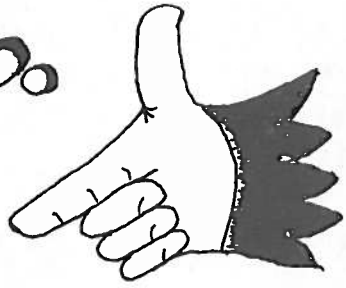
SCOTTISH SCHOOLS SCIENCE EQUIPMENT RESEARCH CENTRE

Bulletin No. 124 December, 1980.

Contents

S.S.S.E.R.C. LOGO COMPETITION



Open To Teachers And Pupils

Design a Logo which will be the basis of a new cover for the S.S.S.E.R.C. Bulletin

Entries should reach us by the 16th January 1981

PRIZE £10 BOOK TOKEN

Introduction

At a recent meeting of our Planning Committee it was decided that our bulletin image needed updating, by providing it with a cover which had more visual appeal. To that end they have suggested the logo competition which is described in the tear-off leaf opposite. The logo should be in one colour, not greater than 15 x 15cm, and the appropriateness of the design to the aims of SSSERC will be a contributory factor in deciding the winner. The competition will be judged by a schools' art adviser. We would be grateful if some member of the science department would see that the tear-off leaf is prominently displayed where pupils may read it, and would shepherd the resulting entries so that they reach us by the 16th January, as stated.

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Our questionnaire published in Bulletin 122, had a disappointingly small response. Just over a hundred replies were received, and since we send out about 1500 copies, of which 90% or more go to Scottish schools and institutions, there are doubts about the validity of the sample replies. We therefore make a further cri de coeur for answers to the questionnaire, especially from those who never bother to read the bulletin. We make a special appeal to principal teachers to contact all their colleagues, and urge on them the necessity for making their views known, if the SSSERC service is to be made more effective.

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Along with Bulletin 122 we sent out an equipment list for physics to 'O' and 'H' grades. It was sent to all Scottish schools on our normal address list, and to all those others to whom we believed that the list might be of value. We excluded certain categories such as principal teachers of technical education, foreign subscribers etc. If anyone who normally receives our bulletin and has not received a copy of the list would wish one, it will be sent free of charge if they notify us. Others not on our distribution list who wish to have a copy are asked to enclose 25p with their request. Copies additional to those already sent out will also be charged at 25p each, or 15p to callers at the Centre.

In order to calculate a figure of what it would cost to equip a laboratory to teach physics, we costed ten of each piece of pupil apparatus, apart from some Nuffield Kits which are labelled as being sufficient for 8 pupils, where we costed a single kit. Demonstration and 'stations' equipment was costed in singles. The cost of the list then, to the nearest £100, comes to £6000 for S1 and S2, £3200 for S3 and S4, and £1000 for S5. Of these amounts, the totals required for pupils apparatus which should be replicated for each lab, e.g. where S1 and S2 classes are set, are £4100 for S1 and S2, £2100 for S3 and S4, and £770 for S5. The big spenders on the list are easy to pick out; in S1 and S2, £290 for l.t. power units, £500 for microscopes, £300 for circuit boards, £1000 for oscilloscopes, £640 for joulemeters. In S3 and S4 we need to spend £500 on ripple tanks, £260 on runways, £350 on ticker timers and trolleys. Remembering that the physics list does not include basic equipment such as burners, tripods etc,

the cost of equipping one laboratory to teach higher physics must come close to £15,000.

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Some time ago we were asked to help the Scottish Council for Educational Technology to make a small modification to domestic cassette tape recorders to enable them to be used with language laboratory tapes. The normal cassette recorder has one track, used for both recording and playback. The language lab tape requires two tracks, so that the students' replies to questions put on one track may be recorded on the second track. This means that any work recorded by the student must be 'marked' in the language lab itself, which can be inconvenient due to the use of the lab by other classes.

Some years ago the technician in Lasswade High School adapted the domestic cassette recorder so that it would playback both tracks, thus allowing the 'homework' to be taken home and used with a cassette recorder. SCET thought that this facility should be made more widely available, as the modification should be within the capabilities of technicians in an audio-visual aids centre.

The modification consists of replacing the existing recording head by one with two half tracks, and connecting it to a single transistor amplifier with volume control, which is then wired in parallel with the existing amplifier. Space has to be found for the amplifier, and the most suitable place for this is in the battery compartment. Hence only mains/battery recorders are suitable for the conversion, and one must accept that after the conversion they will be mains only. With the extra volume control turned to a minimum, the recorder will perform as a normal instrument.

