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ABSTRACT

Presented is the draft form of a handbook for science teachers in the secondary technical schools of Victoria, Australia. This handbook is designed to provide teachers with information concerning the administration and operation of the Technical Schools Division, with information concerning safety hazards, liabilities, and procedures in science laboratories and classrooms, as well as with a list of firms and organizations supplying equipment and resources for science teaching. (PEB)

Technical Schools Sciences Standing Committee

SCIENCE TEACHER'S HANDBOOK

Technical Schools Sciences Standing Committee

SCIENCE TEACHER'S HANDBOOK

Curriculum and Research Branch
December 1971

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FOREWORD.

At this stage the Science Teachers' Handbook must be considered to be a draft form only. It is hoped that discussion of the present contents will produce constructive criticism so that a revision can take place during 1972.

It is intended to publish the handbook for the assistance of teachers in science departments in Victorian Technical Schools following such revision.

TECHNICAL SCHOOLS

DIVISION ADMINISTRATION.

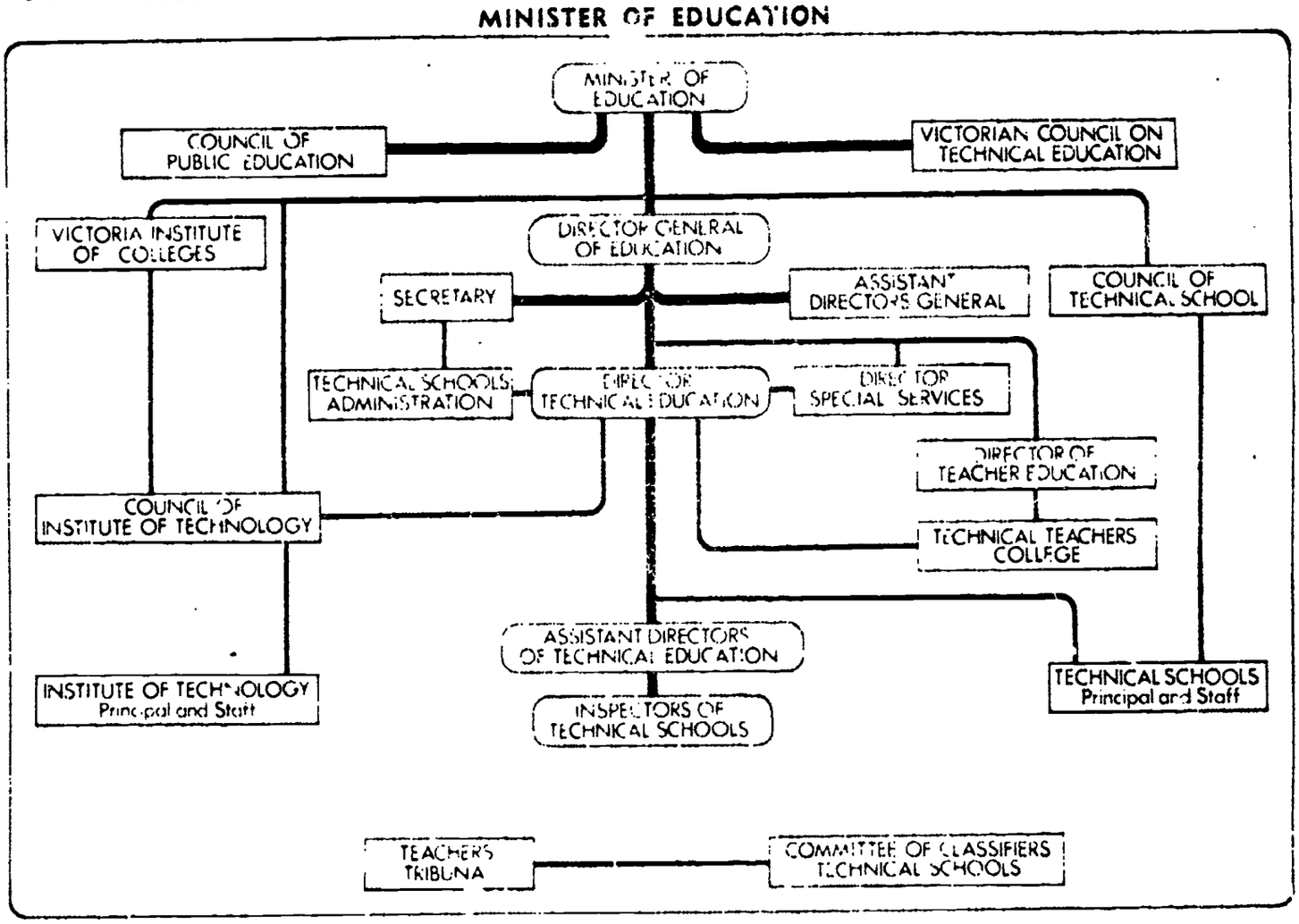
(This section is intended to illustrate the operation of the Standing Committee responsible for the Sciences in Secondary Technical Schools in the context of the administration of the Technical Schools Division).

CONTENTS.

ADMINISTRATIVE STRUCTURE OF TECHNICAL SCHOOLS DIVISION.

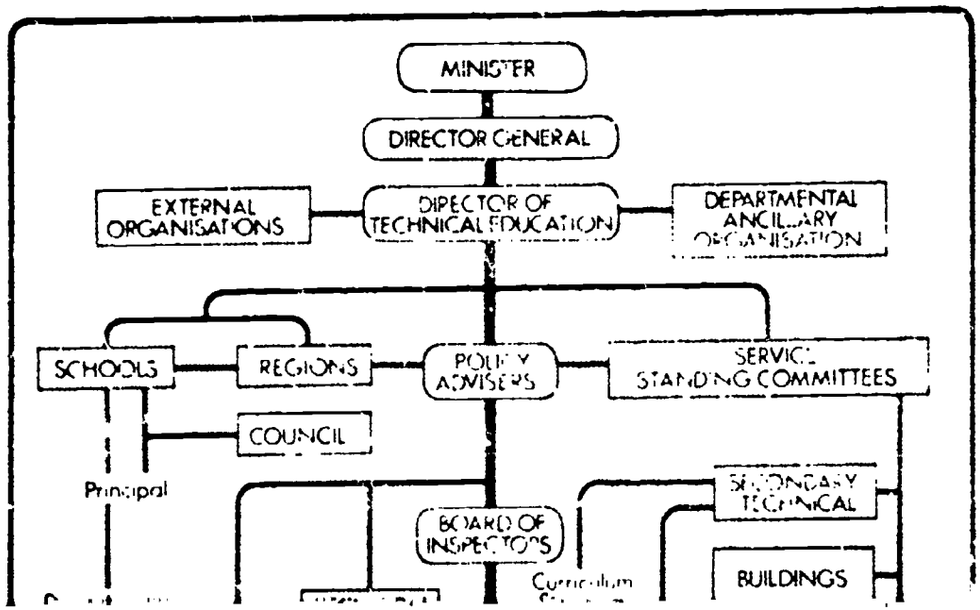
1. Administration of Technical Schools.*

CHART ILLUSTRATING ADMINISTRATION OF TECHNICAL SCHOOLS EMANATING FROM THE MINISTER OF EDUCATION



2. Implementation of Technical Education Programs.*

CHART SHOWING IMPLEMENTATION OF TECHNICAL EDUCATION PROGRAMS



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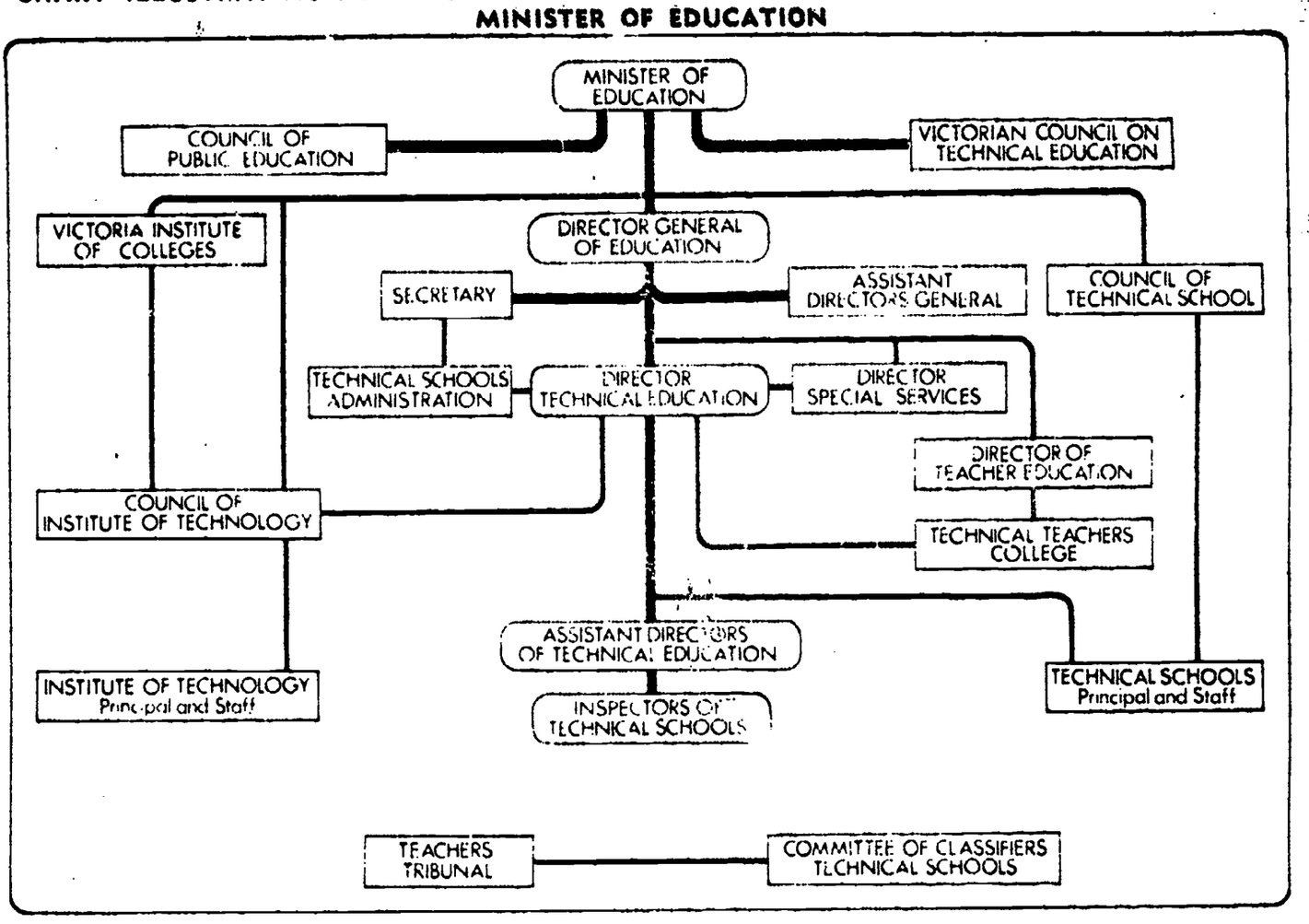

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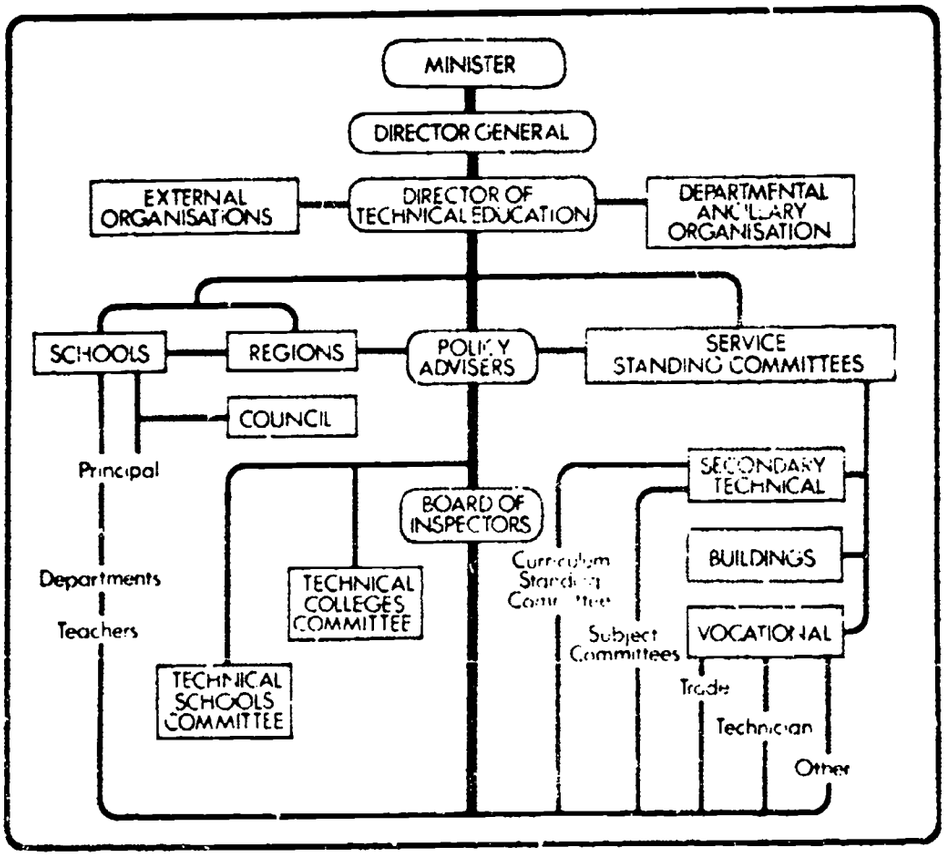

* Technical Schools Division 1972
Technical Schools Publications Unit.

3.3 A subject Standing Committee is also expected to consult widely with teachers in the classroom during the preparation, implementation, evaluation and subsequent revision of any subject syllabus.

3.4 Functions.

(a) To receive from and offer to teachers in the classroom, information and advice on the teaching of the subject.

(b) To consider any changes necessary in the teaching of the subject as a result of contemporary development in the subject field and in educational theory and practice.

(c) To exercise a continuing review of subject syllabuses, and to plan new syllabuses when required.

(d) To prepare any teaching notes required to supplement the subject syllabuses.

(e) To review and report on relevant references, materials and aids.

(f) To make recommendations concerning facilities and equipment required to teach the subject effectively.

(g) To consider the most effective ways of evaluating the teaching of the subject.

(h) To initiate or encourage experiments designed to improve the teaching of the subject.

(i) To maintain liaison with the Curriculum Standing Committee concerning general curriculum developments and the role of the subject teaching in these developments.

(j) To establish contacts and maintain liaison with other committees or organizations concerned with the subject or the teaching of the subject . . . . . " (1)

3. Technical Schools Sciences Standing Committee

Inspector: Mr. W.C. Moore

Address of Committee:

The Executive Officer,
Technical Schools Sciences Standing Committee,
Curriculum and Research Branch,
234 Queensberry Street,
CARLTON. Vic. 3053 34.0941 Ext. 357.

The T.S.S.S.C. is anxious to establish and maintain close liaison with each science teacher in technical schools.

Every science teacher is welcome to utilize the resources the T.S.S.S.C.

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(1) Technical Schools Division.

General Information Circular No. 1969/2 Standing Committees - Secondary Technical A69/1630 Tech.

(a) Technical Schools Committee.

"The Technical Schools Committee is the general committee established to advise the Director of Technical Education on educational policy and the education program at the secondary technical level.

Standing Committees are service committees designed to assist in the detailed planning and implementing of the educational program".(1)

(b) Curriculum Standing Committee.

"2.2 Functions

(a) To ascertain and report on curriculum trends and developments in general and curriculum developments in technical schools in particular.

(b) To investigate and draw attention to changes that may have important implications for the planning of the secondary technical school curriculum.

(c) To examine and report on proposed changes in the secondary technical curriculum.

(d) To investigate and advise on general curriculum and related problems referred to it by any part of the technical schools division.

(e) To make recommendations concerning:

(i) The rationalization of curriculum experiments in technical schools.
(ii) The allocation of funds and resources available for experimental projects.
(iii) Experimental projects needed to promote the development of more effective educational programs.

(f) To maintain liaison with the subject Standing Committees with a view to:

(i) Keeping the committees advised on general curriculum developments.
(ii) Ascertaining the contributions of the various subjects to the total curriculum.
(iii) Examining common principles which might apply throughout the educational program.
(iv) Integrating, where necessary, the work of the various committees . . . . . " (1)

(c) Subject Standing Committees.

"3.2 A subject Standing Committee is required to work within the framework of the policy and curriculum approved by the Director of Technical Education. It may, however, in carrying out its specific task, make recommendations to the

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REGULATIONS AND EDUCATION GAZETTE NOTICES OF RELEVANCE TO SCIENCE DEPARTMENTS.

CONTENTS.

REGULATIONS AND EDUCATION GAZETTE NOTICES OF RELEVANCE TO SCIENCE TEACHERS.

The following Regulations and Education Gazette Notices have been compiled to be of assistance to science teachers.

In some cases where the notice is considered to be particularly important it is quoted in part or in full.

(E.G. = Education Gazette and Teachers' Aid)
(Reg. = Regulations)

Accidents.

1. Accident Insurance — E.G. 13.12.'60 p. 396.
2. Accident Claims — E.G. 12.11.'70 p. 505.

> "Accident Claims.
>
> Any claim for damages received by the head of a school or by a teacher in his official capacity should be immediately referred to the Education Department. In no circumstances is there to be any admission, offer, promise or payment made in connexion with such a claim."

3. Accidents due to Mechanical or Electrical Equipment. — E.G. 12.11.'64 p. 490.

> "Accidents Due to Mechanical or Electrical Equipment.
>
> Where any person suffers accident at school from any mechanical or electrical equipment, the matter must be immediately reported by telephone and confirmed in writing both to the Secretary, Education Department, and to the Chief Mechanical and Electrical Engineer, Public Works Department. These reports must be made separately from any leave application or claim for workers' compensation."

4. Liability of the Crown — E.G. 31.1.'67 p. 14.

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Section 23 (1) (a) of the Crown Proceedings Act 1958 states that "the Crown shall be liable for the torts of any servant or agent of the Crown or independent contractor employed by the Crown as nearly as possible in the same manner as a subject is liable."

A recent court case highlights the need for all persons concerned to exercise great care in their use and control of Government property.

In addition to noting this matter personally, heads of schools should bring it to the attention of caretakers and/or cleaners and to school committees or advisory councils contemplating works under the provisions of Regulation XLV.

Accident Register.

The Department is receiving an increasing number of claims from parents or pupils sustaining injury while at school, alleging negligence against the Department and/or teachers.

Under the Crown Proceedings Act 1958 the Crown may be held liable for damages where accidents are due to the negligence of the Department and/or its servants. The question of negligence is one for the Crown Solicitor to determine, and in order to assess the matter he requires full details of the accident in regard to which the claim is made.

Heads of schools are therefore requested to institute an Accident Register in the form of a bound book (e.g. an exercise book) to record the following particulars in respect of all accidents from which it might be expected that a claim could arise:-

(a) Name, age, and address of child.
(b) Date, time of day, place, and nature of accident.
(c) Names of reliable witnesses, including head of school and supervising teacher.
(d) Action taken for the child's welfare.
(e) Any other relevant details.

The record should be kept in sufficient detail so that, should a particular case be challenged at any later date, the particulars can be easily elaborated. The keeping of this record should obviate the reporting of accidents to the Department, except for serious accidents, which should be reported without delay.

It is suggested that the same Accident Register may be used for recording injuries to teachers to facilitate the making of claims and reports required under the Workers Compansation Act. In this regard the record should show:

(a) Name and address of teacher.
(b) Date, time of day, place, and nature of injury.
(c) Cause of injury and names of witnesses and head of school.

Such a record would not obviate the necessity for the "Employer's Report of Injury" form and "Claim for Compensation by Injured Worker" to be forwarded to the State Accident Insurance Office.

Audio-Visual Aids.

1. Motion Picture Film Stock for Schools. E.G. 10.7.'70 p. 289.

"Motion Picture Film Stock for Schools.

Following recent negotiations with the Audio-Visual Education Centre, Kodak (Australasia) Pty. Ltd., has announced that motion picture film stock for school film-making activities may now be purchased at prevailing Government rates. Departmental schools may obtain films for this purpose on the following conditions:-

1. A school order accompanied by a sales tax exemption certificate, signed by the Principal, shall be issued with all requests for film.
2. The accompanying order shall also state that the stock will be used solely within the school for an approved educational activity and will not be resold or used in any other way.
3. Purchases of film are restricted to 8-mm. and 16-mm. film stock.
4. All purchases will be for cash.
5. Information concerning quotes for film stock at the approved price may be directed to "Motion Picture and Education Markets, attention Mr. C. Robinson", or by phone to 663.3821, extension 63. Kodak will supply technical information and information on other aspects relative to educational activities.
6. Film to be purchased under these conditions is available only at Kodak's 223 La Trobe Street Building, ground floor, wholesale counter.'

