

SCOTTISH SCHOOLS SCIENCE

EQUIPMENT RESEARCH

CENTRE

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# Introduction

With this bulletin we give a list of items of surplus equipment for sale. There will be a greater demand for some of these than we can supply, and we would again remind readers that we deal with all orders on a first come, first served basis. In cases of items which are likely to be in demand, it will profit the teacher if he telephones us as soon as possible to reserve the item in his name. It will then be set aside until any order form can be processed and sent to us.

Concerning the delivery of surplus material, it can easily be the case that the cost of freighting or posting an order to a school is greater than the cost of the items themselves, and there are some items, e.g. nife battery, which we will not send by public transport. Hence we assume that the teacher or regional authority will make their own arrangements for collecting from the Centre, and only if the teacher has indicated on his order form or by letter that he is willing to pay freight charges will we despatch the order. In all other cases it will be held in the Centre pending collection. Teachers in the area served by the Tayside Schools Technology Centre should know that the Director visits SSSERC periodically to uplift surplus material ordered by them. He also maintains a small stock of our surplus material at the Tayside Centre although in the nature of things it is not possible for him to have every item in stock.

With the above arrangements it sometimes happens that teachers forget that they have ordered material from us, or it may be that they are unaware that it is lying here awaiting collection. We would be grateful therefore if someone from the following schools would get in touch with us to decide the outcome of orders which are at present being held for them. Wallace Hall Academy; Ross High School; Hazelhead Academy; Falkirk College of Technology; St. Mary's High School, Bo'ness; Beath Junior High School; Glenwood High School; Linlithgow Academy; Inch Secondary School; Merksworth High School; Wishaw High School; Elgin Technical College; Sanquhar Academy.

Returning to items for which the demand may outstrip the supply, we sometimes receive complaints that the person concerned, having telephoned us without delay finds that he is several days too late to reserve an item. We cannot correct for the vagaries of Post Offices deliveries, although we do all we can. Any bulletin containing a list of surplus material is sent for posting on a Friday. Thereby we hope that the majority of teachers will be opening them simultaneously on Monday morning. We do guarantee that every item listed in the bulletin is available for purchasing when the Centre opens on that morning.

A final point concerns the system of payment through the regional authority. We send out monthly accounts addressed to the headmaster or rector of the school, and the account will carry as reference the number of our Advice Note which is always sent with the goods. In cases where the teacher has sent us an official order or requisition form, no problem arises, as that order number is also quoted on our account, and this should enable the school office to trace the order and learn the details. Quite often,

however, teachers will write their request as an ordinary letter, or will collect the material personally and ask for it to be invoiced to the school. In such cases the number of our Advice Note is the only reference we can give. It follows therefore that if the school office is to be able to trace the order from our account, the note should not be thrown away, or filed where the office has no knowledge of its existence, but that it should be given to the school administrator, or that he/she be otherwise warned to expect an account. One action which the teacher can take which may avoid the confusion is to send us a confirmation order as soon as he returns to his school, and provided that it reaches us before the account is sent out, its number will be quoted thereon.

## Opinion

Abbreviations have been with us for a long time, possibly since Roman times, although my schoolboy Latin never showed the Romans to unbend in the literary sense so far as to write i.e. or e.g. Pronouncable acronyms are much more recent, and I wonder whether DORA, the Defence of the Realm Act, which is of first world war vintage, was the original of the species. There may be evidence that wartime conditions encourages the growth, as the second world war produced a fair batch, such as FIDO and PLUTO, and of course the Korean war produced MASH.

The growth rate of the habit in science education is now as great as elsewhere; we have SCISP, STEP, ASEP and so many more that aspiring heads of department may soon expect to have to submit to an eximination of this aspect of their knowledge. We ourselves are no exception, though I do not have to admit it. Few if any of our readers will know that the baptismal name of this organisation was the Scottish Centre for the Development of Science Equipment for Schools.

The latest trend is to coin an acronym which is not only pronouncable, but in some way comments on the activity which the organisation aims to promote. Thus we have ASH, Action on Smoking and Health, and GASP, Group Against Smog and Pollution. One may play the game in reverse, and I like Bulk Organisation Of Knowledge if only for its pretentiousness. We therefore offer a prize of 5 kg of scrap from our bargain basement (good improvisatory material, making indolent children keen) for the most pithy comment in acronym form on any field of education endeavour.

## Biology Abstracts

### Transport Systems.

Details of method of preparing visking tubing for use in diffusion experiments. (18).

An account of the construction of a Visking tubing mount which can be stored in a disinfectant solution. The semi-permanent mount saves considerable setting-up time. (56).

Details of the construction and use of a pupil atmometer/potometer and of a simple arrangement for weight potometry and atmometry. (58).

Details of a model which can be used to demonstrate the nature of blood flow and reasons for differences in flow and in vessel structure. (56).