A survey conducted by SCET showed that the variety of recorders used in schools was very wide. Also we do not know how many schools will want to convert their recorders. Accordingly we ask your colleagues in the modern languages department that if they want this conversion, they should write us giving the make of the instrument. The first of any make which we receive we will modify ourselves, and the school will be debited for the cost of the components, which should be between £15 and £20. We would also use the instrument to make drawings and details showing how the modification can be carried out, and this we would send to any other school wanting to modify the same make. It will be for the school to decide whether they have the facilities to make the conversion in the school itself, or whether it should be sent to an audio-visual aids or science centre. Drawings of the modifications we have made would also be sent to any such centre on request.

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We intend to prepare a slide sequence with written commentary, on the repair of the pupil oscilloscopes, Serviscope Minor and Advance OS12. Most of these are over 10 years old and feeling their age. Although they cost about £20 when new, to replace one at present day prices costs £100, and anything which prolongs their life is to be applauded. Both the original manufacturers have merged with other firms, so that repairs have to be sent to specialist firms which will accept such work, and the repair bill is likely to be £40-50.

Some faults are irreparable; if the cathode ray tube or the mains

transformer goes dud, and the oscilloscope has to be discarded. But the evidence we have suggests that such faults are not common, and that the time base is the most likely cause why a 'scope has to be put on the shelf. Curing this is usually a matter of changing one or two resistors, or maybe a valve, and the cost of parts is unlikely to exceed £5.

Some members of our Planning Committee have questioned the wisdom of letting a technician loose with a soldering iron inside equipment where the voltages are around 500V, and some technicians have quite reasonably questioned their competence to repair such equipment, when their training courses confine them to transistor technology. On the other hand, there are still teachers and technicians who know what a valve does, and our evidence suggests that some of these, and perhaps some who are not sure what a valve does are already trying to effect their own repairs. In these circumstances it seems only sensible that we should do what we can to make sure that the repairs are safely carried out, and that we should help them to identify and cure the more common faults that occur.

Thanks to the science adviser for Tayside, we already have an idea of what usually goes wrong in an OS12, and we will make a start by preparing the slide sequence for that model. We would like to hear from owners of faulty Serviscope Minors, so that we could have a round dozen of these for servicing. We would diagnose and if possible cure the fault, and the only cost to the school would be that of the replacement parts. It would be as well to phone or write us before bringing the oscilloscope to the Centre, just in case we are overwhelmed.

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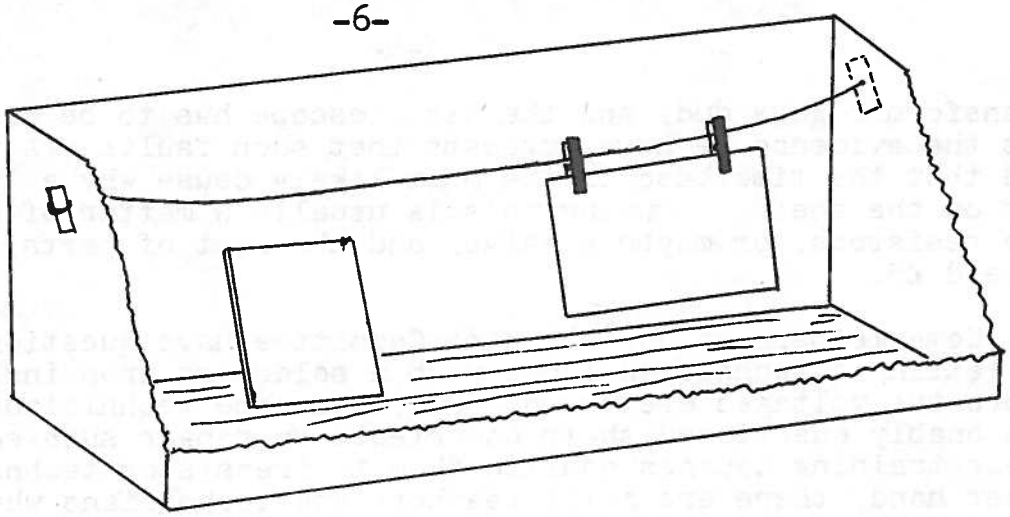
The Centre will be closed over the holiday period from 25th - 28th December, and from 1st - 4th January, all dates inclusive.

Chemistry Notes

We have always recommended the use of a fume cupboard for reagents in aerosol form, for example as used in developing thin layer or paper chromatograms. However in this process the working surface, and walls of the fume cupboard will become contaminated. A useful ploy to reduce or to remove the need for cleaning such surfaces is to use a cut-away cardboard box as a small disposable shield or booth.

