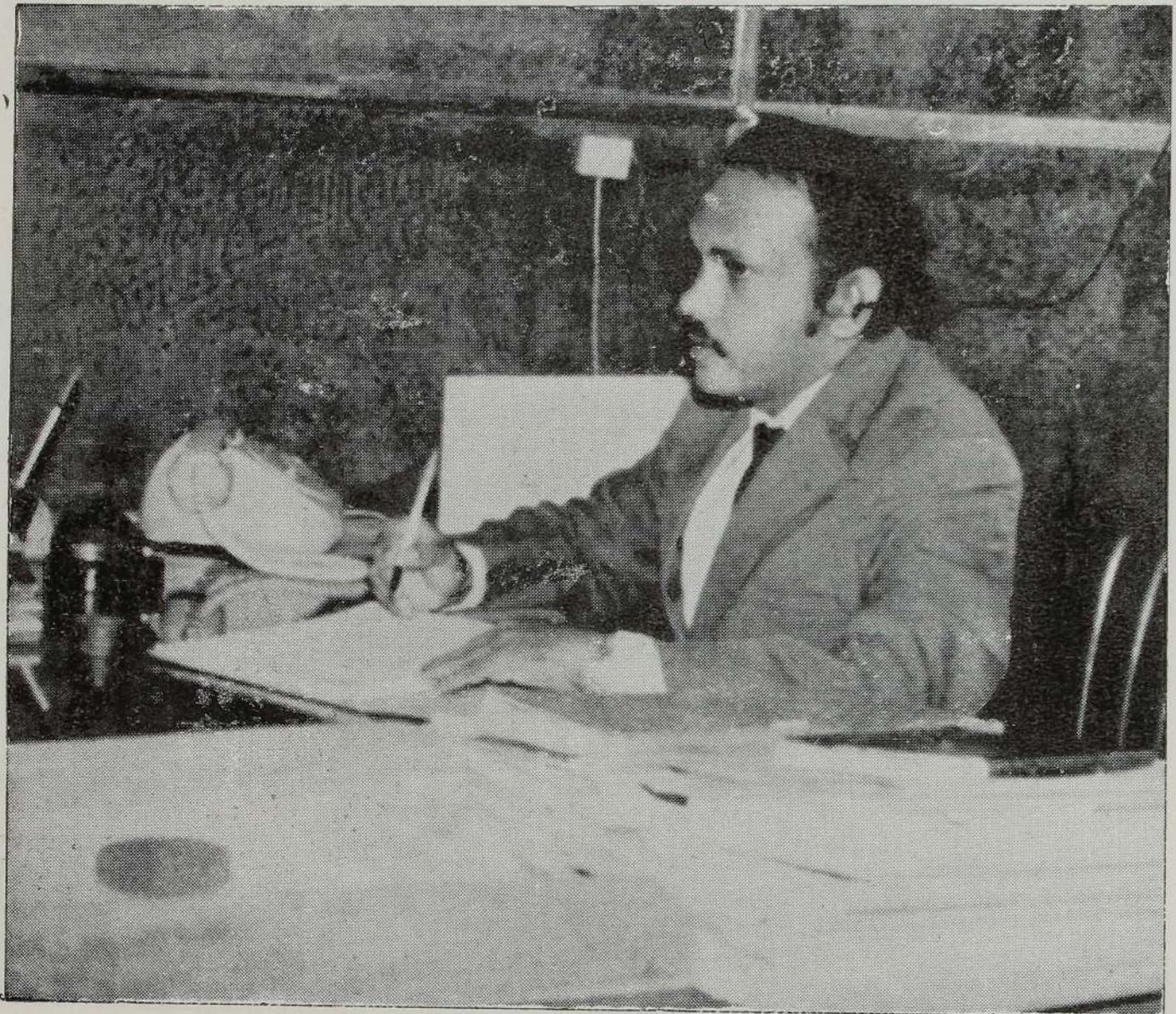
THE DIRECTOR



M. George Pillainayagam

B. Sc. Eng., M. Sc. Ag. Eng., C. Eng., M. I. Mech. E (Lon)
A. M. I. E. (S. L.), C. Eng., A. M. I. E, E.

OUR ACTING DIRECTOR



S. A. P. Thuraiaratnam

B. Sc. Eng (Hon)., M. I. E. (S. L), C. Eng.

Message from Our Acting Director

It is indeed a great pleasure to send this message on the occasion of publishing the Magazine 'TECHSTRUM 88' by the Jaffna College Institute of Technology.

This Institute, a gift by the Board of Directors of Jaffna College to the People of the North, is a leading Technical institution in the Northern Province of Sri Lanka. During the past fifteen years, it has grown up to such an extent that it is now offering fourteen different Courses in various fields of Technical Education. Many Institutions in Sri Lanka and abroad have highly commended its service to the community here. The fact that many of those passed out from this Institute are working in several places in responsible positions is an ample evidence of the role played by the Institute in developing the technical skills of the community in the peninsula.

'Science and Technology should serve Mankind' and every Institution should from time to time examine the technological developments in their related fields and find ways and means of applying these to enhance the living standard of our community. I am happy to note that the Institute is moving in the right direction and I am confident that Jaffna College Institute of Technology will continue to show leadership and serve our community for many more years to come.

I wish the Editorial staff and Students of the Institute every success in the endeavour.

Following his Foot steps

A time like this demands,
Great hearts, strong minds, true faith and willing hands.
Men whom the lust of office cannot kill.
Men whom the spoils of office cannot buy:
Men who possess opinions and a will:
Men who have honour men who will not lie.

— *Oliver Wendell Holme*

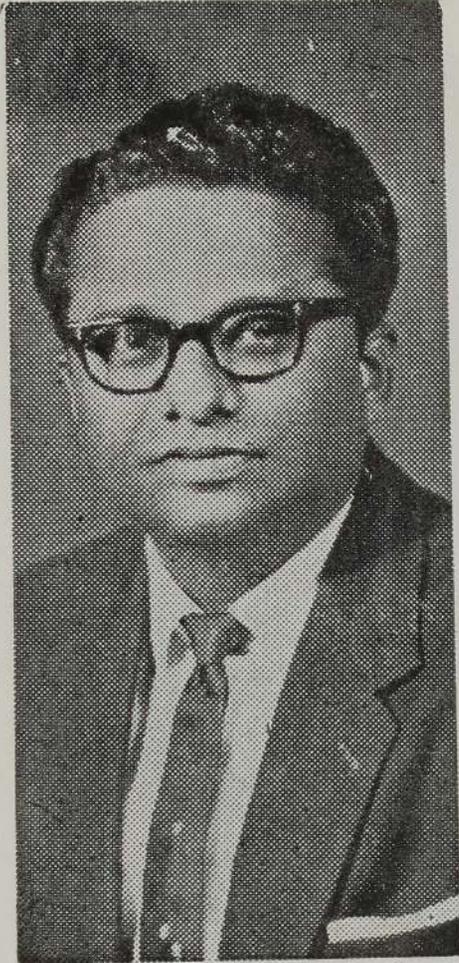
How fortunate are we, who have had the good fortune to work with a man like Mr. A. M. Spencer who dedicated his precious time to the upliftment of our English Department. He by his generous service has earned a name which is deep rooted in our Institution even in his absence.

It is not an easy matter to publish the 'Voice of the Institute' under the present situation. He courageously took up this responsibility and published voice of the Institute during the last two years. We owe a deep debt of gratitude to Mr. Spencer who have been a source of towering strength in bringing the Techsrstum to fruition. We will be failing in our duty if we do not add a few words of thanks to one who had been a magnet in getting things done.

Our gratitude is due in no small measure to Mr. Spencer who have chosen to remain anonymous but without whose deed both material and moral this 'voice of the institute' could not have seen the light of day. He himself have volunteered to help us with valuble suggestions and guidance to carry out the work to completion of the past issues.

'May God Bless him for ever'

The retirement of the Principal of Jaffna College is an event which cannot be ignored by us, in the JCIT.. ...



Mr. Rajan Kadirgamar, whose life is intertwined with Jaffna College as a student, teacher, Vice Principal and Principal, retired this year.

He is one of those few members of the community who had felt the need for a Technical Institution in this part of the country and has been involved with JCIT from its inception.

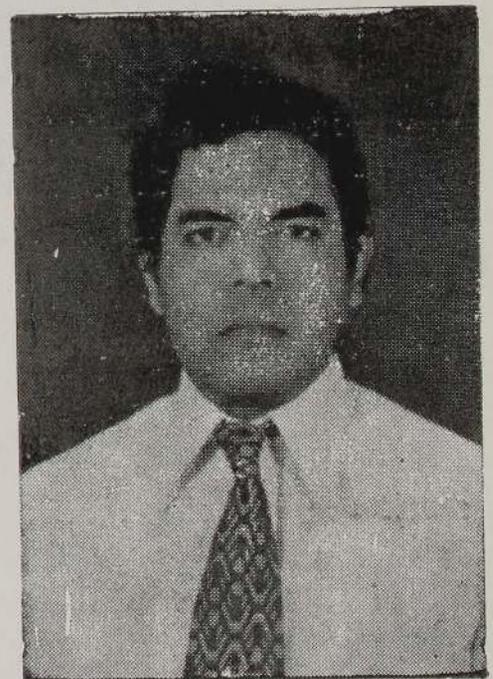
He was the Secretary to the Council of Management of Jaffna College Institute of Technology and Agriculture, until his retirement. His continuous and devoted service has contributed immensely towards the multilateral development of our Institute.

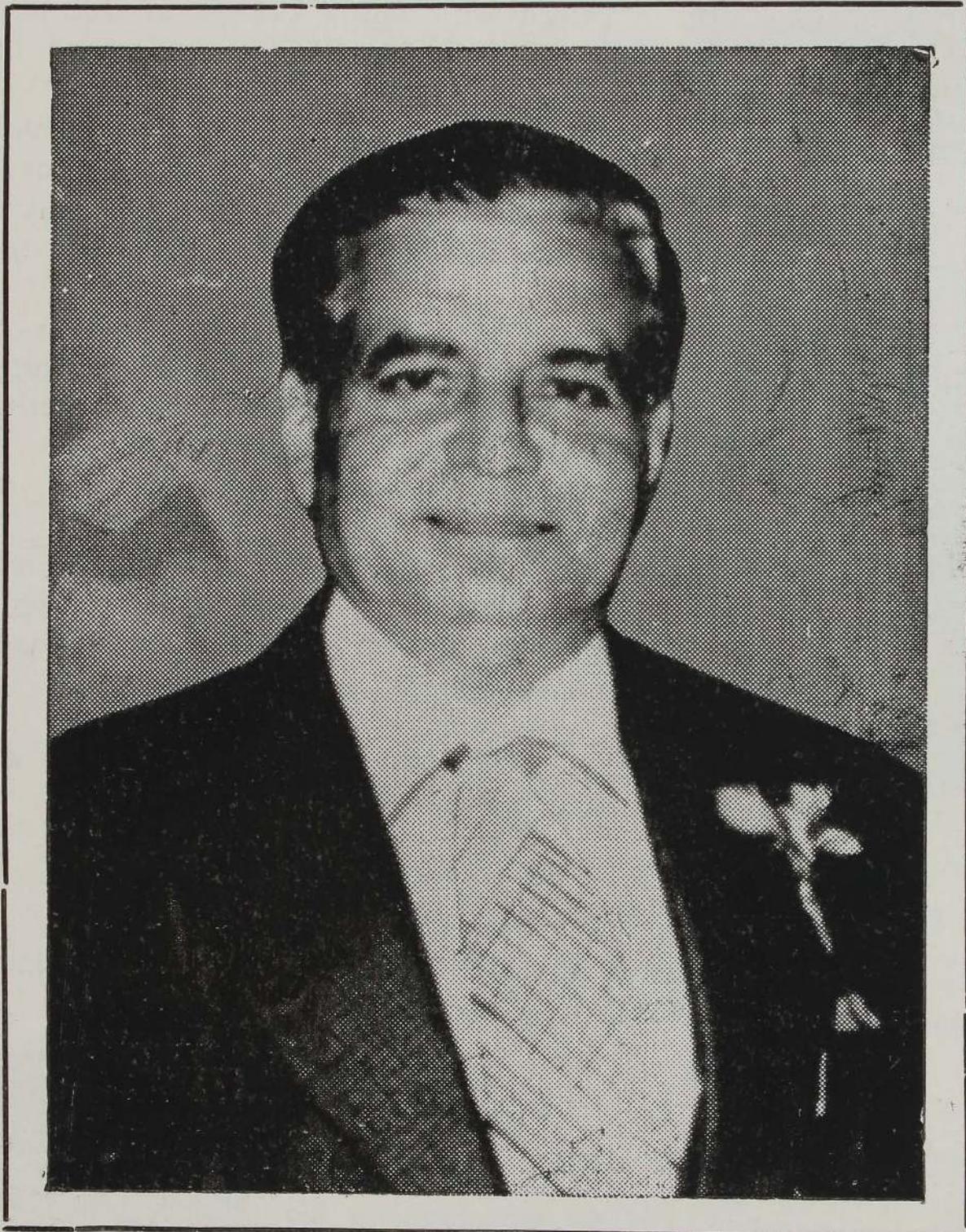
Mr. Kadirgamar who made his mark as a public figure in the field of education, is a man who has led and continues to lead a simple and unassuming life.

We wish him and his family a very happy and prosperous life.

... .. The appointment of a new Principal to Jaffna College is equally important to us.

We congratulate Dr. S. Jebanesan on his appointment to this prestigious post. We welcome him and hope to work with him for the betterment of both Institutions.





Late
Mr. J. M. SABARATNAM

Our tribute to

Mr. J. M. Sabaratnam

The chairman of our management council Mr. J. M. Sabaratnam, went on sabbatical year off and we heard the shocking news of his sudden demise in England on 10th of August 1988 while spending a holiday with one of his daughters. His association with Jaffna College started long before his retirement from the Government service. He served the Board of directors, special committees and Council of Management from the very inception of this Institute in 1972. Mr. Sabaratnam served on the Council as member, Vice Chairman and chairman for fifteen long years until he departed from our midst. He was present at every meeting of the Council and served on the Building Advisory Committee and was very much concerned with the development of the Institute. We cannot forget the services rendered by Mr. Sabaratnam to this Institute and the community at large. While we sympathise with the members of his family, our prayers are for his soul to rest in peace.

INSTITUTE DAY - 1988

THE THIRTEENTH PRESENTATION OF DIPLOMAS AND CERTIFICATES

on
Friday 21st October 1988
at

'ABELS AUDITORIUM'

Chief Guests :

Mr. A. P. Ranjithapalan

B. Sc. (Eng), M. I. E. (SL), C. Eng., MBIM (UK)
M. I. Prod. E (UK), M. I. E. (Aust).
Deputy General Manager,
Lanka Cement Ltd.,
Kankesanthurai.

and

Mrs Meena Ranjithapalan

PROGRAMME

- 9.00 a.m: Guests arrival
- 10.00 a.m: Refreshments in the Auditorium
- 10.25 a.m: Academic staff, Members of Council & Chief Guests form procession near office
- 10.30 a.m: Procession moves up
- 10.40 a.m: Staff, Chief Guests. Chairman, Vice-Chairman., Secretary Director, Principal & Bishop take position on the stage
- 10 45 a.m: Prayer
- 10.50 a.m: Chairman's Address
- 11.00 a.m: Director's Report
- 11.15 a.m: Principal's Report
- 11.30 a.m: Chief Guest's Address
- 11.45 a.m: Presentation of Awards by Mrs. M. Ranjithapalan
- 12.30 p m: Vote of Thanks by President, Students' Union
- 12.40 P.m: "The Hymn for Ceylon"
- 12.45 p.m: Benediction

Director's Report

19⁸⁷
88 *

Distinguished Chief Guests, our Bishops, Chairman, members of the Council, members of the Jaffna College Board, alumni, parents and friends we at the Jaffna College Institute of Technology extend to you all a cordial welcome to this our annual event, the Thirteenth Institute Day celebrations. We appreciate the encouragement you have given us and we thank you for your kind presence here this morning.

Mr. Ranjithapalan, we are indeed happy to have you with us, an industrialist of your calibre, as our Chief Guest at a time when we are fully involved in reconstruction work. You have had your secondary education at St. Johns College, Jaffna, a premier institution in our country and after a bright career, you entered the University of Sri Lanka, Peradeniya, where you obtained your engineering degree in 1975. After serving for a short period as Instructor in the Mechanical Engineering department of the University, you joined Sri Lanka Cement Corporation as an Asst. Engineer in 1976. During this period you were sent to the country's leading engineering institutions like Colombo Port Commission and Sri Lanka Government Railway to obtain your basic workshop training required for a professional engineer. In 1980 you were selected as a Project Engineer to establish the project department for the planning, fabricating, erection and commissioning of the new cement plant of 1600 metric ton capacity at Kankesathurai. Your thirst for knowledge and high aspiration in your vocation as an Engineer enabled you to obtain scholarships to West Germany, Taiwan and Japan to study the latest and the most modern cement plants. Through sheer hard and honest work you were promoted first as the Plant Manager and then in 1986 as the Deputy General Manager of the Lanka Cement Ltd. Apart from your engineering activities, you have taken a keen interest in the welfare and development programmes of other professional institutions by being an active member of various associations. You have impressed us by

your simple, humble and unassuming ways, and we are very grateful to you for helping the institute in providing employment to many of its passed - out students and for your willingness to provide vocational training to our students in the future. It is our firm believe that we in the institution should establish close relationship with industry in order to give proper training to our students. Without such ties it is impossible to correlate the education and training given in the institution to the needs of the eventual employers. Surely the prime reason for establishing technical institutes is to assist and speed up the development of industries. Therefore, your presence here today is a sign of encouragement to our staff and students.

Our warm welcome to Mrs. Ranjithapalan to this function and we thank her for accepting our invitation to give away the awards to our passing out students. Your educational career at Chundikuli Girl's College had ended by your becoming the life partner to Mr. Ranjithapalan. You are an energetic and magnetic wife behind all the success of your husband and a source of great strength and inspiration to him in all his activities. To both of you, Mr. & Mrs Ranjithapalan, we say a hearty 'thank you'.

Management Council

There have been some changes in the Council at the beginning of the year 1988. The Chairman, Mr. J. M. Sabaratnam, went on sabbatical year off and only two months back we heard the shocking news of his sudden demise in England on 10th of August 1988, while spending a holiday with one of his daughters. His association with Jaffna College started long before his retirement from the Government service. He served the Board of Directors, special committees and Council of Management from the very inception of the Institute in 1972. Mr. Sabaratnam served on the Council as member, Vice Chairman and Chairman for fifteen long years until he departed from our midst. He was present at every meeting of the Council and served on the Building Advisory Committee and was very much concerned with the development of the Institute. We cannot forget the services rendered by Mr. Sabaratnam to this Institute and the community at large. While we sympathise with the the members of his family our prayers are for his soul to rest in peace.

Mr. A. C. Canagarajah went on sabbatical year off and he remains one of the long-time associates of the Church and the Council and had also served as Chairman of the Board of Directors and chairman of the Council. I wish to thank

him for the conscientious and devoted service rendered to the Institute. He continues to associate himself with all development work of the Institute.

Mr. S. M. V. Tissanayagam, our Vice Chairman, went on sabbatical year off, too. I thank him for his several years of service to the Council and the Board.

We welcome Mr. L. R. Muttiah as the new Chairman of the Council. He had held this post earlier also. We depend very much on his advice and counsel.

We welcome Mr. K. Gunaratnam, Attorney-At-Law and representative of Jaffna College Alumni Association, to the Board as our Vice Chairman. His legal advice will help us a great deal.

We welcome Mr. A. Rajasingam as the new Treasurer. With his experience as a former Vice-Principal of Jaffna College, he will have much to contribute.

We also welcome to the Council Dr. E. S. Thevasagayam, Principal, St. John's College, Jaffna, as the representative of the Church of Ceylon, Mr. S. D. Gnanapragasam, Senior Staff member of St. Patrick's College, Jaffna, as the representative of the Roman Catholic Church and Mr. Ratnavel, as the representative of the Jaffna Diocese of the Church of South India.

I thank the outgoing members, Mr. L. S. C. Canayasingam and Mr. S. B. Arumainayagam for the counselling given to us during a very difficult period of time and wish them every success in their new spheres of activity.

Institute of Technology

About three weeks after the last Institute Day which was held on 19-9-87 a holocaust of deadly intensity with maniacal descended upon the Jaffna peninsula rending it apart ruthlessly as thousands bit the dust. There was maximum destruction of life and property. As blood spilled over in the North and the East of the island, the number of families, relatives and friends who lost their dear ones underscored a human tragedy of immense proportions. During this horrendous period we lost one trainee technician, Mr. T. Wignarajah and an engineering student, Mr. J. Gnanaswaran. In the midst of this struggle our Director, Mr. M G Pittlainayagam, left for U. S. A on a scholarship to pursue higher studies in technical education. I was given the responsibility of running this Institute during his absence.

After a prolonged closure of three months, the Institute reopened for this year on 4th January 1988. As most of the staff and students were not present at that time, the date of reopening was postponed to 11th of January 1988. Soon after the reopening, we had a staff meeting and decided to extend the last semester by another two months, and to have the examinations at the end of March, 1988.

The overall student performance in this semester examination held in March 1988 is as follows ;

Name Of Course

Semester I	Sat	Passed	Referred	Failed
Diploma	70	18	39	13
Computer	10	6	4	0
Draughtsmanship	17	5	8	4
Automobile	10	1	1	8
A/C & Refrigeration	9	2	3	4
Machine Shop	15	5	9	1
Welding	6	2	2	2
Foundry	2	2	0	0
Electrical Installation	18	4	4	10
Semester II				
Computer	9	8	1	0
Draughtsmanship	11	7	4	0
Semester III				
Electronics	24	8	14	2
Electronic Power	12	2	3	7
Mechanical	8	2	3	3
Civil & Q. Surveying	8	3	1	4
Automobile	1	1	0	0
A/C & Refrigeration	2	2	0	0
B. Engineering	8	2	6	0
E. C. E. (part 1)	1	1	0	0
Semester IV				
Civil & Q: Surveying	1	1	0	0
Semester V				
Electronics	14	3	9	2
Civil & Q Surveying	2	2	0	0
Total	258	87	111	60

Out of the 258 students, who sat this examination, 87 students passed the whole examination. 111 students got referred and proceeded to the next semester, and 60 students failed the exam. On the whole about 76.8% fared well in the examination.

For the new session in April 88, we admitted students for the following courses:

1. B. Engineering course - first semester
2. Diploma in Computer Programming - first semester
3. Diploma in Draughtsmanship - first semester

The total strength of the students at the beginning of April 1988 was as follows:

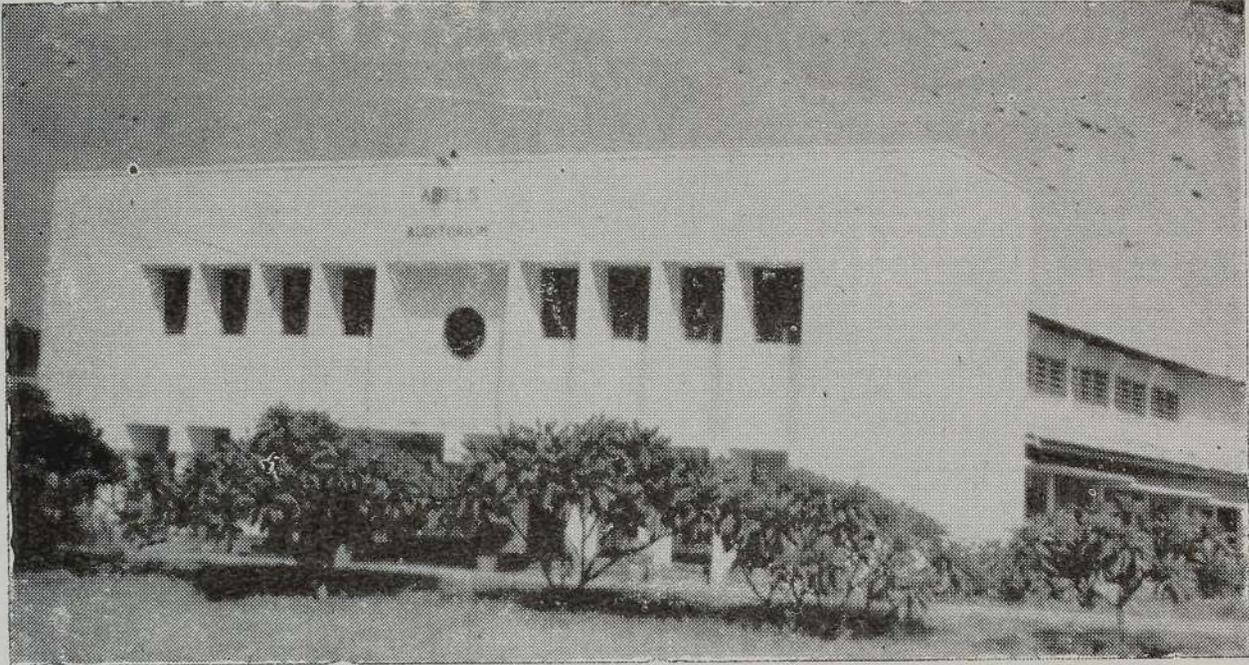
Name of Course	Semester	Beginning of Semester Strength
B. Engineering	I	08
B. Engineering	III	10
Technician Diploma		
Electronics (3 years)	II	29
Electronics	IV	16
Electronics	VI	12
Electrical (2 years)	IV	12
Mechanical (2 years)	IV	08
Mechanical (3 years)	II	09
Civil (2 years)	IV	06
Civil (3 years)	II	09
Diploma (1 year)		
Computer Programming	Module I	27
Computer Programming	Module II	09
Draughtsmanship	I	15
Draughtsmanship	II	07
Technician Certificate (1½ years)		
Automobile	II	09
A/C & Refrigeration	II	09
Craft certificate (1½ years)		
Machine Shop Practice	II	14
Welding Practice	II	06
Electrical Wiring	II	11
Foundry Practice	II	02
Trade Course (6 months)		
Carpentry		04
		<hr/> 232

During the reporting period we have offered thirteen different courses of study to fulfil the hopes and aspirations of the students and their parents. We constantly monitor the syllabi and update the practical exercises, project work, etc. to meet the academic requirements for the diplomas and certificates awarded by us. The strength of the students was far below the number that we had expected as the students had gone out of the peninsula for fear or they were apprehended and sent to detention camps. The cancellation of the G. C. E. (O/L) and A/L examinations also made our admissions difficult.