2. Motion Picture Film Stock and Photographic Products for Schools. E.G. 26.11.'70 p. 529.

3. Loan of Films and Projectors. E.G. 29.1.'71 pp. 27, 28

'Loan of Films from the Film Library.

Head masters and other teachers who borrow films from the Education Department's 16-mm. Film Lending Library should note the following conditions and the preamble of the index to the 16-mm. Motion Pictu Film Catalogue.

Films are available free of charge to Victorian Departmental schools with 16-mm. projectors, subject to agreement that the following conditions of loan will be observed:-

1. Films must be in the charge of a qualified teacher whose name has been recorded at the Department's Audio-Visual Education Centre as an approved projectionist, and who is fully acquainted with the conditions of loan.

2. Films must be used only on projection equipment that has been approved (see following notice for approved types) and that received regular cleaning and attention according to the prescribed maintenance schedules. A log showing running time and maintenance must be kept for reference.

3. The school must make no charge for admission to a screening of any of the Department's films.

4. Borrowers must not -

   (a) re-lend films without the Department's authority.
   (b) use films for any commercial purpose.
   (c) use films for private screenings.
   (d) cut, copy, delete sections, mark, or otherwise mutilate films.

   (In purchasing films for the library, the Department must agree in its contract that films purchased will be used exclusively in its own school system and will not interfere with distribution in other areas.)

5. Every care must be taken with films, and all damage must be reported without fail when they are returned.

6. Borrowers damaging films may be liable for the replacement costs involved.

7. Films must be returned by the due date, or earlier if possible.

8. Return freight charges must be prepaid by borrowers when returning films. The Department meets all forwarding charges.

9. Film reports (enclosed with films) must be filled in and returned with films.

10. Films must be returned in correct cans.

11. Films must be ordered on the regular requisition forms, those for separate dates on separate forms.

12. Orders for films must allow a minimum notice of three working days, not including Saturday, Sunday, the day on which the film requisition form is received, and the day on which the films are dispatched. Alternative titles should be stated in case the first choice is not available. Films should be ordered as far in advance as possible on an order form obtainable from the Audio-Visual Education Centre. A note of advice is always returned to schools when films are booked.

13. The Department may withdraw any film from any booking or from circulation without notice."

4. Projection Equipment E.G. 29.1.'71 pp. 28

"Projection Equipment (16-MM): Limited Service Facilities

It is advised that limited service facilities are available from the Audio-Visual Education Centre to schools with approved 16-mm. projectors. All requests for service must be made in writing to the Supervisor of Audio-Visual Education, 234 Queensberry Street, Carlton. The request for service must be accompanied by a report indicating the nature of the failure or fault in the machine. No machine can be accepted for service until this report is received.

The following projectors are those that will now be accepted for service by the Audio-Visual Education Centre:-

Bell and Howell 622, 631, 655Q-8399
Graflex 821
Siemens 2000
Victor Pyrox
Kodak Pageant
Victor Kalart
Rank Aldis P6

It should be noted that the above-named projectors may be accepted provided they have been operated by a trained projectionist recorded as such with the Audio-Visual Education Centre. The projector must be accompanied by a log book indicating its running time and the maintenance it has received according to prescribed schedules. Details of the nature of the projector failure or other faults are to be indicated in writing when the application for service is submitted.

When a school is advised to forward the projector, its receipt will be acknowledged and the probable date of service indicated. A school should inquire immediately if this acknowledgement is not received within reasonable time.

On completion of service, the school will be advised of the components replaced and that an account to cover the cost of these parts will be forwarded to the school from the Education Department.

Schools should note that only projectors booked in writing can be accepted. Schools requiring service for projectors other than those listed above should write to the agents for that make of machine."

5. Overhead Projector Transparency Service. E.G. 29.1.'71 p. 28

"Overhead Projector Transparency Service.

The Audio-Visual Education Centre of the Education Department is prepared to make transparencies for overhead projectors from original material submitted by teachers. They may be reproduced in color.

The following conditions should be observed:-

1. Material submitted must be original. The Centre is not permitted to copy book or magazine illustration.
2. Copy submitted must be drawn on good quality tracing paper for color reproduction.
3. Diagrams should be prepared, using black Indian ink.
4. Very fine lines will not reproduce. Lettering should be at least 1/8 in. high.
5. Transparencies will be supplied either mounted on cardboard mask or unmounted as requested. Size of copy is limited by the dimensions of the transparency materials (9 3/4 in. by 7 3/8 in.). Color of each overlay and order of attachment should be indicated.
6. To obtain correct registration, overlay sheets should be punched or marked in two corners thus (+).
7. Material must be accompanied by a letter identifying the contents and providing the name of the school and of the teacher.
8. The Audio-Visual Education Centre reserves the right to copy and distribute any such material to schools, or to return material unsuitable for transparency preparation.

Packages should be addressed to the Supervisor of Audio-Visual Education."

6. Tape Transcription Service. E.G. 29.1.'71 p. 28

"Tape Transcription Service.

The Audio-Visual Education Centre began a Tape Transcription Service to schools in July 1969. In this service, the Audio-Visual Education Centre (besides providing a service to schools by duplicating original school drama and musical recordings and material for use in language or stenographic laboratories) makes master tapes of A.B.C. radio broadcasts to schools. Copies of these programs are available to schools at any time after the broadcast, at the cost of the tape and reel. The tapes become the property of the school.

This service was made possible through a relaxation of the Broadcasting Act relating to copyright, but there are still some restrictions to be service: programs are available only up to twelve months after they were broadcast, and schools are expected to erase the programs from their tapes after that date. Tapes may be used only in the school, for classroom purposes.

All secondary school radio broadcasts are recorded, and those primary school broadcasts for which specific requests are made to the Audio-Visual Education Centre before the broadcast. In future, taped copies of radio programs will be available to schools only through the Audio-Visual Education Centre, not direct from the A.B.C.

The tape and reel for a 20-minute program costs $1.30, for a 15-minute program $1.10, and for a 10-minute program 90 cents. Prices include postage. Programs are only supplied separately, each on a 4-inch reel. Recordings are standardised at 3¾ inches/second, half-track. They will not be made on 4 tracks for 4-track recorders. The transcribed programs supplied can be played on 4-track recorders, on track 1 only.

An exception to the above specifications is made in the case of some special A.B.C. features, in which case the specifications are given in a notice in the Education Gazette, with the special price of the program. An arrangement may be made, on application to the Audio-Visual Education Centre, for a school, to supply copies of programs, several on a large reel, in the case of courses comprising a series of broadcasts. However, these will be available only after the last broadcast of the series.

All other programs are available immediately after the broadcast. Schools may order programs and pay for them in advance, and they will be posted to the schools as the broadcasts occur. Programs are not available in

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Orders, accompanied by a remittance, should be addressed to the Supervisor of Audio-Visual Education, 234 Queensberry Street, Carlton, 3053. The order should give the title, date, and any other necessary identification of the program(s) required, and the name and full postal address of the school. Cheques and money orders should be payable to the Audio-Visual Education Centre. The tapes are not available on school account, and particular attention is drawn to the notice regarding method of payment for Audio-Visual Education Centre materials, in the Education Gazette of the 13th of March 1970, page 93.

Notices regarding the Tape Transcription Service are published in the Education Gazette from time to time. Telephone inquiries: 34 0941, extension 145."

7. Loud Speakers for Tape Recorders. E.G. 29.1.'71 p. 28.

Loud Speakers for Tape Recorders.

Open-reel tape recorders that meet Departmental specifications are capable of much better performance than their internal speakers allow. Volume, fidelity, intelligibility, and speech naturalness can be improved by playing through a suitable, approved speaker enclosure. These enclosures are needed to provide adequate sound for any purpose at the volume necessary for usual class sizes. They are essential for speech training, foreign language, and musical appreciation work.

Several approved enclosure models are available, including a portable unit weighing about 10 lb. and measuring approximately 8 x 8 x 15 inches. Proper selection requires a knowledge of the recorder's capabilities. Inquiries should be directed to the Audio-Visual Education Centre."

8. General Information of Services Obtainable from A.V.E.C. E.G. 29.1.'71 p. 27-31

9. Audio-Visual Education Centre Services. E.G. 12.2.'71 pp. 42, 43

10. Maintenance of Audio-Visual Equipment. E.G. 13.5.'71 p. 201,2

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10. Maintenance of Audio-Visual Equipment. E.G. 13.5.'71 p. 201,2

Audio-Visual Equipment: Maintenance.

The Centre will undertake service work on 16-mm. projection equipment on condition that the school agrees to meet the cost of components that may be used in the repair of its equipment and provided that the following conditions are fulfilled:-

1. The school projector is operated by an approved projectionist.

2. The school projector has received regular service and a log book indicating running time and routine maintenance is kept.

3. When forwarding equipment, a statement is submitted indicating the details of the machine and the nature of service required.

4. The log book, with maintenance schedule, is forwarded with the projector when it is sent in for service.

5. The school meets the cost of transport of equipment to the Centre.

NOTE:- To ensure prompt service and to minimise cancellation of film periods, arrangements should be made beforehand so that equipment is booked in for service at the most suitable times.

Head masters are requested to bring the following instructions to the notice of all staff:-

(a) Only staff who have completed a course of training at the Education Department's Visual Education Centre may borrow films from the Department's Film Library.

(b) A running log of the projector is to be kept by all operators, and the maintenance schedules prescribed by the Centre should be carried out regularly. The head master of the school should see that an appropriate entry of this work is made on the form provided.

(c) Details of maintenance service available from the Centre may be obtained from the Audio-Visual Education Centre at 234 Queensberry Street, Carlton. This Centre is closed during the Christmas vacation.

Much needless wear occurs in many projectors owing to lack of proper and regular maintenance and care; it is recommended that the projector should be housed in a dust cover when not in use.

When a projector (not of the oil-less type) is set up for operation after periods of storage (such as vacation periods), the mechanism may be in a dry condition owing to the draining away of the oil normally retained in the wicks that connect the bearings and other moving parts to the lubrication points. Teachers responsible for the equipment should clean, oil, and run the projector the day before the first showing of a film."

11. Return of Films. E.G. 9.6.'71 p. 283.

"Return of 16-MM. Motion Picture Films.

A condition of loan of 16-mm. motion picture films from the Department's Audio-Visual Education Centre Film Library is that films should be returned tail out i.e., not re-wound.

All films are checked upon their return to the Library, and this checking takes place during the re-winding of the film. If a film is returned already re-wound, the time taken for checking that film is doubled. As an average of 3000 films are returned to the Library each week, the limited checking staff is experiencing problems in coping because a sizeable percentage of films are returned incorrectly, thus wasting many man-hours.

To enable films to be returned tail out, all schools borrowing films from the Library should have on hand an adequate supply of take-up reels. Principals should note that the minimum requirements in this respect would be one each of the following reel sizes: 400 ft., 800 ft., 1,200 ft., and 1,600 ft."

12. Films: Late Return. E.G. 9.6.'71 p. 283

"Films: Late Return.

The persistent late return of films to the Audio-Visual Education Centre's 16-mm. Motion Picture Film Library is proving to be an embarrassment to the Library and is causing considerable inconvenience to other schools. Each week, up to two hundred films are being returned two or more days late, making it necessary to cancel subsequent bookings on these films, which in turn causes disruption to the teaching programs in the schools whose bookings are cancelled.

Booking-advice slips and film-report forms sent to the schools indicate the return date for each film order, and films are due back in the Library by 10 a.m. on that date. This means that films being returned by rail should be lodged at suburban or country railway stations in sufficient time to enable them to be at Flinders Street or Spencer Street Station by the afternoon preceding the return date.

Unless greater co-operation can be achieved, it may be necessary for the Library to remove the more persistent offenders from the borrowing list.

13.	A.V.E.C. Film Lending Library Closure for Stocktaking and Holidays.	Notice appears in Ed. Gaz. each year. e.g. E.G. 11.11.'71 p. 580
14.	Radio-T.V. Time Tables.	Notices appear in Ed. Gaz. during the year. e.g. E.G. 11.11.'71 (Insert)
15.	A.V.E.C. Service of Motion Picture Projectors Closed over Vacation.	Notice appears in Ed. Gaz. each year. e.g. E.G. 12.11.'70 p. 511
16.	Television Equipment in Schools.	E.G. 18.8.'71 p. 442.

"Television Equipment in Schools.

Teachers are reminded that procedures and specifications for television equipment in schools are laid down. The advent of direct teaching by television means that unsatisfactory conditions will seriously penalise pupils. The considerations that are the direct responsibility of the school are listed below, with brief comments on the results of non-observance of the recommendations.

1. Receiver.

   The make and the model of the receiver should be as approved by the Department. The list of approved sets is the result of extensive measurement procedure and indicates those giving the highest possible performance over a long period. Stand and speaker design is specified. Details are available from Stores Branch, Education Department.

2. Classroom Brightness.

   An ambient light in the classroom must not exceed a certain level. If it is too high, correct reproduction of the black to white scale is impossible, resulting in concealment of picture information and shortened picture-tube life.

3. Reflections.

   Reflections result in picture concealment and loss of personal concentration. In darkening the room, care should be taken to minimise reflection.

4. Screen.

   The viewing screen must not be placed near a bright area, since this will cause the eye to adjust to the area brightness instead of the screen brightness."

17. Purchase of Audio-Visual Equipment. E.G. 12.2.'71 p. 43

"Purchase of Audio-Visual Equipment.

It is recommended that schools intending to purchase audio-visual equipment should first consult the Audio-Visual Education Centre for recommendations as to the suitability of this equipment for educational use.

Much equipment has been tested and evaluated to ensure that standards of safety, performance, and durability are inherent in the design. Specified equipment can be expected to provide satisfactory performance under conditions for which teachers may expect to use it.

It should be noted that a condition of loan of 16-mm. motion picture films requires schools to meet the cost of any 16-mm. film borrowed from the Department and then damaged through use of inferior equipment.

Commercial organisations often supply items of equipment direct to schools, and as much of this does not conform to Audio-Visual Education Centre standards, principals are advised to seek guidance from the Audio-Visual Education Centre when contemplating purchase. Information on audio-visual equipment can be obtained from the Supervisor of the Audio-Visual Education Centre."

18. Education Media Workshops. E.G. 8.9.'71 p. 473

19. Free or Inexpensive Materials Available to Schools. E.G. 30.1.'70 p. 21 - 28.

20. Geological Maps Available. E.G. 11.11.'70 p. 573

Careers.

1. N.Z.C. Booklet on College Courses. E.G. 18.8.'71 p. 430

2. Scholarships and Bursaries. Entries and Details of Examination. E.G. 5.8.'71 pp. 398 - 403

Commonwealth Secondary
Commonwealth Technical
Commonwealth University

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Commonwealth Secondary
Commonwealth Technical
Commonwealth University
Commonwealth Advanced Education
Junior Scholarships
Senior Technical Full-Time; Part Time
Textile Scholarships
Leaving Bursaries (Teaching)
H.S.C. Bursaries (Teaching)
Senior Scholarships
Free Places at University.

3. George Amos Science Teaching Award. E.G. 15.3.'68 p. 78

"George Amos Science Teaching Award.

The Victorian Council of School Organizations invites applications from high and technical school councils for the George Amos Science Teaching Award for the calendar year 1966. The award seeks to encourage and give public recognition to meritorious achievements in the teaching of science, and it places emphasis on the joint contribution made by the teachers, the students, the parents, and the school council.

The award for 1965 (won by Leongatha High School) took the form of books to the value of $50, but the value of the 1966 award will be $100.

Applications for the award should take the form of a report covering the calendar year 1966 and should include comment on at least the following topics:-

1. Have the science teachers shown ingenuity and originality in devising effective experimental techniques? Have the pupils or the parents assisted in this?

2. Have the pupils been encouraged to enter the Science Talent Quest? What is the quality of their entries, if any?

3. Have the parents' organizations or the school council participated in the provision of improved facilities, equipment, etc., whether directly or with the aid of the Department?

4. Have all available departmental resources (financial and otherwise) been sought and used to further the teaching of science at the school?

5. Has the support of the parents been sought to develop in their children an appreciation of, and enthusiasm for, scientific knowledge and method?

Although responsibility for nominating the recipient of the award will rest solely with the Victorian Council of School Organizations, that body will have the benefit of observations made by specialist referees from the Department and the teaching profession. The Department has approved the award and the procedures for making it . . . . . '

4. Scholarships: Approved Schools. E.G. 9.9.'67 p. 397.8

5. Science Certificates. Reg. XXXV.

Regulation XXXV. - Science Certificates.

1. Science Certificates in Psychology, Botany Grade I., Botany Grade II., Zoology Grade I., and Zoology Grade II. shall be granted to candidates who pass the Education Department's examinations in those subjects.

2. Details of courses and examinations in the subjects mentioned in clause 1 of this regulation shall from time to time be determined by the Director and announced in the Education Gazette and Teachers' Aid."

6. Guidance Techniques and Practices: Short Course. E.G. 12.10.'70 pp. 467 - 8

7. A.I.D.A. Science Teachers' Award. E.G. 12.12.'69 p. 602

Equipment.

1. Equipment Available for Purchase from Stores Branch. E.G. 5.8.'71 p. 416

2. Theft of Equipment. E.G. 13.12.'67 p. 481.

Theft of Equipment.

Owing to the frequency in schools of burglary involving expensive items of equipment, it is recommended that these items be branded 'Education Department Victoria". Inexpensive suitable electric branding equipment is available from most electrical goods stores. The purchase of this equipment will be subsidized under the usual equipment subsidy basis."

3. Fire Insurance on School Equipment. E.G. 25.7.'69 p. 374

4. Insurance of School Equipment. E.G. 13.4.'70 p. 127

Excursions.

1. School Excursions: Fire Danger E.G. 26.10.'71 p. 550

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Excursions.

1. School Excursions: Fire Danger E.G. 26.10.'71 p. 550

School Excursions: Fire Danger.

Heads of schools are reminded of the undesirability of permitting school excursions on days of total fire ban during the summer months. In those cases where such excursions are unavoidable because advance bookings must be made, special precautions should be taken to guard against fire danger."

2. Excursions to State Forests. E.G. 24.7.'70 p. 320

3. Loading of Buses on Charter Hirings. E.G. 31.1.'67 p. 14

"Loading of Buses on Charter Hirings.

In considering charter operations at public hearing proceedings in recent months, the Transport Regulation Board gave particular attention to loading since it was concerned at evidence of overloading of charter buses, particularly when carrying school children on such hirings.

The Board decided that seats should be available for all children of 12 years of age or more and that loading in excess of authorized bus seating should occur only on the basis of 3 children to 2 adults where such children were under 12 years of age. The actual extract of conditions is as follows:-

> "For the purpose of compliance with these regulations, while the vehicle is being used to carry children to the exclusion (except for not more than 3 supervisors) of other passengers, any 3 children under the age of 12 years may with the consent of the hirer be deemed equivalent to 2 seated passengers as assessed pursuant to these regulations."

When negotiating with potential hiring parties, teachers should bear in mind the above loading requirements when assessing the number of vehicles required. In observing attendance of buses at sports meetings, school excursions and other gatherings, Transport Board inspectors are required to report loadings outside the limits set down."

4. Transport for School Excursions, Sports, and Other Activities. E.G. 30.1.'68 p. 17

"Transport for School Excursions, Sports, and Other Activities.

It has been brought under the notice of the Department that some schools do not avail themselves of rail or tram transport in connexion with school sports and other excursions, although it may be practicable and convenient. It is the policy of the Government to use rail and tram services wherever practicable, and it is in the interests of the Education Department and of the State as a whole that this policy should be adhered to, particularly as it is of benefit to the State finances and indirectly to our Department.

It is desired, therefore, that when arrangements are being made for transport in connexion with sports meetings, educational visits, and other movements of groups of pupils -

(a) public transport should be used if practicable.
(b) authorities controlling Government-owned transport should be approached first, to ascertain what services they can provide, before any approach is made to private bus operators.
(c) at least a fortnight's notice of requirements should be given to transport authorities, and those arranging transport should discuss with the authorities the most suitable times of travel, preferably fixing starting and finishing times for events such as sports meetings after having regard to suitability of transport.
(d) when an association, with the concurrence of constituent schools, has made arrangements for transport, individual schools should not make contrary arrangements.

In connexion with (b), it should be noted that the Railways and the Tramways Board can usually provide special transport, and where this can be done the Transport Regulation Board is unlikely to issue permits to private bus operators. It should be borne in mind that, in addition to providing trams, the Tramways Board can also provide special buses.

Loadings of Buses on Charter Hirings.

If it is not practicable to use rail and tram services to provide transport for school excursions, sports, and other activities, the notice "Loading of Buses on Charter Hirings" on page 14 of the Education Gazette for January 1967 should be read carefully before negotiations with potential hiring parties are commenced."