This arrangement also has the advantage of providing a support for TLC plates and for a line on which to suspend undeveloped paper chromatograms. Cardboard should be a satisfactory material for use with most reagents except with any which are powerful oxidising agents or with concentrated sulphuric acid. (The latter is occasionally used to locate organic compounds run on silica plate). Such boxes can be well washed with water before placing in poly bags for disposal.



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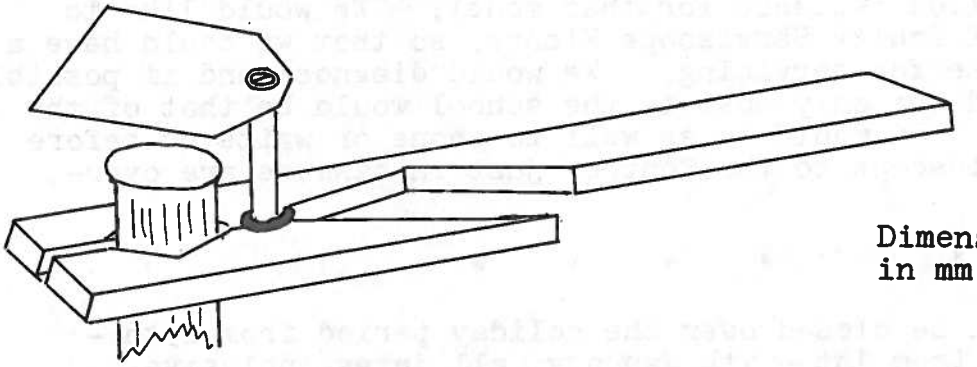
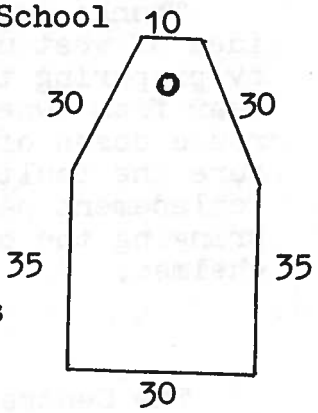
One common source of splashes comes from the uncontrollable bumping of liquids being boiled in test-tubes. Alkaline solutions are particularly prone to this and one simple means of preventing ejected liquid from travelling across the bench is to fit a small splash guard on the test-tube holder or on the tube itself. This idea was inspired by a similar device for sodium fusion (School Science Review, No. 214, p. 109).

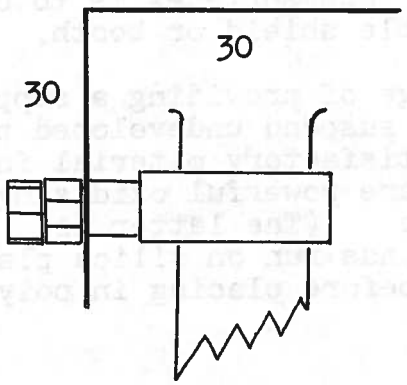




Dimensions in mm

The small flap of hardboard is hinged on a round peg of wood which can be push fitted into the central hole of the spring of the test-tube holder. Thus it can be swung to one side for pouring operations.

An alternative arrangement is to mount the guard on the test-tube itself by means of a terry clip, which should be big enough to hold and grip the test-tube. The guard is a piece of mild steel sheet, 30 x 60mm, bent halfway along to an L shape to give two squares 30 x 30mm. A 6BA bolt fixes the guard to the clip at one side, and two nuts are used to hold it so that the guard can be rotated through a right angle without loosening the screw. Rotating the guard frees the test-tube for pouring.



In common with many others, this safeguard should be an additional line of defence and should not be used to substitute for good technique in boiling.

Biology Notes

Teachers ordering cultures of micro-organisms from Philip Harris Biological will have received notification that they have revised their list of cultures. Several organisms have been withdrawn but wherever possible an attempt has been made to provide alternatives. This follows some recent work by the Microbiological Consultative Committee and the Society for General Microbiology Safety Working Party, on the suitability of micro-organisms for use in schools.

Over the past months we have been revising our own microbiology safety guidance (Bulletin 98) and the revised version will take account of the new recommendations. The work has been undertaken in conjunction with the ASE convened working group on safety and will be published in 'Education in Science' as well as being published by ourselves.

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On the following pages we give a summary of microscopes for work up to 'H' grade. The models listed have been tested at the Centre. Full test reports can be borrowed by Scottish teachers for up to one month; requests to borrow these should be made in writing to the Director.