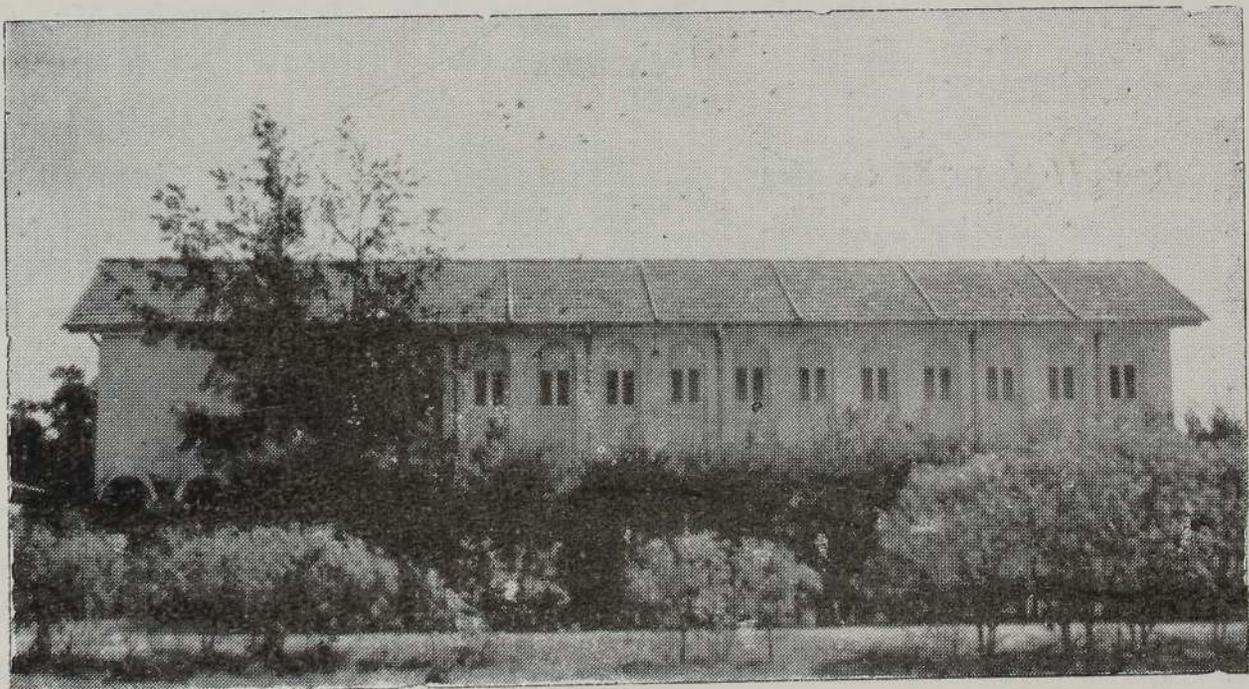
The number of students who successfully completed their courses of study during this academic year as follows:

Diploma Courses	1st class	2nd class	2nd class	Pass	Total
	U.D	U.D	L.D		
a) Electronics & Communication	1	-	4	4	9
b) Electrical Power	-	-	4	5	9
c) Mechanical	1	-	-	7	8
d) Civil Eng. & Q. Surveying	-	-	1	9	10
e) Draughtsmanship	-	3	3	8	14
f) Computer programming	-	4	3	11	18
Technician Certificate Course					
a) Automobile	-	-	-	2	2
b) Air. Cond. & Refrigeration	-	-	-	3	3
Craft Courses					
a) Machine Shop Practice	-	-	-	11	11
b) Welding Practice	-	-	-	4	4
c) Foundry Practice	-	-	-	-	-
d) Electrical Installation Practice	-	-	-	12	12
					100

I am pleased to place on record that despite the numerous problems faced by all sections of the people, our Institute continues with the task of producing technicians and craftsman much needed by our country. This shows our spirit, dedication and courage. Today we are proud to turn out 100 middle level Technicians and Craftsmen



ABELS AUDITORIUM



ADMINISTRATION BLOCK



STAFF - 1987/88

Standing – Row I (L to R) Mr. M. Nagaratnam, Mr. S. Devanathan, Mr. N. Sivayogasundaram, Mr. S. Govindarajan, Mr. K. Sureshkumar Mr. K. Mahadevan, Mr. P. Ravindran, Mr. T. Rajalingam, Mr. V. Prasath, Mr. M. Mathavar

Row II (L to R) : Miss. R. Thambirajah, Miss. S. Gunaratnam, Mr. S. Nesarajan. Mr. S. Vanatheva, Mr. A. Santhan, Mr. K. Sriranganathan, Mr. S. Kantarajah, Mr. S. B. Dhivakaran, Mr. S.P. Ravendran, Mrs. M. Dhivakaran, Miss. K. Kailayanathan

Seated: Mr. S. Brihadiswaran, Mr. K. Thambiayah, Mr. S. K. Xavier, Mr. K. N. Y. Maurice, Mr. I. Balasubramaniam, Mr. S. A. P. Thuraiatnam (Acting Director), Mr. E. M. Jebarajah, Mr. V. Vinayagamoorthy, Mr. T. Satkurunathan Mr. M. Thayanathan, Mr. S. B. Sabanayagam,

Staff

The development of this Institute as a private engineering institution is largely depended on the quality of the education programmes offered and the skill and motivation of the teaching staff. A systematic staff training programme is also very essential if we are to retain the services of efficient staff members and to improve the quality of teaching methods.

As the first step in this direction five staff members were sent to Central Training Institute, Guindy, in May 1988 for three months course in technical teaching methodology and one staff member was sent to American College, Madurai, with the help of Jaffna College for further training on Computer technology. Unfortunately two of our trainees fell sick due to unbearable weather conditions and returned early. Others have successfully completed their courses and returned to the Institute. I sincerely thank Shri. M. K. Sharma, Director of Training, Ministry of Labour, India, Mr K. Sivagnanam, Principal, CTI Guindy and Mr. A. Kadirgamar, Principal, Jaffna College, for helping me to organise this training programme.

During this period there have been many changes, We had to bid farewell to a number of teachers. Mr. S. Ratnagopal who served here faithfully for eight years left us to join the private sector in Colombo.

Mr. A. M. Spencer resigned in October 87 due to ill health after serving 4 1/2 years. He was highly respected by the students for the high standard of work he maintained in English education. He was a devoted and talented lecturer who identified himself with all the activities of the Institute. We are very grateful to him for his services.

Dr. T. Vinayagalingam, our assistant Director, left us in December 1987 to join the Engineering faculty, Peradeniya, after serving here as Dean of studies for a short period of one year. Many students benefited from his expert teaching. He was deeply involved in revising the syllabi of the Diploma and Engineering courses. He is still very closely associated with us. We wish to thank him for his solid contribution to the Institute during the period of disturbances.

I also welcome the following members of the staff:

1. Mr. P. Raveendran -- B. Sc. Eng., Electronics. as Asst. Lecturer
2. Mr. S. Shanmugam -- B. A. (Mysore) , as Visiting Lecturer in English
3. Mr. V. Prasath -- Tech. Diploma in Electrical Eng. & Certificate in Airconditioning & Refrigeration, as Instructor
4. Mr. S. Govindarajan -- B. Sc. (Hons) as Library Assistant

Trade courses

Last year two batches had already completed Carpentry & Masonry courses conducted by the Institute and funded by NORAD. There were only 4 students in the third batch of the carpentry course and no students for the masonry course. These courses ended in August and all expenses were met by the institute. This year we have again started conducting these courses (duration 3-4 months) with the help of the "Care International" Jaffna branch. Fund is provided by the Canadian High Commission through Care International. In the first batch which started in september we have 15 students following Carpentry and 15 students following Masonry. These students are partly employed in our building construction work to receive on - the - job training, and each student earn an allowance of the Rs. 25/- per day of attendance. This scheme is launched mainly to meet the demand for masons and carpenters in the peninsula. Care International through their community development centres advertise and get students to be trained in these trades.

Development Activities

Inter - Church Coordinating Committee, Netherlands, had signed an agreement with Jaffna College Institute of Technology, on 9-4-87. Under this agreement they will make available a sum of Rs. 5, 739, 064/- (Hfl 473,473) for the construction of

1. A Hostel Complex
2. Three Staff Quarters
3. A Civil Engineering Laboratory

Total project period will be two years from the date of agreement.

Work started in July 1987 and the construction activities on these buildings have made steady progress although the situation was tense and uncertain. All three staff quarters were 100% Completed and have already been allocated to three members of our staff. With these there will be altogether 7 families residing within the campus

70 % of the construction work of hostel complex is over. Ground floor is ready for occupation. About 25 hostellers will be able to move in by the end of this week. Entire construction work will be completed before the end of this year so that we will be able to provide hostel facilities for sixty students.

Work on the construction of the Civil Engineering laboratory is making slow progress due to frequent disruption in transport facilities. About 60% of the work is over and we hope to complete this building by the end of January 1989. Arrangements have been made to import testing equipment for this laboratory from India. I must thank Mr. A. C. Canagarajah Consultant cum Engineer, Mr. I. Balasubramaniam, engineer Head of the Civil Department other staff of the Civil Department and Mr. S. Devanathan, our Works Supervisor, for their energetic effort and solid contribution to the progress of this project work.

At present there are 57 students following Computer courses at our Institute. Out of the 8 machines in the Computer Department, 5 were not standard machines for the type of advanced course we are providing. These machines were sold to Jaffna Co'lege and 5 new KAYRO PC Machines were bought at a cost of Rs 230,000/-. Now our Computer Department is fully equipped to run advanced courses and is also in a position to give adequate practical hours for the increasing student population.

All these years students in the Electronics, Electrical labs and machine shop faced difficulties in following lectures and conducting practicals in their laboratories, especially during the very hot season. without proper ventilation. Work on the roofs of these labs was started a few weeks back and the roofs were raised and modified for proper ventilation.

PRODUCTION WORK

During the reporting period we were able to generate a fair income to the Institute by undertaking orders from Redd Barna to make and supply children's furniture to the value of about Rs. 232,000/- Under this scheme students following machine shop practice, welding practice and carpentry were engaged in this work under the supervision of Mr. M. Thayanathan outside their normal practical hours. The allowances paid to them for their work will go a long way to making up for their tuition fees. We have successfully completed the first order and are about to sign an agreement for the next order to the tune of Rs. 232,000/- .

We have also offered our services to Sri Lanka Cement Corporation, Kanke-santhurvi, to prepare a programme for the payroll system and to undertake the preparation of monthly payroll through our computer department. Mr. S.B Dhi-vakaran is in charge of this project and the work on this programme is nearing completion. We are now waiting for their approval to start the monthly payroll work on trial basis.

In addition, the Computer Department is also exploring the possibility of supplying a soft ware for the effective control of the inventory items of the Corporation. The Airconditioning and Refrigeration Department has successfully completed numerous orders for repairs on refrigerators from customers in and around Vaddukoddai.

Research & Development

We always encourage the members of our staff to carry out suitable research and development work using locally available materials, design and construction of lab models which are relevant to our courses of study and practical training.

The Civil Engineering Department is engaged in Cost saving projects like

1. Production of clay bricks, using locally available clay.
2. Logic probe (I. C. tester)
3. Audio mixer

and arrangements have been made with certain commercial establishments to do the market survey for these products.

The mechanical Engineering Department has fabricated few mechanical models for demonstration purposes and as teaching aids in Engineering Science.

These activities with student participation will encourage the students in creative thinking and make them to learn the application of appropriate technology. It would also be beneficial to the society at large.

Scholarships & Studentships

Most of our students are coming from very poor families and low income groups in and around Vaddukoddai. Even though these students have immense potential skills they are finding it difficult to complete their courses due to financial burdens.

Recently we have requested our Trustees to increase the annual Hastings' scholarship fund from Us \$ 500/- to \$ 1,000/-. They have agreed to this request very promptly.

During the reporting period about 30 poor deserving students benefited by these studentships. The total amount involved was Rs. 20 500 -. These students were given studentships only at the beginning of the first semester. In order to continue with this, studentships were granted to those who have done extraordinarily well in their semester examinations and scored an average of more than 65%. About 14 students benefited by this scholarship and the total amount involved was Rs. 7,500/-.

Library

Asia Foundation and British Council continued to send books to our library. My special thanks go to the following well-wishers who have donated books during this period:

1. Mr. R. Sri Baskaran, President, Rural Development Society, Mallakam.
2. Mr. R. R. Blanchard, former member of the Council of Management.
3. Mr. M. Vilavarayar, Industrial Consultant and Engineer, Kaddudai, Manipay.

Students' Union Activities 1987/88

The activities of the Students' Union continued with extra interest and vigour during this period. The annual Saraswathi Pooja was conducted on 30th September 87, and the Inter-Hall Athletic Meet followed that and was held on October 9th under the distinguished patronage of Mr & Mrs. Kadirgamar.

Mr. A. Santhan was appointed as the Vice-Patron in February 88 following the former Vice-Patron taking up duties as Acting Director. The Students drafted and accepted a constitution for their Union, and it was enforced from April 1988. Under this constitution a new committee of management was elected and the annual Cultural Day was celebrated on 27th June 88. Mr. S. Jeyakumar, Works manager, Ceylon Cement Corporation, Kankesanthurai and Mrs. Jeyakumar were the Chief Guests. The annual Lunch followed this on July 28th and Mr. S. Rajendra, Principal, Jaffna Technical College, graced the occasion as Chief Guest.

With the enrollment of new members during this semester and with programmes for the future, the Students' Union is advancing in every respect and contributing towards the betterment of its members and of the Institute as a whole.

Visitors

Many distinguished personalities, including some religious dignitaries visited the Institute during this period. Amongst them were Mr. Erling Hauland from the Norwegian Church Aid, Oslo, Norway, Mr. Sigmund Karlstrom, Redd-Barna, Most Rev Dr. Victor Premasagar, moderator, C. S. I., Rev M. Azariah, Gen. Secretary, Synod, C. S. I., Mr. James Balraj, Director Tech Vocational Training, CSI Council, Mr. Ilkka Vusitalo, delegate, League of the Red Cross, Mr & Mrs. Craig Copland, Programme Director of Christian Children Fund of Canada.

The motive behind their visits was mainly in connection with their rehabilitation programmes and to obtain first hand knowledge of the situation, prevailing in the Peninsula.

Thanks

I wish to place on record my gratitude to the members of the academic, administrative, minor and visiting staff for their useful contribution towards development of the Institute for another year.

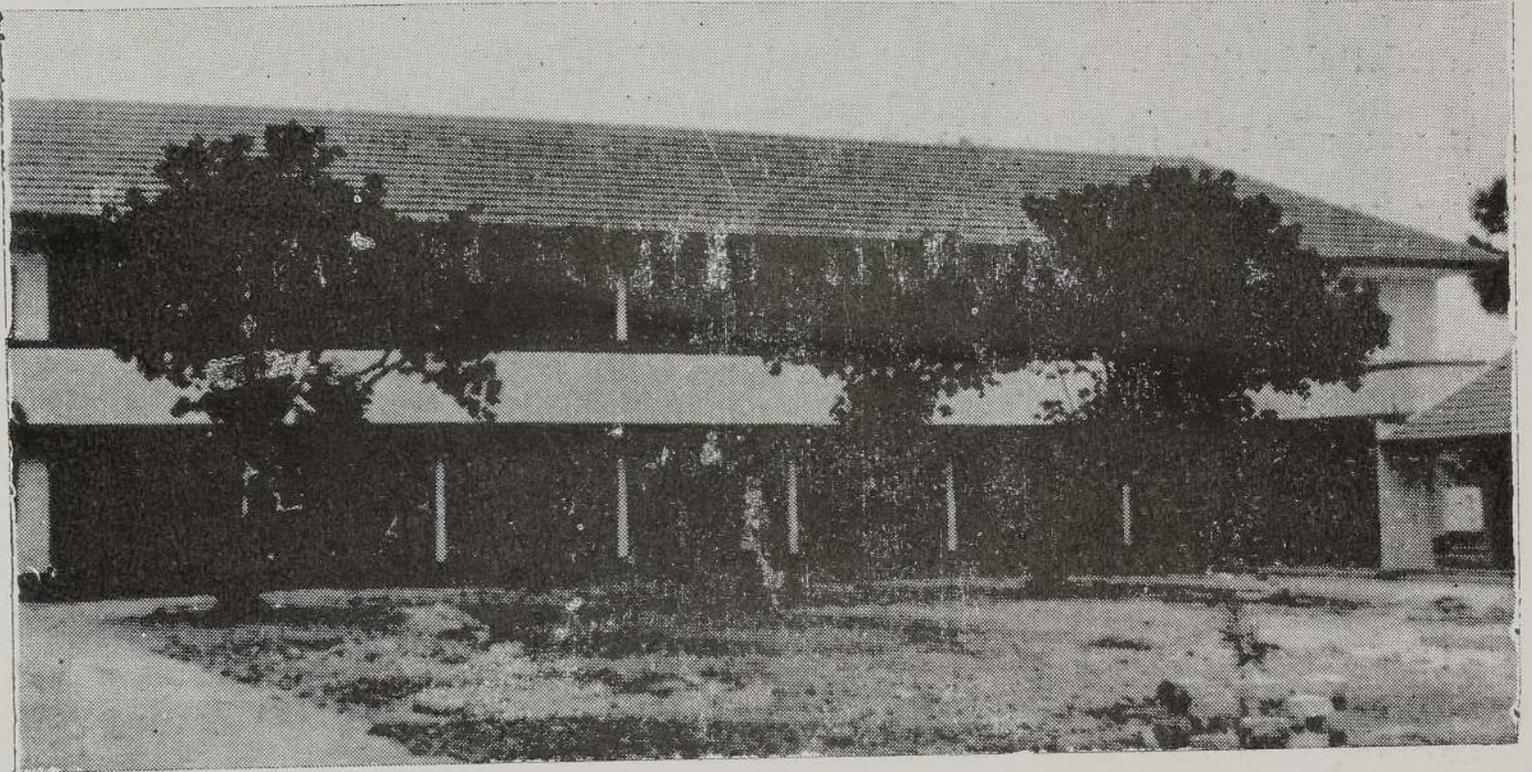
It is my duty to thank the passing out graduates and the present students for their well-disciplined behaviour and corporation given to the staff and management during this academic year.

A special word of thanks I owe to the Warden of the Hostel, Mr. M. Thayanathan, Miss. M. Elias of Jaffna College and the Sports Administrator Mr. K. N. Y. Maurice for the willing support given to me in organising and managing the hostel, and sports activities in the campus.

I thank the Chairman and members of the Council for the valuable advice and guidance extended to me in the administration of this Institute of Technology.

Finally, I thank you all, Ladies and Gentlemen, for accepting our invitation and for being with us here today.



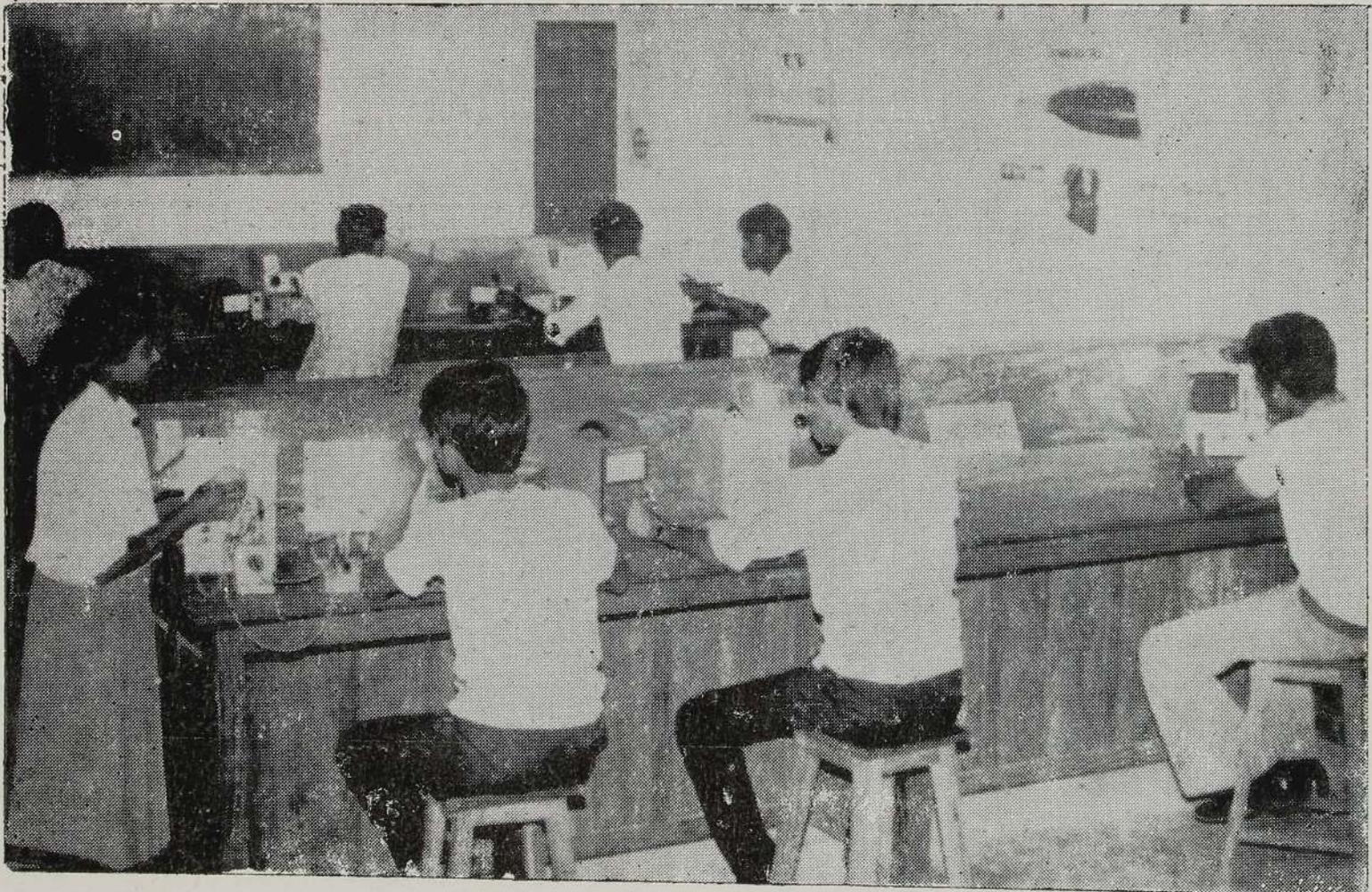


*TWO DIFFERENT VIEWS
OF
THE HOSTEL COMPLEX*





STAFF QUARTERS



ELECTRONICS LABORATORY

LIST OF GRADUATES

The following are the graduates, who have successfully completed their courses of study at their respective Final examinations

TECHNICIAN DIPLOMA COURSES

FIRST CLASS

ELECTRONICS & TELECOMMUNICATION ENGINEERING

Selladurai Sathiyalingam

MECHANICAL ENGINEERING

R. Jayasingarajan

SECOND CLASS (Upper Division)

COMPUTER PROGRAMMING & DATA PROCESSING

Miss. Kalyani Ramachandran

R. Janakan

Miss. Vathsalya Rajaratnam

K. Sakthivel

CIVIL DRAUGHTSMANSHIP

Miss. Ratha Krishnathevan

S. Vilvarajah

S. Sathiyaseelan

SECOND CLASS (Lower Division)

ELECTRONICS & TELECOMMUNICATION ENGINEERING

A. H. Thirurajah

T. Vickneswaran

L. Theivendrarajah

S. Sutharsan

ELECTRICAL POWER ENGINEERING

S. Nikethan

N. Thaneshwaran

S. Premakumar

M. Naguleswaran

CIVIL ENGINEERING & QUANTITY SURVEYING

P. Jeyaranjan

COMPUTER PROGRAMMING & DATA PROCESSING

S. Karunakaran

V. Srirajan

W. S. Tharmaseelan

CIVIL DRAUGHTSMANSHIP

K. Ketheswaran

S. Senthikumar

S. Haran

PASS

ELECTRONICS & TELECOMMUNICATION ENGINEERING

Miss. Nanthini Nadarajah

M. R. Prasanna

Miss. Yoganandarani Thirunavukarasu

R. Sabeswaran

ELECTRICAL POWER ENGINEERING

T. Vijayakumar

E. Jeyanesan

B. Kohulan

P. Nadesalingam

T. Sivakumar

MECHANICAL ENGINEERING

K. Jeyakumar

P. Kirupaharan

M. Kunaratnasamy

A. Mahalingasivam

S. Suganthan

T. Sriravindran

N. Jeyatharan

CIVIL ENGINEERING & QUANTITY SURVEYING

S. Gunesha

V. V. Gesavan

R. R. Terrence

G. Ratnarajah

G. Balamurugan

A. Jeyaputhiran

N. Omkararuban

S. Srikanthan

P. Vaseeharan

COMPUTER PROGRAMMING & DATA PROCESSING

N. Sivabalan

Miss. Chandravathana Velupillai

Miss Jeyasakthie Parameswaran

S. Mailvaganam

Miss Anushiya Sunderalingam

Miss Padmathevi Thiyagarajah

R. Manoharakumar

Miss. Meera Rasa

K. Kobi

N. Rex

K. Arunakrinathan

CIVIL DRAUGHTSMANSHIP

K. Ravichandran

S. Yasotharan

Miss Vasunthara Selladurai

B. Indrakumar

R. Rajkumar

S. Parameswaran

V. Pirabakaran

A. F. Selvanayagam

TECNICIAN CERTIFICATE COURSE

PASS

AUTOMOBILE TECHNOLOGY

P. Arudkumar

K. Ravichandran

AIR CONDITIONING & REFRIGERATION TECHNOLOGY

S. B. Chanthirathas

T. Jaishanker

S. Premananthan

CRAFT CERTIFICATE COURSE

PASS WITH MERIT

MACHINE SHOP PRACTICE

P. R. Inpasithamby

WELDING PRACTICE

K. Thesan

ELECTRICAL WIRING & INSTALLATION PRACTICE

K. Bhaskaran

R. Pathmanathan

MACHINE SHOP PRACTICE PASS

T. Gajan	S. Kanthapillai	D. N. H. Villvarajah
S. Mangaleswaran	J. Mariyaseelan	M. Paremesan
S. Rajan Babu	N. Ratneswaran	S. Sivarajah
		P. Jude Sahayathan

WELDING PRACTICE

P. Thavaratnam	R. Arulchelvam	Y. Anandarajah
----------------	----------------	----------------

ELECTRICAL WIRING & INSTALLATION PRACTICE PASS

T. Sriskantharajah	V. Kalaichelvan	P. Sritharan
P. Manoharan	P. Nageswararajah	N. Thavarajah
K. Ragulagaran	B. Sivanathan	A. Tharmaraja
		K. Ratnakumar

AWARDS

MEMORIAL PRIZES

1. A. S. Saagarapillai Memorial Prize for best student in Electronics & Telecommunication Engineering Course, donated by Mr. V. Sooriyakumar of Karainagar is awarded to Mr. S. Sathiyalingam.
and
Best Performance Prize for Electronics & Telecommunication Engineering to Mr. S. Sathiyalingam,
2. Mr. & Mrs. Thommaipillai Memorial prize for best student in Mechanical Engineering course, donated by their son Mr. T. J. Rajakulendram of Oman is awarded to Mr. R. Jeyasingarajan.
3. Best Performance Prize for Civil Engineering & Quantity Surveying Course donated by Mr. N. K. Singham of Araly is awarded to Mr. P. Jeyarajan.
4. Mr. N. Senthilnathan Memorial Prizes for best student in Machine shop Practice Course is awarded to Mr. P. R. Innasithamby.
5. Best Performance Prize for
Computer 1987 - Miss Kalyani Ramachandran
Draughtsmanship 1987 - Miss Ratha Krishnathevan
Computer 1988 - Mr. K. Sakthivel
Draughtsmanship 1988 - Mr. S. Senthilkumar
Welding Practice - Mr. K. Thesan
Electrical Wiring & Installation Practice - Mr. K. Baskaran
6. Best all Round student for 1987-88
- The Director's Challenge Trophy - Mr. S. Sathiyalingam

**JAFFNA COLLEGE
INSTITUTE OF AGRICULTURE
MARUTHANAMADAM,
CHUNNAKAM.**

THE INSTITUTE

Managerial Staff :-

PRINCIPAL:

**MR. C. JEYARATNAM,
B. Sc. (Agric.), Allahabad
M. Sc. Crop. Science, Sri Lanka.**

FARM MANAGER:

**Mr. T. VIGNESWARAN
Dip. in Agriculture (J. C. A. I.),
Rural Leaders' Training Course(A. R.I. Japan)**

ACCOUNTS CLERK:

MISS, J. SIVAGNANAM

Tutorial Staff :-

LECTURER:

**MR. M. KANDASAMY
Dip. in. Agriculture (Kundasale)**

**VISITING LECTURER:
(English)**

**MR. S. SIVAGNANAM
Inter Arts (London)
English Trained (G. T. C: Maharagama)**

**VISITING LECTURER:
(Home Science)**

**MRS. S. PACKIANATHAN,
B. Sc. (Home Science) Madras.**

Principal's Report

1988

Distinguished Chief Guests, Our Bishops, Chairman and members of the Council, Chairman and Members of the Jaffna College Board of Directors, Parents, Alumni and Friends.

We of the Jaffna College Institute of Agriculture extend to all of you a warm welcome to this annual event.

The year 1987 had been a period of constant turmoil and most of the activities planned could not be carried out. We are hopeful of carrying our activities after the climax of May and while we were gearing ourselves, the most unexpected turn started from October and continued till the end of the year.

STAFF

Messrs. Vigneswaran and Kandasamy continue to be in charge of the Farm and School sections respectively.

Mrs. S. T. Packiyathan takes regular lectures and practicals in Home Science.