5. Teachers Supervising Educational Excursions and School Crossings: Insurance (See Insurance) E.G. 29.1.'71 p. 13

6. School Excursions to State Forest. E.G. 24.7.'70 p. 320

7. National Museum Education Service. E.G. 6.5.'70 p. 190

"National Museum Education Service.

The National Museum Education Office has been established to provide a liaison between teachers and the Museum itself. It provides the following services to educational institutions of all levels:-

1. Lessons to school excursion groups on the subjects covered in the Museum.

   (a) Anthropology (including Aborigines)
   (b) Geology
   (c) Zoology

   The times and particular topics should be organised prior to the actual excrusion by discussion with the Education Officer.

2. Loans of Specimens. These are mainly mammals and birds but a complete listing is available in the catalogue distributed by the centre.

3. Information Service. This office is available for the answering of queries and the identification of specimens.

4. Publications. These are available to supplement lessons or information on the subjects covered by the Museum.

Office hours are from 8.45 a.m. to 5 p.m. All inquiries should be addressed to Education Officer, National Museum of Victoria, Russell Street, Melbourne, 3000. Telephone 663.4811 (Ext. 330)."

8.	School Excursions: Bulla.	E.G.	27.6.'66	p. 377
9.	Sir Colin MacKenzie Santuary.	E.G.	14.7.'66	p. 397
10.	Zoological Gardens Education Service.	E.G.	13.3.'70	p. 91
11.	Planetarium: School Visits.	E.G.	12.2.'70	pp. 53, 4

First Aid.

1.	Medical Attention for Pupils.	E.G.	29.1.'71	p. 12

'Medical Attention for Pupils: Accidents and Illness.

In cases of accident or sudden illness affecting pupils the head of the school is expected to use his discretion as to what action should be taken to prevent serious developments. If any doubt exists, the parents should be communicated with at once, and the cost of any

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Subject to the foregoing, any claim for damages received by the head of a school or by a teacher in his official capacity should be immediately referred to the Education Department. In no circumstances is there to be any admission, offer, promise, or payment made in connection with such a claim."

2. Epileptic Seizures. E.G. 13.4.'70 p. 90

"Epileptic Seizures: Information for Teachers.

The following suggests to teachers who may have in their classes pupils subject to epileptic seizures have been condensed from material supplied by the Victorian Bureau for Epilepsy. It is suggested that head teachers might arrange for a copy to be posted on the staff-room notice-board.

1. Remember that epilepsy is a very common condition and it is no disgrace.

2. If a grand mal seizure should happen in class, it is vital that the teacher should remain calm. Students will assume the same emotional reaction as the teacher.
   (a) Try to prevent the patient from striking his head or body against any hard, sharp, or hot object.
   (b) Do not try to revive the patient. Let the convulsion run its course.
   (c) Do not try to restrain the patient's movements or to force anything between the patient's teeth.
   (d) Turn the patient's face to the side and make sure his breathing is not obstructed.
   (e) Carefully observe the details of the attack for a subsequent report to medical personnel.
   (f) On the very rare occasions when an actual attack continues for more than ten minutes the child's doctor should be asked for special instructions.
   (g) Do not be frightened if the person in a seizure may appear momentarily not to be breathing.
   (h) Remember that a seizure cannot hurt the onlookers.
   (i) When the patient regains consciousness he may be incoherent or very sleepy. He should have the opportunity to rest.
   (j) Proper persons must, of course, be notified.

3. Turn a grand mal seizure in class into a learning experience where accurate information, wholesome attitudes, and understanding (not pity) are end results. Such an

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3. Turn a grand mal seizure in class into a learning experience, where accurate information, wholesome attitudes, and understanding (not pity) are end results. Such an experience need not be frightening.

4. Do not pamper a child with epilepsy, because you fear he may have a seizure. Do not let him 'rule the roost', but treat seizure patients as you would have others treat you or your child in similar circumstances.'

General

1. Copyright Material E.G. 24.6.'71 p. 294

Copyright Material: Reproduction not Allowed.

Teachers should note that the reproduction of any copyright material, whether pages from books, music, pictures, maps, or other illustrations, without the permission of the copyright holder, is an infringement of the law, and renders persons responsible liable to action against them.

The Australian Book Publishers' Association and the Copyright Owners Reproduction Society Limited have pointed out that the increased efficiency of modern copying machines has led to an increase in the practice of reproducing, without permission or payment, material protected by copyright. Apart from the legal aspect, the practice is morally indefensible, since it affects the livelihood of authors and composers.

It is felt that the drawing of teachers' attention to the principles involved will ensure discontinuance of the practice."

2. Departmental Telephone Directory. E.G. 23.7.'71 p. 363 - 9

3. Collection of Money. E.G. 12.3.'71 p. 83

". . . . In no circumstances should money be left in classrooms overnight. All money should be placed in the custody of the principal, who should take adequate precautions for its protection.

Should money be stolen through neglect in this regard the person responsible may be held personally liable to make good the loss sustained. Taxation sheets to which tax instalment stamps have been affixed should be filed in as secure a place as is possible."

4. Political or Religious Comment. E.G. 25.2.'71 p. 61

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The Education Department has consistently required that teachers should avoid comment upon controversial political issues or upon religious matters in the course of their teaching. In such matters, where the convictions

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5. Schools and Political Statements. E.G. 25.2.'71 p. 61

"Schools and Political Statements.

The display on school property of notices containing matter of a controversial political nature is contrary to the long-established tradition that our schools should not be used for political purposes.

Notices or pamphlets containing comment on subjects of political controversy are not to be distributed to parents through the agency of the pupils, nor can school records be made available to any organisation to facilitate the distribution of such notices or pamphlets.

Heads of schools are responsible for seeing that this instruction is strictly observed."

6. Public Comment and Use of influence. E.G. 25.2.'71 p. 61

7. Official Correspondence. E.G. 25.2.'71 p. 62

"Official Correspondence.

In corresponding with the Department, teachers and others are requested to observe the following instructions:-

1. All official communications, including those remitting money, should be addressed to the Secretary, Education Department, Melbourne, 3002.

2. Official communications must not be addressed to individual officers by name.

3. In corresponding with the Department, teachers in all types of schools, secretaries of school committees, and secretaries of school councils are required to use the official form prescribed and supplied for the purpose (MI.408).

   The crested paper issued with the annual supplies of stationery and forms must not be used in correspondence with the Department. This paper is to be used only when corresponding with persons or organisations outside the Department.

4. When writing to the Department, the correspondent should always show in the space provided on the official letter form the date of his last letter (if any) on the subject. If, however, he has not previously written on the subject, the word "nil" should be written in this space. In replying to Departmental correspondence or writing on any subject on which

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5. Communications respecting different subjects should be made on separate sheets of paper, and all letters posted on the same date should be enclosed in the one envelope.

6. All official letters from members of staff must be forwarded through the head master or principal.

7. All communications from the Department should be given immediate attention and any replies called for should be forwarded without delay.

   Teachers should take care in the filling in of all official forms, returns, and the like, and should see that all the required information is promptly supplied.

8. Official envelopes must not be used to cover communications of a personal nature, such as applications for copies of private reports, or on any subject not strictly official. In such cases private envelopes must be used.

9. Correspondence should be confined to essential matters, and inquiry by telephone or telegram should not be made if the subject can be dealt with satisfactorily by letter.

10. Telegrams sent to the Department must be prepaid. In any case, however, where it is actually necessary for a head of a school to telegraph the Department on an urgent matter affecting his school or his duty as a teacher the cost of the telegram may be allowed by the Department. The telegraphic code name "Edmelb" is sufficient address.

11. All forms, returns, and the like should be folded in such a way as to prevent the contents from falling out and should be forwarded in wrappers endorsed "Commercial Papers". They should not be rolled, since this often causes inconvenience and damage.

12. Interviews - A teacher desiring an interview with the Director-General of Education or with any of the senior administrative officers should, except in cases of extreme urgency, make a written application stating fully the reasons why the interview is sought. An interview will be granted only if the matter cannot be effectively dealt with by letter."

8. Metric Conversion. E.G. 12.10.'70 p. 467.

"Metric Conversion of Weights and Measures.

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"Metric Conversion of Weights and Measures.

Teachers will be aware that the Federal Parliament has now passed the Metric Conversion Act, 1970. As a consequence, the Imperial System of weights and measures in common use, such as the yard, the pound, and the gallon, will be replaced eventually by their corresponding metric counterparts, such as the metre, the kilogram and the litre. It is expected that a preparatory period of two years or more will be necessary.

Under the Act, a Metric Conversion Board has been established to plan and facilitate the introduction of the new system of units for the whole community. Important policy decisions have still to be announced by the Board. Any detailed replanning of school curricula and teaching resources arising from metric conversion will need to await information about such decisions. Meanwhile teachers are asked to consider the following matters.

Opportunities already exist in various courses of study for incidental introduction and use of the metric system. Examples of this occur, for instance, in primary school mathematics, geography in secondary schools, and home economics in technical schools.

Careful consideration should be given before acquiring or replacing items in schools with a long service life, and which are likely to become obsolete with the introduction of metric weights and measures. However, this should not happen with many items such as rulers and containers for measuring liquids. These are usually available graduated in both Imperial and metric units.

From time to time information and suggestions will be circulated to appropriate groups of teachers regarding the introduction of the new system into courses. Some important forward planning has already begun where this has been possible."

9.	Metric Conversion (S. I. Units)	E.G. 24.9.'71 p. 444-5
10.	Stationery Available at Government Printing Office.	E.G. 9.9.'70 p. 398
11.	Free and Inexpensive Materials Available to Schools.	E.G. 30.1.'70 p. 21
12.	Chalk Boards: Care and Maintenance.	E.G. 13.10.'69 p. 531,2
13.	Discipline.	Reg. XVI.

"Regulation XVI. - School Discipline.

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2. Teachers shall do all in their power to form habits

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13.	Discipline.	Reg. XVI.

"Regulation XVI. - School Discipline.

1. In this regulation unless inconsistent with the context or subject-matter "head teacher" means the head of the school.

2. Teachers shall do all in their power to form habits of right conduct in their pupils by -

   (i) inculcating the principles of morality, truth and justice.

   (ii) encouraging and judiciously enforcing personal neatness and cleanliness.

   and

   (iii) training the children in habits of modest, orderly, and polite behaviour.

3. Teachers shall avoid all degrading punishments and any punishments that are likely to harm the pupils bodily or mentally

4. The head teacher shall be held responsible for the nature and extent of the punishment inflicted in the school under his charge.

5. Corporal punishment shall be administered only as provided hereunder:-

(i) It shall be reserved for cases of grave misconduct and shall not be inflicted for slowness, dullness, or failure to comprehend what is being taught.

(ii) It shall be inflicted on boys only.

(iii) The instrument employed shall be a strap.

(iv) The only method to be employed shall be that of strapping the pupil on the palm of either hand, and such methods as boxing the ears or pulling the ears, rapping the knuckles, or requiring the pupil to stand for excessive periods are prohibited.

(v) It shall be administered by only the head teacher and any assistant teachers that he may authorize.

and

(vi) It shall not be administered by a student teacher or a student in training.

6. The head teacher shall enter from time to time in the Register of Corporal Punishment the names of the assistant teachers authorized by him to inflict corporal punishment.

7. The nature of the offence, the extent of the punishment, the date on which the punishment was administered, and the name, grade, and age of the pupil shall be entered in the Register of Corporal Punishment.

8. A pupil may be detained for short periods after school hours, but no child shall be detained more than half an hour at any time or for any part of the morning or the afternoon recess or, except as provided in Regulation XII. - School Hours, be given less than one clear hour for the midday recess.

9. (a) The Director, with the approval of the Minister, may issue any orders and instructions that he may consider necessary for safeguarding health and maintaining order and discipline in State schools.

(b) Pupils shall comply with any orders and instructions that may be issued under sub-clause (a) of this clause.

10. (a) Pupils who -

(i) do not comply with any order or instruction that is issued under clause 9 of this regulation.

(ii) fail to observe any prescribed patriotic ceremony.

or

(iii) fail to comply with the lawful orders of their teachers.

or

(iv) are so unclean as to be considered by the Director offensive to, or dangerous to, the health of their teachers or other pupils.

or

(v) are considered by the Director guilty of misconduct or of improper or disgraceful conduct -

may, by order of the Director, with the approval of the Minister be excluded from a State school.

(b) Notwithstanding anything in sub-clause (a) of this clause no pupil shall be excluded from a State school on any ground relative to the religious or political opinions or beliefs of the pupil or of his parents, if such opinions or beliefs do not prevent the inculcation of a love of country or the observance of any prescribed patriotic ceremony at the school.

11. (a) In extreme cases, such as misconduct or improper or disgraceful conduct, or want of cleanliness, or failure to observe any prescribed patriotic ceremony, a head teacher may pending the Director's decision suspend a pupil from attendance at school.

(b) A head teacher on suspending a pupil from attendance as provided in sub-clause (a) of this clause shall immediately report the matter to -

(i) The Director.

(ii) The school committee or advisory council or technical school council as the case may be.

and

(iii) The parent of the pupil.

(c) On receipt of the head teacher's report on his suspension of a pupil from attendance in accordance with the provisions of sub-clauses (a) and (b) of this clause the Director shall cause an inquiry

ceremony.

or

(iii) fail to comply with the lawful orders of their teachers.

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(iv) are so unclean as to be considered by the Director offensive to, or dangerous to, the health of their teachers or other pupils.

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(iii) The parent of the pupil.

(c) On receipt of the head teacher's report on his suspension of a pupil from attendance in accordance with the provisions of sub-clauses (a) and (b) of this clause the Director shall cause an inquiry to be held into the circumstances of the case and after this inquiry shall determine whether the pupil shall resume attendance at the school or be, by order of the Director given with the approval of the Minister excluded from the school."

14. Infectious Diseases: Instructions for Control. E.G. 14.6.'67 pp 250 - 253

Insurance.

1. Excursions and School Crossings. E.G. 29.1.'71 p. 13.

"Teachers Voluntarily Supervising School Crossings and Educational Excursions, Etc.: Insurance.

(This notice supersedes that appearing on pages 3 - 4 of the "Education Gazette" dated the 30th of January, 1969, under the above heading).

The Minister, in trust for teachers employed by the Department as detailed from time to time in the payroll, holds a current Public Liability Policy which, subject to the exclusions stated in that policy, provides as follows:-

1. To provide indemnity for a teacher employed by the Education Department of Victoria in respect of claims against him or her for acts or omissions occurring -

   (i) While supervising in a voluntary capacity pupils of the school to which the teacher is attached during the time when such pupils are preceeding to or from school, or

   (ii) while supervising in a voluntary capacity at any "Marked Cross-Walk" including any "Pedestrian Crossing" or "School Crossing" (within the meaning of the Road Traffic Regulations 1962) any pupils of any school (whether conducted by the Education Department or privately conducted) during the time when such pupils are proceeding to or from school, or

   (iii) while directing pupils of the school to which the teacher is attached to proceed to or from a "Marked Cross-Walk" including any "School Crossing" (as defined above) to display or remove flags or signs, or

   (iv) while supervising outside of school grounds in a voluntary capacity and in an organised way pupils of the school to which the teacher is atrached. (In special circumstances such additional Departmental teachers as may be required as supervisors are also indemnified).

2. Liability for any one accident or series of accidents crising out of one event is limited to $100,000. The Insurers will provide legal assistance for a teacher in any case giving rise to a claim under the

"Teachers Voluntarily Supervising School Crossings and Educational Excursions, Etc.: Insurance.

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   (iv) while supervising outside of school grounds in a voluntary capacity and in an organised way pupils of the school to which the teacher is attached. (In special circumstances such additional Departmental teachers as may be required as supervisors are also indemnified).

2. Liability for any one accident or series of accidents crising out of one event is limited to $100,000. The Insurers will provide legal assistance for a teacher in any case giving rise to a claim under the policy, provided that the indemnity expressed by the policy is applicable to the case.

Teachers should immediately notify the Department if a claim is brought against them in connection with their supervision of a group of children as defined above."

2. Motor Vehicles Used on Official Business: Insurance. E.G. 27.1.'66 p. 8

"Motor Vehicles Used on Official Business: Insurance.

The attention of officers and teachers is drawn to requirements relating to the use of private motor vehicles on official business.

The Government has directed that where a person employed by the Crown uses his private motor vehicle on official business, he shall be required, as a condition precedent to his being paid an allowance for such use, to effect and maintain in force a comprehensive motor vehicle insurance policy that includes liability at law by way of damages to an amount of not less than $200,000 and an indemnity to the Crown, such policy to include passenger risk.

It is probable that present policies already meet the above requirements except that they indemnify "employer" rather than the Crown, in which case it will be necessary for them to be endorsed to the effect that "employer" includes the Crown. The State Motor Car Insurance Office does not charge for this, and other companies would probably charge only a small additional premium, if any.

Officers and teachers who use their vehicles on official business must ensure that their policies meet the requirements outlined above, and, if they have not already done so, should forward their policies and current drivers' licences to the Department without delay for noting."

3. Fire Insurance on School Equipment. E.G. 25.7.'69 p. 374

4. Insurance of School Equipment. E.G. 13.4.'70 p. 127

5. Insurance: Equipment and Third Party. E.G. 28.3.'69 p. 110

Safety.

1. Fire Precautions in Schools. E.G. 12.10.'70 p. 463 - 5.

"Fire Precautions in Schools.

A. Schools in Areas under the Control of the Metropolitan Fire Brigade.

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Safety.

1. Fire Precautions in Schools. E.G. 12.10.'70 p. 463 - 5.

'Fire Precautions in Schools.

A. Schools in Areas under the Control of the Metropolitan Fire Brigade.

1. Fire risks should be reduced to a minimum by safe storage of inflammable liquids; disposal of records and other paper no longer needed; and by care in handling naked lights. Defective heaters must not be used; they must be repaired or replaced. Curtains must be kept clear of heating appliances. Doors and door locks should be kept in good working order . . . . .

2. Inflammable liquids should not be used for the treatment of floors. . . . .

3. The telephone number and the location of the nearest fire brigade should be made known to all teachers in the building. Fires occurring in the City of Melbourne are attended to on call by the Headquarters Fire Station (Telephones 662.1006 and 63.1106 or 000). The numbers of suburban stations of the Metropolitan Fire Brigade are shown on page 402 of the Melbourne Telephone Directory.

   In the event of fire the fire brigade must be immediately called and all efforts, within the limits of safety, should be made to control the fire pending the brigade's arrival.

4. All members of staff should know the location of any fire-alarms in the vicinity of the school building and the method of operating them. The location and the method of use of fire-hoses and of hand-extinguishers should also be made known to the staff, one of whom might be placed in charge of this particular responsibility.

5. New members of staff should immediately be acquainted with the various alternative means of exit from the buildings and grounds and advised regarding possible exit hazards such as staircases, culs-de-sac, and doors opening inwards . . . . .

6. In the event of a fire involving electrical equipment, if possible, first switch off the electric power supply.

   Warning - Do not use soda acid or foam extinguishers on "live" electrical equipment.

7. Fire drill exercises by teachers and pupils should be arranged at least twice yearly, an important feature being an exact check to ensure that all children have left the building and assembled at some distance from the school. The type of warning device to be used, the appointment of monitors to assist in the evacuation of classrooms and to assist handicapped pupils, and the exit doors and stairways to be used by each class are some of the matters that would have to be determined beforehand by the head of the school. All concerned should be impressed with the necessity of self-control, responsibility for others, and the avoidance of panic. . . . .

B. Schools in Areas under the Control of the Country Fire

City of Melbourne are attended to on call by the Headquarters Fire Station (Telephones 662.1006 and 63.1106 or 000). The numbers of suburban stations of the Metropolitan Fire Brigade are shown on page 402 of the Melbourne Telephone Directory.

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B. Schools in Areas under the Control of the Country Fire Authority.

1. Fire risks should be reduced to a minimum by safe storage of inflammable liquids; disposal of records and other paper no longer needed; and by care in handling naked lights. Defective heaters must not be used; they must be repaired or replaced. Curtains must be kept clear of heating appliances. Doors and door locks should be kept in good working order.

2. Inflammable liquids should not be used for the treatment of floors.

3. The telephone number and the location of the nearest fire brigade should be made known to all teachers in the building. In the event of fire the fire brigade must be immediately called and all efforts, within the limits of safety, should be made to control the fire pending the brigade's arrival.

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5. New members of staff should immediately be acquainted with the various alternative means of exit from the buildings and grounds and advised regarding possible exit hazards such as staircases, culs-de-sac, and doors opening inwards.

6. Heads of schools should make arrangements direct by telephone or by letter with the local officer for a demonstration and drill with the installed fire equipment. In areas where there is a voluntary fire brigade the visit of an officer to the school to service fire equipment could be an appropriate occasion for such a demonstration to take place. Demonstrations by unqualified persons must not be attempted.