Prices are as up to date as possible but they should be checked before ordering. With only a three point scale of assessment it is difficult to indicate subtle differences between instruments. However we are always willing to give this information to individual enquirers either over the telephone or in writing. Assessment 'A' is most suitable for school use; 'B' satisfactory for school use; 'C' unsatisfactory. Sometimes considerations of price are very important. An instrument's optical and mechanical performance may well justify an A classification but its price may mean demotion to a B category. Instruments failing our optical or mechanical tests are classified C regardless of price considerations.

A few models listed in previous summaries and still on the market are not shown below. This is either because of considerations of price or of difficulties in obtaining delivery.

Because of the present economic climate we have restricted the summary to 'H' grade instruments. Several of these would also be adequate for CSYS. Teachers requiring advice on more expensive teacher demonstration/CSYS models such as the Olympus CH and BH series, the Prior 2000 models and the Swift 'Collegiate' models, should contact the Centre by telephone or letter.

Those unfamiliar with the terms used in the summary are referred to the Biology Notes in Bulletin 65 and 66 where they will find them explained.

Summary of Microscopes Suitable for 'H' Grade

Abbreviations used in this summary are as follows: (H) = Huygenian eyepiece; (Wf) = widefield eyepiece; (P) = pointer in eyepiece; (Bf) = brightfield objective; (Ph) = phase objective; (S) = spring-loaded; (oil) = oil immersion.

Model etc.	Stand	Optics	Mechanics	Light Source	Phase Contrast	General Comments	Assessment
HSM Student Bausch and Lomb £205-220	'Modular' Upright or inclined head; solid base.	Eyepiece x10 (H) or (Wf). Objectives x4, x10, x40(S) x100(S) oil available.	Stage focussing. Fixed safety stops. Eyepiece held but rotatable.	Mirror or mains illuminator.	Not available.	Robust construction with good finish. Stand with focussing condenser needed for oil-immersion work. Several models can be built from list of basic parts.	B
Olympus HSC Griffin and George £105.00	Upright head; open horseshoe base.	Eyepiece x10 (H). Objectives x4, x10, x40, x100 (S) oil available.	Body focussing; adjustable safety stop. Eyepiece held.	Mirror or mains substage illuminator.	Phase outfit condenser with x40 annulus and x40 (Ph) objective or complete phase model available.	Very satisfactory optically and mechanically. Very versatile; large range of optical accessories.	A
Prior 462 Prior Scientific. £176.50	Upright head; open horseshoe base.	Eyepiece x10 (Wf). Objectives x4, x10, x40(S), x100(S) oil available.	Body focussing. Fixed lower stop.	Mirror or mains substage illuminator.	Available; becomes model 464 with condenser with x40 annulus and x40(Ph) objective.	Satisfactory optically, very robust. x10/0.25 NA objective should be specified. Restyled, lighter in weight than earlier version.	B

Model etc.	Stand	Optics	Mechanics	Light Source	Phase Contrast	General Comments	Assessment
Model D Parisian Optical £69.00	Upright head; open horseshoe base.	Eyepieces x5(H), x10 (H). Objectives x4, x10, x40, x100 (oil) available.	Body focussing, Adjustable lower stop. Eyepieces not held.	Mirror	Not available.	Satisfactory optically and mechanically. Limited range of optical accessories available.	B
Swift M2246(N) M2246B(N) Pyser M2246(N) £178.00 M2246b(N) £190.00	Inclined head; solid base.	Eyepiece x10(Wf) (P). Objectives x4, x10, x40(S), x100(oil) available.	Stage focussing. Adjustable stop, slipping clutch. Eyepiece held/ rotatable.	Mirror (M2246(N)) or built-in mains illuminator (M2246B(N))	See M2248(N) below.	Very satisfactory optically and mechanically. Convenient to use. Wide range of optical accessories available.	A
Swift M2248(N) Pyser £260.00	Inclined head; solid base.	Eyepiece x10(Wf) (P). Objectives x4(Bf). x10(Ph), x40(Ph) (S) quad. nosepiece takes x100 (oil) if required.	Stage focussing. Adjustable stop, slipping clutch. Eyepiece held/ rotatable.	Mirror	See optics. 'Hori-Abbe' phase condenser with single annulus, size computed to suit both phase objectives.	Fixed condenser needed for 'Hori' phase system can limit brightfield performance. Convenient to use, swing-in annulus opens iris automatically.	B