Mr. D. D. Ariyaratnam, our Accounts Clerk left us in June and Miss-Jeyakumary Sivagnanam has been appointed in his place.

School Section:

There were 26 students at the beginning of the year and after the May incidents this number dropped to 18. The Final examination was conducted in September. The hostel for the female students functioned from February 1987 and 6 girls were resident. The New batch was taken in May 1988.

STUDENTS ACTIVITIES

MANAVAR MANTRAM: The students met regularly once a week and conducted debates, Agr. quiz contests and a monthly Agriculture news letter. The staff guided them in these activities.

STUDENTS MAGAZINE: As in the previous year the students guided by the staff have put out an Agriculture Magazine called 'Naam Kattavai' (What we learnt). There have been a great demand for this Magazine and copies have been issued full to the Rural Development Societies, Village Libraries and staff of the Education, Agriculture and Agrarian Departments.

SPORTS:

The students participated in the 3rd Inter Hall Athletic Championships held at the Institute of Technology on 9th October 1987. As in the previous year the Best Female Athlete's and the Best allrounders challenge cups were awarded to the Agriculture Institute.

FARM SECTION

DAMAGE DUE TO THE MILITARY ACTION FROM OCTOBER TO DECEMBER 1987

The Farm Manager, while on duty was injured on the 12th October and was warded at the Inuvil Hospital. After the temporary occupation of the I. P. K. F. only 50 birds, three cattle and three pigs remained; similarly planting materials seeds and agrochemicals, tools and equipments, furniture and cutlery were all stolen. The total value of these items came to over Rs. 50,000/- There was damage to the New Hostel building and the repair came to about Rs 30,000/- According to the audited statements for the year 1987 the total profit from the production units comes to Rs, 32,563-23.

There was no cultivation during the rainy period of October to December and the Farm has to start from the beginning. This we were able to do in March 88 only.

Once again to be an effective teaching aid we have started on Broiler and egg production, hatching eggs for the needy, various field and Horticultural crops and the dairy. The piggery is temporarily closed and we hope to start it soon.

VISIT BY SCHOOLS: During the period from February to April 1987 6 schools visited the Institute to get first hand information on science farming. It is our students who took them around and explained the various activities.

RESEARCH PROJECT: Special Degree Students of the chemistry department of the university of Jaffna carry out their Research Projects at our Institute. Last year the project was on the Investigation of available broiler feed in the Jaffna Peninsula and comparative study in Broiler production. This year the Project is on 'Various poultry layers Feeds'

THANKS:

I wish to Thank the staff, students and employees for the co-operation extended to carry out the Institute day activities to day under very difficult conditions.

A special word of thanks to the Director, Staff and students of the Institute of Technology for inviting us to participate in their activities.

I thank the Chairman and members of the Council for their encouraging responses and guidance to our problems.

I thank you, Ladies and Gentlemen for your kind presence and patient hearing.

Thank you

C. Jeyaratnam
(Principal)

JAFFNA COLLEGE INSTITUTE OF AGRICULTURE

DIPLOMA IN AGRICULTURE 1986 -87

UPPER SECOND DIVISION:

Mr. Samithamby Kokuladasan
Mr. Kasipillai Sathiyathoesan
Miss Vigneswari Thurairajah
Miss Sathiyabama Sundaralingam
Miss Gamini Nadesu
Miss Kalanithy Thiyagarajah
Miss Jeyanthi Sinnadurai
Mr. Santhirasegaram Karunanathan

LOWER SECOND DIVISION

Miss Sarathadevy Rajaratnam
Miss Vasantharani Kanapathipillai
Miss Ravichanthirika Nagendran

PASS DIVISION

Mr. Paramanathan Shanmugalingam
Mr. Stanley Jeyesan Thevasagayam
Miss Varathanayahi Velupillai
Miss Jeevi Kandiah
Miss Arunthavam Rajaratnam
Miss Anusha Shanmugam

Vote of Thanks

by

Mr. R. G. David
President of
THE STUDENTS' UNION

Our Chief Guests, Chairman, Members of the Council, Rt. Rev. Bishops, Parents, Friends, and My Colleagues;

It is a golden rule, with us to choose, only men of eminence to be the centre piece of our annual grand function.

We are indeed fortunate to have you both with us as our distinguished Chief Guests today. Mr, Ranjithapalan started his carrier as an Instructor at the University of Peradeniya. after graduation and has now risen to be one of the top men in the Lanka Cement Ltd, and presently holds the enviable post of Deputy General Manager. Sir, during your career, you have become "Roving Ranji" trotting the globe to learn the latest in management and technology, which you have mastered. We are lucky we have trapped you before next flight.

We are happy, to learn that your professional interest has not cramped your style and that you have deep and abiding interest in various fields as computer technology, football and chess. Your presence, with us this morning, would certainly be an inducement and inspiration, to all our students. Our Institution, is imparting an education that is not merely technical but something that makes man not only vocationally efficient but also psychologically wholesome.

We are sure, Sir, your presence with us and your address at our "convocation" would inspire our youth to forge ahead in the present context of strain and stress and prove to be men and women who could serve their Country with devotion and dedication. We are thankful to you sir, for breathing encouragement in to all of us.

They say, behind every successful man, remains unnoticed, like a shadow a woman of great charm and substance. Mrs Meena Ranjithabalan a product of Chundikuli Girls' College, is one such silent figure. Johnians often say

that an ideal home is, when the husband comes from St. John's and it becomes even more when the wife in addition hails from Chundikuli. We thank you madam, for having consented, to give away the prizes willingly. Madam, your presence has added colour and charm to the occasion.

Let me extend our felicitation to the new graduates of our Institute as well as the prize winners. We wish them, well.

Mr. Jeyaratnam, the Principal of the Agriculture Institute, is a member of our family. Sir, your presence with us, is a show of consolidation of strength and support, that, we could make the mark, inspite of continuous disturbances in which we are far pressing forward. We are grateful for your presence with us,

Mrs Thuraiaratnam's presence with us on an occasion like this, does not merely warm the hearts but, also steadies the stance of our director in terms that all is right with the world and the Institute Day has to be a resounding success. We thank you madam for your kind presence in the past the present and hopefully in the days yet to come.

Last, but not the least, may I extend our thanks to the guests, friends, parents and well-wishers for your gracious presence and encouragement without which, this Institute could not have been, what it is today, an edifice of Technical and Vocational Training.

Thank you

Improving Balance Quality of Electric Water Pump Sets

T. Vinayagalingam

B. Sc. Eng., M. Sc., Ph. D., M. A. S. M. E.,
Senior Lecturer, Department of Mechanical Engineering
University of Peradeniya, Sri Lanka.

*"Perfection is not a small thing.
but, small things make perfection"*

Abstract

Locally cast and assembled electric water pump sets have become popular in recent times, among domestic users and farmers alike. As with any high speed machinery, these sets require balancing to fine limits for minimum of maintenance and long life. Conventional balancing procedures require expensive instrumentation, which the small scale manufacturer could ill-afford. A more appropriate and inexpensive procedure for balancing these sets is outlined in this paper.

1. Introduction

Unbalance is a major source of vibration in all types of equipments with rotating element. Common causes of unbalance are:

Blow holes in castings
Machining error

and cumulative assembly tolerances. Thus the need for balancing arises not only with every new rotor, but also with rotors reassembled during repairs. Proper balancing will ensure:

Reduced wear of machine seals and bearings,
Reduced vibration and noise,
Reduced likelihood of fatigue and loosening of fastenings,
Reduced requirement for structural sturdiness, and
Lengthened product life

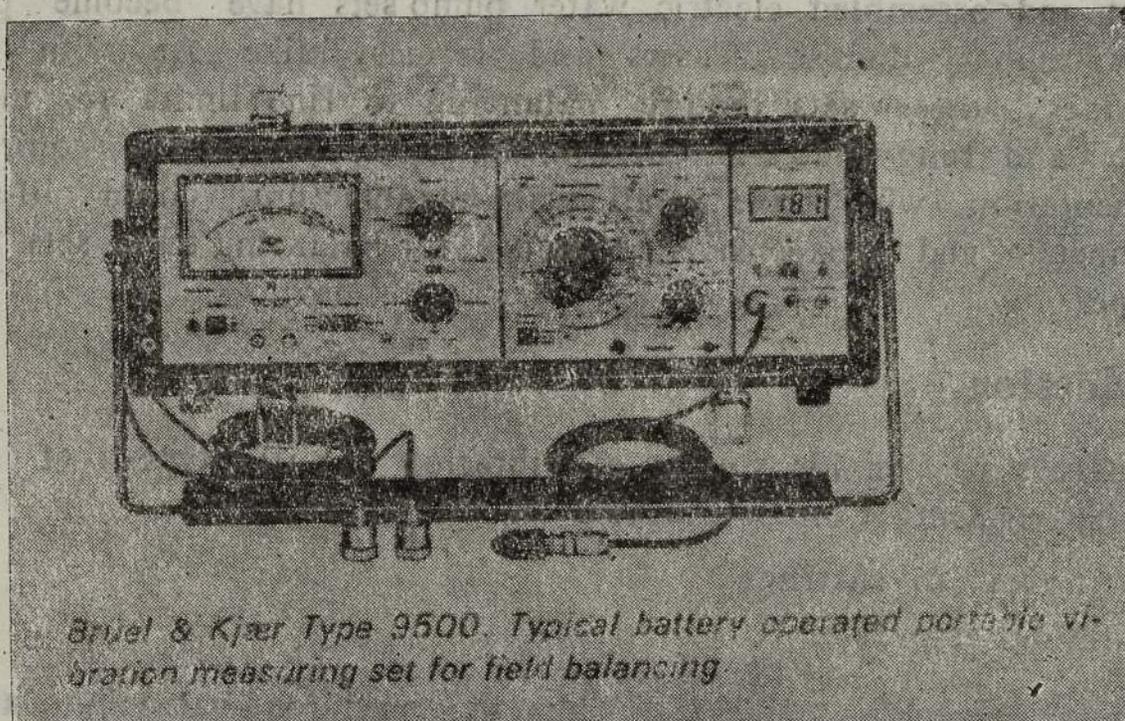
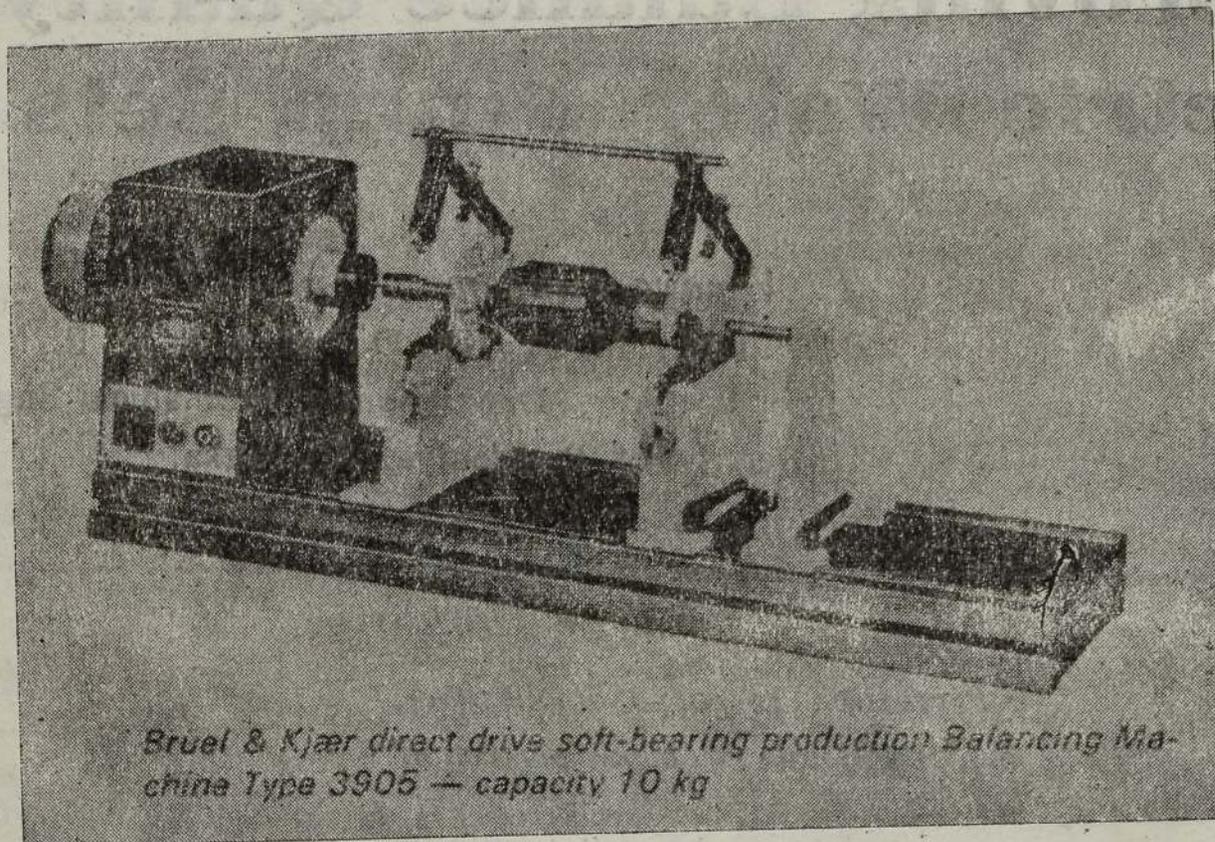


Figure 1 **Modern Balancing Equipments**

Balancing is the process of attempting to improve the mass distribution of a body so that it rotates in its bearings without unbalanced centrifugal forces. Of course, this aim can be attained only to a certain degree; even after balancing, the rotor will possess residual unbalance. By means of the measuring equipments available today ^{1,2} (see also figure 1) unbalances can be reduced to rather low limits. International Standard Organisation (I S O) has made recommendations concerning the balance quality of rotating rigid bodies ³ (relevant sections from this are given in Table 1 and Figure 2) Recommended balance

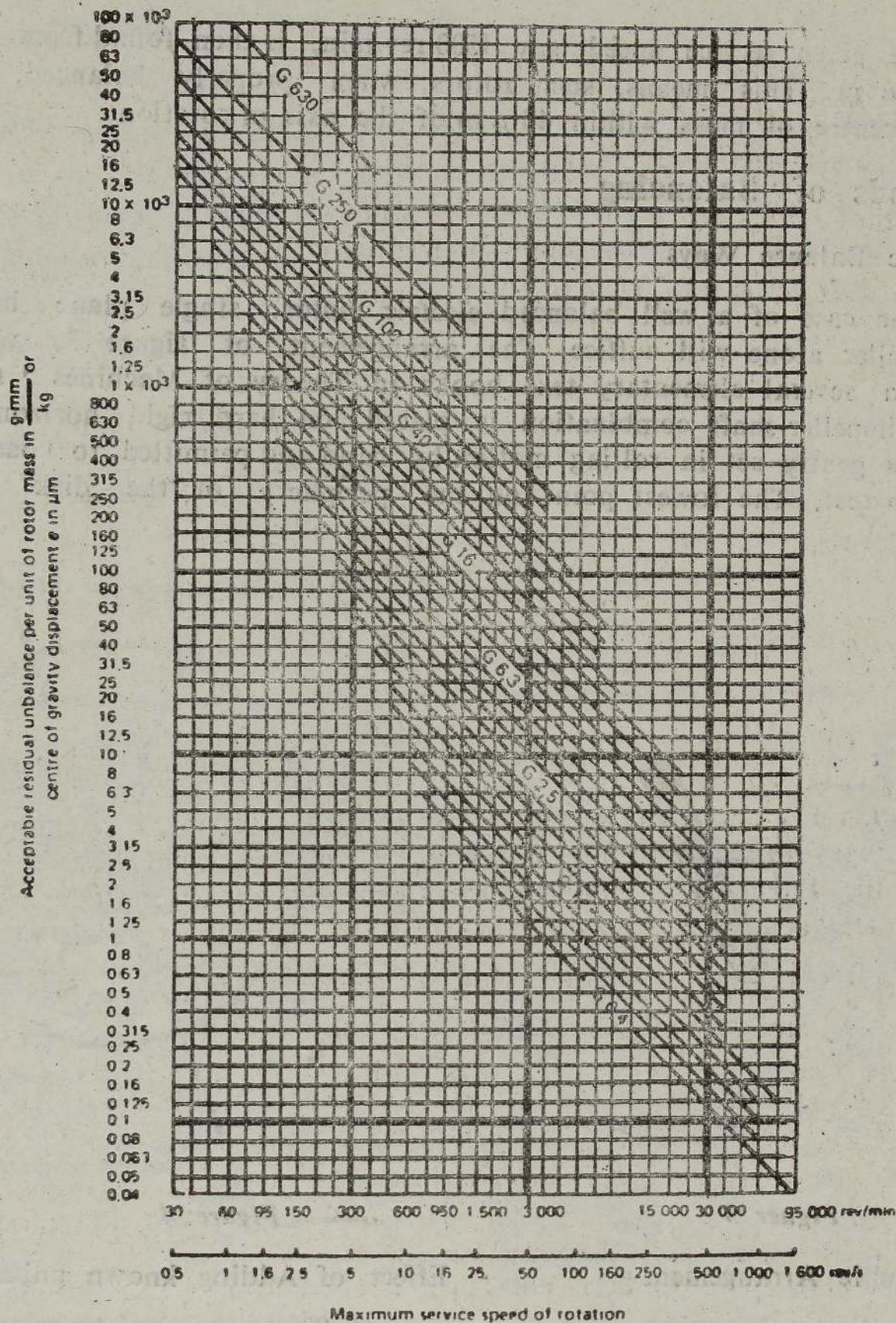


Figure 2

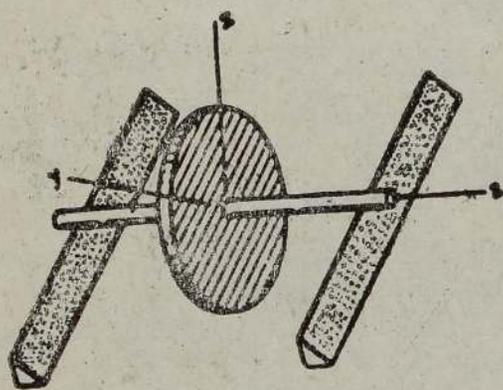
quality grades for various rotor groups are given in Table 1, while Figure 2 relates *Balance Quality Grade* and *Service Speed* to *Permissible Centre of mass Displacement*. From Table 1 we obtain the balance quality grade for electric armatures and pump impellers as 6.3. Corresponding Centre of mass displac-

ement for a given service speed, say 1500 rev/min, is then found from Figure-2 to be $40 \mu\text{m}$. This means, such rotors, when properly balanced, should have their centre of mass within $40 \mu\text{m}$ of the axis of rotation.

2. Methods of Balancing

2. 1. Static Balance Ways

In the case of a well balanced electric motor, single plane balancing of the impeller alone will suffice. The arrangement of figure 3, which is described in several elementary text books in Theory of Machines ⁴ may be used. The impeller-shaft combination is placed on hard rigid horizontal rails. The disk is gently set in rolling motion by hand and permitted to coast until it comes to rest. The lowest point on the periphery of the disk is then



Figuer 3

Simple Arrangement
for Static Balancing

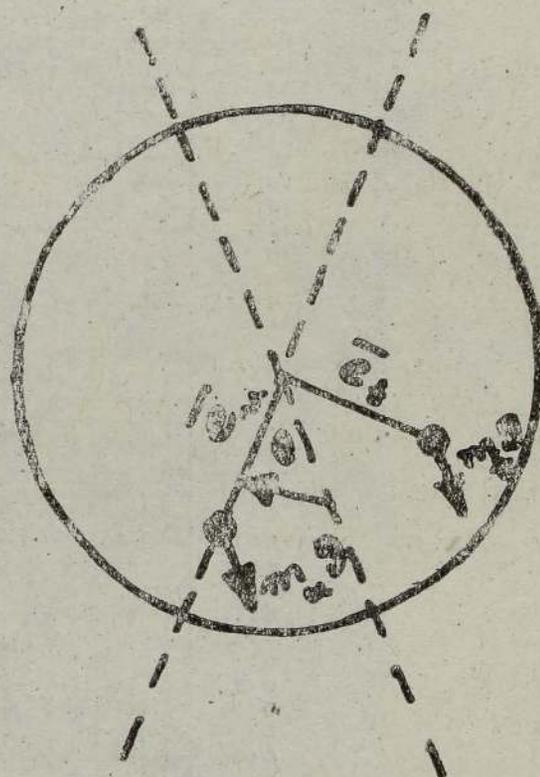


Figure: 4

Effect of Adding known unbalance
at 90° to original unbalance

marked with chalk. This procedure is repeated a few times. If the chalk marks are scattered at different places around the periphery, the rotor is in static balance. If all the chalk marks are coincident, the disk is statically unbalanced. The position of the chalk mark indicates the angular location of the unbalance but not the amount. The amount of unbalance $m_u e_u$ present in the rotor is then determined by attaching trial unbalance $m_t e_t$ to the rotor 90° away from the original unbalance and noting the angle turned through before the rotor comes to rest in a new position (see figure 4).

Original unbalance is then given by
$$\frac{m e}{u u} = \frac{m e}{t t} \cot \theta \quad (1)$$

In this method, inaccuracy occurs due to imperfections in the horizontal rails and in the rolling shaft. Figure 5 shows a commercial version in which the horizontal parallel ways are replaced by free turning hardened and ground knife-edged disks mounted on ball bearings. One manufacturer quotes a sensitivity of 'five grams in a 3" radius on a 1 1/2 lb. workpiece.' This translates to a centre of mass displacement of:

$$\frac{5 \times (3 \times 25.4 \times 1000)}{(1.5 \times 454)} = 560 \mu m.$$

This is much in excess of the ISO limit of 40 μm .

Static Balancing Ways

For accurate balancing, straightening and truing operations on armatures, fly wheels, crankshafts, propellers, grinding wheels, cams and many other rotating parts. No leveling, centering or set-up required. Simply set shaft of part on supporting discs and let it swing. Balance or out-of-balance will be quickly detected. Free turning hardened and ground discs run on

ball bearings. Super Sensitive Model detects out-of-balance as small as five grams in a 3" radius on a 1 1/2 lb. workpiece.

Pillow Block Type is for unusual widths or lengths. Can be set apart at any distance. Sub base gives necessary clearance for large diameter work. Includes 2 pieces. Capacities to 20,000 lbs. are available... Prices on Request.

STANDARD BENCH TYPE

Maximum Diameter Of Work.	Maximum Space Between Standards	Maximum Capacity Lbs.	Overall Height	Weight Lbs.	No.	NET EACH
21"	20"	1,000	11 3/4"	50	2219A10	3524.25
21"	20"	800	13 3/4"	40	2284A20	526.19
42"	30"	2,000	24"	80	2284A13	1137.78
42"	35"	1,000	22 3/4"	105	2219A20	858.31

SUPER SENSITIVE BENCH TYPE

21"	20"	200	13 3/4"	40	2284A70	573.41
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STANDARD FLOOR TYPE

42"	20"	800	30 1/4"	95	2284A11	709.33
60"	30"	2,000	32 3/4"	150	2284A80	1483.17

PILLOW BLOCK BENCH OR FLOOR TYPE

Maximum Cap. Lbs.	Base Width	Base Length	Weight Lbs.	No.	NET/SET
200	4"	9 1/2"	38	2337A16	\$671.90
800	4"	9 1/2"	38	2337A21	708.33
1,000	4"	7 1/2"	50	2337A16	1020.65
2,000	4"	9 1/2"	60	2337A17	1339.65
5,000	5 1/2"	12 1/2"	145	2337A18	3781.38

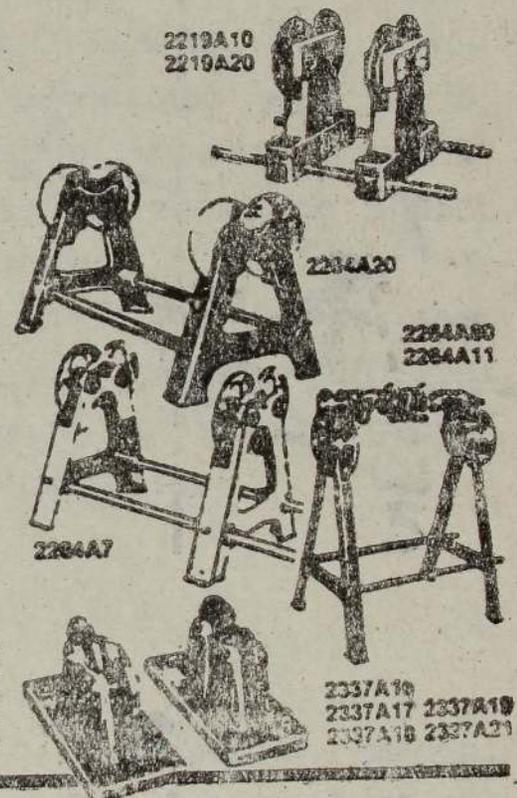
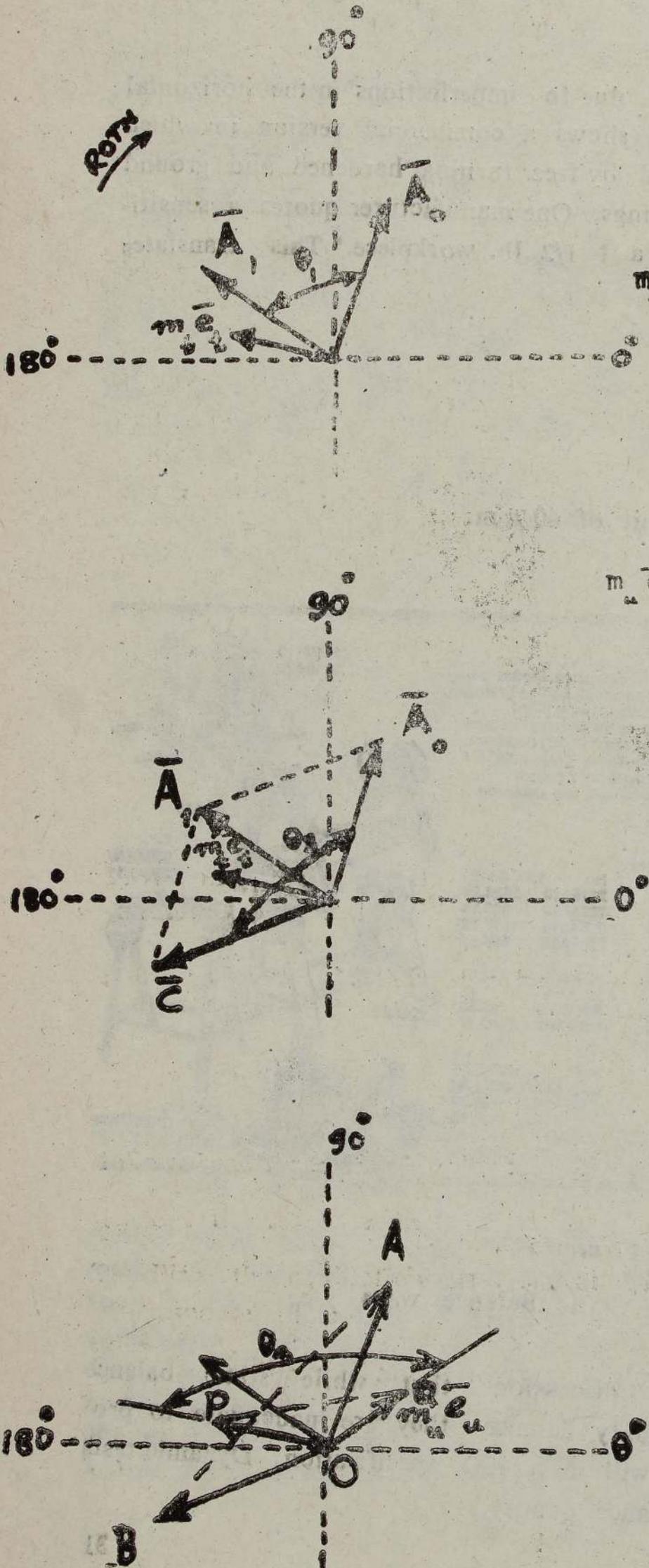


Figure: 5

Commercial Static Balance ways

It may be concluded from the above discussion that while static balance ways are useful in obtaining preliminary balance they are inadequate to provide a high degree of balance that will meet ISO specification. Dynamic tests alone can lead to the required balance quality.