7. In the event of a fire involving electrical equipment, if possible, first switch off the electric power supply.

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Heads of schools are asked to note and bring under the notice of their staffs the above points in connexion with fire precautions in State school buildings.

2. Fire Extinguishers. E.G. 12.10.'70 p. 465.

"Fire Extinguishers: Installation and Initial Charging.

The Public Works Department is now responsible for the installation and the initial charging of fire extinguishers supplied to schools. So that this work may be carried out expeditiously, heads of schools should notify the Inspector of Works immediately fire extinguishers are received from the manufacturers.

Schools will still be responsible for the re-charging and the servicing of fire extinguishers, the cost of which may be met from the School Works and Buildings Account . . . . ."

3. Dangerous Chemicals. E.G. 13.7.'65 p. 249.

"Warning: Dangerous Chemicals.

Following a recent explosion in a pupil's home during the school vacation, the Chief Inspector of Explosives has asked that teachers of chemistry should be warned of the dangers associated with the use of certain chemicals, in particular, potassium chlorate. This chemical becomes a dangerous explosive when mixed with any oxidizable material. Teachers should use it with caution, should ensure that students are warned of its dangers, and should store it in a place to which students do not have access."

4. Matches. E.G. 12.10.'70 p. 486

"Warning: Playing with Matches.

Teachers are asked to impress upon their pupils the dangers of playing with boxes of matches, both in the home and out of doors. In addition to the personal risk involved, there is danger of setting fire to grass, paper, or other litter in playgrounds, paddocks, or gardens, with resulting damage to homes and buildings and even loss of life.

It should be emphasized that the law provides heavy fines and terms of imprisonment for anyone found guilty of lighting fires out of doors on days declared by radio announcement to be days of total fire ban."

5. Electrical Appliances. E.G. 23.1.'53 p. 23

"Safety First: Electrical Appliances.

Both because many schools are fitted with a number of electrical appliances and because children may be called upon to use them in the home, training in the correct [illegible] should be given wherever

supplied to schools. So that this work may be carried out expeditiously, heads of schools should notify the Inspector of Works immediately fire extinguishers are received from the manufacturers.

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5. Electrical Appliances. E.G. 23.1.'53 p. 23

"Safety First: Electrical Appliances.

Both because many schools are fitted with a number of electrical appliances and because children may be called upon to use them in the home, training in the correct use and care of such equipment should be given wherever possible. The following points, drawn from a pamphlet on the subject published by the National Safety Council of Australia, should be stressed:-

1. Repairs to electrical installation or equipment should not be attempted by amateurs.
2. Flexible cords should be examined frequently for signs of wear or fraying.
3. Portable appliances should not be connected to lamp holders.
4. Appliances should not be left switched on longer than necessary and should not, as far as possible be left unattended while the power is on.
5. Jugs and kettles should never be filled or emptied unless the power is first turned off.
6. Radiators should not be used without protective bars in position.
7. Overhead wiring should be inspected from time to time, so that any peeling of the insulation may be noted.
8. If it is necessary to climb upon the roof all wiring must be carefully avoided.
9. Flying kites or kicking footballs near electric supply lines is dangerous."

6. Bush Fires: Safety of Pupils. E.G. 12.10.'70 p. 494, 5

7. Electricity Supply. E.G. 23.6.'55 p. 201

"Electricity Supply: Teaching of Safe Practices.

The State Electricity Commission is anxious that all school pupils should be instructed in correct and safe practices in connexion with electricity supply and electric appliances. It has drawn up the following list of topics covering the general principles of electricity supply, and it is recommended that these should be incorporated in the teaching of electricity topics to all forms in secondary schools. As notified in the University's Circular to Schools No. 88, copies of the "Shocko" booklet for pupils are available in quantity from the State Electricity Commission which is also preparing a guide for the use of teachers.

General Principles of Electricity Supply and Safe Practices for Inclusion in Science Course.

1. Electricity in the Home.

   (a) Fixed Wiring - How electricity supply is brought into the home from street mains. The fixed wiring, with diagram in simple

3. Portable appliances should not be connected to lamp holders.

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General Principles of Electricity Supply and Safe Practices for Inclusion in Science Course.

1. Electricity in the Home.

(a) Fixed Wiring - How electricity supply is brought into the home from street mains. The fixed wiring, with diagram in simple form showing light and power outlets and earthing system. Fuses and their importance. Dangers of overloading wiring system. Legal requirements concerning work on fixed wiring.

(b) Lights and Appliances - How lights and appliances work. Dangers of metal-clad appliances and bare elements. Principles of three-pin power outlet. Why light sockets are not suitable for appliances. Need for adequate wiring.

(c) Flexible Cords - How flexible cords carry supply to portable appliances. Importance of green earthing conductor. Why cords can be dangerous. Necessity for proper insulation.

2. Earthed Situations.

Explanation of what constitutes an earther situation. Natural tendency of electricity to take easiest path to earth. Special caution necessary when using appliances in earther situations. How green core of flexible cord and earthing system protects.

3. Wiring of Flexible Cords.

Explanation, with diagrams, of how an expert connects three-core flexible cords to (a) three-pin plug, (b) plug-all, (c) appliance with earthing terminal. Warnings that wiring should be carried out by qualified electrician. Proper usage and storage of flexible cords.

4. Handling of Appliances.

Care needed in using appliances such as lawn-mowers and portable tools. Do not handle two appliances at the same time. Importance of proper maintenance of appliances.

5. What to Do in Case of Electric Shock.

Explanation of the effect of electric shock. Analogy with drowning. Importance of immediate resuscitation. Methods of resuscitation.

6. "Shocko" Booklet as General Summary."

8. Poisons. E.G. 28.10.'57 p. 321

"Safety First: Care with Poisons.

The Pharmaceutical Societies of Australia and kindred bodies, disturbed at the high incidence of accidental poisoning among children, have instituted a campaign to urge more care with regard to the storage and handling of harmful substances in the home. Teachers are asked to help by discussing the matter with their classes during health or "safety first" lessons.

Since most cases of accidental poisoning occur in pre-school groups, pupils might be encouraged to

appliances. Need for adequate wiring.

(c) Flexible Cords - How flexible cords carry supply to portable appliances. Importance of green earthing conductor. Why cords can be dangerous. Necessity for proper insulation.

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4. Handling of Appliances.

Care needed in using appliances such as lawn-mowers and portable tools. Do not handle two appliances at the same time. Importance of proper maintenance of appliances.

5. What to Do in Case of Electric Shock.

Explanation of the effect of electric shock. Analogy with drowning. Importance of immediate resuscitation. Methods of resuscitation.

6. "Shocko" Booklet as General Summary."

8. Poisons. E.G. 28.10.'57 p. 321

"Safety First: Care with Poisons.

The Pharmaceutical Societies of Australia and kindred bodies, disturbed at the high incidence of accidental poisoning among children, have instituted a campaign to urge more care with regard to the storage and handling of harmful substances in the home. Teachers are asked to help by discussing the matter with their classes during health or "safety first" lessons.

Since most cases of accidental poisoning occur in pre-school groups, pupils might be encouraged to take the view that, as well as taking proper precautions themselves, they should help to guard younger members of the family. Points that might be emphasized are as follows -

1. Medicines, pills, and tablets that may be harmless when taken by adults according to doctor's orders may cause serious illness or death when taken by young children. Such substances should be kept out of the reach of children.

2. Household or garden chemicals and cleansers are more dangerous than is often thought. They, too, should be stored where children cannot get at them. Kerosene, because it is commonly used, because insufficient care is taken with it, and because it is often kept in such containers as soft drink bottles, has caused more than its share of trouble. Other common harmful substances are weed killer, paint thinner, turpentine, paint, methylated spirits, furniture polish, clothes bleachers, ammonia, liquid soaps and detergents, alcohol in all forms, toilet preparations, cosmetics, petrol, caustic soda, ferrous sulphate, nicotine, and most garden sprays.

3. Children should be trained from earliest years, to refrain from eating or drinking substances met with in a casual way.

4. Accidents can be caused by such unsafe practices as storing other substances in food or drink containers, leaving containers unmarked, failure to read labels or directions, and giving medicine prescribed for one person to another.

5. When it is suspected or known that a child has taken any substance that may be harmful, the child should be taken to a doctor at once. The doctor should be told the nature of the substance, where this is not clearly known a sample or the container should be taken to him."

9. Warning Eclipse of Sun. E.G. 18.8.'71 p. 430

"Warning: Eclipse of the Sun, 21st August.

An eclipse of the sun will occur in Victoria on the 21st of August, commencing at 6.57 a.m. and finishing at 8.54 a.m., with the greatest part of the eclipse at 7.53 a.m.

In previous eclipses many people, especially school children, have had the sight of one or both eyes damaged by looking directly at the

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In previous eclipses many people, especially school children, have had the sight of one or both eyes permanently damaged by looking directly at the eclipse.

Teachers are requested to stress that an eclipse should never be viewed by direct vision with or without protective glasses, since looking directly at the sun for even a few seconds will cause a retinal burn at the most vital spot (the macula). It is the opinion of the Australian College of Ophthalmologists that there is no safe way to look at an eclipse of the sun.

As there is great temptation to look at the sun during an eclipse, children and parents should be warned of the dangers involved."

Teacher Training.

1.	Studenships for Teacher Training Courses.	E.G. 8.9.'71 p. 457
2.	Application for leave for Examinations.	E.G. 25.2.'71 p. 63
3.	Annual examinations for Teachers.	E.G. 23.7.'71 pp 375 - 6
4.	In-service Education: Study Leave	E.G. 24.6.'71 pp 304 - 8
5.	In-service Education: Program of Non-Formal Activities.	E.G. 24.6.'71 pp 309 - 321
6.	Administrative Course	E.G. 13.5.'71 p 208
7.	Science Certificates (See Careers).	Reg. XXXV.

Teacher Liability. E.G. 8.8.'69 p. 404

"Liability of Teachers in Cases of Injury to Pupils.

The following statement explains the liability of teachers in cases of injury to pupils in their care:-

1. The overall position is that a teacher is well protected as an employee of the Crown.

2. A teacher incurs no liability in connexion with an injury to a pupil unless it is established that he has been negligent or has acted in an improper way. Negligence on the part of a teacher cannot be defined precisely, and in any actual suit for damages a court will determine whether or not in the particular circumstances the teacher has been negligent. Broadly, a teacher is not negligent if he exercises reasonable care in supervision, "reasonable care" being the care that a good parent would be expected to exercise. Actions such as physical assault would be regarded as improper and these might result in a charge being laid against the teacher by police.

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3. The Crown (i.e. the State of Victoria) may be held liable for damages arising from the negligence of a teacher during the performance of official duties as a servant of the Crown. If a claim for damages is made against a teacher on the grounds of negligence or improper conduct, the Crown is usually joined as

a defendant, and in general the Crown Solicitor will represent, and provide legal services for, the teacher. However, in each case the decision as to whether the Crown will represent the teacher is made by the State legal authorities. In special circumstances, for example where the action of a teacher has been improper, the State may decide not to represent or support the teacher, and the teacher may be expected to meet the claim if it is upheld.

4. Summing up, this means that if a teacher is reasonably careful in the discharge of his official duties he is not liable for damages. If a claim is lodged he will be fully protected by the Crown.

5. Official duties include all curriculum activities such as teaching in a classroom; preparation in a staff-room or laboratory; supervision of pupils during recess; sport supervision; supervision of sports teams taking part in contests against other schools in a schools' association; supervision of pupils on visits to museums, art galleries, theatres, factories, etc.; supervision of pupils on geography or science excursions. It is expected that all such activities are undertaken either by direction of the head of the school or with his knowledge and approval. If a claim for damages is made against a teacher, the Education Department may be asked whether he was engaged on official duties. The Department gives a liberal interpretation to this term.

6. It is the policy of the Department that excursions such as visits by groups of pupils to other States and visits by city schools to country areas should be undertaken only with the prior approval of the Department. In particular this is necessary for excursions during weekends or vacations. Because teachers involved in these excursions are often acting in a voluntary capacity, the Department has taken out a Public Liability Indemnity Policy which covers such teachers against claims arising from approved excursions. It also covers teachers who voluntarily supervise school crossings."

FINANCE.

CONTENTS.

FINANCE IN TECHNICAL SCHOOLS.

General.

The administration of the finances of Victorian Technical schools is explained below with emphasis on the relevance to science departments.

Estimates from schools concerning anticipated expenditure for the next financial year are called for during First Term (generally about April 30th.)

The internal administration of accounts varies from school to school. There appears to be two main methods of administering the finances of departments within schools.

(a) In some schools each department is allocated a fixed amount each year and the head of department is expected to purchase requirements within this amount.

(b) Science departments in other schools make purchases which are approved by the Principal in the context of the needs of the whole school.

It is advisable for Heads of Departments to discuss their particular needs with their Principal at the earliest opportunity to familiarise themselves with the school policy in this matter.

Maintenance (No. 1) Account.

Instructions concerning the allocation of these funds are sent periodically to schools (2).

The Maintenance Account is intended to cover all normal overhead expenses e.g. clerical and cleaning staff wages, light, power, fuel, telephone, general equipment.

Finance is received as monthly payments (December and January simultaneously). The yearly allocation for a school is based on the estimates referred to above.

Relevance to Science Department.

No. 1 Account is used for: class material, new items and replacement of articles, repairs, and maintenance of furniture and fittings.

"Single items, whether new or replacement, costing less than $10.00 each, and expendable items, should be purchased from Maintenance Funds." (1)

Special Equipment (State).

In general special equipment funds are provided for purchase of.-

(a) major items of equipment,
(b) minor items purchased in quantity for equipping laboratories or workshops, or for the establishment of new courses.

"Departmental Approval of Items for Purchase.

(a) Lists of equipment requirements in triplicate, must be submitted with the estimates in April of each year. Separate lists, on the attached pro-forma, should be submitted for:-

(i) State Special Equipment Grant Items

Equipment for the use of Forms I to V only." (1)

Procedure for purchase.

(a) Single items, or a number of similar items, costing up to an aggregate of $200:- Two or more quotations to be obtained by Council.*

(b) Single items, or a number of similar items, costing in the aggregate over $200:- Tenders to be invited in the press.*

(*This may rise to $500 in the near future).

Internal or Extraneous (No. 2) Account.

This account is administered by the school council and consists of money raised within the school from composite fees, bookstall, canteen, social services, tours, special efforts (assembly hall, grounds, improvements).

Relevance to Science Department

No. 2 Account could provide some revenue at the discretion of the Principal, e.g. book sets.

Commonwealth Science Grant (Secondary).

These funds are allocated by the Commonwealth Government for the supply of science equipment to secondary and technical schools. In the early stages, some 6 - 7 years ago, this grant was used to supply schools with various items of equipment e.g. telescopes, oscilloscopes, microscope sets, biological specimens.

In recent years the "annual shopping list" has been used. All eligible schools are issued with a standard list of equipment and prices. The school nominates the equipment it requires to a certain maximum value determined by school population. Schools may elect to forego the use of this grant in a year in order to accumulate reserves for future years, or may elect to contribute their own funds toward the purchase of an expensive item.

The Advisory Committee for the Commonwealth Science Grant Equipment Fund is aware of the gap developed over the years between the large and small schools, and new schools. Between June 1972 and July 1973 an attempt will be made to establish parity between schools. To this end the "shopping list" will be suspended for 12 months and a survey will be taken with the object of identifying and providing equipment which is considered desirable but has not been available to many schools. The relevant questionnaire has been distributed to schools at the time of distribution of this document.

Commonwealth Science and Technical Grant.

This grant is applicable only to schools involved in some post-secondary education, e.g. Form VI, apprentices, higher technician, certificate and diploma studies.

"Departmental Approval of Items for Purchase.

(a) Lists of equipment requirements in triplicate, must be submitted with the estimates in April of each year. Separate lists, on the attached pro-forma, should be submitted for:-

(i) . . . . . .

(ii) Commonwealth Technical Training Grant Items.

Equipment for use in Trade or Technician Courses, and (except in Colleges of Advanced Education where recurrent expenditure is subsidized by the Commonwealth) tertiary equipment.

(b) At the time the funds are made available to the school from the Commonwealth Technical Training Grant the Department may designate a portion to be applied in the purchase of specified items." (1)

Purchases have a $10.00 minimum limit, and only items approved on "List B" (A 64/1115) may be bought. (3) This fund cannot be used to purchase expendable items.

Commonwealth Library Grant.

This grant is similarly applicable only to schools involved in some post-secondary education and is used for the purchase of reference materials e.g. books, films, slides, tapes, charts.

School Official Account.

This account is concerned with scholarships, travelling allowances, etc.. The account is non-profit making and a nil balance is maintained.

Not applicable to the science department.

REFERENCES.

1. Education Department of Victoria.

Equipment Instruction No. 39: Special Equipment Grants.

Tech. Sch. Br. T 68/1402

2. Education Department of Victoria.

Maintenance Instructions.

Tech. Sch. Br. (various)

3. Education Department of Victoria.

Commonwealth Technical Training Grant Equipment Approved by Commonwealth for Senior Technical and/or Trade Courses (List B).

Tech. Sch. Br. A 64/1115

FUNCTIONS OF THE HEADS OF SCIENCE DEPARTMENTS.

CONTENTS.

FUNCTIONS OF THE HEAD OF SCIENCE DEPARTMENTS.

Introduction.

During 1971 the Technical Schools Sciences Standing Committee were successful in securing approval to hold a conference for Heads of Science Departments in Technical Schools. The standing committee considered many subjects when deciding the conference agenda - far too many to be included in a two day conference. It was realized that these discussions would be of value to heads of departments because, in fact, the committee was exploring the range of activities expected of heads of departments

The following summary therefore, can be interpreted as an attempt to define the function of a head of science department in technical schools.

General Principles.

The Head of Science Department is expected to:

(a) Develop such an environment within his department as to ensure that the members of his teaching team can create optional learning conditions for their students. The head of department must therefore be a leader and a resource to his teaching team.

(b) Represent the interests and responsibilities of the science department to the school administration. The head of department must therefore contribute to the interests of the school and be prepared to accept responsibility. He must provide a good channel of communication between his team and the school administration.

Areas of Responsibility.

A. Administrative

1. Personnel

(a) New teachers. The head of department is expected to assist new teachers in several ways.

(i) Detail the duties and responsibilities of each new teacher.
(ii) Discuss the general aims of the science department.
(iii) Indicate the courses of study to be followed.
(iv) Ensure that the newcomer is acquainted with safety requirements in a science department.
(v) Inform the newcomer about procedures of use, storage and maintenance of equipment.
(vi) Indicate the records of tests and assessments to be kept.
(vii) Detail the testing and assessment policy within the department.

The head of department should also attempt to assess the potential talent of the newcomer so that the opportunity to develop this to the fullest extent is maximized.

Special assistance may be needed if the new teacher is newly graduated and inexperienced. The head of department should be prepared to discuss with the newcomer:

(i) Conduct of practical sessions.
(ii) Interpretation and organization of courses.
(iii) New trends in science teaching. The opportunity to learn from the newcomer should not be missed.
(iv) Preparation and planning of lessons.
(v) Disciplinary worries.
(vi) Experiments and other techniques to assist teaching.

(b) Subject Co-ordinators.

The head of department cannot himself co-ordinate all subjects taught at each form level. Some aspects to consider are:

(i) The selection of suitable co-ordinators and their teaching load.
(ii) Duties and responsibilities of co-ordinators.
(iii) Testing and assessment.
(iv) Maintenance of good standards and uniformity (i.e. consistency NOT "sameness")
(v) Interpretation of courses of study.

(c) Supervision of College Trainees.

The head of department may or may not be a supervisor, but in any case he would be expected to:

(i) Assist trainee with lesson preparation, techniques, aids, discipline.
(ii) Encourage the trainee.
(iii) Ensure that trainee has the opportunity to observe other teachers, (and uses it).
(iv) Liaise with the Technical Teachers' College, and other teacher training institutions.
(v) Assist in the selection of supervisors.

(d) In-Service Training.

This is one of the most important functions of the heads of department. Some aspects are:

(i) Teacher participation in training courses conducted from time to time by various organizations.
(ii) Keeping staff up to date in their fields.
(iii) Encouragement of staff to expand their knowledge into "new" branches of science.
(iv) The utilization of the expertise in the teaching team in the school.
(v) Regular meetings to ensure discussion of new trends, aims and methods of science teaching.
(vi) Ensuring that all members of the team can learn over a period of time, how to use existing and new equipment in the department.
(vii) The use of teaching aids.

(e) Teacher Aides.

The head of department should explore the possibility of securing ancillary staff to his teaching team. Some aspects:

(i) Student assistants in class.
(ii) Student assistants outside class time. It may be possible to arrange for payment of these assistants. It is important to secure coverage by insurance and workers' compensation.
(iii) Laboratory technicians.