Model etc.	Stand	Optics	Mechanics	Light Source	Phase Contrast	General Comments	Assess-ment
Harris Advanced Philip Harris £142.90	Upright head; open horseshoe base.	Eyepiece x10(Wf) (P). Objectives x4, x10, x40(S).	Body focussing. Fixed stops and slipping clutch. Eyepiece held.	Mirror or mains sub-stage illuminator.	See Harris Intermediate.	Optically and mechanically satisfactory. Limited range of optical accessories available.	B
Harris 'Intermediate' Philip Harris £115.00	Upright head; open horseshoe base.	Eyepiece x10(Wf) (P). Objectives x4, x10, x40(S). Fixed simple condenser.	As above. Sub-stage disc-diaphragm instead of iris.	As above.	Available in a phase form as the Harris 'Hori-Phase' x4(Bf), x10 (Ph), x40(Ph) (S) condenser with single annulus.	Simple fixed condenser limits brightfield performance, oil immersion work not advisable. Hori-Phase system uses one annulus for both phase objectives, requires fixed condenser.	B
ABF 400X Opax £82.50 Abbe condenser £21.50	Upright head; open horseshoe base.	Eyepiece x10(Wf) (P). Objectives x4, x10, x40(S) x100(oil) available.	Body focussing. Adjustable lower stop. Eyepiece fixed/ removeable.	Mirror or low voltage or mains sub-stage illuminator.	Not available.	Basic version has simple fixed condenser, limits optical performance. Focussing Abbe condenser available, improves performance of x40 objective, and needed if x100 (oil) fitted. Limited range of optical accessories.	B
PZO Studar Model D (ER1300D) Irwin Desman £154.90	Inclined head; solid rectangular base.	Eyepiece x12(Wf) with eye cup. Objectives x5, x10, x40(S).	Stage focussing, coaxial fine and coarse controls.	Mirror or mains sub-stage illuminator.	Not available.	Satisfactory optically and mechanically. Coaxial controls very convenient. Simple fixed condenser limits optical performance, oil immersion work not advisable.	B

Model etc.	Stand	Optics	Mechanics	Light Source	Phase Contrast	General Comments	Assessment
PZO Studar Model K (ER1300K) Irwin Desman £178.10	Inclined head; solid rectangular base.	Eyepieces x5(H), x12 (Wf). (x10 (H) is available). Eye cup supplied. Objectives x5, x10, x20 x40(S). x100 (oil) is available.	Stage focussing, co-axial fine and coarse controls.	Mirror or mains substage illuminator.	Not available.	As PZO Studar Model D but focussing condenser improves optical performance. Large range of optical and mechanical accessories.	B
PZO Model MS4 O.M.C. £97.50	Inclined head; solid circular base.	Eyepiece x12(Wf) with eye cup. Objectives x10, x40(S) (triple nosepiece, x5 objective is available).	Stage focussing, co-axial fine and coarse controls.	Mirror or mains substage illuminator.	Not tested.	As for PZO Studar Model D.	B
PZO Model MS7M O.M.C. £152.10	See PZO model MS4	Eyepieces x5(H), x10(H) x12(Wf), eye cup supplied. Objectives x5, x10 x40(S), x100(S) (oil) (quad. nosepiece).	See MS4	Mirror or mains substage illuminator.	Not tested.	As for PZO Studar Model K.	B

S.S.S.E.R.C., 103 Broughton Street, Edinburgh EH1 3RZ
Tel No. 031 556 2184.

Bausch and Lomb UK Ltd., Scientific Optical Products Division, Highview House, Tottenham Crescent, Epsom Downs, Surrey KT18 5BR.

Griffin and George Ltd.,Braeview Place, Nerston, East Kilbride, Glasgow G74 3XJ.

Philip Harris Ltd., 34-36 Strathmore House, Town Centre, East Kilbride, Glasgow.

Philip Harris Biological, Oldmixon, Weston super Mare, Avon BS24 9AX.

Irwin Desman Ltd., 294 Purley Way, Croydon CR9 4QL.

Overseas Marketing Corporation Ltd., 26-42 Bond Street, Ealing London W5 5AA.

Opax Ltd., 142 Silverdale Road, Tunbridge Wells, Kent TN4 9HU.

Parisian Opera and Field Glass Co. Ltd., 24/5 Princes Street, Hanover Square, London W1R 7RG.

Prior Scientific Instruments Ltd., London Road, Bishops' Stortford, Herts CM23 5NB.

Pyser Ltd., (Optical Division), Fircroft Way, Edenbridge, Kent TN8 6HE.

Scottish Council for Educational Technology, Dowanhill, 74 Victoria Crescent Road, Glasgow G12 9JN.