Figure 16
Stages in the Evaluation of Unbalance Vector



- \bar{A}_0 - Original Response
- $m_e \bar{e}_t$ - Calibration Unbalance
- \bar{A}_1 - Response after addition of Calibration Unbalance
- θ_1 - Angle between \bar{A}_0 and \bar{A}_1
- $\bar{C} = \bar{A}_1 - \bar{A}_0$, response due to Calibration Unbalance
- $m_u \bar{e}_u$ - Original Unbalance
- θ_3 - Angle between \bar{A}_0 and \bar{C} , and also between $m_e \bar{e}_t$ and $m_u \bar{e}_u$.
- $\triangle PQR$ is drawn similar to $\triangle ABO$.

2. 2 Dynamic testing

Most approaches to balancing rotating equipment involve a calibration procedure. That is, a known calibration mass is added to the rotor to be balanced at a known angle, radius and plane to determine the effect. Once the response to the calibration mass is known, the residual rotor unbalance can be evaluated by assuming a line relationship to exist between the rotor unbalance and the response it produces. Figure 6 illustrates the procedure for the simple case of single plane balancing.

There are three variants to the method, namely, balancing with amplitude and phase measurements, balancing with amplitude measurement only and balancing with phase measurement only⁷. In the last two cases calibration mass is placed in two different locations (preferably 180° apart) in turn, and the responses measured.

Balancing with phase only method has the advantage that it requires nothing more sophisticated in vibration instrumentation than a pencil or crayon. The unbalanced rotor along with its driving motor is mounted on a flexibly supported platform which is designed to have a natural frequency of vibration very close to the drive motor speed. In this way any unbalance present in the rotor is amplified into a steady forced vibration. The high spot of the rotating shaft (or any circular object attached to the shaft) is then marked by gently moving a marking device towards the rotating shaft. Provided that the fundamental mode dominates the vibratory motion, this 'pencil' method of balancing will yield the required phase information.

3. Test Set Up

A schematic of the test set up is given in Figure 7. The vibrating platform, on which the electric water pump set is to be mounted, is supported at the end of two thin, flat, cantilevered, steel strips. The platform and the pump set (Total Mass, M kg) along with the steel strips. (stiffness KN/m) constitute a single degree of freedom vibrating system. The dimensions of the steel strips are such that the natural frequency of vibration of the system

$$\sqrt{\frac{K}{M}} \text{ equals } N \times \frac{2\pi}{60} \text{ where } N \text{ is the motor speed in rev/min.}$$

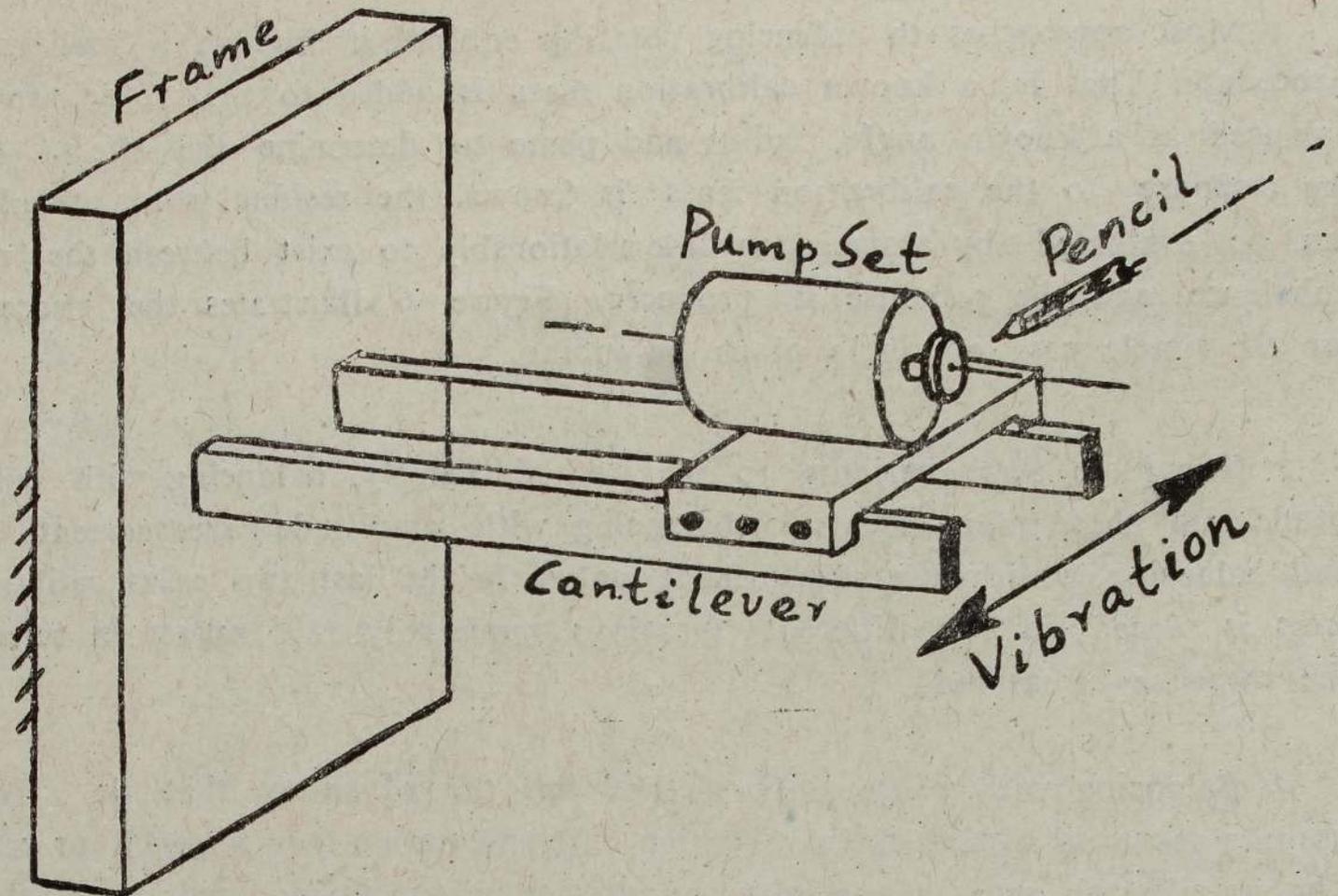


Figure: 7 - TEST SET UP

Provision is made to fix the platform anywhere along the length of the cantilevers; this will enable fine tuning of the system's natural frequency for resonance. The pencil, held firmly at the end of a screw, can be moved slowly and gently towards the rotor by simply turning the screw.

Single - Plane Balancing Procedure

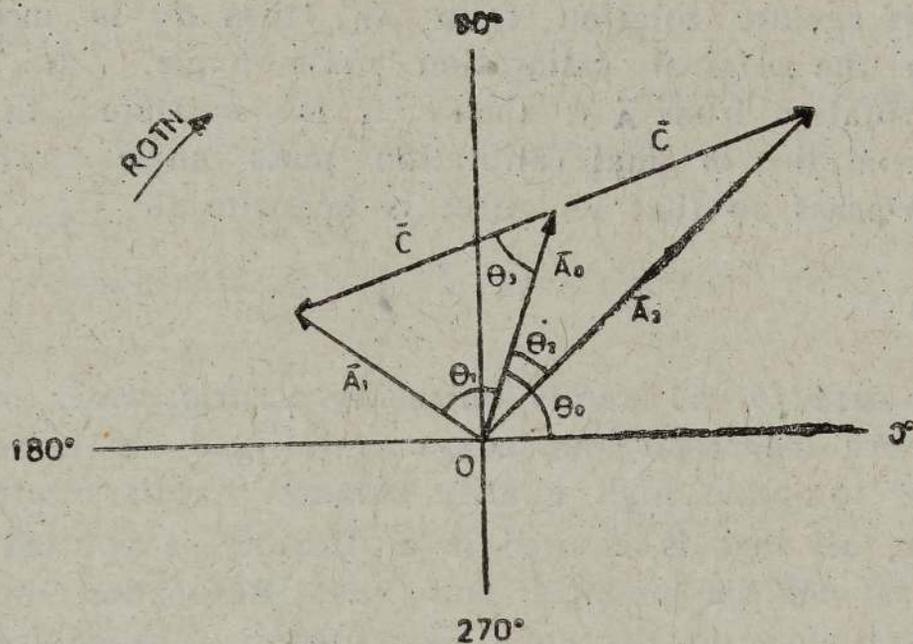
For brevity, mathematical details are left out and only practical steps to be followed out, are listed below:

- 1) Get the response angle at constant motor speed N rev/min
- 2) Place the calibration mass M_t at a known angular position and get the response angle.
- 3) Remove the calibration mass and place it at 180° opposite location. Get angle of response.
- 4) The difference between angles from step 1 and step 2 is angle θ_1 as in Figure 8

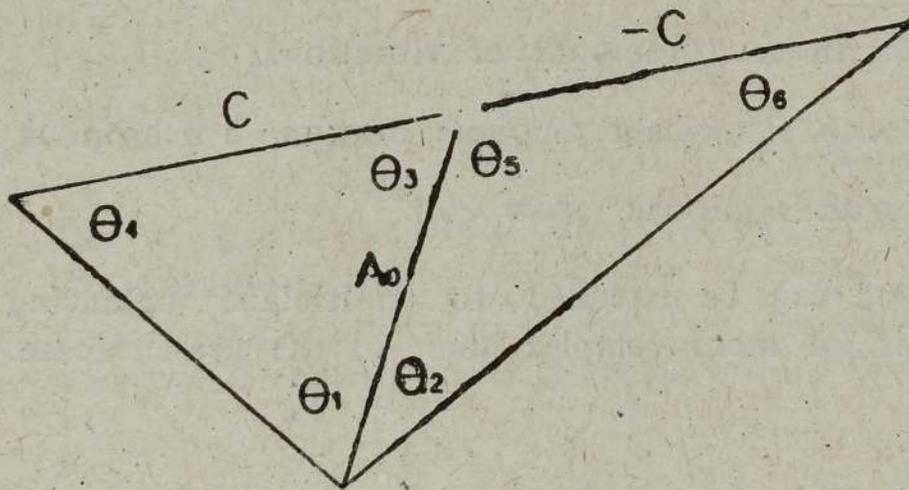
5) The difference between angles from step 1 and step 3 is angle θ_2 as in Figure 8

6) Calculate θ_3 from the equation :

$$\theta_3 = \cot^{-1} \left\{ \frac{\cot \theta_2 - \cot \theta_1}{2} \right\} \dots\dots\dots (2)$$



The geometry related to balancing with two equal calibration weights placed 180 deg apart, presented in the polar plot format



When balancing without amplitude θ_1 and θ_2 are known, θ_3 (or θ_5) and A_0/C must be calculated

Geometry Related to balancing with Phase only method
Figure 8

7) Calculate correction mass M_u from the equation :

$$m_u = m_t \times \frac{\sin(\theta_3 - \theta_2)}{\sin \theta_2} \dots\dots\dots (3)$$

Effective radius of m_u and m_t are assumed to be equal (ie. $e_t = e_u$).

- 8) Remove the calibration mass and place the correction mass at an angle θ_3 with the first calibration mass angle. To determine whether the θ_3 angle is measured in the direction of rotation or against the direction of rotation, sketch the results as in Figure 8

If \bar{A}_1 is against rotation from \bar{A}_0 , then θ_3 is measured against rotation from the original calibration mass angle. If \bar{A}_1 is in the direction of rotation from \bar{A}_0 , then θ_3 is measured in the direction of rotation from the original calibration mass angle. This will place the correction mass so that its effect is opposite to \bar{A}_0 .

5. Conclusions

In this paper the need for accurately balancing electric water pump sets has been emphasised. An inexpensive procedure is outlined for balancing, dynamic testing is required to obtain high quality balance. As the electric water pump set is self driving, all that is required is a flexibly supported platform on which the pump set can be mounted and run. Resonance vibration set up in the system corresponds to the unbalance present. The choice of the phase only method enables balancing to be done without expensive instrumentation. The pencil blancing technique, however, will run into difficulties:

- a) On machines with small amount of vibration.
- d) On machines with significant amounts of non synchronous vibration, and
- c) On machines with significant slow roll.

The method can be extended to multiplane balancing although the mathematics is lot more complex than in the present case.

TABLE 1

Balance quality grades for various groups of representative rigid rotors

Balance quality Grade G	ew ^{1 2} mm/s	Rotor types-General examples
G 4000	4000	Crankshaft drives ³ of rigidly mounted slow marine diesel engines with uneven number of cylinders. ⁴
G 1600	1600	Crankshaft - drives of rigidly mounted large two-cycle engines
G 630	630	Crankshaft - drives of rigidly mounted large four - cycle engines Crankshaft - drives of elastically mounted marine diesel engines
G 250	250	Crankshaft - drives of rigidly mounted fast four - cylinder diesel engines ⁴
G 100	100	Crankshaft -drives of fast diesel engines with six or more cylinders ⁴ Complete engines (gasoline or diesel) for cars, trucks and locomotives ⁵
G 40	40	Car wheels, wheel rims, wheel sets ⁴ drive shafts. Crankshaft - drives of elastically mounted fast four cycle engines (gasoline or diesel) with six or more cylinders ⁴) Crankshaft - drives for engines of cars, trucks and locomotives
G 16	16	Drive shafts (propeller shafts carden shafts) with special Parts of crushing machinery. [requirements. Parts of Agricultural machinery. Individual components of engines (gasoline or diesel) for cars, trucks and locomotives. Crankshaft-drives of engines with six or more cylinders under special requirements

Balance ew 1 2
quality mm/s
Grade G

Rotor types-General examples

G 6.3	6.3	Parts of process plant machines Marine main turbine gears (Merchant service) Centrifuge drums Fans. Assembled aircraft gas turbine rotors Fly wheels Pump impellers. Machine-tool and general machinery parts Normal electrical armatures Individual components of engines under special requirements Gas and steam turbines, including main turbines (merchant service)
G 2.5	2.5	Rigid turbo-generator rotors Rotors. Turbo-compressors Machine-tools drives. Medium and large electrical armatures with special Small electrical armatures [requirements Turbine-driven pumps
C 1	1	Tape recorder and phonograph (gramophone) drives. Grinding-machine drives. Small electrical armatures with special requirements.
G 0.4	0.4	Spindles, disks and armatures of precision grinders. Gyroscopes.

1) $w = 2\pi n/60 = n/10$ if n is measured in revolutions per minute and w in radians per second.

2) In general, for rigid rotors with two correction planes, one-half of the recommended residual unbalance is to be taken for each plane. These values apply usually for any two arbitrarily chosen planes but the state

of unbalance may be improved upon the bearings. (See 3.2 and 3.4)
For disk-shaped rotors the full recommended value holds for one plane
(see section 3)

- 3) A crankshaft - drive is an assembly which includes the crankshaft, a flywheel clutch, pulley, vibration damper rotating portion of connecting rod etc. (see. 3.5)
- 4) For the purposes of this international standard slow diesel engines are those with piston velocity of less than 9 m/s; fast diesel engines are those with a piston velocity of greater than 6 m/s
- 5) In complete engines the rotor mass comprises the sum of all masses belonging to the crankshaft-drive described in note 3 above.

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Language and Mental Ability

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How much do language and language structure affect the way in which people perceive issues and events and determine their meaning? Does language predispose the perceiver to use particular reasoning processes from which responses are generated? To what extent is one's psychological world - or Cognitive processes - a function of language?

To what extent could a man think his thoughts or engage in any abstract reasoning without a language framework to channel his Cognitive functions?

It appears that the relationship between language and reasoning is an intimate one. From the time a human infant begins to distinguish the features of his world, the relationships and roles of the people around him, and begins to form some conception of himself, he does so by using the words and language patterns which are supplied to him by the human society in which he is cared for and 'socialized'.

New knowledge, ideas, and other people's experience come to the human's attention mostly in the form of language. But the question is, does it make any difference which language? If language is so intimately tied up with thought and reasoning do different languages set the stage for differing formula in cognitive processes? That is, do different languages represent different psychological worlds?

In Anthropology, credit for starting a new approach to studying the relationship between language and thought has gone mostly to Benjamin Lee Whorf and to a lesser extent to his mentor, Edward Sapir.

Stuart Chase says Whorf came to believe that "all higher levels of thinking are dependent on language" and "that the structure of the language one habitually uses influences the manner in which one understands his environment".

We are thus introduced to a new principle of relativity, that is, people do perceive events, roles etc. differently as language differences conceptualize such matters in differing ways.

As evidence, the following was reported by a young Lady of French descent who worked as a secretary in a country in Africa. Staff meetings were held in either Arabic or French, or the men assembled might switch from one language to the other according to the subject. When the secretary had occasion to enter the room while they were speaking in French, they would always courteously rise. If, however they were speaking Arabic, they ignore her completely. Atleast there seems to be some relationship between a language used and feeling of being in the culture world of that language.

Whether culture or words came first to make the other is hard to determine. It is a 'chick-and-egg' process of reasoning. It is also not the issue. The fact is, they are intimately associated, and when a child begins to perceive his world and internalize his characteristic patterns of reasoning, he does so in terms of the word categories and linguistic ways of connecting ideas made available to him by the language of his group.

Curiously, little study has been made of what happens when a child goes through this process in two widely differing languages at once, and becomes bilingual from the time he starts to use language. Does such a person think normally in one language to the exclusion of the other? Some times in one, and sometimes in the other? depending on the subject and context of the thoughts or does such a person live in two different psychological worlds, switching from one to the other as he switches languages? Theorizing on the subject is long over due.

This aspect of comparative linguistics is in its infancy. Anthropologists and linguistics have moved close enough to just identify and name the field. They have not followed it to the depth sufficient enough to justify any theorizing.

The English language is subject-predicate: actor-action-result; subject-verb-object, sequence 'model' as are most of the Indo-European languages. This pattern is consistent with the English speaking peoples personality pattern, and this seems to underlie the success achieved by English - speaking societies in their highly productive, scientific economic system.

The fact that the English language structure is so congenial to the thought processes, which go with science management skills, business operations and the like, it is possible that people using languages less suitable to this kind of thinking are at a disadvantage in coping with the modern science-oriented world.

Children increase their ability to use abstractions as they grow old. It is not just the ability to engage in abstract thought itself that matters. What that ability to manipulate ideas and concepts abstractly in organized ways toward results, which can be brought back to bear on more concrete problems. For this facility, languages do seem to offer varying degrees of support.

There are more than 200 major languages in the world. With modern technology, languages around the world have tended to become more similar. Radio, television, Car, Coca cola, are incorporated in many languages, perhaps, with some phonetic adjustments to suit local tastes. Idea patterns to peculiar to English are beginning to have their counterparts in other languages, mostly by imitation. Diffusion of artifacts and customs from one culture to another will call for corresponding linguistic adjustments and since English language structure is congenial to thought processes we shall soon have idea pattern peculiar to English worm its way in to other models.

In any abstract reasoning vocabulary content of a language is a contributory factor helping lucid thinking and correct perception. But the ability to manipulate ideas and concepts abstractly in organized ways depend, not so much on the Vocabulary Content but on the idea pattern peculiar to a language. A general word for a thing with an imprecise generality may sometimes prove to be inadequate to say the exact nature of the thing, but that is not fatal as a clumsy idea pattern.

Vocabulary content varies from language to language. while most English speaking people except perhaps, ski enthusiasts, fare reasonably well with one general word for snow, certain Eskimo languages cannot operate with such an imprecise generality. Hence they have no simple word for "snow". Is the snow hard or soft, old or new, crystalline or fine powder? It is as though the various states of snow were not the same substance just as ice is not water. More exact words exist for the Eskimo, consistent with his need to percieve the exact nature of the snow.

Some Tamil language enthusiasts often say that Tamil is plentiful with exact words. English speaking people, except perhaps, the Botanist, fare well with two words, the bud and the flower. More exact words exist in Tamil, they say. Arumbu, Pothu, Mugai, Malar - for the different stages in the process of flowering.

We often find that although substantially equivalent ideas can be expressed in two languages. What is said efficiently and directly in one short word in one language may require a whole phrase in another. To be exact we might have to say in English. "my aunt on my father's side", or perhaps "my father's sister". In many other language, for instance as in Tamil. where relationships are taken more seriously, there is single word designate the relationship, and only that relationship. there seems to be a correlation between the shortness of a word and how specific it is, and its importance and frequency of use.

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Limits & Fits

For Interchangeability

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When two or more parts are mated to form an assembly, their dimensions and tolerances must fit together within predetermined limits. International standards express a system of dimensions and tolerances intended to form fits by a combination of letters and numbers. This system which is becoming increasingly popular, offers a range of technical and economic advantages. In design, the dimensions and tolerances of a desired fit can be quickly and consistently established with the help of tables. In manufacturing, planing is simplified, tooling and gauging equipment is held to a minimum quality is improved, and interchangeability is ensured.

The standardisation of limits and fits began in Europe more than fifty years ago. The most recent is ISO recommendation 286. Limits and fits are conventionally described in terms of shafts & holes. However, they can also be applied to keys and keyways. Fig I shows the definitions used in the standardisation of limits and fits. The Basic size is the nominal size of the mating hole & shaft to which deviations and tolerances are assigned. Deviation is the displacement of the surface of the part from its basic size. There are two deviations, the upper and the lower, and they delimit the width of the tolerance band.

The deviation lying closer to the basic size is the fundamental deviation. Its position with respect to the nominal size is designated by a lower-case letter for the shaft and an upper case letter for the hole. The Tolerance Grade is the spread between the two deviations and is expressed by a numeral. The smaller the number, the tighter the tolerance.

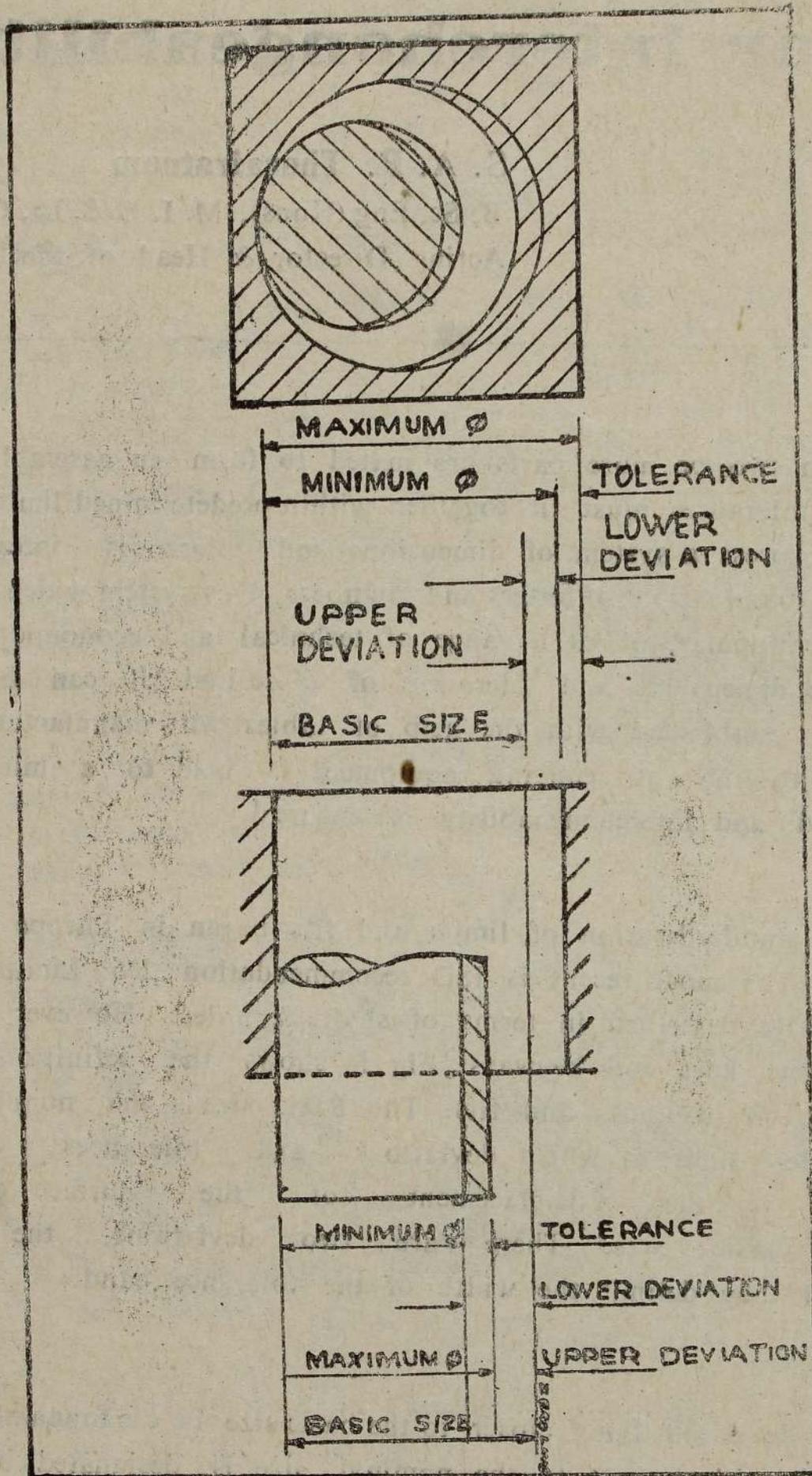


Fig. 1

Shaded Area represents tolerance zones.

Shaft or Hole basis

Several decisions must be made before the system can be used. The first is whether to establish the shaft or the hole as the basis, from which to work. With the hole as the basis, the fundamental deviation of the hole is zero and the allowance for clearance or interference is determined by the fundamental deviation of the shaft. If the shaft is the basis, the conditions are reversed. In industry, hole basis is overwhelmingly preferred, at least in part because holes up to a certain size are machined by fixed tools such as drills and reamers, and when the hole is the basis the number of necessary tools and gauges can be kept down. A hole 50 mm in diameter might be toleranced by the expression:

ϕ 50H7

H indicates that the fundamental deviation is zero, and the numeral 7 refers to the tolerance grade. Standard B4.2 provides 22 basic deviations each for the shaft and the hole: a to z plus js for the shaft and A to Z plus JS for the hole. There are 18 international tolerance grades IT01, IT0, and IT1 through 16. Again, the lower the IT number, the closer the tolerance. Fig 2 shows where the tolerance grades are applied to gauges fits, material and large machining tolerances.

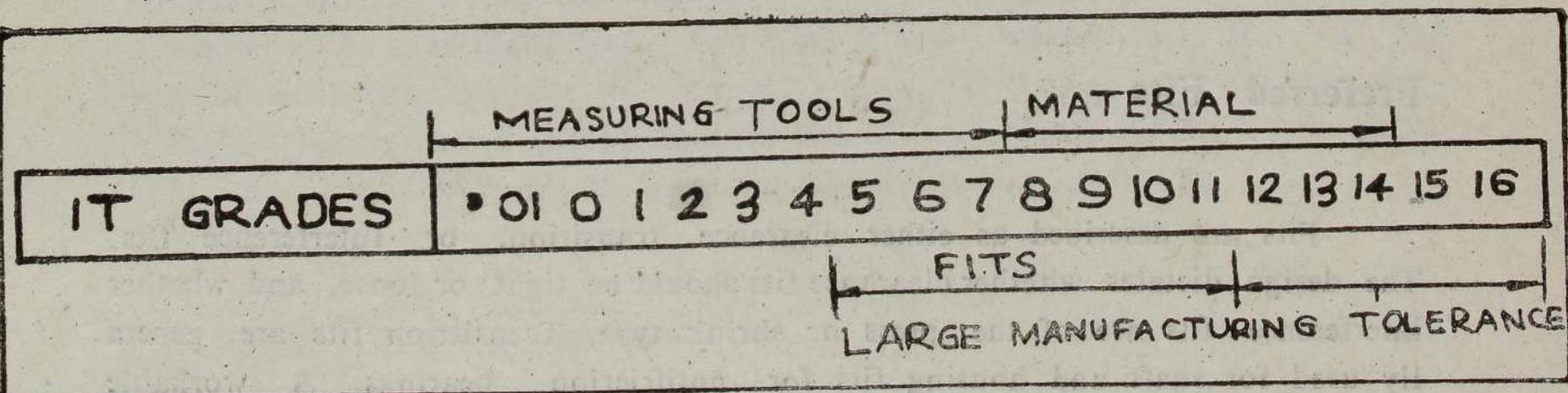


Fig 2

	IT GRADES							
	4	5	6	7	8	9	10	11
LAPPING AND HONING								
CYLINDRICAL GRINDING								
SURFACE GRINDING								
DIAMOND TURNING								
DIAMOND BORING								
BROACHING								
POWDER METAL SIZES								
REAMING								
TURNING								
POWDER METAL SINTERED								
BORING								
MILLING								
PLANING AND SHAPING								
DRILLING								
PUNCHING								
DIE CASTING								

Fig 3

Correlates the precision of various machining operations with the tolerance grades they can achieve.