The training, payment, employment, selection and responsibilities of these aides must be carefully considered.

(f) Departmental Meetings.

The head of department must be aware that his most important function has to do with the management of people. The regular departmental meeting ensures that direct interaction between members of the team does take place.

Some possible items for these meetings are:

(i) Content, scope and aims of courses.
(ii) Testing, assessment, records.
(iii) Extra curricular activities, clubs etc.
(iv) Use and maintenance of equipment.
(v) Discussion of school policy. Information to and from school administration.
(vi) Trends and methods of science teaching.
(vii) In-service education sessions.
(viii) New equipment to be purchased.
(ix) Safety procedures.
(x) Guest speakers.

Some aspects to be considered:

(i) When meetings are held and whether they are timetabled or not.
(ii) Alternation of mathematics with science meetings.
(iii) Selection of a chairman for meetings.
(iv) Combined meetings with other departments.
(v) Planning the agenda of such meetings.

(g) Absence of Teachers.

Some aspects to consider:

(i) Regulations related to absences.
(ii) Special leave regulations.
(iii) Extra periods - T.T.A.V. policy, use of emergency teachers, extra periods organized within a department.
(iv) Reasons for teacher absences and methods of reducing them.
(v) Extended absences e.g. long illness - the allocation of the teaching load.

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(h) Support for Teachers.

The head of department should be alert for difficulties any member of his team experience e.g. family illness, and be prepared to give special consideration to such a teacher if warranted. Very conscientious teachers should be protected from being overloaded with additional work. The head of department should endeavour to ensure that the work load is equitable distributed amongst the team.

(i) Staff Teaching Allotments.

It is to be expected that among the members of most departments there will be a variety of qualifications, abilities and interests. It is important to place these people to the best advantage within the department. Heads of department should acquaint themselves with the capabilities of their staff members by:

(i) Discussion with the school administrators.
(ii) Checking the "white cards".
(iii) Holding a departmental meeting early in the year.
(iv) Private discussion with each member of the teaching team.

The head of department should keep in mind other duties performed by members of his team e.g. sports master, vocational advisor etc. . The head of department may be requested to draw up a tentative allotment for his team for discussion with the principal. Certain principles should be observed if possible:

(i) Each teacher should have the opportunity to teach classes of varying ranges of ability and level.
(ii) Form 1 is a critical year and thought should be given to providing experienced staff for this year.
(iii) The individual interests and qualifications of teachers should be kept in mind.
(iv) Inexperienced teachers should be given the opportunity to expand their experience.
(v) The head of department should attempt to objectively assess his own qualifications and talents in relation to those of his staff in deciding his own allotment.

2. Equipment

(a) Maintenance Control and Storage.

One of the most time consuming activities of the heads of department has to do with equipment.

(i) The heads of department and his team should develop a rational method of organising the storage of all equipment in the department. Such a system should be published and copies made available to each member.

The distribution of apparatus and chemicals in the department should be related to:

1. Safety requirements, e.g. concentrated acids.
2. Legal requirements, e.g. poisons.
3. Cost, e.g. projectors.
4. Frequency of use, e.g. test tubes.
5. Specialist nature of equipment, e.g. Wilson Cloud Chamber.
6. Accessibility to students and teachers.

Each item of equipment should have its own storage place.

(ii) It is considered desirable to establish a standardized nomenclature for equipment, ensuring that the stock list kept in the central office is identical with the departmental inventory.

(iii) A card system for progressive stock-taking of equipment during the year enables stock to be re-ordered when depleted and the end of year stock-taking to proceed smoothly. Each member of the science team must accept responsibility for maintaining records.

An alternative procedure is to establish a "breakages" book.

(iv) A similar card system can be useful for the control of chemicals.

(v) When the stock on each card is near depletion the card can be placed in an order file for monthly purchase of replacements.

(vi) It is advisable to exclude all expendable items and apparatus of little cost from the stock list.

(vii) New items of equipment arriving in the school should be promptly processed. All members of staff should be notified of such arrivals and the place of storage decided and published.

(viii) The science department needs to keep a good tool kit available for use. A shadow board in a central location is a good method of storage for tools. (e.g. screwdrivers, hammer, pliers - large and fine, soldering iron).

(ix) Teacher reference and student reference books should be controlled by a card system and located in an agreed position in the department.

(b) Furnishings and Fittings.

The head of department is responsible for the physical environment of his department.

(i) Damage to any furnishings and fittings should be promptly reported to the school administration e.g. gas taps, water taps, bench surfaces.

(ii) The opportunity should be taken to develop the department by arranging for notice boards to be placed where required, cupboards painted and cleaned.

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(ii) The opportunity should be taken to develop the department by arranging for notice boards to be placed where required, cupboards painted and cleaned.

(iii) The arrangement of furniture in the department should be carefully considered. Often it is possible to enable a change in the educational program of a department to develop by a fairly simple rearrangement of fittings.

(iv) The head of department should discuss with the school administration the fittings and furnishings available from the Education Department.

(c) Resource Material.

The head of department is responsible for securing as good a supply of resource material for science teaching as possible.

Some aspects of this are:

(i) The head of department should be familiar with the resources available from A.V.E.C. A visit to A.V.E.C. should be made to explore the opportunities this excellent service can provide for schools.

(ii) The resources within the school and the local community should be well known to the head of department. Close liaison with the school library should be established as well as with municipal libraries, municipal and government departments and industry.

(iii) Excellent resource material is also available from S.T.A.V. and other organisations such as A.C.F., Museum of Applied Science.

(iv) It is often convenient for one member of the science team to accept responsibility for ordering all films. An efficient system can be devised so that this does not become a burdensome chore.

(d) Sources of Equipment.

(i) Most suppliers of equipment and aids to schools maintain regular visits to ensure that the head of department is fully aware of new items available.

(ii) The head of department should acquaint himself with the equipment available from the Stores Branch of the Education Department.

(iii) The Executive Officer of the Commonwealth Science Grant Fund regularly supplies schools with information concerning equipment available from this source.

(e) Insurance.

The head of department should check that all major items of equipment arriving at the school are covered by adequate insurance.

3 Other Administrative Issues.

(a) Finance.

The head of department must become fully conversant with the methods of financing technical schools.

(b) Ordering

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(b) Ordering.

The head of department should establish a procedure for ordering new equipment in consultation with the school administration.

(c) Returns.

Certain information is required of the head of science department by the Education Department. This information should be prepared in good time to reach the department by the due date. The head of department should become familiar with the procedures adopted each year for examinations, as an example.

(d) Regulations: Education Gazette Policies.

The head of department should systematically file all regulations and Education Gazettes for easy reference.

(e) Maintenance of Records.

A simple and efficient filing system should be developed for the maintenance of records.

Copies should be kept of:

(i) Departmental correspondence.
(ii) Education Gazette.
(iii) Student's records.
(iv) Orders.
(v) Assignments, work sheets, etc.
(vi) Inspectorial reports.
(vii) Outward correspondence.
(viii) Examination papers.
(ix) Publications of standing committees.

B. Science Education.

The head of science department is usually the most experienced science teacher in the science team. He is expected to provide guidance and leadership in science education in his school. Therefore he would be expected to be thoroughly conversant with the following points and foster the discussion of these issues amongst his team.

1. The Aims of Science Teaching in Technical Schools.

The head of department must be familiar with the published documents concerning Technical Education in Victoria.

Three such documents are:

Forms I - III Curriculum C 69/335 (C & R)

Forms IV - V Curriculum 69/336 (C & R)

Policy Statement by E.T. Jackson The Future Role and Operation of Technical Schools and Colleges A 70/1460 Tech. Sch. Dv.

Within the general framework outlined in these documents, the head of department should be aware of the aim of science teaching stated

by the due date. The head of department should become familiar with the procedures adopted each year for examinations, as an example.

(d) Regulations: Education Gazette Policies.

The head of department should systematically file all regulations and Education Gazettes for easy reference.

(e) Maintenance of Records.

A simple and efficient filing system should be developed for the maintenance of records.

Copies should be kept of:

(i) Departmental correspondence.
(ii) Education Gazette.
(iii) Student's records.
(iv) Orders.
(v) Assignments, work sheets, etc.
(vi) Inspectorial reports.
(vii) Outward correspondence.
(viii) Examination papers.
(ix) Publications of standing committees.

B. Science Education.

The head of science department is usually the most experienced science teacher in the science team. He is expected to provide guidance and leadership in science education in his school. Therefore he would be expected to be thoroughly conversant with the following points and foster the discussion of these issues amongst his team.

1. The Aims of Science Teaching in Technical Schools.

The head of department must be familiar with the published documents concerning Technical Education in Victoria.

Three such documents are:

Forms I - III Curriculum C 69/335 (C & R)

Forms IV - V Curriculum 69/336 (C & R)

Policy Statement by E.T. Jackson The Future Role and Operation of Technical Schools and Colleges A 70/1466 Tech. Sch. Dv.

Within the general framework outlined in these documents, the head of department should be aware of the aim of science teaching stated by the standing committee concerned with science.

The head of department and his team should discuss this matter and agree on a statement of the aim of the science teaching in their school to be published and available to all members of staff.

2. Developments in Science Education.

The head of department should be thoroughly familiar with developments in science education and be able to advise the school administration and members of his team about these. Some projects in science education are:

BSCS (Biological Science Curriculum Study)

PSSC (Physical Sciences Curriculum Study)

CBA (Chemical Bond Approach)

ESCP (Earth Sciences Curriculum Project)

AAAS (American Association for the Advancement of Science 1 - 6)

ISCS (Intermediate Science Curriculum Study)

JSSP (Junior Secondary Science Project)

ASEP (Australian Science Education Project)

IPS (Introductory Physical Science)

TPS (The Process Way to Science)

NSCMP (National Science Curriculum Materials Project)

SCISP (Schools Council Integrated Science Project)

NUFFIELD SCIENCE TEACHING PROGRAMMES

(Junior Science Project)

(Chemistry - various levels)

(Physics - various levels)

(Biology - various levels)

(Physical Science Project)

(Secondary Integrated Science)

(Secondary Science)

(Project Technology)

Biological Science - The Web of Life Patterns and Processes

CHEM - Study

Scottish Integrated Science

Harvard Project Physics

Victorian Education Department Primary Science

Engineering Concepts Curriculum Project

JSSP (Junior Secondary Science Project)

National Science Development Board (Phillipines) Projects

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Victorian Education Department Prima y Science

Engineering Concepts Curriculum Project

JSSP (Junior Secondary Science Project)

National Science Development Board (Phillipines) Projects

Elementary School Science - Grades 1 - 6

Environmental Science

Integrated Science

Chemistry for Phillipines Schools

Fundamentals of Physics

Syllabuses of T.S.S.S.C. and S.S.S.C.

Documents from C & R.

3. Assessment.

(a) Most schools will have a broad policy concerning examinations and assessment. Heads of department and his team should fit the examination and assessment in the science subjects into this framework.

(b) Details of areas of assessment, methods of testing, recording, and related matters should be the subject of a series of staff discussions.

(c) A comprehensive record of each student's progress throughout each year should be maintained in departmental records so that some appreciation of long term achievement can be gained.

(d) The head of department should advise members of his team regarding the setting of examination papers and tests. The opportunity to liaise with examination panels should be taken.

(e) Other issues relevant to science education:

Purposes of examinations.
- Diagnostic.
- Predictive.

Types of examinations.

Formal.

Objective	Testing mainly in cognitive domain, some sensory-motor
"Essay"	
Practical	
"Open Book"	
Oral	

Informal.

Practical	Cognitive, sensory-motor and affective
Oral	
Check list	

Statistical Considerations.
- Pass mark.
- The use of the mean.
- Standardisation of scores.
- Pass rates.

Examination Construction.
- The need for behaviourally stated objectives.
- Topic grid.
- Bloom's Taxonomy.

Other issues that should be considered by heads of departments are:

Team Teaching.

(b) Details of areas of assessment, methods of testing, recording, and related matters should be the subject of a series of staff discussions.

(c) A comprehensive record of each student's progress throughout each year should be maintained in departmental records so that some appreciation of long term achievement can be gained.

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Examination Construction.
- The need for behaviourally stated objectives.
- Topic grid.
- Bloom's Taxonomy.

Other issues that should be considered by heads of departments are:

4. Team Teaching.
5. Streaming and Tracking.
6. Moderation.

7. Evaluation of the Progress and Effectiveness of the Department.

A form of external evaluation takes place by the school administration and Board of Inspectors. This evaluation provides useful information for heads of departments.

In addition the head of department and his staff should attempt an internal self evaluation in a continuing attempt to improve the effectiveness of the department.

Basically, the evaluation of the educational programme should be related to what the school seeks to accomplish, to the philosophy and objectives of the school within which framework the aims and objectives of disciplines such as science are included.

A series of questions perhaps including the following should assist the head of department in assessing his effectiveness:

How well do the practices of this department meet the needs of the school and community?
How adequate are the courses to meet the needs of all students?
How adequate is staff preparation and planning?
To what extent is teaching adapted to the needs of individuals?
Where is the greatest need for improvement?
Have the aims and objectives of the courses been met?
Do the senior/junior students reveal in their performance any strengths or weaknesses in the department?

C. The Science Department in the School.

Some aspects for heads of departments to consider are:

1. Liaison with

Principal and Vice Principal.
Members of the Board of Inspectors.
S.T.A.V.
Examination panels.
T.S.S.S.C. and Curriculum and Research Branch.
Education Committee.
Technical Teachers' College and Regional Technical Institutes and Universities.
Other departments.

(i) Co-ordination of: Homework
Assignments
Excursions
Camps
Audio visual resources.
Library.

(ii) Integration of Studies
Sequence of related topics.

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(i) Co-ordination of:
- Homework
- Assignments
- Excursions
- Camps
- Audio visual resources.
- Library.

(ii) Integration of Studies
- Sequence of related topics.
- Teaching for other faculties.
- Graphic communications.

Schools in the area.

2. The head of department should be prepared to contribute to the development and general welfare of the school. He should participate and encourage his team to participate in:

   (a) Extra curricular activities e.g. school camps.

   (b) Pastoral scheme.

   (c) Education committee.

   (d) Educational innovation.

3. Public Relations.

   Through the school administration the head of department should:

   (a) Seek to keep feeder schools well informed of the activities of his department, providing information about courses and standards. He should also seek information from these schools.

   (b) Be prepared to establish contact with parents to ensure their co-operation on such matters as homework schedules. Opportunities to discuss progress and any problems should be actively sought.

AIMS OF SCIENCE TEACHING IN TECHNICAL SCHOOLS.

CONTENTS.

AIMS OF SCIENCE TEACHING IN TECHNICAL SCHOOLS.

Introduction.

(a) This statement of the Aims of Science Teaching in Technical Schools is intended to provide guidance to teachers of all science subjects in Junior Technical Schools - Forms I to V. It is hoped that this statement will provide a stimulus for continuing discussion on this matter amongst science teachers and assist them in devising aims for their teaching in their schools.

(b) This statement of aims is consistent with several important recent statements concerning Technical Education in Victoria. It is assumed that teachers are thoroughly familiar with these.

These are:

Curriculum Information Circular 1970/1 - Technical Schools.
Forms I - III Curriculum. C69/335 (C & R).

Curriculum Information Circular 1970/2 - Technical Schools.
Forms IV - V Curriculum. C69/336 (C & R).

Curriculum Standing Committee - Technical Schools.
Discussion Paper No. 1 Curriculum Development in Technical Schools.
AC70/9 (C & R).

Curriculum Standing Committee - Technical Schools.
Discussion Paper No. 2 School Based Curriculum Development.
AC71/271 (C & R).

Education Department Victoria Technical Schools Division.
The Future Role and Operation of Technical Schools and Colleges Policy Statement by E.T. Jackson, Director of Technical Education.
A70/1466 Tech. Sch. Div.

(c) These statements include the following which have particular relevance to science teaching:

"Each school will be responsible for developing its own curriculum within (these) general principles". (3)

"The first three years in the technical school are essentially concerned with providing a general education, and should preferably be planned in terms of the whole three years rather than in terms of individual years". (3)

"The curriculum design for (Forms IV and V) should not only continue the students' general education, but (should) also make provisions for two attractive options: one leading to further education and the other leading directly to job opportunity". (4)

(d) It is clear therefore that the aims of science teaching must:

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(d) It is clear therefore that the aims of science teaching must:

1. Promote the general education of students throughout the whole school.
2. Contribute to the preparation for a vocation or future education in Forms IV and V.

(e) This statement of aims of science teaching is a general statement covering all sciences in the secondary technical curriculum. It is expected that more specific aims will be prepared for particular subject areas within the general framework outlined in this statement. These more detailed aims will be of use when designing assessment programs for each level in addition to providing guidance for teaching.

The Nature of Science.

Any discussion of the aims of science teaching must take into account the nature of science itself. Some aspects of science are briefly discussed below.

1. "For many people science is that mysterious agent which has produced the host of gadgets and machines with which modern life is enriched - or plagued." (1) The impact of science in the modern world constitutes a major reason for the inadequacies in our understanding of it. We are dazzled by science and deluded into the conviction that science has already provided, or can provide the solution to all our problems.

2. Whilst the body of knowledge that is part of science is the most objective thing known to man, the process of science in the making is as subjective as any other field of human endeavour. Einstein has written that for this reason the question "What is the purpose and meaning of science?" receives quite different answers from different people at different times. As an example of this, quite eminent scientists simply rely on hunches!

3. Science attempts to create understandings of the world in an attempt to make the world a safer one to live in, a world easier to manipulate; to reduce uncertainty. (2)

   The same can be said for many disciplines. But science is further characterised by the techniques used, although these vary from science to science and from time to time.

4. We cannot separate science from the social framework in which it develops. The theories of science depend on the ideas of men and these flesh and blood humans interact with other scientists and also the society at large. Simultaneous discoveries in science in various parts of the world, indicate that a social force is at work. Science is just as much the dreams and follies of scientists as it is their calculations and experimentation. (2)

5. The distinction between science and technology should be made. The scientist systematically manipulates the environment and measures any changes produced. The technologist starts with a defined end point and works back to decide what conditions are necessary to produce this end point.

6. Science is a creative intellectual enterprise and in this sense is similar to the activity of the artist or musician. The scientist himself must be involved in the process but with a distinctive attention, methodology and

addition to providing guidance for teaching.

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7. From the foregoing it is obvious that science is a continuing process. Explanations advanced in science for observed phenomena in nature can only be regarded as tentative and are only retained so long as they are the most useful. There is nothing more practical than a good theory.

Some Aims of Science Teaching.*

Science education should aim to develop:

1. An understanding of the nature of science.

2. A concern with the social consequences of science and technology.

3. A commitment to enquiry as one mode of operation in life situations; the conviction that observed phenonemon are capable of rational explanation.

4. An understanding of the physical and biological environment.

5. A capacity to be creative and flexible in new situations.

(*Based on aims published by Australian Science Education Project).

The Justification of Science Education in Technical Schools.

1. At the present time "the effects of science on human life and thought have become so great and are potentially so much greater, that those who have no understanding of them and the science which has produced them cannot be considered to be educated or truly cultured . . ." (1) and the capacity of such individuals to participate in the life of their time is restricted. Science is part of contemporary life and we cannot turn our back on it.

2. Science has a contribution to make toward the intellectual growth of humans. This contribution may be the major factor in such development and it is clear that characteristics such as flexibility, a commitment to enquiry and creativity are promoted in other disciplines such as history, art, and language. (It is in the interests of science education therefore, that the curriculum should have balance).

3. Our society depends heavily on science and technology for survival and progress. Technical schools must play their part in the training of future specialists - scientists, technologists and technicians.

Practical Implications of the Aims.

The aims of science teaching stated above are probably acceptable to most teachers. However, these aims are general and therefore do not provide definite guidance for the science teacher. Nevertheless, these aims have certain implications in the practical teaching situation.

1. Students themselves should be involved in the scientific process in schools. Discovery in science should have its usual meaning, rather than being a teaching technique of finding information previously determined by a course or a teacher. Similarly, experiments should be just that, rather than a way of demonstrating a well established truth.

2. Teachers and students should work together in co-operative style on real problems. Meaningful problems would at least be partially self-generated. Rigid authority of the teacher is incompatible with the nature of science and the aims of science teaching. On the other hand, and just as important, complete freedom, lack of self discipline and irresponsibility are completely contrary to science and the aims of science. This statement cannot be equated with the student simply doing as he pleases.

3. Whilst the body of knowledge that is part of science is important, it is only important to particular students at particular times. The continuous use of text book and notes to impart a selection of information in a set order at certain times is incompatible with the aims of science teaching. Knowledge should be available to students when it is relevant to them. In building a picture of the world it is important that the student is aware of the pictures of others, pictures that have been shown to be useful. There is no reason to assume that students engaged in devising a picture of the world should learn any less of what others have discovered. The important principle is to expect the student to create a model of his own to be tested against others.