Preferred Fits

Fits are described as either clearance, transition, or interference fits. The design dictates whether clearance fits should be tight or loose, and whether interference fits are of the press or shrink type. Transition fits are generally used for shaft and housing fits for antifriction bearings. A workable selection of ten preferred fits each on hole and shaft basis is provided for functional purpose. Those for hole basis are shown in the Fig, 4.

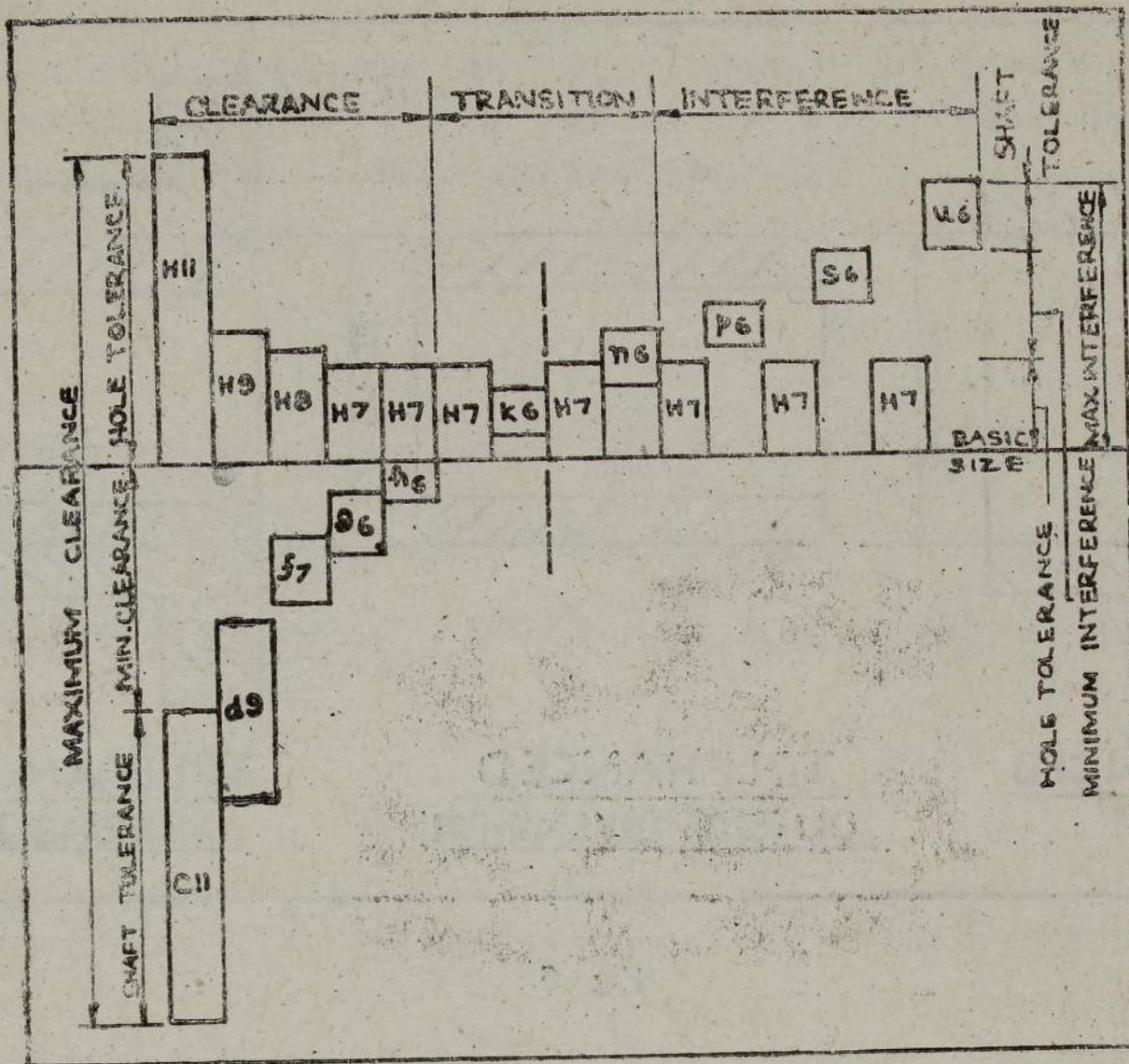


Fig. 4

The inscription of limits and fits on drawing is simple, clear and efficient. The bushing in Fig. 5 A shows a hole of 50 mm diameter with a fundamental deviation H, and a tolerance grade of 7. The symbols for the fit are placed slightly above the dimension. The pin in fig. 5 B has a nominal diameter of 50 mm fundamental deviation S and tolerance grade 6. In the case of shaft descriptions, the symbols are inscribed slightly below the dimension. The two work pieces can also be shown assembled as in fig. 6 C. With the combined limit & fit designations inscribed as shown.

Finally, showing limits and fits on drawings must be considered. The shop should not be burdened with making calculations or referring to tables that can be done by engineering or drafting personnel. It is therefore appro-

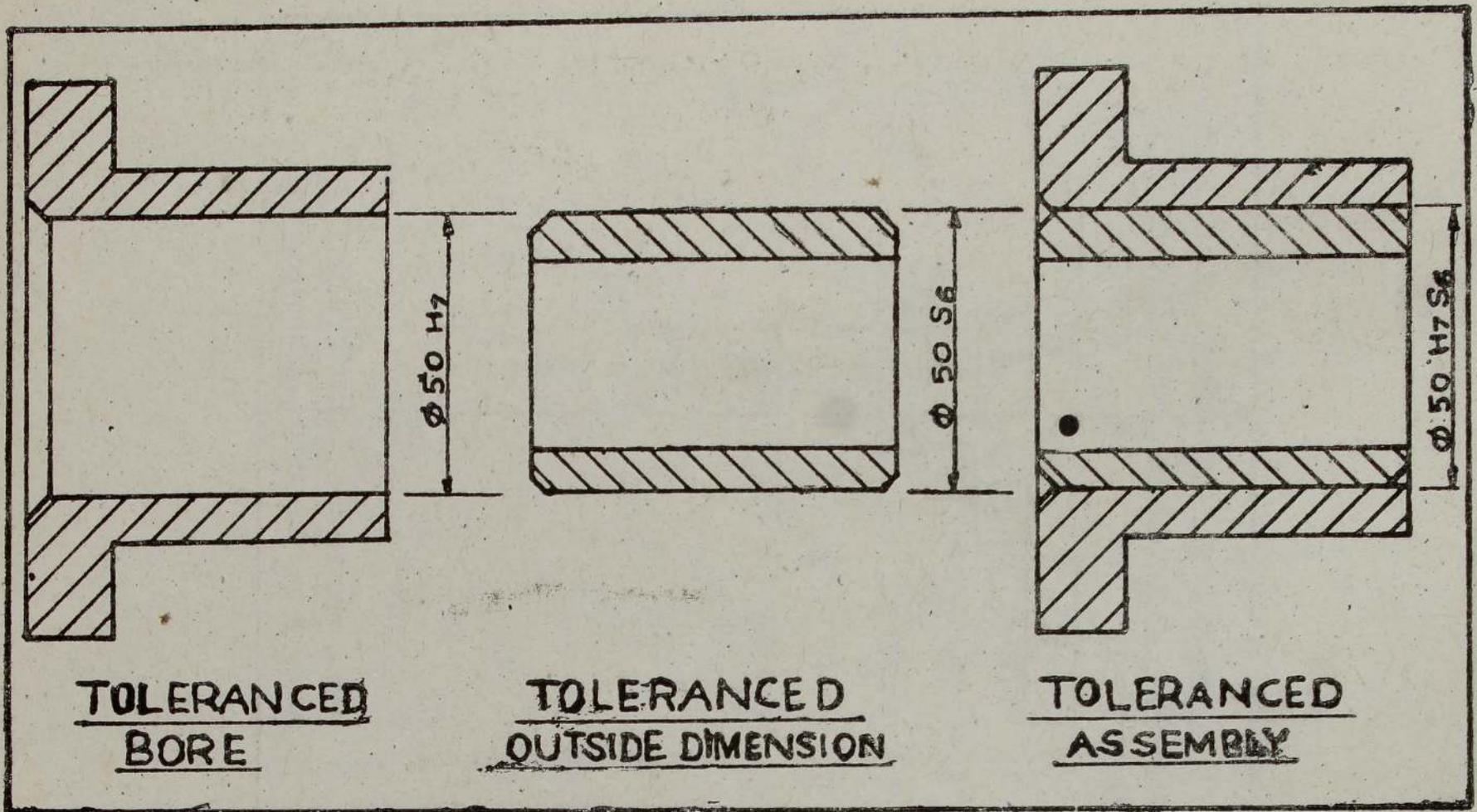


Fig. 5.

appropriate that dimensional information be shown, in addition to the symbols for limits and fits. There are two ways to do this.

$\phi 50$	H8	
	(50.039)	
	(50.000)	
	0_{τ}	
	ϕ (50.039)	
	ϕ (50.000)	($\phi 50 H8$)

One of these groups of parameters must be shown in parentheses for reference to avoid over dimensioning. The user should select one or the other form of inscription and make it the standard for the company.

Standards for limits and fits can be the basis for extensive improvements in the efficiency of engineering and design, manufacture, quality assurance, and use and maintenance of the product. In most industries, B4.2 is used without modifications; some have retained a few minor changes to

ease the transition from prior practices. A thorough and detailed evaluation of the international system of limits and fits should be of particular interest to industries planning to adopt metric measurements.

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பீடை கொல்லிகளால்

ஏற்படும்

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பயிர்ச் செய்கையில் பயிர்களுக்குத் தீங்கு செய்பவற்றைப் பீடை என்கிறோம். பயிர் வகைகளை பூச்சிகள், நுண்ணுயிர்கள், வட்டப்புழுக்கள், ஊர்வன, கொறிப்பன, களைகள் எனப் பல்வேறு பீடைகள் தாக்குகின்றன. பீடைகளைக் கட்டுப்படுத்த பீடைகொல்லிகள் பாவிக்கப்படுகின்றன. பீடைகொல்லிகள் விவசாய இரசாயனப் பொருட்களின் ஒரு தொகுதியாகும். இவை கூடியளவில் சேதன குளோரீன், பொஸ்பரஸ், காபன் ஆகிய இரசாயன பொருட்களை கொண்டுள்ளமையால் அதிநச்சுத்தன்மை வாய்ந்தவையாக உள்ளன. பீடைகளைக் கட்டுப்படுத்துவதில் மற்ற எந்த முறையையும்விட பீடை கொல்லிகள் விரைவாக செயல்படுவதுடன் உடனடிப் பலனையும் தந்தமையால் இதன் பாவனை காலத்துக்கு காலம் அதிகரித்துக்கொண்டே வந்தது. பீடை கொல்லிகளை தொடர்ந்தும் அதிகளவில் பாவிக்கும்போது நேரடியாகவும் மறைமுகமாகவும் மனிதனுக்கு பல தீமைகள் ஏற்படுகின்றன. பீடை கொல்லி பாவனையால் எமது நாடு மட்டுமல்ல உலகநாடுகள் பலவும் பிரச்சனைகளை எதிர்நோக்கியுள்ளன.

உணவில் பீடை கொல்லிகளின் தாக்கம்

பயிருக்குப் பீடை கொல்லிகளை விசிறும் போது பயிரில் சில பீடை கொல்லிகள் இலகுவில் மறைந்துவிடும். சிலநீண்ட காலத்துக்குப் பயிரில் இருக்கும். விவசாயிகள் பீடைக்கொல்லி உற்பத்தியாளரால் கூறப்படும் அறுவடை நாட்களுக்கு முன் பயிரையோ அல்லது பயிரின் பகுதியையோ அறுவடை செய்து விற்பனை செய்கின்றார்கள் இவ்வகையான உணவுப்பொருட்களை உண்ணும்போது பயிரில் தங்கியுள்ள பீடை கொல்லிகளின் கூறுகள் எமது உடலில் உள்ள கொழுப்புக்களில் திரள்கின்றன, முந்திரிகைப்பழத்தை விரைவில் பழுக்கவைப்பதற்கு ஒரு சில விவசாயிகள் பீடைகொல்லியை விசிறி 2, 3 நாட்களில் அறுவடை செய்கின்றார்கள். இதனால் பீடைக்கொல்லிகளின் கூறுகள் உறிஞ்சப்பட்டு பழத்தில் காணப்படும். வெண்டிபோன்ற 5 நாட்களுக்கு ஒரு முறை அறுவடை செய்யும் பயிர்சளில் நீண்ட காலம் தங்கும் பீடை கொல்லிகளைப் பாவிக்கும்போது வெண்டிக்காயில் பீடை நாசினிகளின் கூறுகள் காணப்படும் கத்தரியில் வெண்டியைக் கட்டுப்படுத்த சக்தி கூடிய அதிநஞ்சுத் தன்மையுள்ள பீடை கொல்லிகள் பாவிக்கப்படுகின்றன. இவ்விதம் பலவிதமான பயிர்வகைகள் குறிப்பிட்ட அறுவடை நாட்களுக்குமுன் பாவிப்பதால் பீடைகொல்லிகளின் கூறுகள்

ளைக் கொண்டுள்ளன. விவசாயிகள் குறிப்பிட்ட அறுவடை காலத்துக்குமுன் அறுவடை செய்வதைத் தவிர்ப்பதன் மூலம் அறுவடைப் பொருட்களில் நஞ்சுத்தன்மை அற்றுவிடும் சில பீடை கொல்லிகளையும் அவை விசிறி அறுவடை செய்யவேண்டிய காலத்தையும் நோக்கும்போது லெனற் 3-4 நாட்களிலும் காபரில், ரைகுரோ பொன் 7 நாட்களிலும் அறுவடை செய்யலாம். காபோமியூரூன், டைமீதேயிற்று, பெஸ்தியோன், மெதோமி டோபொஸ், மீதோமைல், மொனோதரொட்டபொஸ், பெஸ்தோயேற்று, புரோபெ னோபொஸ், குவினல்பொஸ் போன்ற பீடைகொல்லிகள் பாவித்து 14 நாட்களின்பின் அறுவடை செய்யலாம். அதேபோன்று புரோத்தியோபொஸ், ஏக்சிடேமற்றோன் மீத னில் 21 நாட்களிலும் அறுவடை செய்யலாம். நச்சுத்தன்மையுள்ள மரக்கறி வகைகளை சமைக்கும்போது அவற்றின் இயற்கையான மணமும் சுவையும் இருப்பதில்லை.

கொழுப்புகளில் மட்டுமல்ல, பாலிலும், கல்லீரலிலும் டி. டி. ரி போன்ற பீடை கொல்லிகளின் கூறுகள் அடங்கியிருப்பதை அறிந்துள்ளார்கள். இதற்கு ஐக்கிய நாடுகள் சபையின் உணவுவிவசாய நிறுவனமும் உலக சுகாதார நிறுவனமும் இணைந்து தினமும் உட்கொள்ளக்கூடிய கூறுகளின் அளவுகளை அறிவித்து எச்சரித்துள்ளார்கள். அயலிலுள்ள பயிர்களுக்குப் பீடைகொல்லிகள் பாவிக்கும்போது அவை காற்றில் கலந்து பயிர்களில் படியும்போது அகத்துறிஞ்சும் நாசினி வகைகள் பயிரினால் உறிஞ்சப்பட்டு பயிர் நச்சுத் தன்மையடையும் சந்தர்ப்பம் ஏற்படுகிறது. பயிர்களில் நஞ்சுத்தன்மையை ஏற்படுத்தும் பீடை கொல்லிகள் பயிரிலிருந்து மண்ணிற்குச் சென்று தங்குகின்றன. மண்ணில் பீடை நாசினி இரசாயனங்கள் தங்கியிருக்கும் சமயங்களில் அதே இடத்தில் பயிரிடும்போது மண்ணிலுள்ள பீடை நாசினி இரசாயனங்கள் மறுபடியும் பயிர்மூலம் எடுக்கப்பட்டு எமது உணவுடன் சேருகின்றன.

மச்சு எல்ம் நோய் கட்டுப்பாட்டுத் திட்டத்தில் உணவுச்சங்கிலித் தொடர் மூலம் மறைமுகமாக உணவில் பீடைகொல்லிகளின் இரசாயனக் கூறுகள் சேருவதை நிரூபித்துள்ளார்கள். மரம் ஒன்றுக்கு இடப்பட்ட டி. டி. ரி என்னும் பீடைகொல்லி மண்ணில் தங்கும் போது அங்குள்ள மண் புழுக்கள் அவற்றை உண்டன. பின்மண் புழுக்கள் உண்ட பறவைகள் இறந்தன. பறவைகளைப் பரிசோதித்த போது அவற்றின் மூளையில் டி. டி. ரி எஞ்சியிருக்கக் காணப்பட்டது. இங்கு மண் புழுக்கள் இறக்காமல் காணப்பட்டன ஒரு சில நாடுகளை தவிர அநேக நாடுகள் டி. டி. ரியை தடை செய் துள்ளமையால் அதிகளவு பிரச்சனை இல்லையாயினும் மற்றைய பீடை கொல்லி இரசாயனங்களின் பாதிப்புகளையும் அறியவேண்டும். பீடைகொல்லிகள் உணவின் மூலம் எமது உடலை அடைந்தாலும் இதுவரை உயிர் ஆபத்து ஏற்பட்டதற்குச் சான்றுகள் இல்லை. ஆனால் மார்பு நோய்கள், கொள்ளைநோய் என்பன ஏற்படுவதை எமது நாட்டில் அவதானித்துள்ளார்கள்.

பீடை கொல்லியால் நீரும் சூழலும் மாசடைதல்.

மண்ணைத் தொற்று நீக்குவதற்காகப் பாவிக்கப்படும் பீடை கொல்லி இரசாயனங் களின் கூறுகள் மண்ணில் தங்குகின்றன அதேபோன்று ஏற்கனவே கூறியவாறு பயி ருக்கு பாவிக்கப்படும் பீடைகொல்லி இரசாயனங்களின் கூறுகள் மண்ணில் தங்குகின்றன மண்ணில் பல வகையான நுண்ணுயிர்கள் மண் வளத்தைக் கூட்டுவதற்கு தொழிற் பட்டு நன்மை செய்கின்றன. இப்படியான நுண்ணுயிர்களின் தொழிற்பாடு சில பீடை கொல்லிகளினால் தடைசெய்யப்படுகின்றது. நுண்ணுயிர்களின் தொழிற்பாட்

டின்போது அனேகமான இரசாயன மூலக் கூறுகள் அழிக்கப்பட்ட போதும் ஒரு சில மூலக்கூறுகள் எதிர்க்கத்து நிற்கின்றன. சூரிய ஒளியினால் ஒளிப்பிரிகையடைந்தும் சில மூலக்கூறுகள் அழிந்துபோகின்றன. ஆயினும் குளோரினைக் கூட்டுப்பொருளாக கொண்ட பீடை கொல்லிகள் மண்ணில் அதிக காலம் இருக்கும். பின் இவை மழை பெய்யும் போது கீழ்வடிந்து ஆறு குளம் வாவினை அடையலாம். மண்ணரிப்பு ஏற்படும் போது ஆற்று நீருடன் கலக்கப்படுகின்றது.

காற்றில் பீடை கொல்லிகள் கலக்கப்படும்போது சூழல் மாக அடைவதுடன் நீரில் பீடை நாசினிகளின் மிகுதிகள் படிக்கின்றன. அதுமட்டுமன்றி நுளம்பை கட்டுப்படுத்துவதற்கு நீர் தேங்கியுள்ள இடங்களில் பீடை கொல்லிகள் பாவிக்கும் போது அந்நீர் நல்ல நீருடன் கலந்து விட சந்தர்ப்பம் உண்டு. பீடை கொல்லி உற்பத்திச் சலையிலிருந்து வெளியேறும் வாயு காற்றுடனும் சமீப திரவ நீருடனும் கலக்கப்படுகின்றது. இந்நீரை மனித பாவனைக்கு உபயோகிக்க முடியாததுடன் அதிலுள்ள உயிரினங்கள் அழிக்கப்படுகின்றன. மீன்வகையே கூடியளவு பாதிக்கப்படுகின்றது. பீடை கொல்லி சிதைவுறும் தன்மை அவற்றின் காப அமிலதன்மை, இரசாயன அமைப்பு வெப்ப நிலை என்பவற்றில் தங்கியுள்ளது.

பீடை கொல்லிக்கு எதிர்ப்புத் தன்மையுள்ள இனம் உருவாக்கல்.

பீடைகளை கூடியளவுக்குக் கட்டுப்படுத்துவதற்காக அதிக செறிவில் சிபார்சு செய்யப்பட்ட அளவை விட கூடியளவில் பீடை கொல்லியைப் பாவிக்கும் போதும் தொடர்ந்து ஒரே பீடை கொல்லியைப் பாவிக்கும் போதும் புதிய எதிர்ப்புத் தன்மையுள்ள சந்ததி பூச்சிகளில் உருவாகின்றது. 1965 ம் ஆண்டுக்கும் 1972 ம் ஆண்டுக்கும் இடைப்பட்ட 12 வருடகாலத்தில் 364 புதிய எதிர்ப்பு சக்தியுள்ள சந்ததிகள் உருவாகியுள்ளதாக ஐ. நா. சபையின் உணவு விவசாயஸ்தாபன புள்ளிவிபரங்கள் தெரிவிக்கின்றன. இப்படி உருவான புதிய சந்ததியைக் கட்டுப்படுத்த வலுகூடிய பீடை கொல்லிகளை பாவிக்க வேண்டியுள்ளது. இதனால் மனிதர்களுக்கும் மற்றும் உயிரினங்களுக்கும் பாதகமில்லாதிருக்கக் கூடிய பூச்சிகொல்லிகளை உற்பத்தி செய்வதற்கும் ஆராய்ச்சிகளுக்கும் கோடிக்கணக்கில் பணம் செலவிட வேண்டியுள்ளது. வடபகுதியில் வெங்காய தான் கோதிப்புழு. உருளைக்கிழங்கில் அழுக்கணவன், கத்தரியில் வெண்டா என்பன பீடை கொல்லிகளால் கட்டுப்படுத்த தமுடியாமல் விவசாயிகள் கஷ்டப்பட்டார்கள்.

புதிய பீடைகளின் தோற்றம்.

தீமை விளைவிக்கும் பூச்சிகளை பீடை கொல்லிகளால் கட்டுப்படுத்தும் போது தன்மை செய்யும் பூச்சியினங்கள் அழிக்கப்படுவதுடன் தீமை விளைவிக்கும் பூச்சிகளை இரைவாக உட்கொள்ளும் உயிரினங்களும் அழிக்கப்படுகின்றன. இதனால் இரை கொல்லிகளின் சமநிலை குறைந்து சாதகமான சூழ்நிலை ஏற்படும்போது கட்டுப்பாட்டிலிருந்து உயிரினமொன்று பீடையாக மாறுகின்றது. சில சந்தர்ப்பங்களில் சில பீடைகள் பீடை கொல்லியால் அழிக்கமுடியாத நிலையில் இரைகொல்லிகளின் சமநிலை குறைவதாலும் இவற்றின் பெருக்கம் விரைவாக ஏற்படுகின்றது.

உ + ம்:- பழமரங்களைத்தாக்கும் சிவப்பு சிலந்தி டி. டி. ரி போன்ற பீடை கொல்லிகளால் அழிக்கமுடியாதபோது சாதாரண பூச்சியாக இருந்து பின் பீடையாக மாறியுள்ளது இதேபோல் அண்மையில் யாழ்மாவட்டத்தில் கத்தரிப்பயிரில் சாதாரண நிலையில் தாக்கமில்லாது இருந்த வெண் ஈ இன்று கட்டுப்படுத்த முடியாத ஒரு பீடையாக வுள்ளது.

பரம்பரை அலகுகளை மாற்றுதல்

பீடை கொல்லிகள் சந்ததிசுவட்டையே (பரம்பரை அலகுகளை) மாற்றக்கூடியதாக உள்ளன, அண்மைக் காலங்களில் இது பூச்சி+ளில் அவதானிக்கப்பட்டுள்ளது. வளர்ச்சி யடைந்த நிலையிலுள்ள உயிரினங்களில் இன்னமும் இந்நிலை ஏற்படவில்லை. ஆனால் புதிய புதிய வலுக்கூடிய பீடை கொல்லிகள் தொடர்ந்தும் பாவிக்கும் போது மற்றைய உயிரினங்களிலும் பரம்பரை அலகு மாற்றம் ஏற்படலாம் என விஞ்ஞானிகள் கருத்துத் தெரிவித்துள்ளனர்.

பீடை கொல்லிகளால் நஞ்சுட்டல்.

விவசாயிகள் இவற்றை தகுந்த அறிவுறுத்தல்களின் பிரகாரம் பாவிக்காவிடில், கூடிய பாதிப்பு ஏற்படும். பீடை கொல்லி பாவிக்கும் போது புண் வெட்டுக் காயங்கள் இருக்கக் கூடாது, பாதுகாப்பு உறைகள் பாவிக்க வேண்டும், உற்பத்தியாளரின் அறிவுறுத்தலின்படி நடக்க வேண்டும். பானம்பருகுதலோ, புகைத்தலோ கூடாது. நீண்ட நேரம் பீடை கொல்லி தெளிக்கக்கூடாது. ஒதுக்குப்புறமான இடங்களில் இவற்றை வைத்துப்பூட்ட வேண்டும். வாய் மூக்கு என்பவற்றை சீலையால் மூட வேண்டும். அவதானக்குறைவு நடக்கும் போது நஞ்சுட்டப்பட்டு மரணம் ஏற்பட சந்தர்ப்பம் உருவாகும். அண்மையில் இணுவில் பகுதியில் (எமது நிறுவனத்தின் சுற்றூடல்) தோட்ட வேலை செய்த தொழிலாளர்களின் உணவுடன் நஞ்சு உட்சென்றதால் வாந்தியும் எடுத்து மயக்கம் அடைந்த இரு வேறு சம்பவங்கள் புதினப்பத்திரிகையில் வெளிவந்ததை நினைவு கூரலாம். உலகசுகாதார அறிக்கையின்படி வருடம் ஒன்றுக்கு 500,000 மக்கள் பீடை கொல்லிகளால் நஞ்சுட்டப்படுகிறார்கள். அபிவிருத்தியடையும் நாடுகளில் ஒவ்வொரு நிமிடமும் ஒருவர் நஞ்சுட்டப்படுகிறார். இலங்கையில் 1000 விவசாயிகளுக்கு 5 பேர் நஞ்சுட்டலால் வைத்திய சாலையில் அனுமதிக்கப்பட்டதாக சுகாதார திணைக்களபுள்ளிவிபரம் தெரிவிக்கின்றது. இலங்கையில் ஆண்டுதோறும் நஞ்சுட்டலால் 13000 நோயாளிகள் அனுமதிக்கப்படுகிறார்கள் எனவும் அதில் 1000 பேர் மரணமடைகின்றனர் எனவும் 1982 ம் ஆண்டு உலக சுகாதார ஸ்தாபனத்தின் அறிக்கை கூறுகின்றது இதில் 73 சத விதமும் தற்கொலைச்சம்பவங்களாகும். உபஉணவுப்பயிர்கள் கூடியளவு உய்யப்ப்படும் யாழ்ப்பாணம் வவுனியா, கிளிநொச்சி, மட்டக்களப்பு ஆகிய மாவட்டங்களில் விரிவான அளவில் பீடை கொல்லிகள் பாவிப்பதால் மற்றைய மாவட்டங்களை விட கூடியளவு நஞ்சுட்டல் சம்பவங்கள் நடைபெற்றுள்ளன. 1988 ம் ஆண்டில் 2000 பேர் நஞ்சுட்டலால் மரணமடைந்திருக்கிறார்கள். வைத்தியசாலையில் அனுமதிக்கப்பட்டு மரணமடைந்தவர்கள் மட்டுமே இங்கு குறிப்பிடப்பட்டுள்ளார்கள்.

பல்தேசிய கம்பனிகளின் விற்பனை உத்திகள்

இக்கம்பனிகள் கூடியளவு மேற்குலக நாடுகளைச் சேர்ந்தவை. இந்நாடுகளில் தடை செய்யப்பட்ட பீடை கொல்லிகளை மூன்றாம் உலக நாடுகளில் விற்பனை செய்கின்றன பல்தேசியக் கம்பனிகளுக்கு மூன்றாம் உலக நாடுகளில் துணைநிறுவனம் அல்லது சார்பு நிறுவனம் இருக்கும். உதாரணமாக இந்தியாவில் யூனியன்காபைட், இம்பீரியல் கெமிக் கல் இண்டஸ்த்ரீஸ் (I.C.I.) பேயர், ஹேஸ்ட் போன்ற நிறுவனங்களும் இந்தோனீஷியாவில் பேயர் I.C.I., டோ, செப்ரோன் போன்ற நிறுவனங்களும் பிலிப்பைன்சில் இப்படி 20 க்கு மேற்பட்ட நிறுவனங்களும் இயங்குகின்றன. இந்நிறுவனங்களுக்கு தமது நாட்டில் தடைசெய்யப்பட்ட பீடை கொல்லிகளை மூலக்கூறுகளாக அனுப்பி அங்குள்ள சூத்திர தொழிற்சாலைகளில் உற்பத்திசெய்து மூன்றாம் உலக நாடுகளுக்கு மீண்டும் ஏற்றுமதி செய்வதாக அமெரிக்க ஆராய்ச்சியாளர்களான டேவிட் வெயர், மார்க் ஷபிரே ஆகியோரால் கூறப்பட்டுள்ளது. அமெரிக்காவில் தடை செய்யப்பட்ட அல்லது கடுமையாக கட்டுப்படுத்தப்பட்ட பீ. எச். சி., டி, டி, ரி, போன்ற பீடை கொல்லிகள் இவ்விதம் இந்தியா, மலேசியா போன்ற நாடுகளில் தயாரிக்கப்படுகின்றது. எமது நாட்டிலும் மலத்தியன் டி, டி, ரீ போன்றவற்றுக்கு தடை விதிக்கப்பட்டபோதும் கறுப்பு சந்தையில் தேவையான அளவு பெற்றுக்கொள்ள முடிகின்றது.

பயிர்ச்செய்கையில் 30% செலவு பயிர் பாதுகாப்புக்குச் செலவிடப்படுகின்றது. பீடை கொல்லிகளின் விலை காலத்துக்காலம் பல வித காரணங்களை சாக்காக வைத்து அதிகரித்துக் கொண்டே செல்கிறது. விவசாயிகள் இதனால் பயிர் பாதுகாப்பாக அதிகளவு பணத்தைச் செலவிட வேண்டிய நிலையில் உள்ளார்கள். பீடை கொல்லிகளின் அதிகரித்த விலைக்கு ஏற்ப விளைபொருட்களின் விலையை அதிகரிக்க முடியாமல் விவசாயிகள் நட்டமடைகிறார்கள்.

இலங்கையில் பாவிக்கப்படும் 210 பீடை கொல்லிகளில் 110 இரசாயனப் பொருட்கள் உண்டு. வருடாந்தம் 7,00000 கிலோகிராம் நிறையுடைய பீடை கொல்லிகள் இறக்குமதி செய்யப்படுகின்றது இறக்குமதியின் போது ஏற்படும் அதிகரித்த அந்நியச் செலாவணியும் பீடை கொல்லிகளின் விலை அதிகரிப்புக்கு ஒரு காரணமாகும் அத்துடன் பீடை கொல்லி விற்பனை நிறுவனங்களின் இலாப நோக்கமும் எரிபொருளின் அதிகரித்த விலையும் பீடை கொல்லிகளின் விலை அதிகரிப்புக்கு காரணங்களாக உள்ளன

பீடை கொல்லிகளின் பல விதப் பெயர்கள்.

ஒரே இரசாயனப் பொருளைக் கொண்ட பீடை கொல்லிக்கு ஒவ்வொரு பெயரைச் சூட்டுவதன்மூலம் விவசாயிகள் பீடை கொல்லிகளின் தன்மைகளை அறியமுடியாமல் தடுமாறுவதுடன் பல சிரமங்களுக்கும் ஆளாகின்றார்கள்.

உ + ம் :-

பொதுப்பெயர் :

வர்த்தகப் பெயர் :

மொனோ குரோட்டபொஸ்

அசோட்ரின்

மொனோ குரோட்டபொஸ்

நியூவோக்குரோன்

பென்தியேன்

லெபசிட்,

பென்தியோன்.

பயடெக்ஸ்.

சட்டங்களை மீறுதல் :-

பீடை கொல்லிகள் சம்பந்தமாக பலவித சட்டங்கள் நிறைவேற்றப்பட்ட போதும் அவற்றைச் சரியான முறையில் கையாளுவதில்லை. இதற்குப் பல்வேறு காரணங்கள் இருந்த போதும் விவசாயிகளினதும், பீடை கொல்லி பொதி செய்வோர், விற்பனை ஊழியர் ஆகியோரினதும் நலன்களைப் பீடை கொல்லி விற்பனை நிறுவனங்களும் அரசாங்கமும் கவனிப்பதில் அக்கறை கொள்வதில்லை. பீடை கொல்லி நஞ்சிலிருந்து மக்களைப்பாதுகாத்தல், பீடை கொல்லி உற்பத்தி தொழிற்சாலைகளின் செயல்பாட்டில் அபாயமின்மையை உறுதிப்படுத்தல் தரக்குறைவான விற்பனைப் பொருட்களுக்கு நடவடிக்கை எடுத்தல் சரியான பீடை கொல்லி பிரயோசத்தை உறுதிப்படுத்தல் போன்றவை பற்றி சட்டங்களில் கூறப்பட்டுள்ளன அத்துடன் பீடை கொல்லியின் சகல விபரங்களும் பெயர்ச் சீட்டில் (லேபல்) குறிக்கப்பட வேண்டும்.

பீடைகளைக்கட்டுப்படுத்த பீடை கொல்லிகளைப் பாவித்துப் பழகிய விவசாயிகளால் உடனடியாகப் பீடை கொல்லி பாவனையைக் குறைப்பது இலகுவான காரியமல்ல. விளைவில் 17-60% வீழ்ச்சி ஏற்படும் இதனால் விவசாயிகள் பொருளாதார ரீதியாக பயிர்ச் செய்கையை மேற்கொள்ள முடியாமல் இருக்கும்.

இந்நிலையில் பீடை கொல்லிகளின் பாவனையைக் குறைத்து மற்றைய பீடைக்கட்டுப்பாட்டு முறைகளான பயிர்வராமரிப்பு முறை, பொறிமுறை, உயிரியல்முறை, சட்ட ஒழுங்குமுறை, பீடைக்கு எதிர்ப்புத்தன்மையுள்ள புதிய பயிர்வர்க்கங்களை உற்பத்தி செய்தல் ஆகியவற்றை ஒரு திட்டமிட்ட ஒழுங்கில் ஒன்றிணைந்த பீடைக்கட்டுப்பாட்டுத்திட்டத்தை நடைமுறைப்படுத்துவதன்மூலம், நாம் பீடை கொல்லி அபாயங்களைத் தவிர்த்துக் கொள்ளலாம்.

விவசாயம் என்பது ஒரு போராட்டம். அதில் வெற்றி பெற சகல துறையினரின் ஒத்துழைப்பும் விவசாயிகளுக்கு அவசியம். விவசாயிகளின் நலனை பாவனையாளரின் நலனாக அமையும்.

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Fighting the Water Crisis in Israel

Mary Stewart Krosney

As temperatures soar in America's midwest and scientists announce alarming evidence that the world is becoming an overheated "greenhouse", the question of water supplies throughout the world is becoming a burning issue.

Israel, a small country which is two thirds desert, has struggled with water problems for the past half century. The struggle has paid off in innovative developments which have not only stretched Israel's precious water supply, but have influenced water management in dozens of countries.

The main water sources in Israel are the Jordan River and the Sea of Galilee in the north. They are connected to the dry south by a large national water carrier, which incorporates a series of wells along the coast. The wells and aquifers are replenished annually with run off water caught from winter rainfall. In this way Israelis hope to avoid alarming situations most strikingly seen in the declining productivity of the great Oglalla aquifer which irrigates North American wheat fields from Saskatchewan to Texas. Refilling underground reservoirs also prevents land collapses, which occurred several years ago in Florida, swallowing up homes and leaving huge craters.

In order to keep pace with the country's growing water needs—and Israel use some 95% of its available water - increasing number of determined scientists have entered the picture. Israeli researchers are looking into the sea, brackish underground reservoirs and passing rain clouds for answers. They are developing crops that can grow on saltier water. They are making use of sewage water intelligently and safely. They are engineering computer controlled water saving irrigation equipment, which is sturdier and cheaper. No less important are the interesting studies going on into how Nabatean man, living centuries ago in the Holy Land, managed on minimal rainfall.

"Desalinization has to be made more efficient and less costly," says an official of Tahal, Israel's water management company. But, he says, good progress is being made in that direction, pointing to Israel's Red Sea port of Eilat, where desalinated water is integrated into the town's water supply. In Eilat the reverse osmosis desalinization filter is successfully in use. Scientists continue to work on the "zarash" method (Hebrew initials for "multi

stage flash process'), in which sea water is used to cool electric generating stations the resulting hot water evaporates and is condensed as distilled water.

The use of the sea doesn't stop with desalinization. Agronomists are developing many crops — from tomatoes to cotton — which not only tolerate, but thrive on brackish water pumped from under ground reservoirs in the desert. Encouraged by such horticultural successes, Professor Dov. Pasternak of Ben Gurion University in Beersheva is growing nutritious, edible plants on Mediterranean sea water. Human beings wouldn't eat them, but sheep and camels do. Professor Pasternak and his team are currently studying 150 species of plants irrigated by sea water.

Sewage produced by more than four million people is another major source of water, says Shaul Arlosoroff, former deputy director of Israel's Water Commission. Israel has built a large sewage treatment plant not far from Tel Aviv for the treatment of waste water in stages. The resulting water is "of a quality that meets drinking water standards", although the reclaimed sewage water will be used only in agriculture.

Israelis have been seeding clouds for many years in an effort to increase rain fall. Researchers in this area, such as Professor Avraham Gagim at the Meteorological Department of Jerusalem's Hebrew University, have succeeded in coaxing 15% more rain from the clouds in certain parts of Israel. Using crops dusting planes, Israelis select the most promising clouds and batter them with silver iodide from above and below. From the ground, silver iodide is sent up through vast batteries of generators located throughout the country. In winter months, the only time serious rainclouds are seen here, radio listeners hear the mystifying instructions at the end of some news broadcasts. "light the stoves", referring to the funny-looking devices with smokestacks, an important part of the rain making scheme.

Agriculture, crucial to Israel's export market, eats up a lot of water. To make the most of each drop, Israeli farmers and gardeners are literally watering their crops in droplets. Kibbutz fields, private and public gardens throughout the country are striped with the black polyethylene tubes for "drip irrigation," a method engineered here in the 1960s. Precise amounts of water are delivered by drippers directly where plants grow. Roots get more water and less is lost to evaporation — effecting dramatic savings.

Tomato yields, for instance, have increased fourfold with drip irrigation, in comparison with produce watered by conventional sprinkler systems. Not only were losses due to evaporation or wind dramatically reduced, but plant leaves, untouched by water, are more resistant to disease, and saline water can be used for irrigation without affecting them. Another beneficial aspect

of drip irrigation is "fertigation", simply injecting liquid fertilizers into the source water during irrigation. which achieves not only better growth but reported savings of up to 30% on fertilizers.

Computers controlling all kinds of irrigation have been used in Israel for some time. Individual kibbutzim and settlements employ sophisticated computer programs which help determine when and how much water to deliver to crops, but not before special sensors in the field have gathered information about wind direction and ground moisture.

Getting back to Biblical Israel, how *did* ancient civilizations manage to support sizable populations in desert cities without all the benefits of cloud seeding, sewage recovery, water-saving irrigation equipment and desalination? Researchers at the Desert Research institute of Ben Gurion University have unearthed systems dating back to Solomon's reign. These early watering programs involved a series of stone conduits which directed unabsorbed rainwater from hillsides into terraced farms and catchment basins. In regions of the northern Negev, which normally can support little more than sparse grasses, ancient irrigation practices are today back in service, bringing water to field of luscious apricots and peaches, high yields of pistachios, dates and almonds, and bountiful crops of wheat and barley.

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SRI LANKA HYDRO

In this article on the Samanalawewa project, the 'International Construction' looks at its history, organisation and the technical challenges of difficult ground conditions facing the contractors.

1

Joint venture arrangements for major projects are becoming commonplace as the demands and risks for individual companies become too high. But it is one thing to go in with an agreed partner: quite another to find that, mainly because of funding arrangements the project is developing into an interlocking network of contracts involving companies from other countries known to one another only by reputation. This is what has happened on the Samanalawewa hydropower project in Sri Lanka.

The hydropower potential of the rivers flowing from the southern edge of Sri Lanka's Central Highlands has been the subject of several studies. The first was in 1961; another followed in 1973. In 1975, Russian engineers undertook an extensive and more detailed study at Samanalawewa, but by this time attention was shifting to the much larger Mahaweli project, and the plans for the Sam Dam went back on the shelf. But in 1982, the UK consultants and contractors for the Victoria Dam, Sir Alexander Gibb and Partner, Balfour Beatty International, were invited by the Ceylon Electricity Board to put together a finance, design, build package for Samanalawewa.

After a 12 month study, the consultants came up with a scheme which basically followed the lines of the Russian proposal - a 100 m high rockfill dam just below the junction of the Walawa Ganga and one of its tributaries the Belihul Oya, with an intake 6 km upstream of the dam on the Walawa, taking water through a 5.25 km long tunnel to a power house in the valley of the Katupal Oya. There is a drop of about 300 m between the two valleys, and the scheme included the further possibility of a dam on the intervening Diyawini Oya to provide additional generation.

Having concluded that the scheme was feasible, financing was sought. It was hoped that this would come from the UK but in the event UK funding was restricted to the design work, power tunnel and power house. Funds for the main dam were eventually obtained from the Japanese government.

What emerged was a six lot project. Lots I and II the twin diversion tunnels and embankment dam were to be constructed by joint venture Japanese groups (Hazama-Kumagai for Lot I, Kumagai - Hazama - Kajima (KHK) for II). Lot III, the power tunnel, power station and access road, went to Balfour Beatty. There was a similar division over the M and E work. Mitsui is supplying turbines, GEC the generators, transformers and switchgear, Gates valves and penstocks are being supplied by a Japanese joint venture of Sumitomo, Mitsubishi, and Marushima. Gibb remain as design engineers, with Engineering and Power development Consultants of the U.K. Supervising Engineer is another joint venture, linking Nippon Koei of Japan and Electrowatt of Switzerland, who reviewed the initial proposals on behalf of the client. CECB of Sri Lanka is also assisting the client.

Complex organisation

What had started therefore as a comparatively straightforward arrangement ended as a complex organisation involving six contractors, power and five consultants from four different countries, each with their own priorities, programmes and organisation structures. If the project was to be completed successfully, all these had to work together harmoniously. The unusual - may be unique - step was therefore taken of appointing one of the contractors, Balfour Beatty, to the additional role of Co-ordinating Engineer, to make sure as one of the engineers says, "that all the bits fit together at the right time in the right place"

Adding to the problems, the location, about 160 k m from Colombo, is in a remote area with few roads, and the sites of the dam and power house are separated by some 11 k m of ridges and valleys, covered by thick jungle. Even to gain access to the site required a sizeable road building programme with some 30 k m of new roads on the tunnel and power house contract alone. Larger items of construction equipment had to be brought in piecemeal and assembled on site.

There have also been design changes. The geology of the area is complex consisting of very old metamorphic rocks with some layers of limestone, much folded, faulted and weathered but dipping generally towards the north. The earliest concepts proposed a single diversion tunnel to pass through the right abutment of the dam, but investigations revealed some karstified lime stone formations, so the tunnels were switched to the left side of the valley. Gibb's original design had an underground penstock shaft, with possible problems of geology in mind this was changed to a surface penstock. This in turn meant moving the power tunnel outlet to a point about two thirds of the way up the escarpment above the Katupal valley, changing the line of the tunnel and resiting the surge chamber.

All this took time. Balfour Beatty, with their work on Victoria nearing completion and the roads to build, were keen to start. Completion of the diversion tunnels on time was a key factor in starting work on the main dam, if the project was to meet its target of impounding by January 1991.

Balfour Beatty mobilised on 1 January 1987, and by May had started on the excavation of the adit of the downstream end of the power tunnel. At this stage the only access was by a rough track which zig-zagged down from the top of the escarpment, in places on a slope of 1 in 3 and impassible in the wet.

The Hazama/Kumagai joint venture started work on the diversion tunnel at the end of November 1987, and river diversion took place in May 1988. In April this year KHK started work on preparing the dam abutments.

In the meantime, the organisation for running the contract began to take shape. In the early stages this was made more difficult by the lack of communication between the dam and power house sites, but by July there was an unsurfaced road between the two.

The lines of communication between the various groups also had to be established. There were some language problems, differences of social patterns and philosophy, and a certain wariness in regard to the dual role of Balfour Beatty. Since June this year the position of interface liaison has been held by Stuart Copland, who describes his job as requiring the skills of a diplomat as well as an engineer.

Keeping the project on schedule is a prime responsibility. Each month progress is reviewed at a meeting of all parties, on the basis of the information Copland gathers in the preceding days. This ensures that everyone involved is kept informed of the situation on each section of the work.

Flow charts

One of the most useful tools in keeping track of the various sections and pinpointing potential trouble spots, is a series of flow charts produced in Balfour Beatty's Croydon head office. These identify the various activities and their sequence, which contractor is responsible and the stage at which contractor takes over from another. They also pinpoint the critical activities which, if not completed on time, will affect overall progress. "They aren't in any way contractual documents", Copland emphasises, "but if anyone is slipping behind they can see this well in advance and we hope, in time to catch up". These visual presentations have been particularly valuable in explaining matters to those for whom English is a second language.

As the project progresses, Copland's task is likely to become more difficult. There have already been problems on the tunnel and certain difficulties with the dam abutments, and more cannot be ruled out. But at least the foundations, in all senses, have been laid for co-operation on a successful venture.

II

The geology of Sri Lanka seem to be consistent only in its unpredictability. This was apparent on the Mahaweli scheme, and similar problems have arisen on both dam and power tunnel at Samanalawewa.

The rock in the area is a mixture of gneisses, granulites and quartzites, some hard abrasive and mica rich, but in places heavily weathered and decomposed. There are also layers of karstic limestone, and all the strata are twisted, tilted and folded, with a number of fault zones.

The design of the dam specifies a claycored rockfill structure, 100m high and with a crest length of about 530m with a spillway on the left bank. The strata dip across the line of the dam, but it was expected that the rock

on the left abutment would be good. This was confirmed during construction of the twin diversion tunnels, which were completed by contractors Hazama-Kumagai JV with few problems.

On the right abutment however, the situation is very different. Deep bands of weathered rock dip into the hillside, and the possibility of cavities and decomposed areas in the limestone has already been detected. Control of seepage is therefore a critical aspect of both design and construction. An extensive programme of grouting has been specified, which it is estimated will involve a total of 110,000 lin.m. of holes drilled. Seepage on the left side will be controlled by a conventional grout curtain, and beneath the core of the dam, where there is an area of more permeable rock, a concrete cut-off trench with another grouting gallery running the full length of the embankment will be constructed.

Currently dam contractor KHK (Kumagai-Hazama-Kajima JV), is driving four adits into the right abutment. These will be used as grouting galleries, linking up with that under the main embankment. Where areas too large for conventional grouting are found, the specification requires the use of a technique known as jet flushing, in which high pressure air or water is used to remove the loose material and replace it with concrete. The technique, which uses equipment from Koken, has been used in Japan, but rarely elsewhere. Remote control TV cameras will be used to monitor the operation.

When IC visited the site, the two lower adits were completed and the other two under way, but the possibility of extending their length was under discussion. The main activity however, was at the spillway and on the coffer dam which will be incorporated into the structure of the main dam.

Excavation of the spillway headworks was nearing completion. A landslide at the upper end had meant that it had been necessary to cut back further than expected to reach good rock, and some slope stabilisation work has been necessary. In all some 46,000m³ of rock has been moved.

The first concrete pour was under way. Initially only the small batching plant used for lining the diversion tunnel was available, but a much larger one, plus a massive crushing and screening plant has been constructed for the main works.

The coffer dam was also a hive of activity. KHK were working to a deadline of 403 m elevation by the end of October, so that the main site can be protected against the rise in river levels which follows the onset of the monsoon in late October. A fleet of 14 25 t Mitsubishi trucks carries clay from the borrow pit about 3.5 km upstream on the Belihul Oya, and Cat 773B dumpers - KHK has 13 on site - bring the rock from a quarry which has been developed on the left bank. Latest information is that the coffer dam reached the 403m point ahead of deadline.

Cat equipment is conspicuous on site. In addition to the dumpers, there are five D9L bulldozers, plus two D8Ls, three D7 HRs and two D7LGP's plus backhoes, 992C wheel loaders and a 977L shovel. Two of the six rollers are also Cat, the other four from Tokyo Ryoki, who also supplied the drill for the quarry. The other five drilling machines on site are Furukawa C-300s

Tunnelling problems

While work on the dam is in its early stages, the power tunnel and power house construction have been under way for some time. Understandably, Balfour Beatty here have seen the worst of the rock problems.

The initial excavation of the downstream adit portal had to be made by workers suspended on ropes from the escarpment, but discovery of a possible, though difficult route down the slope, meant that work could be speeded up.

It had always been intended to work from both ends, with the major portion of the tunnel constructed from the downstream end to take advantage of the gradient for drainage. Initially this strategy worked well: progress on the adit reached 56 m one week, and excavation of the penstock tunnel averaged about 30 m a week. Skanska's raise boring team was brought in for the 2m diameter pilot to the surge shaft, and holed through in a matter of 2 weeks.

Working three 8 hr shifts, six days a week with 15 two-man hand drill teams on a 3 deck platform, the upstream drive started well. The rock was good, though very abrasive and by mid-September 1987 the tunnel was

two months ahead of schedule. It was at this point that the contractors hit the first of the fault zones.

Faced with difficult ground and sudden water inflows, progress slowed dramatically. Heavy support had to be installed, and in one particularly bad section pilot bores, and heading and benching had to be used. A short section of good ground was followed by even worse conditions. Massive water inflows and solution cavities alongside the line of the tunnel again required heading and benching.

With such difficult ground, progress slowed to a few metres a week at best, and one 100 m length took 15 weeks. But again the rock improved and the contractors were able to forge ahead. In one week 63 m was achieved including a best day of 14 m -- a progress rate which Balfour Beatty believes has never been bettered in Sri Lanka. It was at the end of this week that again the ground deteriorated, and when I C visited the site workers were inching their way through material which was more like soil than rock.

Water inflows have also been a problem. Although it had always been known that there would be some waterbearing strata, it has been the suddenness and volume of the flows which has been hard to handle. At one point over 550 l/s were flooding in from the walls, and roof of the tunnel. Flow has now stabilised at about 350 l/s at the portal, and levels are being kept at bay by a range of Flygt pumps including four of the biggest submersible produced by the company.

On the downstream drive from the intake water has not so far been the problem -- just the nature of the ground. Large areas of completely weathered rock have needed more substantial support than forecast and John Redman, BB's Project Manager describes progress as "a steady slog". Virtually every metre of the 800 m so far driven has needed support of some kind.

The water inflows, poor rock and much heavier support systems needed took time to deal with and by the end of 1987 a new target rate had to be considered. It is hoped that an accelerated programme and a revised method of tunnel lining will limit the effects of the delay enabling the contractor to meet the dam impounding date of end December 1990.

On the powerhouse and penstocks. work has been easier, though the extremely abrasive nature of the rock has caused problems for Plant Manager, David Pilkington. It is so harsh that standard buckets on the Cat loaders wore out in a week, and these have now been stiffened up with 25 mm plate.

BB have on site some \$ 11.5 million of equipment, a mixture of new and second hand plant including a Goodwin Barsby crusher, two Alimak tower cranes, two 50 t Grove / Cole mobile cranes and a wide selection of caterpillar earthmovers. Drill rigs are from Ingersoll Rand and Meyco have provided the shotcreting equipment for the tunnel.

Both dam and tunnel still have a long way to go and the extent of the problems which may face them are still unknown.

RESERVOIR

Catchment area 341.7km², average run off 598 million m³.
Live storage above min. operating level, 254million m³.

DAM AND SPILLWAY

Rockfill, clay core dam, crest length 540 m, height 100 m.
Volume of fill 4.5 million m³ Spillway capacity 3,600 cumecs
Diversion tunnels: 2 x 550 m long, 6.8 m dia., 1,450 cumecs capacity

POWERHOUSE AND TUNNEL

Low pressure concrete lined tunnel: length 5,410 m, dia. 4.5 m
Surge chamber: height 94 m ; dia. 6.0 m
Penstock: length 840 m, diam. 4.5 - 2.85 m
Surface power station: 2 x 60 MW Francis turbines.

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Free Hand Drawings

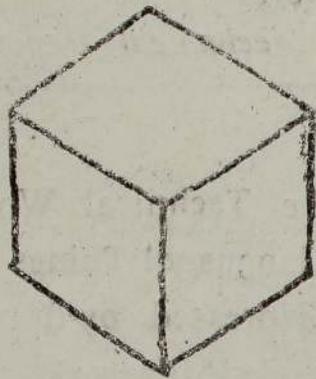
S. K. Xavier

Lecturer, Mechanical Department

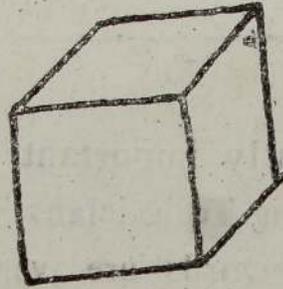
Drawings play a paramountly important role in the Technical World as a means of communication among Technicians; that is a language! Things that are difficult to be expressed by words are very easily expressed by drawings. As a language, drawings need to be learned, read, expressed (drawn), understood and interpreted. There are many ways in which this is accomplished in drawings and basically they could be classified into three. One of them is *free hand drawings* also known as sketches which will be dealt with in this article. The other two are *orthographic projections* where two, three or more of the principal views of the object are arranged in a specified manner and *pictorial projections* where a single view is used to express two or three faces of the object.

Free hand drawings are produced without using any guides or instruments other than pencil, eraser and paper. Even though it does not conform to the standard Engineering Drawings drawn to a scale, the essence is still preserved, viz, to act as a means of communication. Infact, owing to its non-requisition of accurate measurements which enables a speedy development and presentation. it can be said that free hand drawing is relatively a quick and easy way to express ones ideas.

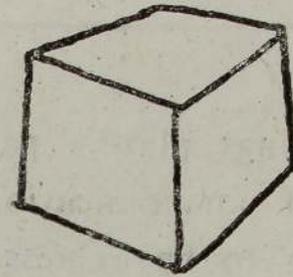
There are many types of free hand drawings and basically could be categorised into two, namely *pictorial sketches* and *single view sketches*. The pictorial sketches are those in which two or three faces of the object are shown. This can be classified into three, namely *isometric sketches*, *oblique sketches* and *perspective sketches*. In the isometric sketch, the object is made to appear with equal expression of the visible faces, none of them having true shape or size and equally appear distorted. In the oblique sketch, prominence is given to the required face by making it to appear to its true shape & size and the other faces are shown just shading away from it. The perspective sketch will express an object just as it would appear for a naked eye; ie, views at farther and from the eyes will appear converging. Fig 1 (a), (b) & (c) illustrate these three in expressing a cube.