4. Specific skills and knowledge should be taught at times relevant to the students' progress. On occasions traditional lessons will be needed, and demanded by students.

5. It is clear that the progress of individuals will vary according to their abilities, needs and interests.

6. It is important that all ideas proposed by students, however unlikely, should be respected by all as the contribution of an individual.

7. The student will gradually develop an appreciation of the major conceptual schemes in science. These should be understood as attempts to simplify nature and are based on a large amount of established knowledge.

8. Communication skills are an intrinsic part of science education - oral, written and graphic.

9. Whilst elaborate apparatus is useful, particularly at senior levels, it should be realised that this apparatus is only an aid and is not necessarily critical. Outstanding scientific advancement has been made with simple, inexpensive apparatus.

10. To be consistent with the aims stated above it is important for the student to develop experience in the physical earth and biological sciences. The exploration of fields of science unfamiliar to the teacher provide the ideal situation for genuine science to take place. In this situation the teacher is also a member of the team. It should be kept in mind that even the experienced research scientist is learning as he works.

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S. I. UNITS FOR SCIENCE TEACHING.

CONTENTS.

THE USE OF S. I. UNITS IN TECHNICAL SCHOOL SCIENCE.

(This statement supersedes 151 1970 - Circular of Information: Recommended Units, Symbols and Abbreviations for Technical School Science).

Introduction.

An internationally agreed system of units is now coming into general use. In 1960 the international authority on units, the Conférence Générale des Poids et Mesures (C.G.P.M.), agreed to adopt the Système Internationale d'Unities, or the International System of Units, the agreed abbreviation of which is S. I. in all languages. This system has also been endorsed by the International Organisation for Standardisation (I.S.O.), which is the international authority on the standardisation of the names and symbols of physical quantities. Both the British Standards Institute (B.S.I.), and the International Union of Pure and Applied Chemists (I.U.P.A.C.), are members of the I.S.O.

At present some thirty countries have prepared or are preparing the necessary legislation to make S. I. the only legally acceptable classification of units. By 1975 S. I. units should be very nearly the only units of measurement in the United Kingdom. It is therefore apparent that S. I. is destined to be in world wide use within a few years. Shortly the whole of Europe will be using only S. I. units, and India and Japan have already changed over to S. I.. Australia, Canada, New Zealand, South Africa and Pakistan are in the process of changing over. It appears that Australia intends to change to metric measurement by 1973. The U.S.A. is considering the desirability and practicability of changing to S. I.

It is clear that once the International System of Units has been universally accepted, it will be a long time before any new system is introduced to replace it.

At present a very wide variety of units exists throughout the world. It is only in recent times that international attempts have been made to standardise the units of measurements. Of course, with the development of more advanced and sophisticated human activities, the need is greater for more and more precise measurements.

In this respect a major disadvantage of the older units is that they are not in any way derivable from scientific formulae or natural constants, whereas most of the basic S. I. units may be so obtained. For example, instead of defining the metre as the distance between two marks on a particular metal bar, it will now be defined as the length equal to 1 650 763.73 wavelengths in vacuum of the radiation corresponding to the transition between the levels $2p_{10}$ and $5d_5$ of the krypton-86 atom.

Similarly the unit of time, the second, will now be defined as the duration of 9 192 361 770 periods of the radiation corresponding to the transition between two hyperfine levels of the ground state of the cesium-133 atom. On the other hand the kilogram, the unit of mass, remains equal to the mass of the International Prototype of the kilogram kept at Sèvres. It is important to note that the unit of mass is therefore not defined in terms of other units. It seems quite possible that the basic unit of mass now known as the kilogram will be renamed the "giorgi", symbol G. The mole has been stated as the basic S. I. unit of amount of substance.

This is a unique opportunity to standardise the units of measurement throughout the world. Of course, some units which are in everyday use will remain so, for instance minute, hour, day, litre, degree Celsius, degree (angle), minute (angle), etc..

"No country uses only S.I. units. If it did it would use kiloseconds and megaseconds to measure time interval instead of minutes, hours and days. Some non-S.I. units will be a necessary part of Australia's metric system.

These additional units will be kept to a workable minimum and their use will be on the basis of convenience and simplicity. Some are already in common use and replacing them with pure S. I. units would not be justified.

For this reason it is proposed that Australia generally will retain degrees, minutes and seconds for the measurement of angles as well as the S. I. unit the radian and its submultiples." (3, p4)

It should be noted that the litre is now regarded as a special name for the cubic decimetre and no longer according to the old definition as being equal to 1.000028 dm^3. The term litre should not be used to express results of high precision.

Recommendations.

The Victorian Education Department plans to adopt the metric system of units by 197-. The Technical Schools Sciences Standing Committee has considered the matter of units, symbols and abbreviations for science teaching. The T.S.S.S.C. strongly recommends to science teachers in Technical Schools the appended list of units, symbols and abbreviations for use in all science subjects from Form I to Form V. The S. I. system should be used in its entirety, although some non-S. I. units will be necessary for convenience and simplicity e.g. minutes, hours etc., as indicated above. Examiners in the appropriate subjects have been advised of the recommendation.

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   J. Chem. Ed., Vol. 46, No. 11, November, 1969.

5. Standards Association of Australia

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   AS 1000 - 1970

6. Standards Association of Australia 1046 - 1971

   (Awaiting publication)

APPENDIX 1.

Basic S. I. Units and Their Definition (2, p 57, 58; 5, p 4)

Metre The metre is the length equal to 1 650 763.73 (exactly) wavelengths in a vacuum of the radiation corresponding to the transition between the energy levels $2p_{10}$ and $5d_5$ of the pure nuclide 86Kr.

Kilogram The kilogram is the mass of the International Prototype Kilogramme which is in the custody of the Bureau International des Poids et Mesures at Sèvres, France.

Second The second is the duration of 9 192 631 770 periods of the radiation corresponding to the transition between the two hyperfine levels ($F = 4$, $M_F = 0$ and $F = 3$, $M_F = 0$) of the ground state of the atom of pure nuclide 133-Cs.

Ampere The ampere is that constant current, which, if maintained in two parallel rectilinear conductors, of infinite length and of negligible cross section, at a distance apart of 1 metre in a vacuum, would produce a force between the conductors equal to 2×10^{-7} newton per metre of length.

Degree Kelvin The degree Kelvin is completely defined by the decision of the 1954 Conférence Générale to assign the value of 273.16 degrees Kelvin (exactly) to the thermo-dynamic temperature at the triple point of water.

Candela The candela is the luminous intensity in the perpendicular direction of a surface of 1/600,000 of one square metre of a full radiator at the temperature of solidification of platinum under a pressure of 101 325 newton per square metre.

Mole The mole is the amount of substance of a system which contains as many elementary particles as there are carbon atoms in 0.012 kg (exactly) of the pure nuclide ^{12}C. The elementary unit must be specified and may be an atom, a molecule, an ion, and electron, a photon, etc., or a specified group of such entities.

APPENDIX II

Recommended Symbols, Units and Abbreviations.

QUANTITY		S. I. UNIT	
NAME	SYMBOL	NAME	ABBREVIATION
Length	l	metre	m
Mass	m	kilogram	kg
Time	t	second	s
Amount of substance	n	mole	mol
Area	A		m^2
Volume	V		m^3
Linear displacement	s		m
Linear velocity (final)	v		m/s
Linear velocity (initial)	v_o		m/s
Linear velocity (average)	$\bar{v}$		m/s
Linear acceleration	a		m/s^2
Linear momentum	p		kg m/s
Force	F	newton	N
Work	W	joule	J
Energy	E (E_K, E_p)		J
Power	P	watt	W (J/s)
Moment of a force (torque)	T (capital tau)		Nm
Angular displacement	θ (thetu)		rad
Angular velocity (~~initial~~ final)	ω (omega)		rad/s
Angular velocity (initial)	ω_o		rad/s

QUANTITY		S. I. UNIT	
NAME	SYMBOL	NAME	ABBREVIATION
Length	l	metre	m
Mass	m	kilogram	kg
Time	t	second	s
Amount of substance	n	mole	mol
Area	A		m^2
Volume	V		m^3
Linear displacement	s		m
Linear velocity (final)	v		m/s
Linear velocity (initial)	v_o		m/s
Linear velocity (average)	$\bar{v}$		m/s
Linear acceleration	a		m/s^2
Linear momentum	p		kg m/s
Force	F	newton	N
Work	W	joule	J
Energy	E (E_K, E_p)		J
Power	P	watt	W (J/s)
Moment of a force (torque)	T (capital tau)		Nm
Angular displacement	θ (theta)		rad
Angular velocity (~~initial~~ final)	ω (omega)		rad/s
Angular velocity (initial)	ω_o		rad/s
Angular velocity (average)	$\bar{\omega}$		rad/s
Angular acceleration	α (alpha)		rad/s^2
Moment of inertia	I		$kg\ m^2$
Temperature (thermodynamic)	T	degree kelvin	K

QUANTITY		S. I. UNIT	
NAME	SYMBOL	NAME	ABBREVIATION
Density	ρ (rho)		kg/m^3
Pressure	p	pascal	Pa (N/m^2)
Frequency	f	hertz	Hz
Wavelength	λ (lambda)		m
Wave velocity	v		m/s
Heat	Q		J
Specific heat	c		J/kg K
Latent heat	L_v, L_f		J/kg
Coefficient of friction	μ (mu)		-
Electrical charge	q	coulomb	C
Electric current	I	ampere	A
Electrical resistance	R	ohm	Ω
Electromotive force	E	volt	V
Potential	V	volt	V
Potential difference	V	volt	V
Electric field strength	E		V/m
Resistivity	ρ (rho)		Ω m
Conductivity	σ (sigma)		S/m ($/\Omega$ m)
Capacitance	C	farad	F
Magnetizing force	H		A/m
Magnetic induction (magnetic flux density)	B		T (Wb/m^2)
Permittivity	ϵ (epsilon)		F/m
Permeability	μ (mu)		H/m

APPENDIX III

A. Special Notes on the Use of S. I.

1. Only the singular form of units is to be used:
   e.g. km NOT kms.

2. Full stops at the end of abbreviations are to be omitted:
   e.g. km NOT km.

3. The decimal sign is to be a point on the lines:
   e.g. 2.5 NOT 2·5 (Some publications may use a comma instead of a point).

4. Digits should be grouped in three about the decimal point in order to facilitate the reading of long numbers. Commas should not be used to space digits in numbers:
   e.g. 16 543 211.133 45 NOT 16,543,221.133,45.

5. The degree sign is to be omitted when the Kelvin scale is employed:
   e.g. 273K NOT 273°K.

6. The solidus is preferred to the negative index, but where used, no more than one solidus should be employed:
   e.g. J/kg K NOT J/kg/K; m/s^2 NOT m/s/s or ms^{-2}

7. The power to which a unit is raised applies to the whole unit including the prefix:
   e.g. $km^2 = (km)^2 = (1000m)^2 = 10^6 m^2$ NOT $1000\ m^2$
   $\mu m^3 \quad (\mu m)^3 = (10^{-6}m)^3 = 10^{-18}m^3$ NOT $10^{-6}m^3$

8. Symbols for units should be printed in lower case type except when derived from a proper name where they should start with a capital letter:
   e.g. m (metre); A (ampere); Wb (weber)

9. Multiples and submultiples of units should be confined to multiples of 10^3 as follows:

10^{12} tera (T)	10^{-3} milli (m)
10^9 giga (G)	10^{-6} micro (μ -mu)
10^6 mega (M)	10^{-9} nano (n)
10^3 kilo (K)	10^{-12} pico (p)
	10^{-15} femto (f)
	10^{-18} atto (a)

Hence the angstrom should be replaced with the nanometre wherever possible.

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	10^{-18} atto (a)

   Hence the angstrom should be replaced with the nanometre wherever possible.

   The use of double prefixes is to be avoided:
   e.g. pF NOT $\mu\mu$F

10. Subscripts may be needed to indicate a medium:
    e.g. ε_o for permittivity of free space;
    μ_o for permeability of free space.

B. Other Non-S. I. Units

The following must be included because of common usage.

QUANTITY		UNIT	
NAME	SYMBOL	NAME	ABBREVIATION
Mass	m	gram	g
length	l	angstrom	Å (10^{-10}m)
		astronomical unit	au
		light year	ly
		parsec	pc
Time	t	minute	min
		hour	h
		day	d
Angle	θ (theta)	second	"
		minute	'
		degree	o
Volume	V	cubic decimetre (litre)	dm^3 (litre)
		millilitre	ml
Electrical energy	E	kilowatt hour	kWh (3.6×10^6 J)
Celsius temperature	t	degree Celsius	°C
Molarity		mole per cubic decimetre	M (mol/dm^3)
Solubility	S	gram per 100 gram	-

C. Notes

1. A change in any quantity should be indicated by using the delta notation:
e.g. $\Delta\theta$ (For very small changes $\delta\theta$)

NAME	SYMBOL	NAME	ABBREVIATION
Mass	m	gram	g
length	l	angstrom	Å (10^{-10}m)
		astronomical unit	au
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		parsec	pc
Time	t	minute	min
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Solubility	S	gram per 100 gram	-

C. Notes

1. A change in any quantity should be indicated by using the delta notation:
   e.g. $\Delta\theta$ (For very small changes $\delta\theta$)

2. The unit for temperature change is different from the unit for temperature:
   e.g. 10C° NOT 10°C

3. It is recommended that only those symbols and abbreviations in Appendix II should be used for quantities and units.

APPENDIX IV.

The following are some values of physical constants and other date expressed in S. I. units.

	SYMBOL	VALUE
Speed of light	c	$2.997\,925 \times 10^{8}$ m/s
Mass of hydrogen	m_H	$1.673\,43 \times 10^{-27}$ kg
Mass of proton	m_p	$1.672\,52 \times 10^{-27}$ kg
Mass of neutron	m_n	$1.674\,82 \times 10^{-27}$ kg
Mass of electron	m_e	$9.109\,1 \times 10^{-31}$ kg
Charge on electron	e	$1.602\,10 \times 10^{-19}$ C
Charge to mass ratio	e/m_e	$1.758\,796 \times 10^{11}$ C/kg
Planck's constant	h	$6.625\,6 \times 10^{-34}$ Js
Avagadro's constant	N_A	$6.022\,52 \times 10^{23}$ /mol
Molar gas constant	R	8.314 3 J/mol K
Gravitational constant	G	6.670×10^{-11} Nm^2/kg^2
Acceleration due to gravity	g	9.807 m/s^2
Permittivity of vacuum	ε_o	$\frac{1}{36\ \pi} \times 10^{-9}$ F/m
Permeability of vacuum	μ_o	$4\ \pi \times 10^{-7}$ H/m
curie	1 Ci	3.700×10^{10} disintegrations per second
Mean radius of earth	R_E	6.37×10^{6} m
Mass of earth	M_E	5.988×10^{24} kg
Mean earth-sun distance	R_o	1.495×10^{11} m
Mass of sun	M_S	3.294×10^{5} M_E
Mass of moon	M_M	1.228×10^{-2} M_E

SAFETY IN THE SCIENCE DEPARTMENT.

CONTENTS.

SAFETY IN THE SCIENCE DEPARTMENT.

General Principles.

1. The Head of the Science Department should confer with the Safety Officer of a school in a continuing attempt to identify safety hazards in his department and to plan and implement appropriate action.

2. Careful housekeeping practices in the science department will reduce hazards to a minimum.

3. Good technique in handling apparatus is necessary for efficient use of the apparatus and the reduction of accidents. Each particular piece of apparatus has its potential hazards. Apparatus should not be used unless the teacher is thoroughly familiar with its use and hazards e.g. the centrifuge, vacuum pumps.

   Good technique must be stressed at all times to students.

4. Practical work in science rooms demands the constant supervision of the teacher. Practical work should be suspended if the teacher for some unforseen reason must leave the room.

5. A well stocked first aid cabinet and first aid chart should be readily accessible. Emergency aid treatment should be well understood.

6. Boisterous behaviour should not be tolerated.

7. A teacher should give prior thought to the possible sources of danger when planning practical work. Students should be informed of potential hazards and instructed in precautionary measures to be observed. The teacher must ensure that the students observe all necessary precautions.

8. When the laboratory is in use, all recognized ways of exit should be free from obstruction and readily available for use in the case of emergency.

9. Laboratory rules should be formulated for the guidance of students. (See Appendix II).

10. Accidents in the laboratory should be reported to the school administration for entry in the Accident Register.

11. In any practical session students should not be permitted to crowd around one particular point.

12. The numbers in any practical class should be kept to a practicable maximum.

13. Safety clothing and face masks are highly desirable, especially where chemicals are being handled. Long hair and loose ties present special hazards in some circumstances.

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13. Safety clothing and face masks are highly desirable, especially where chemicals are being handled. Long hair and loose ties present special hazards in some circumstances.

14. Students should not be permitted to enter store rooms. Students should not handle large containers of dangerous chemicals e.g. winchesters of concentrated nitric or sulphuric acids.

15. A compressed carbon dioxide fire extinguisher should be available for each science room.

16. Fire drill should be regularly practised within the school.

17. Students and teachers should wash their hands thoroughly after handling chemicals or biological materials.

18. Eating should not be permitted in the science department.

19. The gas supply should be turned off at the isolating tap each night, if possible.

Common Hazards in Various Sciences.

Astronomy

Irreparable damage to the eye (burnt retina) may result from viewing the sun with the naked eye or through a telescope.

Biology

(a) Cuts due to mishandling of scalpels, other sharp instruments or glassware.

(b) Infection entering cuts e.g. from a dirty scalpel.

(c) Infection from animals - either live or preserved.

1. Handling animals.
2. From bites.
3. From dirty cages.
4. By inhalation.

(c') Bacterial cultures should be handled with special care. Cultures may contain virulent strains.

Chemistry

(a) Chemicals.

1. Containers of chemicals must be clearly labelled, including concentrations where applicable. The contents of unlabelled containers should be disposed of.

2. Some chemicals may be corrosive to clothing, skin and eyes. All chemicals should be handled with care at all times.

3. Some chemicals are poisonous. Some poisons may be cumulative and some individuals may be specifically sensitive to certain chemicals.

4. Food containers should never be used to hold laboratory chemicals.

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3. Some chemicals are poisonous. Some poisons may be cumulative and some individuals may be specifically sensitive to certain chemicals.
4. Food containers should never be used to hold laboratory chemicals.
5. Chemicals should always be securely stored. Chemicals should not be stored in classrooms unless in locked cupboards. Some chemicals must, by law, be stored in locked cupboards.

6. Plastic containers should not be used for concentrated acids (See T70/581).

7. Chemical containers should be periodically checked to ensure they are adequate. Corroded and inadequately sealed containers must be replaced.

8. Special storage demands should be catered for e.g. sodium and potassium; white phosphorus.

9. Chemicals which deteriorate with time should be labelled with the date of purchase e.g. ether.

(b) Glassware.

1. Glass tubing and rod should be stored in a special rack.

2. Good technique for inserting glass fittings into rubber tubing and stoppers should be practised at all times.

(c) Laboratory.

1. The use of dirty apparatus can be dangerous e.g. organic residues can provide a source of carbon capable of violent reaction with certain reagents.

2. Damage to the eyes frequently occurs due to the person looking down a test tube or ignition tube in which something is being heated. Do not boil liquids in test tubes.

3. Burns may occur due to the handling of hot objects e.g. tripod, or from hot liquids.

(d) Fire

1. Flammable liquids (solvents) present a major hazard. Frequently there is little or no need for such liquids, their presence representing some past requirement. Such chemicals should be dispensed with.

2. Adequate sealing is most important as some fumes can ignite readily e.g. ether.

3. Solvent containers should be inspected for corrosion and leakage.

4. Leakage and accumulation of gas is a hazard which can be rendered particularly dangerous due to long holidays. Rubber hose should be checked periodically for deterioration.

5. Hot objects should never be returned to store.

Geology

Eye damage can occur due to flying pieces of steel or rock when a geological hammer is used to obtain rock samples.

Physics

1. Burns from hot apparatus, liquids or steam can occur.
2. Electrical apparatus and extension cords should be checked periodically for faults.
3. Induction coils will readily impact a shock if carelessly handled.
4. High tension leads should be used whenever high voltages are in use.
5. Capacitors may retain sufficient charge for a considerable time and may cause shock.

Radio-Active Substances

Radio-active sources must be stored in locked cupboards in suitable lead lined containers. Sources should not be handled directly.

Regulations concerning radio-active sources are referred to in the References (2)

Irradiating Apparatus

No Junior Technical School should possess apparatus capable of producing X rays. (2)

REFERENCES.

1. C.S.I.R.O.

C.S.I.R.O. Safety Handbook.

2. Dept. of Health, Victoria.

Regulations Relating to Irradiating Apparatus and Radio-Active Substances.

Vic. Govt. Gaz., No. 56, Monday, June 29th, 1959.

3. Gray, C.H. (Ed.)

Laboratory Handbook of Toxic Agents.

R.A.C.I., London, 1966.

4. National Safety Council of Australia.

Safety in the Laboratory (pamphlet)

5. R.A.C.I.

Safety (pamphlet)

6. University of London: Imperial College Safety Committee

Safety in the Chemical Laboratory and in the Use of Chemicals

University of London, London, 1971.

APPENDIX I.

Chemicals Presenting Potential Hazards in the Laboratory.

The following common chemicals represent potential hazards in the laboratory. Teachers must be familiar with safe methods of storage and handling of these chemicals, and be aware of the poisonous and/or dangerously corrosive nature of them.

This list of chemicals cannot be considered to include all chemicals presenting hazards in the laboratory.

Alcohols

Acetone

Acids and alkalis

Ammonia (880)

Ammonia fumes and ammonium hydroxide

Barium compounds

Benzene

Bromine

Carbon disulphide

Carbon monoxide

Carbon tetrachloride

Chlorine

Ethers

Gas supply (coal gas and natural gas)

Glacial acetic acid

Hydrogen

Hydrogen chloride

Hydrogen sulphide

Lead and lead salts

Manganese dioxide

Mercury and mercurial salts

Nitric acid

Nitrogen dioxide

Phosphorous

Picric acid

Potassium metal

Potassium chlorate

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Barium compounds

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Bromine

Carbon disulphide

Carbon monoxide

Carbon tetrachloride

Chlorine

Ethers

Gas supply (coal gas and natural gas)

Glacial acetic acid

Hydrogen

Hydrogen chloride

Hydrogen sulphide

Lead and lead salts

Manganese dioxide

Mercury and mercurial salts

Nitric acid

Nitrogen dioxide

Phosphorous

Picric acid

Potassium metal

Potassium chlorate

Sodium metal

Sulphuric acid

Sulphur dioxide

APPENDIX II.

LABORATORY PROCEDURE.

INSTRUCTIONS TO STUDENTS.

The following is a suggested set of instructions to be given to all students who at any time work in the science laboratory.

(a) Pupils are not allowed to enter a laboratory unless a teacher is present.

(b) Laboratory materials (apparatus and chemicals) must not be taken out of the laboratory, unless an instruction to do so is given by the teacher.

(c) Liquids only are to be poured into sinks. Broken glass should be placed in the special container for broken glass.

(d) Chemicals must not be tasted and should be smelled with care, by wafting some of the escaping fumes towards the nose.

(e) Care should be taken to avoid fires. Glowing pieces of wood or paper must not be placed in the waste paper bin. The use of burning paper to light gas jets is prohibited.

(f) Breakages and accidents must be reported immediately to the teacher in charge of the practical class.

(g) Chemicals must not be mixed aimlessly. Apparatus and chemicals should only be used for purposes approved by the teacher.

(h) After use, apparatus must be cleaned and replaced and the bench left clean and dry.

(i) Hands should be washed at the conclusion of the practical period.

(j) The opening of a test-tube containing a reagent must never be pointed at another student, particularly if the tube is being heated.

(k) Painful burns can be avoided by bringing the back of the hand near a piece of apparatus which is suspected of being hot.

(l) When pushing glass tubing through a rubber stopper, use water as a lubricant and protect the hand by means of a cloth pad.

(m) Dissecting instruments should be thoroughly cleansed and washed in methylated spirits after they have been used.

(n) Protective clothing should be worn when carrying out experiments.

(o) Long hair must be tied back. Loose ties and shirt sleeves must be secured.

RESOURCE MATERIAL FOR SCIENCE TEACHING.

CONTENTS.

RESOURCES: SCIENCE.

The following firms and organizations are known to supply resources for science teaching.

By including these in this section the T.S.S.S.C. is not recommending them to teachers, but providing addresses and phone numbers for the convenience of teachers. Other firms and organizations may be relevant to science teaching, but they have not yet come to the attention of the T.S.S.S.C.

1. Suppliers - Chemical/Apparatus

Townson and Mercer (Vic.) Pty. Ltd.,
194 Whitehorse Road,
BLACKBURN. Vic. 3130 878.2511

H.B. Selby and Co. Pty. Ltd.,
352 Ferntree Gully Road,
NOTTING HILL. Vic. 3168 544.4844

Astronics Australasia Pty. Ltd.,
161 Sturt Street,
SOUTH MELBOURNE. Vic. 3205 69.0300

Amateur Astronomers' Supply Co.,
116 Clark Street,
CROWS NEST. N.S.W. 2065 (Sydney) 43.4360

B.W.D. Electronics Pty. Ltd.,
333 Burke Road,
GARDINER. Vic. 3146 25.4425

Biotech Pty. Ltd.,
240 High Street,
ST. KILDA. Vic. 3182 94.6117

Dynavac High Vacuum Pty. Ltd.,
Evans Street,
BURWOOD. Vic. 3125 288.1211

Jacoby Mitchell & Co. Pty. Ltd.,
155 Abbotsford Street,
NORTH MELBOURNE. Vic. 3051 329.7988

L & S Educational Equipment,
259 East Boundary Road,
EAST BENTLEIGH. Vic. 3165 579.3244

Geological Specimen Suppliers,
288 Birdwood Street,

teaching.

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L & S Educational Equipment,
259 East Boundary Road,
EAST BENTLEIGH. Vic. 3165 579.3244

Geological Specimen Suppliers,
28B Birdwood Street,
BOX HILL. Vic. 3128 89.8147

Kehm & Co. Pty. Ltd.,
22 Brentford Square,
FOREST HILL. Vic. 3131 878.2807

Phillips Industries Ltd.,
252 Sturt Street,
SOUTH MELBOURNE. Vic. 3205 69.0141

Pyrox Ltd.,
Settlement Road,
THOMASTOWN. Vic. 3074 465.2633

Ramsay Surgical Ltd.,
196 Berkeley Street,
CARLTON. Vic. 3053 347.4122

Scientific & Laboratory Supply Co. Pty. Ltd.,
364 Lonsdale Street,
MELBOURNE. Vic. 3000 67.5254

Seimens Industries Ltd.,
544 Church Street,
RICHMOND. Vic. 3121 42.0291

Thomas Opitcal & Scientific Co. Pty. Ltd.,
358 Lonsdale Street,
MELBOURNE. Vic. 3000 67.6991

Ultra Violet Supplies Pty. Ltd.,
122 Fulton Road,
BLACKBURN SOUTH. Vic. 3130 232.9988

Unique House Consolidated Pty. Ltd., (Tabula)
139 Boundary Road,
NORTH MELBOURNE. Vic. 3051 30.1381

Watson Victor Ltd.,
201 Victoria Parade,
COLLINGWOOD. Vic. 3066 419.1588

Radio Parts Pty. Ltd.,
562 Spencer Street,
MELBOURNE. Vic. 3000 329.7888

Recorder Charts,
28 Levanswell Road,
MOORABBIN. Vic. 3189 95.4871 or 95.2215

Drug Houses of Australia Ltd.,
Cherry Lane,
BROOKLYN. Vic. 3025 399.2311

May and Baker Aust. Pty. Ltd.,
Paramount Road,

Settlement Road,
THOMASTOWN. Vic. 3074 465.2633

Ramsay Surgical Ltd.,
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Radio Parts Pty. Ltd.,
562 Spencer Street,
MELBOURNE. Vic. 3000 329.7888

Recorder Charts,
28 Levanswell Road,
MOORABBIN. Vic. 3189 95.4871 or 95.2215

Drug Houses of Australia Ltd.,
Cherry Lane,
BROOKLYN. Vic. 3025 399.2311

May and Baker Aust. Pty. Ltd.,
Paramount Road,
FOOTSCRAY. Vic. 3011 314.0444

I.C.I.,
1 Nicholson Street,
MELBOURNE. Vic. 3000 662.0201

Shell Chemicals (Aust.) Pty. Ltd.,
163 William Street,
MELBOURNE. Vic. 3000 391.5511

Stores Branch,
107 Russell Street,
Annexe, 63.2351
MELBOURNE. Vic. 3000 Ext. 339

A & R Transformers Pty. Ltd.,
30 Lexton Road,
BOX HILL. Vic. 3128 89.2303

Warburton Franki Industries (Melb.) Pty. Ltd.,
220 Park Street,
SOUTH MELBOURNE. Vic. 3205 69.0151

E.N. Waterworth,
Park Street,
HOBART. Tas. 7000

J. H. McGrath,
208 Little Lonsdale Street,
MELBOURNE. Vic. 3000 663.3731

Brownbuilt Office & Storage Equipment,
14 - 24 Alexander Parade,
CLIFTON HILL. Vic. 3068 489.2311

Symbio Biological Laboratories Pty. Ltd.,
43 Cawarra Road,
CARRINGBAH. N.S.W. 2229 (Sydney) 524.8818

Australian Biological Supplies Pty. Ltd.,
Cnr. Barney & Crescent Streets,
ARMIDALE. N.S.W. 2350

R.H. Wagner & Sons Pty. Ltd., (Photographic Supplies)
43 Elizabeth Street,
MELBOURNE. Vic. 3000 62.3114

C.I.G.,
90 Bell Street,
PRESTON. Vic. 3072 44.0211

Industrial Safety Services (Goggles, face masks)
52 Burwood Road,
BURWOOD. Vic. 3125 288.6322

2. Repair of Apparatus.

(a) Addresses of Suppliers or Repairers.

A.E. Supplies Pty. Ltd., 22 Hardner Road, MT. WAVERLEY. 3149 544.0055.

A. & R. Transformers Pty. Ltd., 46 Lexton Road, BOX HILL. 3128 89.2303

Australian Sound & T.V. Pty. Ltd., 35 Yarra Bank Road, SOUTH MELBOURNE. 3205 61.3024

B.W.D. Electronics Pty. Ltd., 333 Burke Road, GARDINER. 3146 25.4425

D.H.A. - ANAX Pty. Ltd., 147 Cardigan Street, CARLTON. 3053 347.2111

Dynavac High Vacuum Pty. Ltd., 25 Evans Street, BURWOOD. 3125 288.1211

Fitter Instrument Co., 88 Carrington Road, SEFTON, N.S.W 2162

J.A. Floyd & Co. Pty. Ltd., 82 Keilor Road, NORTH ESSENDON. 3041 379.5400

G.C.N. Products Pty. Ltd., 1a Levanswell Road, MOORABBIN. 3189 95.6617

Jacoby Mitchell & Co. Pty. Ltd., 155 Abbotsford Street, NORTH MELBOURNE. 3051 329.7988

John Kehm & Co. Pty. Ltd., 22 Brentford Square, FOREST HILL. 3131 878.2807

Malleys Bahco Pty. Ltd., Allen Street, MORELAND. 3058 36.9811

Metters Ltd., Gordon Street, FOOTSCRAY. 3011 317.7026

Namco Distributors, 468 Princes' Highway, NOBLE PARK. 3174 546.0422

Photimport Pty. Ltd., 153 Barkly Street, BRUNSWICK. 3056 38.6922

Photocopy Pty. Ltd., 153 Wellington Parade South, EAST MELBOURNE. 3002

Pyrox Ltd., Settlement Road, THOMASTOWN. 3079 465.2555

Ramsay Surgical Ltd., 196 Berkeley Street, CARLTON. 3053 347.4122

H. Rowe & Co. Pty. Ltd., 54 Racecourse Road, NORTH MELBOURNE. 3051 329.6511

H.B. Selby & Co. Pty. Ltd., P.O. Box 11, OAKLEIGH. 3166 544.4844

544.0055.

A. & R. Transformers Pty. Ltd., 46 Lexton Road, BOX HILL. 3128 89.2303

Australian Sound & T.V. Pty. Ltd., 35 Yarra Bank Road, SOUTH MELBOURNE. 3205 61.3024

B.W.D. Electronics Pty. Ltd., 333 Burke Road, GARDINER. 3146 25.4425

D.H.A. - ANAX Pty. Ltd., 147 Cardigan Street, CARLTON. 3053 347.2111

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G.C.N. Products Pty. Ltd., 1a Levanswell Road, MOORABBIN. 3189 95.6617

Jacoby Mitchell & Co. Pty. Ltd., 155 Abbotsford Street, NORTH MELBOURNE. 3051 329.7988

John Kehm & Co. Pty. Ltd., 22 Brentford Square, FOREST HILL. 3131 878.2807

Malleys Bahco Pty. Ltd., Allen Street, MORELAND. 3058 36.9811

Metters Ltd., Gordon Street, FOOTSCRAY. 3011 317.7026

Namco Distributors, 468 Princes' Highway, NOBLE PARK. 3174 546.0422

Photimport Pty. Ltd., 153 Barkly Street, BRUNSWICK. 3056 38.6922

Photocopy Pty. Ltd., 153 Wellington Parade South, EAST MELBOURNE. 3002

Pyrox Ltd., Settlement Road, THOMASTOWN. 3079 465.2600

Ramsay Surgical Ltd., 196 Berkeley Street, CARLTON. 3053 347.4122

H. Rowe & Co. Pty. Ltd., 54 Racecourse Road, NORTH MELBOURNE. 3051 329.6511

H.B. Selby & Co. Pty. Ltd., P.O. Box 11, OAKLEIGH. 3166 544.4844

T.J. Shilton, 1481 Malvern Road. TOORONGA. 3146 20.5726

Sixteen Millimetre Aust. Pty. Ltd., 4 Queens Bridge Road, SOUTH MELBOURNE. 3205 61.2551

Tektronix Aust. Pty. Ltd., 25 Alma Road, ST. KILDA. 3182 94.0229

Charles Tims Pty. Ltd., 34 Eastern Road, SOUTH MELBOURNE. 3205 69.7401

Townson & Mercer (Vic.) Pty. Ltd., 194 Whitehorse Road, BLACKBURN. 3130 878.2511

University Graham Instruments Pty. Ltd., 106 Belmore Road, RIVERWOOD. N.S.W. 2210

J.G. Walsh, P.O. Box 165, DOUBLE BAY, N.S.W. 2028

Watson Victor Ltd., 201 Victoria Parade, COLLINGWOOD. 3066 419.1588

York Instrument Service Pty. Ltd., 2 Somerset Place (rear 211 Elizabeth Street), MELBOURNE. (Box 1566P, G.P.O., 3001). 67.5354

(b) Repair of Stores Branch Apparatus.

Item No.	Item	Supplier or Repairer
40029	Charge on a capacitor	G.C.N.
40185	Energy Transfer, motor	G.C.N.
40363	Millikan apparatus	Kehm
40673	Xenon - First excit.n	G.C.N.
40681	" Ioniz.n pot	G.C.N.
42803	Subst. Balance: Mettler	W. Victor
	" Sartorius	Selby
42811	Q.W. Balance: Ohaus	Selby
43443	Pressure gauge	Floyd
43508	Pressure Transmission	Selby
43583	Pump, vacuum, rotary	Dynavac
43826	Stop clock, electric	Rowe
44156	Vacuum work plate	Selby
44849	Still, elec: Qualtex	W. Victor
	" Others	Selby
44946	Thermometer, dial type	Fitter
45829	Ammeter, demo)	University
46035	Galvanometer,) demo)	Graham
46558	Voltmeter demo)	
46043	Galvanometer, spot	A.E. Supp.
46132	Motor, elec. IEC	Kehm
46140	Multimeter: MT 220	J. Mitchell
	" CT 500/P	Rowe
46248	Rectifier, 2-12v DC	G.C.N.
46264	Resistance box 4 dial	Kehm
46418	Ruhmkorff's coil	Shilton
46523	Transformer, dissect	Kehm

Item No.	Item	Supplier or Repairer
47112	Radiation counter	Watson Victor
47139	Stroboscopic lamp	Ramsay Surg.
47589	Lamps: Hg, Na,	Selby
47619	Ne, Uv,	
47791	Total reflection: Kent	Walsh
	Total reflection: Shimadzu	T. & Mercer
47848	Spectroscope, D.V.	Selby
47856	Telescope	York Optical
47864	Light ray box	Kehm
48755	Electric blower	Malleys
48828	Glass workers' burner	T. & Mercer
48968	Ozonizer	Selby
49654	Centrifuge	Selby
50180	Aquarium	G.C.N.
50261	Clinostat, clockwork	Kehm
	Clinostat, electric	Selby
50660	Hotplate: Labmaster	D.H.A. Anax
	" T. & M.	T. & Mercer
50687	Incubator: Qualtex	Watson Victor
50768	Lab. Oven, electric	T. & Mercer
51268	Pressure cooker	Namco
51332	Refrigerator: Metters or	Malleys
51659	Thermistor	G.C.N.
51691	Tullgren funnel	Selby
54194	Photocopier: Favorit	Tims
54208	Projector, 35mm Hilux	Photimport
54216	Proj., 16 mm. sound: B & H	Sixteen Mm.
	Proj., 16 mm Victor Kalart	Pyrox
54232	Proj., O/head: Bessler	Sixteen Mm.

No.		Repairs
40029	Charge on a capacitor	G.C.N.
40185	Energy Transfer, motor	G.C.N.
40363	Millikan apparatus	Kehm
40673	Xenon - First excit.^{n}	G.C.N.
40681	" loniz.^{n} pot	G.C.N.
42803	Subst. Balance: Mettler	W. Victor
	" Sartorius	Selby
42811	Q.W. Balance: Ohaus	Selby
43443	Pressure gauge	Floyd
43508	Pressure Transmission	Selby
43583	Pump, vacuum, rotary	Dynavac
43826	Stop clock, electric	Rowe
44156	Vacuum work plate	Selby
44849	Still, elec: Qualtex	W. Victor
	" Others	Selby
44946	Thermometer, dial type	Fitter
45829	Ammeter, demo)	University
46035	Galvanometer,) demo)	Graham
46558	Voltmeter demo)	
46043	Galvanometer, spot	A.E. Supp.
46132	Motor, elec. IEC	Kehm
46140	Multimeter: MT 220	J. Mitchell
	" CT 500/P	Rowe
46248	Rectifier, 2-12v DC	G.C.N.
46264	Resistance box 4 dial	Kehm
46418	Ruhmkorff's coil	Shilton
46523	Transformer, dissect	Kehm
46914	Audio amplifier	Aust. Snd.
46949	C.R.O.: S 51 A	Tektronix
46959	Cloud chamber: Shimadzu	T. & Mercer
	Cloud chamber: Kemp	Kehm
47082	Oscillator, audio	B.W.D.
47104	Power pack, AC/DC	A. & R.
47112	Radiation counter	Watson Victor
47139	Stroboscopic lamp	Ramsay Surg.
47589	Lamps: Hg, Na,	Selby
47619	Ne, Uv,	
47791	Total reflection: Kent	Walsh
	Total reflection: Shimadzu	T. & Mercer
47848	Spectroscope, D.V.	Selby
47856	Telescope	York Optical
47864	Light ray box	Kehm
48755	Electric blower	Malleys
48828	Glass workers' burner	T. & Mercer
48968	Ozonizer	Selby
49654	Centrifuge	Selby
50180	Aquarium	G.C.N.
50261	Clinostat, clockwork	Kehm
	Clinostat, electric	Selby
50660	Hotplate: Labmaster	D.H.A. Anax
	" T. & M.	T. & Mercer
50687	Incubator: Qualtex	Watson Victor
50768	Lab. Oven, electric	T. & Mercer
51268	Pressure cooker	Namco
51332	Refrigerator: Metters or	Malleys
51659	Thermistor	G.C.N.
51691	Tullgren funnel	Selby
54194	Photocopier: Favorit	Tims
54208	Projector, 35mm Hilux	Photimport
54216	Proj., 16 mm. sound: B & H	Sixteen Mm.
	Proj., 16 mm Victor Kalart	Pyrox
54232	Proj., O/head: Bessler	Sixteen Mm.
54240	Proj., micro: Leitz	Pyrox
54259	Projector trolley	Photocopy
18120	Barograph	Selby
18325	Thermograph	Selby
18368	Windmeter	Selby

Air Tracks contact John Kehm & Co. for spare parts or additional accessories.

(c) Microscopes.

The following information may be useful to heads of departments who want to restore the microscopes in their school.