(a)
ISOMETRIC
SKETCH



(b)
OBLIQUE
SKETCH



(c)
PERSPECTIVE
SKETCH

Fig. 1

In the single view sketch, only the prominent view of the object is drawn. These sketches are mostly used for first objects, primarily having two dimensions; ie, the third dimension is of insignificant size compared to the other two. If, for instance, we try to draw the object in a pictorial view, the third dimension will have a narrow line or strip and thus will have very little value in describing the object.

Now having known the different types of the sketches, the natural tendency would be to long for the 'how' of it. In sketching both pictorial & single view objects, there are basically three steps namely Modification, proportionalising, and setting out. Modification implies the simplification of complicated shapes, conveniently and understandingly done, as a combination of simple regular shapes like circles, triangles, polygons, spheres, cylinders etc. The second step, proportionalising, is closely observing the object and grasping it into our minds noting the rough proportions of such simplified shapes. This develops in getting a very good eye estimation. Having done the above two, the third step will be to set about drawing. In setting out to draw pictorial sketches, one has to be very familiar with some of the basic regular shapes which usually occur. Fig. 2 shows some of these in free hand sketch.

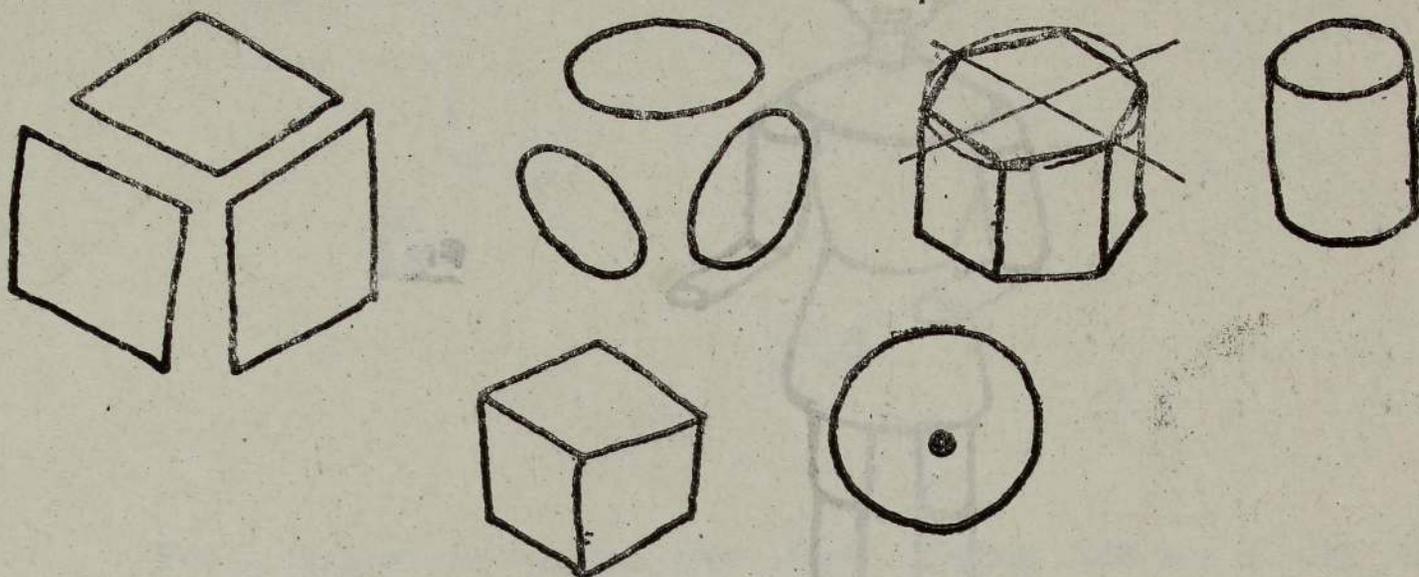


Fig 2

Having this familiarization, the first important step in setting out is to draw the mass shape (or overall shape) of the object. This could sometimes be even a basic shape onto which the others will be built upon, to give the appearance. After having drawn the overall shape, the details should be drawn. In doing this also, the largest details should first be drawn & the small ones added consequently. Consider the following examples in Fig. 3.





Fig. 3

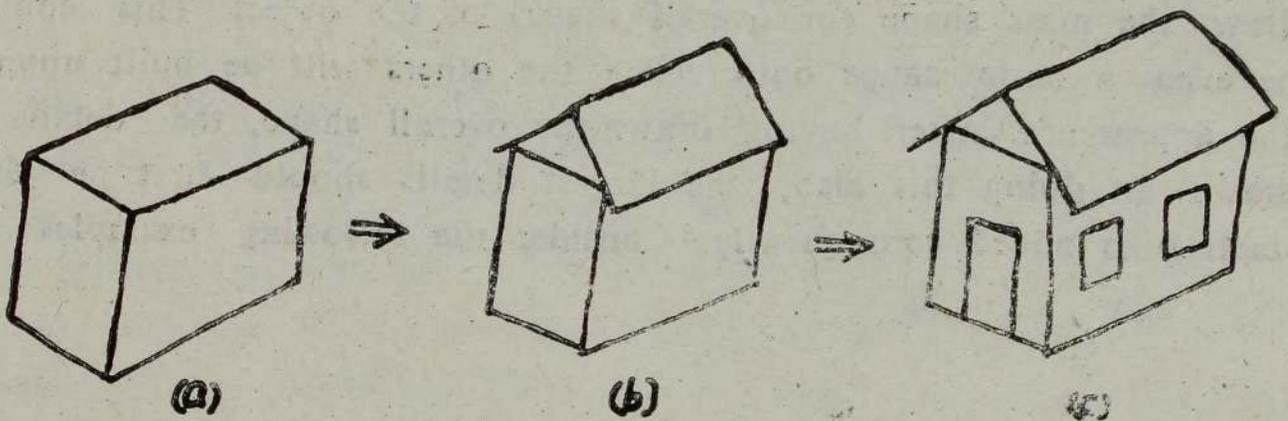


Fig. 4

Figure 4 illustrates how the fig. 3 (a) is drawn. Notice the mass shape in Fig 4 (b) & how details are added in Fig. 4 (c). The reader could try the other three in fig 3

In setting out to draw the single view sketches, the procedure is the same; ie, moving from mass shape towards the details. These are relatively simple and can be drawn as close as possible to the accurate proportion, Fig. 5 illustrates how a tri square is drawn.

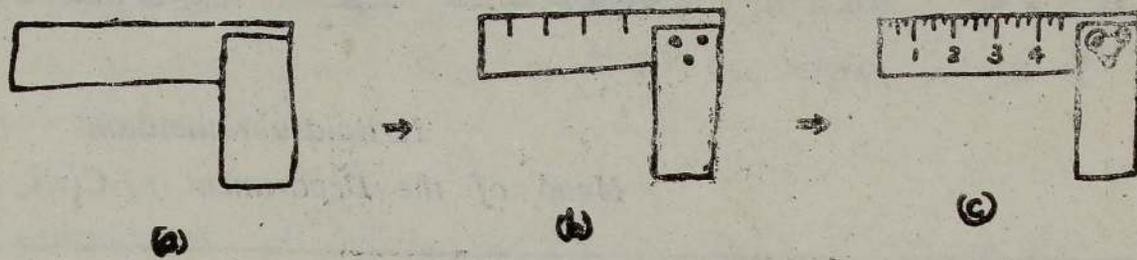


Fig 5.

For a better sketch, the mass shape & other add ups should be first drawn in light thin lines, using single strokes. Once the complete overall shape is drawn with details appearing, then the visible lines could be darkened. In doing these, the body position should be erect and the fingers should be as close as possible to the tip end of the shank of the pencil. The elbow should rest comfortably and thus a larger table is preferred. Starting from single view sketches and moving towards the advanced pictorial sketches, any technician can become an effective communicator and handle with appropriate sketches.

Chloride Salts in Concrete

I. Balasubramaniam

Head of the Department of Civil Engineering

The most convenient method of achieving an enhanced early strength in concrete is to add calcium chloride to the mix and quantities of upto 1%, 2% or even 3% by weight of the cement have been considered acceptable. However, recent evidence on the weathering of buildings and corrosion of reinforcement suggests that chloride in concrete may present problems to the industry which, although not as dramatic, could be just as far reaching as high alumina cement. Reports in the industry's press recently indicate the scope and cost of remedial works.

The limit originally in CP 110 was 1.5% for calcium chloride as a percentage of the weight of cement. This has been reduced to approximately 0.5%. It should be borne in mind that aggregate might contain some chloride, particularly sodium chloride, and efficient washing will be required to keep within the 0.5% limit.

For the above reasons, calcium chloride should not be used as an additive particularly in cold weather concreting where its use has been popular. Another case where it has been popular is in precasting to achieve a faster turn round on moulds and suppliers should be checked out to ensure that chloride salts are not being added to the mix

Hot Weather Concreting

The following general notes are intended to be of assistance in avoiding problems that arises when concreting in hot weather.

Individual sites will require to use their judgement on the precautions necessary to the particular prevailing conditions at the time of concreting.

The climatic factors affecting concrete in hot weather are high air temperature and reduced humidity, the effect of which may become more pronounced with increase in wind velocity.

The necessary precautions will vary with the degree of exposure, air temperature, cement content and dimensions of the work. Some of the hot weather effects may include.

1. Rapid evaporation of mixing water and rapid slump on and may be combined with difficulty in finishing, curing and compaction
2. Greater dimensional changes on cooling of harden concrete.
3. Increase in plastic shrinkage and tendency to crack and craze.
4. Increase in colour and surface variations.

Formwork and reinforcement should be moist and cool prior to concrete being laid and work should be programmed to be completed as quickly as possible so that protection can be provided in good time from drying winds and evaporation. Proper curing is very essential as alternate wetting and drying of concrete promotes pattern cracking and colour variations.

Test cubes have a high surface to volume ratio and are extremely vulnerable to high temperature and non-standard curing. Leaving test cubes exposed and without access to water does have a serious effect on the strength obtained.

Precautions for quality control cubes are storage in a cool atmosphere at 20°C, covered to prevent moisture loss until hardened for 16 - 24 hours followed by curing in water at 20°C.

Failure of these precautions will result in the potential of the material not being realised.

Are the Soakage Pits outdated ?

A. SANTHAN

INSTRUCTOR

Department of Civil Engineering

The main mode of disposal of faecal matter in our peninsula is by soakage pits. Although a definite advancement over the earlier system, its suitability at present, especially in the densely populated areas, is to be reconsidered in view of the following .

1. Pollution of water

The water used to carry the sewage and the effluent that is produced in the pit are allowed to soak into the ground. These, with the possible presence of pathogenic bacteria are liable to pollute the sub soil water. True, the soakage pits are generally permitted to be built at a minimum distance of 50' - 0" away from any drinking water source, but, this is not fool proof as the soaking range and thus the range of pollution depends on the nature of ground and the water table.

Even when the fact is this, it is interesting to note, in some places, the pits are permitted closer, due to scarcity of land.

In otherwords, with the increase in population and repeated partitions of lands among new generations, it is unavoidable for pits to get closer to existing wells or new wells to come into being nearer to pits.

2. Nitrogenous Contents

Recent observations reveal a considerable increase in the nitrogenous content of the underground water in some places of the peninsula.

The main reason may be the increased use of artificial manures, but at the same time the effect due to soakage pits also cannot be ruled out. Detailed studies are required in this regard.

3. Menace of mosquitoes

The menace of the mosquito was a symptom of rainy seasons in Jaffna, during the good old days. But, anyone would have noticed the omnipresence of mosquitoes during the last decade or so, even during the driest of seasons.

The reason can easily be found out, by watching a soakage pit in an evening at dusk. Swarming mosquitoes come out through any available crevice of the pit, not to mention the vent holes. (Of course, this can be prevented by providing wire domes for the vent pipes with smaller mesh and patching up any opening).

With the ever increasing population and thus the number of soakage pits, the above problems will be even more.

When considering these, we have to think of switching over to public sewerage schemes sooner or later.

Report

— Mechanical Engineering Department

Mechanical Engineering Department of Jaffna College Institute of Technology is divided into following Sections.

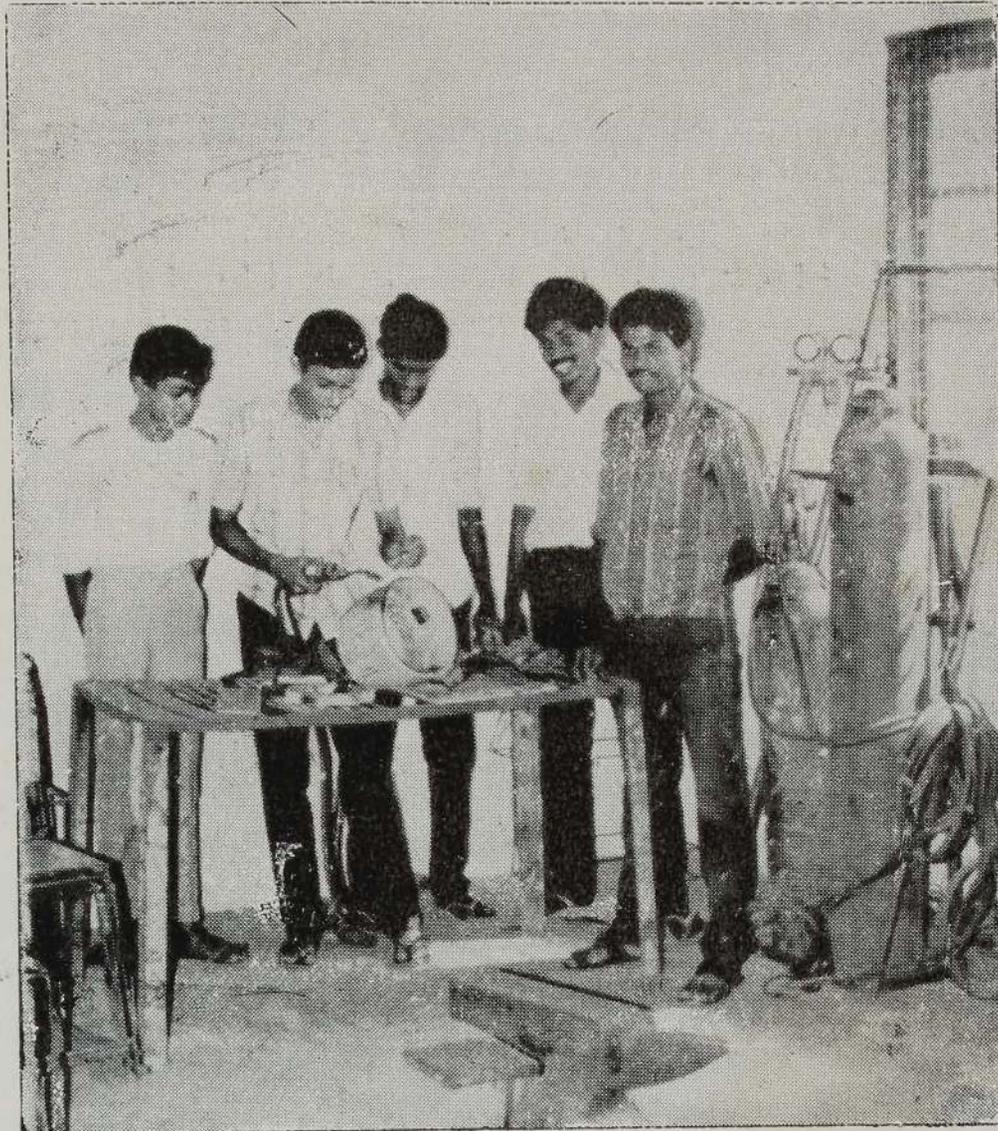
- (i) Mechanical
- (ii) Automobile
- (iii) Air Conditioning & Refrigeration
- (iv) Machine Shop
- (v) Welding Shop
- (vi) Foundry
- (vii) Drawing office

Departmental Staff

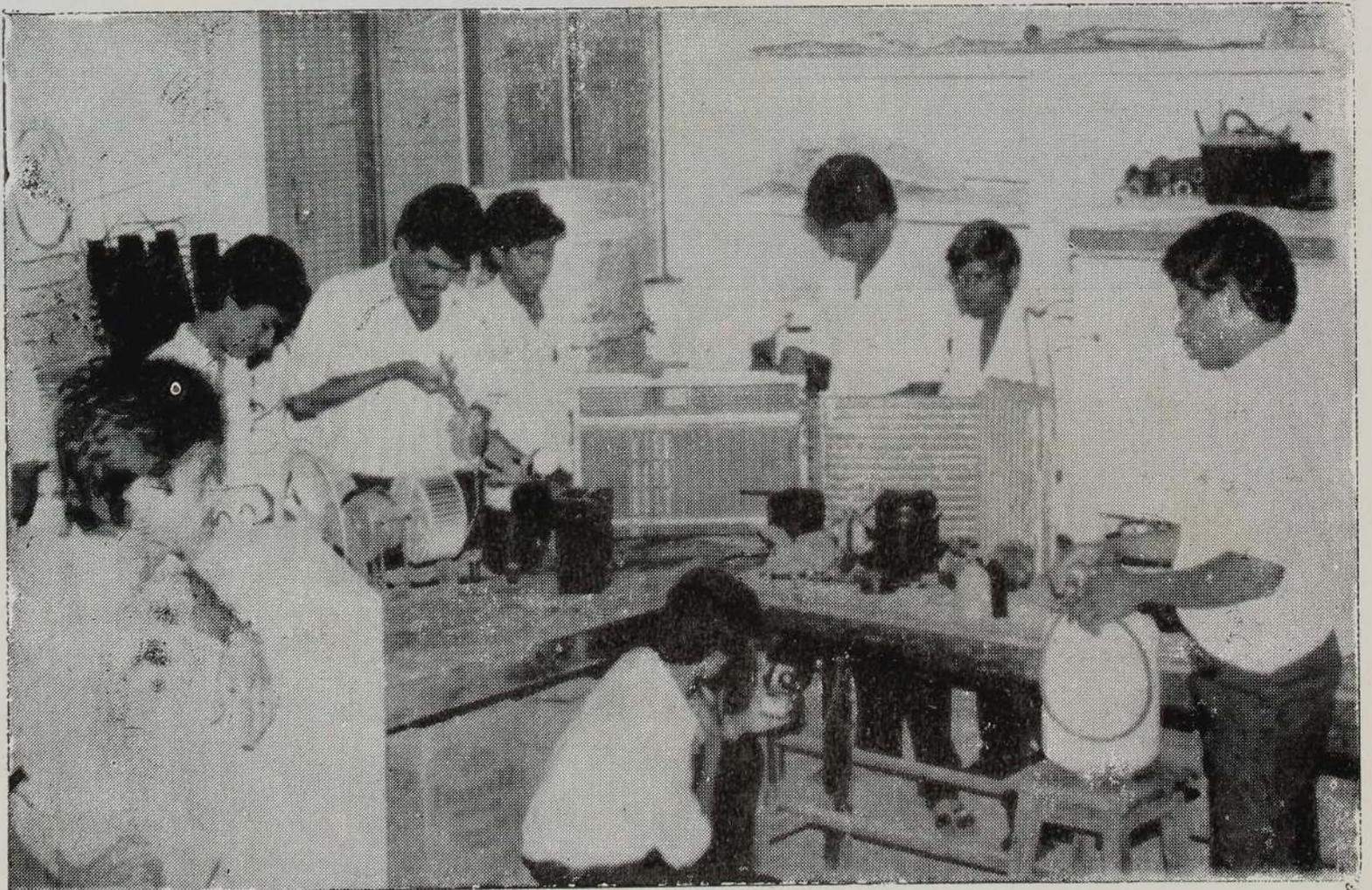
Mr. S. A. P. Thurairatnam	-	(Head of the Dept.) Senior Lecturer
Mr. S. K. Xavier	-	Lecturer
Mr. S. Brihadiswaran	-	Asst, Lecturer
Mr. M. Thayanathan	-	Gr I Instructor
Mr. P. Raveendran	-	Gr II Instructor
Mr. S. Nesarajah	-	Gr III Instructor
Mr. V. Prasath	-	Gr III Instructor
Mr. N. F. Rajkumar	-	Gr III Instructor

This Department conducts Courses varies from Engineering level to Craft level. At present the following courses are being conducted.

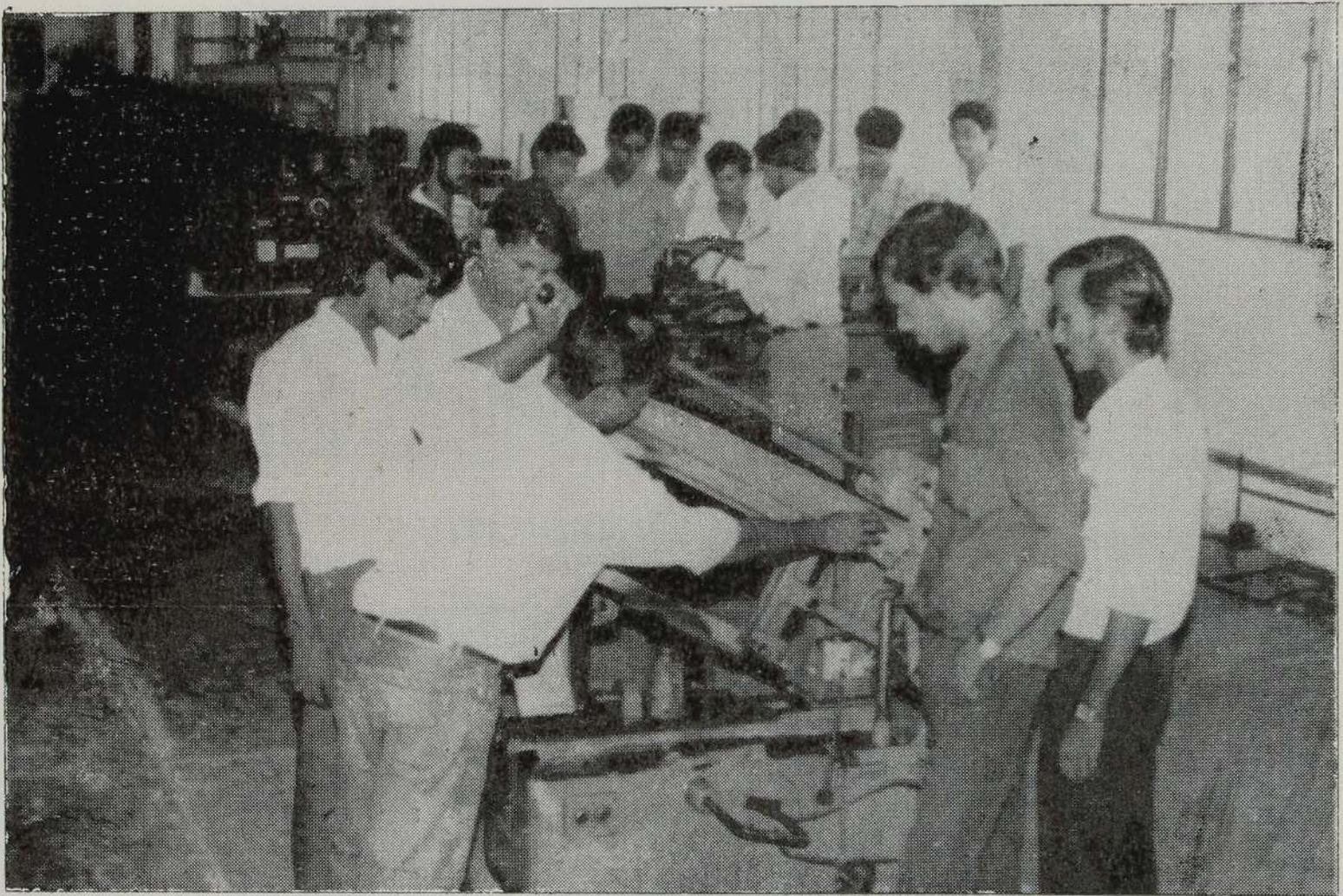
- (i) E. C. E. (London) Part I (Mechanical section) (1 1/2 years)
- (ii) Technician Diploma in Mechanical Engineering (3 years)
- (iii) Technician Certificate in Air Conditioning & Refrigeration (1 1/2 years)
- (iv) Technician Certificate in Automobile Technology (1 year)
- (v) Craft Certificate in Machine Shop practice (1 year)
- (vi) Craft Certificate in Welding Shop Practice (1 year)
- (vii) Craft Certificate in Foundry Practice (1 year)



WELDING LABORATORY



A/C LABORATORY



MACHINESHOP

During the year under review the number of students who successfully completed their courses of study is as follows.

Courses	1 st Class	Pass	Total
Technician Diploma (Mechanical)	1	7	8
Tech. Certificate (Automobile)		7	7
Tech. Certificate (Air Cond & Ref)		9	9
Craft Certificate (M/c Shop)		11	11
Craft Certificate (Welding)		4	4
Craft Certificate (Foundry)		2	2

Apart from conducting technical courses, this Department also undertakes outside orders. During the year 1988, the nett profit earned by the production work itself amounted to Rs, 65,000/- Mr N. Srisivathas (Automobile section), Mr. S. Ratnagopal (Air Conditioning & Refrigeration section) both members of the staff of our department left us during the reporting year.

I take this opportunity to thank all the members of the staff, trainees & students for the whole hearted co-operation and particularly the members of the production staff for their devotion and keen interest shown in the departmental activities.

S. A. P. Thuraiyatnam
Head of the Department.

Report

— Department of English

English which is a lingua franga universal language spoken all over the world even though it is very much neglected by our present youngsters. If we analyse the real cause for it, it is the greed of our youngsters for white collar jobs. There is high competition for professional courses that the students concentrate on their subjects to secure high gradings that they entirely neglect learning as second language in school as it does not help them to enter the university. Our students must realise that a knowledge of English is necessary to compete and keep in contact with other parts of the world for employment, commerce and trade.

At present the modern world is changing rapidly and unless our students adjust themselves to their changes they will be severed from the rest of the world. They may not be able to compete with the world at large towards technical and professional courses.

The students of this Institute must thankful to our Director who is giving his whole hearted co-operation in promoting and giving inspiration to the students by organising Elocution Contests and awarding prizes to the winners. Such contests evoke much enthusiasm among the students to get into the spirit of acquiring the art of making public speeches. Each student of our Institute must make it a point to take part in contests of this type and make their life fruitful in the competitive world of today.

There were three groups and the contest was held on the 22nd of June 1988. Commencing at Abels auditorium with the Students Union in over all charge. The following members of the staff officiated as judges;

Mr. E. M. Jebarajah.

Mr. V. Vinayagamoorthy.

Miss. V. Muthukumar.

Results of the contests: **FIRST YEARS**

1. Mr. Balakrishnan — Computer
2. Miss. E. Suthamathy — Electronics
3. Miss. D. Priyadharshini — Electronics

SECOND YEARS

1. Miss. S. Anushiya — Computer
2. Mr. Thushiyanthan — Electronics
3. Mr. Senthilkumaran — Draughtsmanship

THIRD YEARS — CRAFT

No award.

We have great pleasure in congratulating the winners.

Our thanks are due to the judges who inspite of their heavy work co-operated with us in making the contest a success.

Before I conclude once again I thank our Director, who inspite of his manifold duties gave his full co-operation and encouragement to conduct the contests:

I must be grateful to Mr. A. M. Spencer for his dedicated service to our department in this Institute. He tooled all his resources to make English Language meaningful and useful to our students. The result of his toil was the publication of a text book meant for advanced courses. He had rendered his best services to our English Department by his guidance. We are able to conduct the lectures peacefully and successfully.