MAKE	REPAIR SERVICE	'PHONE
A.S.A.	*York Instrument Service, 2 Somerset Place, (rear 211 Elizabeth Street), MELBOURNE. 3000	67.5354
Bios	*H.B. Selby & Co. Pty. Ltd., P.O. Box 11, OAKLEIGH. 3166	544.4844
Harris	*H.A. Groiss & Co., (Repairs) rear 1 Gordon Grove, MALVERN. 3144	50.3003
Kinei	*Ramsay Surgical Ltd., 196 Berkeley Street, CARLTON. 3053	34.4121
Lumiscope	Optical Parts Pty. Ltd., 200 Little Collins Street, MELBOURNE. 3000	63.2227
Nikon	H.B. Selby (above)	
Olympus	ANAX D.H.A. Pty. Ltd., 147 Cardigan Street, CARLTON. 3053	34.2111
Portable MBD-1 (U.S.S.R.)	Industrial & Scientific Supply 97 Bridge Road, RICHMOND. 3121	42.8148
Regal	Watson Victor Ltd., 201 Victoria Parade, COLLINGWOOD. 3066	419.1588
Reichert	H.B. Selby (above)	
Shimadzu	Townson & Mercer (Vic.) Pty. Ltd., 194 Whitehorse Road, BLACKBURN. 3130	878.2511
Yashima	Protector Safety Products Pty. Ltd., 83 Gaffney Street,	35.3674

MAKE	REPAIR SERVICE	PHONE
A.S.A.	*York Instrument Service, 2 Somerset Place, (rear 211 Elizabeth Street), MELBOURNE. 3000	67.5354
Bios	*H.B. Selby & Co. Pty. Ltd., P.O. Box 11, OAKLEIGH. 3166	544.4844
Harris	*H.A. Groiss & Co., (Repairs) rear 1 Gordon Grove, MALVERN. 3144	50.3003
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Lumiscope	Optical Parts Pty. Ltd., 200 Little Collins Street, MELBOURNE. 3000	63.2227
Nikon	H.B. Selby (above)	
Olympus	ANAX D.H.A. Pty. Ltd., 147 Cardigan Street, CARLTON. 3053	34.2111
Portable MBD-1 (U.S.S.R.)	Industrial & Scientific Supply 97 Bridge Road, RICHMOND. 3121	42.8148
Regal	Watson Victor Ltd., 201 Victoria Parade, COLLINGWOOD. 3066	419.1588
Reichert	H.B. Selby (above)	
Shimadzu	Townson & Mercer (Vic.) Pty. Ltd., 194 Whitehorse Road, BLACKBURN. 3130	878.2511
Yashima	Protector Safety Products Pty. Ltd., 83 Gaffney Street, NORTH COBURG. 3058	35.3674

*Firms thus marked offer workshop service for several makes.

For makes not listed try firms marked*.

The Botany School workshop (contact Mr. Muss) at Melbourne University (Parkville 3052) is equipped to carry out repairs and servicing to many makes.

3. Audio - Visual Aids

Teachers are advised to contact A.V.E.C.,

Special Services Division,
234 Queensbury Street, 34.0941
CARLTON. Vic. 3053 Ext. 150

for advice concerning Audio-Visual aids.

(a) Projectors & Accessories.

Clifford Audio Visual Pty. Ltd.,
1a Whiteman Street,
SOUTH MELBOURNE. Vic. 3205 61.2933

Copy Craft Pty. Ltd.,
321 William Street,
MELBOURNE. Vic. 3000 329.8833

Fairchild Projectors,
553 St. Kilda Road,
MELBOURNE. Vic. 3000 51.6764

Kodak (Aust.) Pty. Ltd.,
223 Latrobe Street,
MELBOURNE. Vic. 3000 663.4821

L & S Equipment Pty. Ltd.,
259 East Boundary Road,
EAST BENTLEIGH. Vic. 3165 579.3244

Minnesota Mining & Manufacturing Aust. Pty. Ltd.,
17 Queensbridge Street,
SOUTH MELBOURNE. Vic. 3205 61.3841

N.A.V.A. Pty. Ltd.,
69 Barry Street,
CARLTON. Vic. 3053 347.2622

Phillips Industries Ltd.,
252 Sturt Street,
SOUTH MELBOURNE. Vic. 3205 69.0141

Hanimex Pty. Ltd.,
187 Moray Street,
SOUTH MELBOURNE. Vic. 3205 69.3111

MacMillan Co. Aust. Pty. Ltd.,
107 Moray Street,
SOUTH MELBOURNE. Vic. 3205 69.7491

234 Queensbury Street,
CARLTON. Vic. 3053 Ext. 150

for advice concerning Audio-Visual aids.

(a) Projectors & Accessories.

Clifford Audio Visual Pty. Ltd.,
1a Whiteman Street,
SOUTH MELBOURNE. Vic. 3205 61.2933

Copy Craft Pty. Ltd.,
321 William Street,
MELBOURNE. Vic. 3000 329.8833

Fairchild Projectors,
553 St. Kilda Road,
MELBOURNE. Vic. 3000 51.6764

Kodak (Aust.) Pty. Ltd.,
223 Latrobe Street,
MELBOURNE. Vic. 3000 663.4821

L & S Equipment Pty. Ltd.,
259 East Boundary Road,
EAST BENTLEIGH. Vic. 3165 579.3244

Minnesota Mining & Manufacturing Aust. Pty. Ltd.,
17 Queensbridge Street,
SOUTH MELBOURNE. Vic. 3205 61.3841

N.A.V.A. Pty. Ltd.,
69 Barry Street,
CARLTON. Vic. 3053 347.2622

Phillips Industries Ltd.,
252 Sturt Street,
SOUTH MELBOURNE. Vic. 3205 69.0141

Hanimex Pty. Ltd.,
187 Moray Street,
SOUTH MELBOURNE. Vic. 3205 69.3111

MacMillan Co. Aust. Pty. Ltd.,
107 Moray Street,
SOUTH MELBOURNE. Vic. 3205 69.7491

Photimport Pty. Ltd.,
153 Barkly Street,
BRUNSWICK. Vic. 3056 38.6922

Sixteen Millimetre Aust. Pty. Ltd.,
4 Queensbridge Street,
SOUTH MELBOURNE. Vic. 3205 61.2551

(b) Tape Recorders & Video Recorders.

Contact A.V.E.C. for technical advice.

(c) Photocopiers & Accessories.

Contact A.V.E.C. for technical advice. Many firms listed in (a) above handle this equipment.

Others:

Agfa Gevart Ltd.,
376 Whitehorse Road,
NUNAWADING. Vic. 3151 878.8000

Fordigraph (Vic.) Pty. Ltd.,
526 Latrobe Street,
MELBOURNE. Vic. 3000 329.8966

Remington Rand,
334 City Road,
SOUTH MELBOURNE. Vic. 3205 69.0660

Roneo Vickers (Vic.) Pty. Ltd.,
93 Clarendon Street,
SOUTH MELBOURNE. Vic. 3205 69.6914

Timms Pty. Ltd.,
34 Eastern Road,
SOUTH MELBOURNE. Vic. 3205 69.7401

Max Wurcker Pty. Ltd.,
236 Adderly Street,
WEST MELBOURNE. Vic. 3003 30.1411

Rank Xerox (Aust.) Pty. Ltd.,
377 Lonsdale Street,
MELBOURNE. Vic. 3000 67.6371

(d) Films & Film Strips.

A.V.E.C.

State Film Centre

C.S.I.R.O.

I.C.I.

Shell

B.P.

R.A.C.I. Index of Chemistry Films 1970.

Contact A.V.E.C. for technical advice. Man, who in (a) above handle this equipment.

Others:

Agfa Gevart Ltd.,
376 Whitehorse Road,
NUNAWADING. Vic. 3151 878.8000

Fordigraph (Vic.) Pty. Ltd.,
526 Latrobe Street,
MELBOURNE. Vic. 3000 329.8966

Remington Rand,
334 City Road,
SOUTH MELBOURNE. Vic. 3205 69.0660

Roneo Vickers (Vic.) Pty. Ltd.,
93 Clarendon Street,
SOUTH MELBOURNE. Vic. 3205 69.6914

Timms Pty. Ltd.,
34 Eastern Road,
SOUTH MELBOURNE. Vic. 3205 69.7401

Max Wurcker Pty. Ltd.,
236 Adderly Street,
WEST MELBOURNE. Vic. 3003 30.1411

Rank Xerox (Aust.) Pty. Ltd.,
377 Lonsdale Street,
MELBOURNE. Vic. 3000 67.6371

(d) Films & Film Strips.

A.V.E.C.

State Film Centre

C.S.I.R.O.

I.C.I.

Shell

B.P.

R.A.C.I. Index of Chemistry Films 1970.

Consulates (listed p. 278 1971 Telephone Directory)

Ed. Gazette 30.1.70 pages 21 - 28

Educational Film Services,
1 Leyland Road,
MT. WAVERLEY. Vic. 3149 288.4894

"Film Exchanges or Libraries"
pages 425 - 6 Melbourne "Pink Pages" 1970 - 71

Astronomical Society,
Box 1059J, G.P.O.,
MELBOURNE. 3001

(OR Institute of Applied Science, Swanston Street, MELBOURNE 663.4811)

(e) Charts

A.V.E.C.

Ed. Gazette 20.1.70 pages 21 - 28

Suppliers listed in:
1 and 2 (a)

Note: Many large industrial companies have charts available in limited numbers upon written request.

(f) Maps.

Crown Lands and Survey Department,
2 Treasury Place,
MELBOURNE. 3000 — 63.0321

Forrests Commission of Victoria,
2 Treasury Place,
MELBOURNE. 3000 — 63.0321

Mines Department,
171 Flinders Street,
MELBOURNE. Vic. 3000 — 654.4388

Note: Most booksellers sell detailed maps of a particular area for a small charge.

4. Library

(a) Booksellers - Retail

Aurous Pty. Ltd.,
144 Auburn Road,
AUBURN. Vic. 3122 — 81.7639

Cheshire Pty. Ltd.,
Head Office,
362 Little Bourke Street,
MELBOURNE. Vic. 3000 — 67.9532 or 41.7041 (Book Oraers)

Halls Pty. Ltd.,
371 Bourke Street,
MELBOURNE. Vic. 3000 — 67.2658

262 Chapel Street,
PRAHRAN. Vic. 3181 — 51.3081

L & S Pty. Ltd.,
259 East Boundary Road,
EAST BENTLEIGH. Vic. 3165 — 579.3244

Suppliers listed in:
1 and 2 (a)

Note: Many large industrial companies have charts available in limited numbers upon written request.

(f) Maps.

Crown Lands and Survey Department,
2 Treasury Place,
MELBOURNE. 3000 — 63.0321

Forrests Commission of Victoria,
2 Treasury Place,
MELBOURNE. 3000 — 63.0321

Mines Department,
171 Flinders Street,
MELBOURNE. Vic. 3000 — 654.4388

Note: Most booksellers sell detailed maps of a particular area for a small charge.

4. Library

(a) Booksellers - Retail

Aurous Pty. Ltd.,
144 Auburn Road,
AUBURN. Vic. 3122 — 81.7639

Cheshire Pty. Ltd.,
Head Office,
362 Little Bourke Street,
MELBOURNE. Vic. 3000 — 67.9532 or 41.7041 (Book Oraers)

Halls Pty. Ltd.,
371 Bourke Street,
MELBOURNE. Vic. 3000 — 67.2658

262 Chapel Street,
PRAHRAN. Vic. 3181 — 51.3081

L & S Pty. Ltd.,
259 East Boundary Road,
EAST BENTLEIGH. Vic. 3165 — 579.3244

Melbourne University Bookroom,
University of Melbourne,
PARKVILLE. Vic. 3052 — 347.4164

Monash University Bookshop,
4 Wellington Road,
CLAYTON. Vic. 3168 — 544.0811

Ramsay Surgical Ltd.,
403 Swanston Street,
MELBOURNE. Vic. 3000 34.9181

Norman Robb Bookshop Pty. Ltd.,
190 Little Collins Street,
MELBOURNE. Vic. 3000 63.3117

Robertson & Mullins Pty. Ltd.,
107 Elizabeth Street,
MELBOURNE. Vic. 3000 60.1711

Source (Books from America) The,
121 Collins Street,
MELBOURNE. Vic. 3000 63.8541

Technical Book & Magazine Co. Pty. Ltd., 663.3951
295 Swanston Street, 663.2012
MELBOURNE. Vic. 3000

Thomson Publications (Aust.) Pty. Ltd.,
415 Bourke Street,
MELBOURNE. Vic. 3000 67.5385

Whitcombe & Tombs Pty. Ltd.,
20 Bond Street,
MELBOURNE. Vic. 3000 61.3687

(b) Booksellers - Secondhand

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(c) Library Supplies

Raeco Library Equipment Pty. Ltd.,
69 Sutherland Road,
ARMADALE. Vic. 3143 50.8506

S & M Co. Pty. Ltd.,
104 High Street,
ST. KILDA. Vic. 3182 94.0311

(d) Publishers.

Pages 885 - 886 "Pink Pages" 1970 - 71

(e) Periodicals.

Subscriptions to the periodicals listed below, which are primarily concerned with the teaching of sciences, are available through:

B.C.N. Agencies Pty. Ltd.,
178 Collins Street,
MELBOURNE. Vic. 3000

PERIODICAL	ANNUAL RATE (Dollars)	FREQUENCY OF PUBLICATION
* Australian Science Teachers' Journal	10.00	3 per year
* Lab-Talk		Monthly
* The American Biology Teacher	10.00	8 per year
* The Science Teacher	10.00	6 per year
Science Education News	Free	3 per year
* School Science Review	8.05	Quarterly
South Australian Science Teachers' Journal	1.20	Quarterly
* Science Education	10.40	Quarterly
Scios (Science Teachers Association of Western Australia)		Quarterly
Science and Children	4.50	8 per year
London Science Teacher	1.00	Quarterly
Science Teachers Association of Tasmania Newsletter		3 per year
* School Science and Mathematics	9.30	9 per year
Physics Teacher	9.00	8 per year
Physics Education	9.05	Bi-monthly
Journal of Chemical Education	5.65	Monthly
* Education in Chemistry	7.40	Bi-monthly
* Journal of Biological Education	9.60	Quarterly
* The Australian Technical Teacher	2.00	Quarterly
Audio-Visual Media	10.00	Monthly
* Guidelines	10.00	Monthly
* Educational Books and Equipment	Free	Monthly

The Technical Teachers' College has subscriptions to periodicals marked * and copies of these are available, for appraisal, within the library.

(f) Stationers

Norman Bros. Pty. Ltd.,
60 Elizabeth Street,
MELBOURNE. Vic. 3000 654.4999

(g) Labelling

Letraset (Vic.) Pty. Ltd.,
447 Collins Street,
MELBOURNE. Vic. 3000 62.1154

5. Excursions (See Regulations)

Most large industries, companies, banks, and Government institutions may allow small parties of interested students to visit their plant, providing bookings are made well in advance.

However, many have discontinued allowing visiting school children because:

(i) Release of staff presents problems.

(ii) Excursions were not of an educational nature.

(iii) Students were not controlled by teachers..

(iv) Certain age limits are involved.

(v) Little or no "preparation' was given at school.

(vi) Little or no "follow-up' was given at school.

(vii) Films are readily available.

It is suggested that the following procedures be adopted whenever possible.

(i) Investigate whether the excursion will be worthwhile by:

  (a) Visiting the plant alone.
  (b) Phoning or writing to the Manager.
  (c) Asking someone (teacher/student) who has made the excursion.

(ii) Arrange the excursion by 'phone or letter stating dates, times, number of students and teachers, and meal arrangements.

(iii) Arrange suitable transport, (bearing in mind that should the weather be inclement, public transport is often unsuitable).

(iv) Estimate cost per student and inform them well before-hand.

(v) Arrange that "indemnity" forms are distributed, signed, and collected.

(vi) Inform the Principal, Vice-Principal and Time Table man of dates, classes, times, etc. so that extras will be covered.

(vii) Students of "doubtful" character or wearing 'unsuitable" dress should be excluded from the excursion as not only will your school be classified as "GOOD" or "BAD" but ALL Technical Schools may be so branded if it is the first excursion to that plant by a Technical School group, and other Technical Schools may, (and have been), jeopardized.

(viii) For "outdoor' excursions (geology, ecology, conservation, astronomy etc.) ensure that suitable clothing is worn.

(ix) Prepare and duplicate some form of questionaire to be completed

plant, providing bookings are made well in advance.

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(viii) For "outdoor" excursions (geology, ecology, conservation, astronomy etc.) ensure that suitable clothing is worn.

(ix) Prepare and duplicate some form of questionaire to be completed by the students and this should be marked and may carry toward the students' assessment.

NOTE: As many schools now hold regular camps science excursions of type 8 above are fairly common.

Some suggested excursions are:

1. Planetarium
2. Museum of Applied Science
3. Zoological Gardens
4. Studley Park
5. Werribee Gorge
6. Lerderderg Gorge
7. Geological Museum
8. Conservation League - Natural Resources
9. Ports and Harbours
10. Kraft Foods
11. G.M.H.
12. Ford - Geelong
13. International Harvester - Geelong
14. P.R.A. - Altona
15. I.C.I. - Yarraville
16. State Laboratories
17. Museum of Victoria
18. Shell - Geelong
19. Fibremakers - Bayswater
20. Wilson's Promontory
21. Yarra Valley
22. Ogden Industries
23. B.P. - Hastings
24. Soil Conservation Authority
25. Observatory
26. Yallourn Open Cut & Power Station
27. A.P.M.
28. Goodyear Tyre
29. Dunlop Rubber Plants
30. Heinz Foods - Dandenong
31. Specialist Technical Schools -
    e.g. M.S.P.G.A., W.A.F.T.S., etc.
32. V.I.C. - specialist departments
33. Alcoa or Comalco

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31. Specialist Technical Schools -
    e.g. M.S.P.G.A., W.A.F.T.S., etc.
32. V.I.C. - specialist departments
33. Alcoa or Comalco
34. Astrojet Space Centre, Tullamarine
35. Fisheries and Wildlife Department Units.

6. Professional Organizations.

Science Teachers' Association of Victoria,
Clunes Ross House,
191 Royal Parade,
PARKVILLE. Vic. 3052 347.2537

Technical Mathematics and Science Teachers,
(T.M.A.S.T.)
Geelong Region,
The Secretary.

Astronomical Society of Victoria,
C/- Box 1059 J, G.P.O.,
MELBOURNE. Vic. 3001

Australian Conservation Foundation,
Clunes Ross House,
191 Royal Parade,
PARKVILLE. Vic. 3052 347.5666

National Resources Conservation League of Victoria,
593 Springvale Road,
SPRINGVALE SOUTH. Vic. 3172 546.4740

* Royal Australian Chemical Institute (vic.) 347.2560

* Australian Institute of Physics. 347.4941

* Institute of Industrial Engineers. 347.2793

* Institute of Instrumentation and Control. 34.6629

* Institute of Marine Engineers. 347.2570

* Institute of Mining and Metallurgy 347.3166

* Institution of Chemical Engineers 347.2570

* Institution of Civil Engineers 347.2570

* Institution of Electrical Engineers (Vic.) 347.2570

* Institution of Engineers (Aust.) 347.2570

* Institution of Production Engineers 347.2570

* Institution of Surveyers (Aust.) 347.2664

* Clunes Ross House,
191 Royal Parade,
PARKVILLE. Vic. 3052

7. Miscellaneous Organizations.

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PARKVILLE. Vic. 3052

7. Miscellaneous Organizations.

Australian Broadcasting Commission,
Education Department,
St. James Building,
A.M.P. Square,
121 William Street,
MELBOURNE. Vic. 3000 60.0721.

Apprenticeship Commission of Victoria, 200 Little Collins Street, MELBOURNE. Vic. 3000	654.4800
Careers in Science and Technology Bureau, 55 Exhibition Street, MELBOURNE. Vic. 3000	63.3093
Metric Conversion Board, 450 St. Kilda Road, MELBOURNE. Vic. 3000	267.2155
Commonwealth Department of Education and Science, 450 St. Kilda Road, MELBOURNE. Vic. 3000	267.2988
Standards Association of Australia, Clunes Ross House, 191 Royal Parade, PARKVILLE. Vic. 3052	34.9321
Victoria Institute of Colleges, 582 St. Kilda Road, MELBOURNE. Vic. 3000	51.9921
Science Museum of Victoria, (Formerly Institute of Applied Science), 304 - 328 Swanston Street, MELBOURNE. Vic. 3000	663.4811
National Museum, Russell Street, MELBOURNE. Vic. 3000	663.4811
Royal Botanic Gardens and National Herbarium, The Domain, SOUTH YARRA. Vic. 3141	63.7030 63.8935
Royal Society of Victoria, 9 Victoria Street, MELBOURNE. Vic. 3000	347.4728
Government Printing Office, 7a Parliament Place, MELBOURNE. Vic. 3000	63.0321 Ext. 6181
Fisheries and Wildlife Department, 605 Flinders Street Extension, MELBOURNE. Vic. 3000	62.3611

Special Publications.

MELBOURNE. Vic. 3000 63.3093

Metric Conversion Board,
450 St. Kilda Road,
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8. Special Publications.

Science teachers are referred to the following publications.

(i) Education Gazette and Teachers' Aid.

(ii) Educational Magazine.

(iii) Handbook 1972 Technical Schools Division.

(iv) Curriculum and Research Branch.
- (a) Curriculum and Research Bulletin
- (b) Circulars of Information.
- (c) Other publications.