Mrs. M. Dhivaharan
Acting Head of the Department

Report

— Department of Civil Engineering

The Department of Civil Engineering of J. C. I. T. is conducting:

- (i) Diploma in Draughtsmanship (2 semesters)
- (ii) Diploma in Civil Engineering & Quantity Surveying (4 semesters)
Course programmes and;
- (iii) Trade Courses in (a) Masonry (4 months)
(b) Carpentry (4 months)

The Dept. is also responsible for the construction & maintenance of buildings, roads, water supply & drainage works of the Institute Campus.

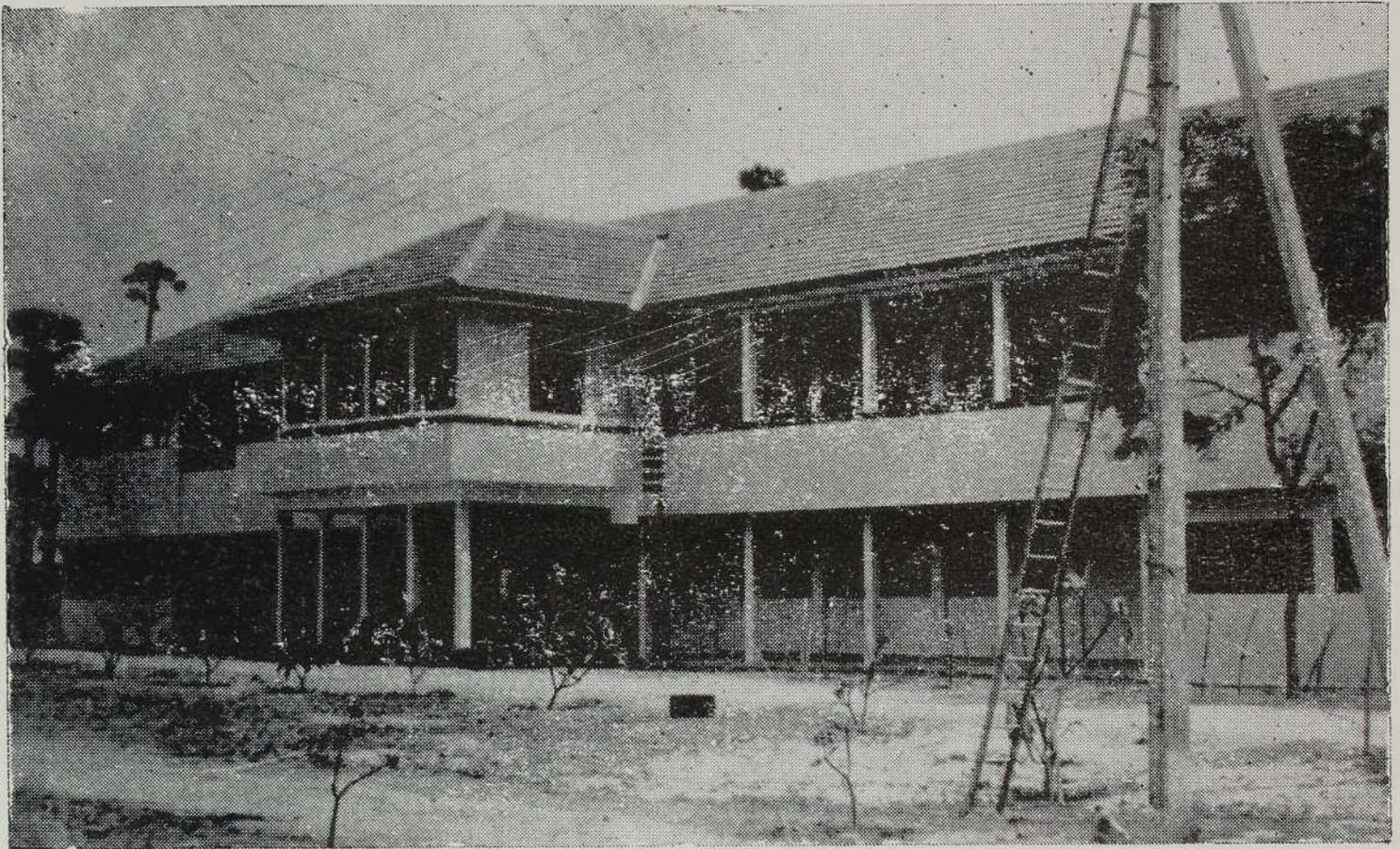
Members of the Staff

Mr I. Balasubramaniam	— Head of the Department, Lecturer.
Mr T. Satkurunathan	— Asst. Lecturer.
Mr A. Santhan	— Instructor Gr.I
Miss R. Thambirajah	— Instructor Gr.II
Mr S. Devanathan	— Works Supervisor
Mr T. Rajalingam	— Instructor, Masonry
Mr S. Tharmalingam	— Instructor, Carpentry

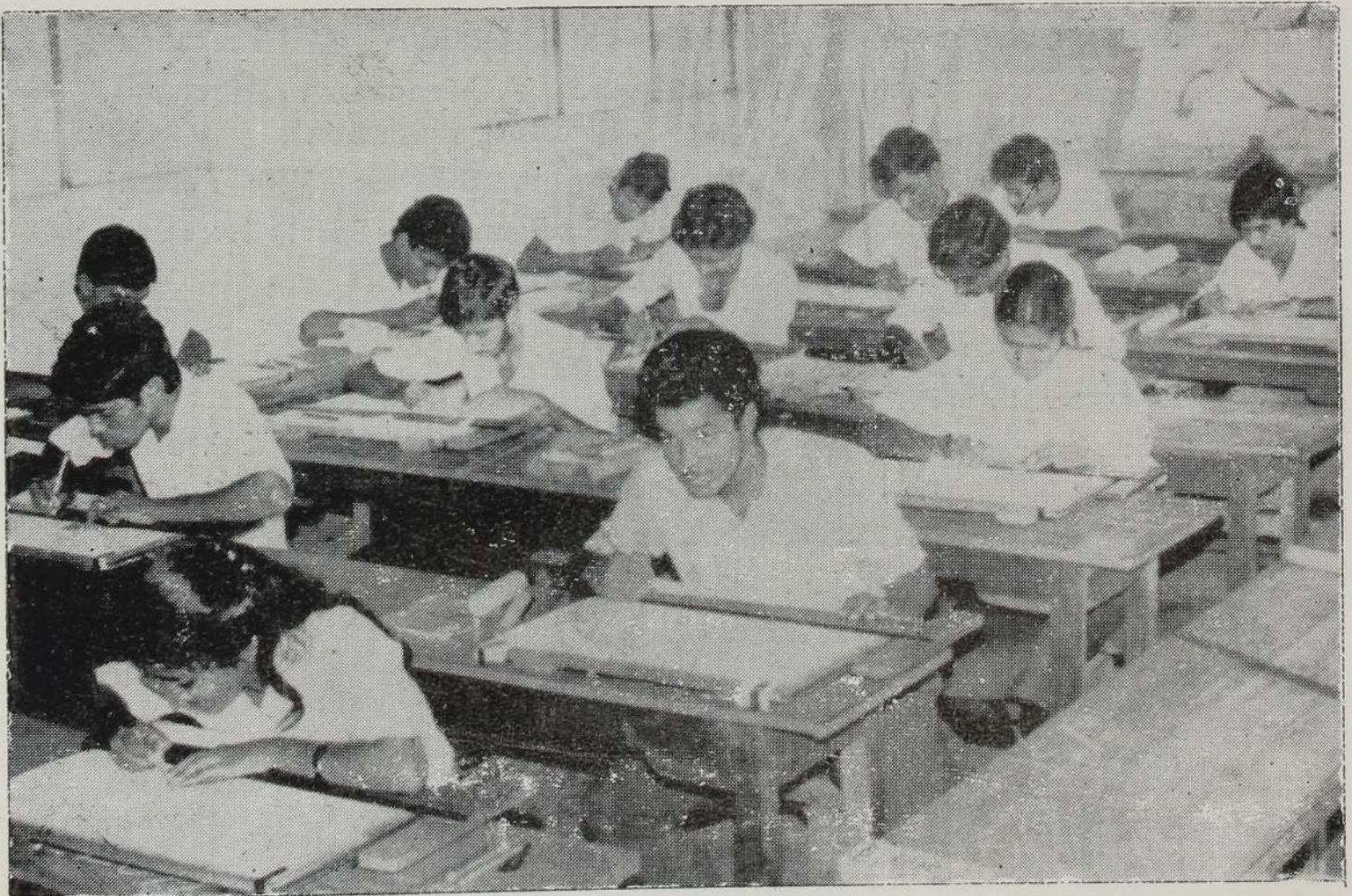
Admissions for course programmes

For Draughtsmanship program, applicants must have 6 passes in G. C. E. (O/L) with Credits in English, Maths & Science.

For Civil Engineering & Quantity Surveying, applicants must have the same entry requirements as Draughtsmanship, but the students must satisfactorily



THE NEW CIVIL LABORATORY



CIVIL DRAWING OFFICE



STUDENTS' UNION (Sept — Dec 88)
COMMITTEE OF MANAGEMENT

Seated (L to R): E. M. Jebarajah (Staff Advisor), M. Thayananthan (Staff Advisor), V. Manoharan (Secretary), The Acting Director (Patron), R. G.-David (President), A. Santhan (Vice Patron) T. Sriendran, S. P. Radhamohan (Sports Secretary) I. Balasubramaniam (Staff Advisor)

Standing (Middle Row) L to R :

Miss. C. Umarubini, G. Kumaran, K. Kukenthiran, S. Sakthikanthan, P. Sureshkumar, K. Gowritharan, M. Gnanavel, R. Balamurugan, T. Pushparajah, S. Sivabalakumar, S. Jeyaprakash, Miss. D. Priyadharshini.

Standing (Second Row) L to R :

K. Sivakumaran, J. G. Jeshurajah, K. Jeyathevan, R. Sakthyrajah, K. Sritharan.

complete the first two semesters, that is the Draughtsmanship programme, to proceed to the third & fourth semesters

The trade courses of Masonry & Carpentry require a pass in the 8th standard. These are conducted with the help of CARE International and the trainees are paid an allowance of Rs.25/- per day.

Laboratory facilities

The Civil Engineering Laboratory building is nearing completion and will be equipped for studies in concrete, soils, bituminous materials, hydraulics and Surveying & Levelling.

The apparatus for soils classification and the apparatus for testing materials are already available in addition to the Surveying & Levelling equipments. A 1000 kN compression testing machine is ready for installation as soon as the building is completed.

The well equipped Drawing Office will be modified when shifted to the new building. Hydraulics and fluid mechanics lab will be equipped with channels, notches, orifices and flumes.

Fields of research

Current students research is on clay products, particularly Masonry blocks from local clay and low cost partition walls with the use of locally available materials as reinforcements.

I. Balasubramaniam

Head of the Department

Report

— Students' Union

2nd SEMESTER OF 1987 / 88
(Jan. 88 — April 88)

As secretary, I give here the report for the above period.

The Office bearers of our Committee of Management are as follows:

President Mr. L. Theivendrarajah

Secretary : Mr. N. Omkararupan

Treasurer : Mr. T. Sriravindran

Sports Monitor : Mr. R. Sabeswaran

Editor: Mr. N. P. Prasanna

Fine arts society — Secretary: Mr. S. Suganthan

During January, our Director & Patron, Mr. M. G. Pillainayagam left to read for his further studies. We wish him success in his mission abroad. The Patronship was taken up by our Vice Patron Mr. S. A. P. Thuraiatnam, following his appointment as Actg. Director of the Institute.

The Patron appointed the following members of the staff to the Advisory Committee:

Mr. A. Santhan

Mr. I. Balasubramaniam

Mr. E. M. Jebarajah

Mr. M. Thayananthan

Mr. Santhan was also appointed to the prestigious post of Vice Patron.



**STUDENTS' UNION
COMMITTEE OF MANAGEMENT (Jan — Apr. 88)**

Standing (L to R) : K. Jeyadevan, K. Ketheeswaran, W. S. Tharmaseelan, N. Thatparan, K. Kunarajah, K. Kukenthiran, K. Ra_gulagan, J. Mariyaseelan.

Seated (L to R) : Mr. R. Prasanna (Editor), R. Sabeswaran (Sports Monitor), R. Sri Ravindran (Treasurer), N. Omkararuban (Secretary), L. Theivendrarah (President), Mr. M. G. Pillainayagam (Director), Dr. T. Vinayagalingam, (Assistant Director), Mr. S. A. P. Thurairatnam (Patron), Miss. R. Devaki.



STUDENTS' UNION
COMMITTEE OF MANAGEMENT (Apr — Sept 88)

Seated (L to R) : S. Suganthan (Secretary), K. Sritharan, Mr. S. A. P. Thurairatnam (Patron), J. Premkumar (President), Mr. A. Santhan (Vice Patron) E. Jeyanesan, Miss. M. Ramani.

Standing (L to R) : R. Sarweswaran, K. Jeyathevan, P. Jeyaranjan, K. Gowri-
tharan, K. Balakrishnan, T. Srindran, S. Suthakaran, A. F.
Selvanayagam, K. Ragulagaran, P. Iyngaran, K. Satkurunathan,
G. Kumaran.

Our committee has made a unique contribution to our union during the period under review. All these years, the need for a constitution was realized but due to various reasons it has not been materialized. During the later stages of our office, we managed to draft a constitution with the help of our Vice Patron and committee members and it was discussed and duly accepted unanimously on 8th of April 88. We are proud of such a contribution which is remarkable and will be remembered for ever.

To enable our members to elect a new Committee of Management in accordance with the constitution, our committee rendered its resignation and an election was held on the 11th of April 88.

We wish the new Committee of Management every success and assure our whole hearted co-operation to them.

Also, we express our sincere gratitude to our Patron and Vice Patron for their help and guidance.

N. Omkararupan
Secretary

Report

— Students' Union

2nd SEMESTER OF 1987 / 88

(April. 88 — Sep 88.)

It is with great pleasure and satisfaction that I submit this report of our union, for the above period.

A general meeting was convened on 11th of April 88 by the outgoing secretary Mr. N. Omkaraupan, to elect the office bearers according to the new constitution of the union. All office bearers were elected unanimously as follows:

President	: S Premkumar
Secretary	: S Suganthan
Treasurer	: M Thatparan
Sports Monitor	: E Jeyanesan
Editor	: K Jeyathevan
Fine Arts Society — Secretary	: K Sritharan

Our Acting Director, as Patron of the Union, reappointed Mr A Santhan as Vice Patron and the following members of the staff to the Advisory Committee.

Mr I Balasubramaniam

Mr E M Jebarajah

Mr M Thayanathan

During this period, weekly meetings were held regularly on Wednesdays from 11.00 a. m to 12.00 noon. We organized debates, elocutions & musical programmes. A special address, 'NAMUM NADAGAMUM' was delivered by Mr Naavannan, a guest speaker. We extend to him our sincere thanks.

The annual 'Kalaivizha' (cultural show) was featured on 27th June, under the distinguished patronage of Mr S Jeyakumar works Manager of Ceylon Cement Corporation (K-K-S) and Mrs Jeyakumar, on a grand note.

Following this, the annual lunch of the Union was held on 20th July, with Mr. S. Rajendra, Principal of the Jaffna Technical College, as our Guest of Honour.

In the field of sports & games, cricket and indoor games played a major role. A shramadana campaign was organized during the 2nd week of August, to prepare the playground for the Inter-Hall Athletic meet & games.

Before I conclude, I must thank all those who spared no pains in helping me in the execution of my duties and the union in its manifold activities, in particular, to extend our sincere gratitude to our Patron Mr. S A P Thurairatnam, our dynamic Vice Patron, members of the Advisory Committee and the Sports Administrator, for their help and guidance. My thanks are also due to the executive committee and to all members of our Union for their enthusiasm and co-operation.

S. Suganthan

Secretary

Report

— Students' Union

1st SEMESTER of 1988 / 89 (Sept. 88 - Dec 88)

I give here the report for Semester one ending December 1988.

A general meeting was convened on 14th Sept '88, to elect the office bearers and Course Representatives for the academic year 1988/89.

The following were elected to office:

President	—R G David
Vice President	—R Sarveswaran
Secretary	—V Manoharan
Asst Secretary	—S Jeyaprakash
Treasurer	—T Sriendran
Sports Monitor	—S P Radhamohan
Asst. Sports Monitor	—K Gowridaran
Fine Arts Society -- Secretary	—K Sritharan
Editor	—K Jeyathevan
Asst Editor	—K Kukendran
Boys' Common room Monitor	—D Premananthan
Girls' Common room Monitor	—Miss C Umarubini

Our Actg Director & Patron, Mr S A P Thurairatnam appointed Mr A Santhan as Vice Patron and the following members of the staff to the Advisory Committee:

Mr I Balasubramaniam
Mr E M Jebarajah
Mr M Thayananthan

During the period under review, regular meetings were held and we organized special programmes, with enthusiastic participation of our members.

The freshers welcome was held on 30th September.

The Saraswathi Pooja was celebrated on 20th October.



Athletic Team

Seated (R to L) : Mr. S. Kantharajah, (Hall Warden) G: Mugunthan, S. Sivaginy, S. Selvarajah, S. P. Radhamohan (Sports Monitor), Mr. S. A. P. Thurairatnam (Acting Director), R. Thevagi, Mr. K. N. Y. Maurice (Sports Ad-ministrator), J. G. Jeshurajah C. Sivakumar, Mr. S. B. Dhivakaran (Hall Warden.)

Standing (R to L) : Miss. C. Umarubini, Miss. Geevakumary, P. A. D. Alakakone, G. Kumaran, J. Jeyakanthan, V. Arudselvam, M. Gnanavel, P. Namasi-vayam, K. Karunakaran, V. Rajendran. S. Jeyakanthan.

2nd Row : M. J. Premkumar, K. Gowritharan, R. Rajkumar, V. M. Jeyaseelan, A. Mariawilson, S. S. Jeffry:



Table Tennis Team

Seated (R to L : Mr. R. Y. Thambyrajah, (coach) S. P. Radhamohan. (Sports Monitor), Mr. S. A. P. Thurairatnam (Acting Director), K. Gowitharan (Captain), Mr. K. N. Y. Maurice (Sports Administrator)

Standing : M. G. Kumaran, J. Jeyakanthan, J. G. Jeshurajah



Badminton Team

Seated (L to R) : Mr. K. N. Y. Maurice, (Sports administrator M. Gnanavel (Captain), Mr. S. A. P. Thurairatnam, S. P. Radhamohan, Mr. S. P. Ravindran (coach)

Standing : G. Kumaran, S. Sakthikanthan, V. Arulchelvan, J. Jeyakanthan, J. G. Jeshurajah.

The thirteenth Institute Day was celebrated on the 21st October. Certificates and Diplomas were awarded to the passing out members of the Union.

The fourth Inter--Hall Athletic Championship meet was conducted on 4th November, Dr S Jebanesan, Principal, Jaffna College and Mrs S Jebanesan were the Chief Guests who graced the occasion.

A Tamil elocution & a singing contests were held on 16th November. A Quiz programme was conducted by the members of the Staff on 30th November.

For the first time in the recent history of our Union, a special Christmas programme was conducted on 14th December.

Concluding this report, I would like to thank our Patron, Vice Patron and Advisory Committee for their help and guidance and to the executive committee & members of the Union for their enthusiasm and cooperation.

V. Manoharan

Secretary

The Need of English for Technical Education in Jaffna Institutions

S. Manielpillai

Visiting Lecturer (English)

Technology is fast becoming the language of our times. For better or worse it has become part and parcel of our lives. Whether we like it or not it has come to stay and there is no choice except to make ourselves knowledgeable and competent in the science and art of technology, the levels of course will vary according to each individuals aptitudes and interests and for this the tool is technical education both theory and practice, 'heads to know and hands to fashion'.

Our youths are facing a crisis many avenues that were open to them until recent times are steadily getting closed and if they are to live with dignity and self respect the option cannot be other than efficiency in technology; limited land area, its poor resources, nature's parsimony have all the own Jaffna man on its own resources. A few of course in the past specially the English educated found employment in government service. Also a good few of the common run engaged in petty business mostly in Southern parts.

The bulk of the population just eked out its living on the shallow seas and the stingy soil. As for the future the prospects are still less reassuring. In the midst of this local stagnation the world all over science and technology have made giant strides enriching the countries that have taken advantage of these advances. Contemplating the dismal plight we are in the words of Julius Caesar to the pirates, come to mind; "You carry Caesar and Caesar's fortune". Jaffna youth would be wise to ponder these words.

Technical education is the only choice left to us in the present circumstances. But the technology that is pushing itself upon us comes not from within us but from foreign countries like England, France, Germany, U.S.A., Japan, China etc. The cars we drive in, the lorries that carry our loads, the planes that shuttle us from continent to continent, the ubiquitous radio, the entrancing T.V to which our eyes are glued, refrigeration systems, ocean liners, submarines, marvels of electricity, micro electronics, satellites, rockets, computers in short every type of technology whether it is agricultural, medical, communication, industrial etc., all these are imported ones.

Even bicycles jolly ride, the sewing machines, scissors, ball point pens, terylenes and tetrons are no exception. So to learn this imported technology a language also has to be imported. Out of the languages of the technologically advanced countries the best choice will be English. English has been the official language of the country until recent times. All higher education from school to university was in English. This atmosphere of English still persists. In fact even after the switch over to the mother tongue in schools curriculum has had to continue to have English as a second language. So rather than venture with French, German, Russian or Japanese it is easier and wiser to continue with English for technical education purposes. Moreover the English speaking countries are second to none in technology and they are all the time updating techniques of importing the technical education in the schools and universities. These institutes of technology and engineering bring out standard works on technology incorporating all the latest results of research. Besides a whole stream of journals and magazines issue from various scientific societies popularising science and technology. Furthermore our talented students go to these countries for pursuing technical studies. These on their return home will naturally be inclined to impart their knowledge and experiences in English. Again it is undeniable that English is the most powerful international language and consequently the transferred technical knowledge from one country to another is done through it.

An English version is invariably given a place in the instruction manuals for operation and maintenance of machinery whatever the country of origin. One more argument for the adoption of English for technical education is the relative simplicity of its grammar and syntax as against the languages of other technically advanced countries. It is a language uncluttered

with grammatical genders for nouns and adjectives intricate declension and conjugations though its pronunciation is not phonetic enough and its structure unfamiliar to our way of thinking now as to the extent of skill required in the use of a language for technical purposes the minimum requirement will be a comprehending ability of technical literature which can be acquired with patience and persistence by adult students provided they have a good grounding in the functioned grammar of their own language plus the aptitude and interest for the field they specialise in. In the past the teacher with book, chalk and board was the only audio visual aid. The present generation is better placed with broadcasts, and telecasts, cassettes video tapes and computer word games but what is wanting is the will to learn which in former times was from time prodded with the brick and rod.



Volley Ball Team

Seated (L to R) : Mr. K. N. Y. Maurice (Sports administrator),
M. Gnanavel (Captain), S. A. P. Thurairatnam,
S. P. Radhamohan, Mr. S. P. Raveendran. (coach)

Standing : G. Kumaran, A. Mariawilson, M. Gnanavel, K. Ka-
runakaran, S. Selvarajah, J. Jeyakanthan, P. Krishna
moorthy



Football Team

(Seated R to L) : P. Krishnamoorthy, Mr. S. Devanathan (coach), J. Jeyakanthan (Vice Captain) S P. Radhamohan, Mr. S. A. P. Thurairatnam, S: Selvarajah (Captain), Mr. K. N. Y. Maurice, (Sports administrator) M. Gnanavel Mr. S. Poonitharajah.

Standing (R to L) : P. Jeyakumar, J. Premakumar, J. G. Jeshurajah, K. Karunakaran, P. Namasivayam, A. Maria-wilson, I. Victor, P. Sivakumar.

Technical Education and Employment Opportunities

A. SANTHAN

INSTRUCTOR, J. C. I. T.

A paper submitted at the seminar organised by the Institution of Engineers - Sri Lanka (Jaffna branch) on 3-3-88

Education, it must be said, is not meant for its own sake. It is meant for society, for the sake of humanity. But, unfortunately, our system of education in general has failed in serving these goals in the past. Prof. K. Nesiiah, in his essay "The failure of our educational system" points out that, 'we have failed to make knowledge and especially technology central to our national growth.'

But it must also be admitted, that any change in education without accompanying or preceding radical social changes will only be superficial and would hardly serve any purpose. Education, society and the individual are intertwined. Although education should not be viewed as a mere access to employment, looking at this angle - that is, expecting the returns or rewards of educational expenditure - also cannot be ignored, especially in a society like ours.

The education of the right kind rewards the individual as well as society. What will be the right kind of education which serves both - the individual and the society - alike, at this difficult juncture? No doubt, it is the education which can provide us prosperity and advancement in every aspect. At last, in this centenary year of technical education we have come to a stage, where one has to acknowledge, that technical education also has a greater role to play in the development society.

It is sad to note that in the Northern part of this country, there is only one Govt. Polytechnical Institution. The Jaffna College Institute of Technology which was founded in 1974, as an offshoot of Jaffna College, also plays an equally important and constructive role. Apart from these two, there are several secondary schools conducting various technical and vocational training courses for school leavers. There are some private tutorials also

which conduct courses of varying standards. The National Apprenticeship Board and Construction Industry Training Programme are also playing an important role.

The J. C. I. T., with its motto. "Technical competence is the key to economic self-reliance" provides technical and vocational education and training at tertiary level for school leavers, in order to prepare them for employment in engineering trades.

The medium of instruction for all the courses except the trade ones is English. The students who are not quite proficient in English face difficulties with the medium of instruction itself. Furthermore, they have to get acquainted with completely new subjects except for Maths, English and some portions of Engineering Science. But it is neither the change in medium nor in the subjects is the real problem of students. It is the change in the very process of learning.

A student who has been brought up from his early years in a mere exam-oriented, tuition-going, monotonous system of learning-which gradually deprives him of creativity and individuality, faces a real challenge when he encounters a mode of study which demands a lot of original thinking from him.

I often hear students saying that English and Maths are their problems. But in my opinion, it is not so - their actual problems are even Tamil and Arithmetic, or, rather the way in which they were brought up. Are these innocent youngsters to be blamed for this pathetic situation?

After graduation, a student may seek employment under an employer or he can start his own enterprise. When seeking employment, competition and recognition are considered as the problems. But, both these can be overcome by acquiring knowledge and skill in the chosen field. In a technical course of study, recognition cannot rest on just carrying a certificate alone. That will not fulfil our expectations and again will lead us to the same old exam-oriented path. Hence, a budding technician should be weighed for his skill and knowledge and not for the certificate he happens to have.

With various institutions awarding their own certificates, the actual competence has to be tested. And here the Institution of Engineers - Sri Lanka, Jaffna Centre, or other interested institutions have a role to play. They have to form a body and maintain relevant standards for the respective disciplines. Students learning at different institutions can appear before these bodies and prove their abilities. The certificate of competence awarded by this body can be considered as a standard-at least within the peninsula-for the time being.

Further, with the limited industrial enterprises in our area young graduates face problems in getting apprenticeships and training. Here too, a Co-ordinating and counselling body has much to contribute. Such a body can also help prospective self employers by guiding and advising them.

In view of all these, I wish to suggest that an umbrella organisation with the aim of taking the benefits of technical education to the masses should be formed, and the functions of the proposed body can be enumerated as follows:

- 1) Popularising the benefits of technical education among the masses and especially, the secondary school students.
- 2) Planning the courses according to the demands etc., and also deciding on any modifications and improvements accordingly.
- 3) Approving new technical institutions, if necessary, and teachers.
- 4) Organising refresher courses for those teachers who are already in the field, as modern technology is developing and changing rapidly.
- 5) Evaluating the competence of young technicians from various institutions and maintaining relevant standards..
- 6) Approving employers and industries suitable for training apprentices, during and after course programmes.
- 7) Acting as a co-ordinator between trainees and industries.
- 8) Providing counselling to young graduates, especially to the prospective self-employers.
- 9) Helping them by follow-up programmes.
- 10) Updating local technology and technical education by means of analysis and research.

Only such concerted and continuous efforts can help us in realizing our ambitions and goals.

I wish to quote Prof. K. Nesiiah again, in conclusion, although it sounds a little pessimistic:

“Till we have decided on our basic social philosophy, we cannot plan our educational system or economic and political institutions or even our technology”.

But it does not mean we have to keep quiet till the time changes.

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