Apparatus using a milk straw to illustrate pulse beat. (20).

Renal tubule. Constructional details of a model illustrating the action, using plastic tubing and glass-ware. Phenolphthalein indicator is used to represent blood, with acid in the Bowman's capsule to produce the urine. (3).

### Respiration.

Constructional details for a simple compensated respirometer. (48).

Account of the use of the compensated respirometer above, to determine respiratory quotients. (54).

Note on a simple respirometer constructed from a disposable syringe and a length of capillary tubing. (54).

Note on modification of gas analysis J-tubes, the OBA screw being replaced by a 1 ml syringe. (45).

Notes on the use of a straight length of capillary tube for gas analysis together with experimental details for analyses of human breath and air which has been respired by small organisms. (50).

Notes on the use of straight capillary tubes for gas analysis and on modifications to the methods of preparing and storing reagents. (60).

Details for constructing a thermistor thermometer having four switched ranges, which can be used for respiratory heat detection as well as for a variety of ecological/physiological applications. (35).

Note on the use of the SSSERC silicon diode thermometer for respiratory heat detection. (55).

Note on the use of Medicon thermistor probes with the SSSERC silicon diode thermometer for respiratory heat detection. (57).

An account of the use of an electronic thermometer with a Medicon disposable probe, and a capillary gas analysis tube for investigations into anaerobic respiration. Experiments, not using thermos flasks, are described, showing the production of heat and carbon dioxide by anaerobically respiring seeds without using mercury. (62).

Notes on the preparation and use of bicarbonate indicator. (61).

Details of the construction and use of a 'module' which can be used to detect carbon dioxide production by a range of organisms. (53).

Details of the construction of an 'improved' version of the respiration module above. (60).

Constructional details of a module for comparing inhaled and exhaled air for small mammals. (36).

Details of a stethograph and tambour arrangement for measuring rate and depth of breathing. The conventional lever and pen method of producing a record has been replaced by an electrical arrangement using a strain gauge in a Wheatstone bridge. (75).

Details of a model using 'Meccano' parts and plastic syringes to demonstrate the movements of the rib cage in breathing. (77).

Suggestion to use a manometer in demonstrating lung action with balloons in a bell-jar. (9).

Details of apparatus to show existence of contaminants in cigarette smoke. (38).

Details of a 'smoking doll' model used to demonstrate lung contamination by smoking. (73).

### Photosynthesis.

Notes on the use of straight capillary gas analysis tube for the analysis of gases produced by Elodea and grass or onion leaves. (50).

### Nutrition.

Hints on use of DCPIP to determine Vitamin C. (25).

Note on nomenclature used by suppliers for bile salts. (57).

Note on the use of Clinistix and Albustix for food testing in the Integrated Science Course. (40).

Note on the use of Albustix and Clinistix for food testing. (54).

Discussion on the use of Clinistix and Albustix for comparative estimations of glucose and soluble protein contents of a range of foodstuffs. (64).

Description of simple methods of estimating the energy yield of foodstuffs together with constructional details for a gauze basket used for burning the foods. (63).

### Growth.

Constructional details of improved form of auxanometer which gives sufficient permanent records to supply each pupil. (12).

### Reproduction.

Hint on the supply of Rhabditis for embryological work. (57).

Account of techniques used and results obtained to observe fertilisation in Pomatoceros. (25).

Hints on methods for examining incubating eggs. (33).

### Movement.

Constructional details of a model to show the bird perching mechanism, using a 'foot' cut from detergent bottle. (7).

Hint for using a mirror to show snail movement on glass. (35).

Constructional details for a fore-arm model, using a plastic syringe to show muscle action. (24).

Constructional details of a fore-arm muscle model, using string to show muscle action. (13).

Constructional details for displaying muscular contraction on a long-persistence screen oscilloscope. (39).

### Sensitivity.

Constructional details for a choice chamber. (33).

Constructional details for semi-circular canals model. (13).

Note on the use of the SSSERC silicon diode thermometer to demonstrate skin capillary contraction. (55).

Measurement of reaction time, using a stick  $\frac{1}{2}$  m long, marked in 0.01 s divisions. (9).

Note on the use of a scaler/timer from the physics department as a reaction timer. (48).

### Ecology.

Constructional details of a plankton net. (30).

Constructional details of a trap for catching unharmed, small feral mammals. (28).

Constructional details for a simple trap for catching small mammals. (55).

Hint on collecting ground-living organisms by pitfall trapping. (32).

- Hint on the extraction of living organisms from a soil sample. (32).
- Constructional details of a mud scoop for dredging ponds. (28).
- Hint on modification to commercial light meters to adapt them for ecological work. (29).
- Constructional details of a light meter using a photo-emissive cell. (25).
- Note on the use of the SSSERC silicon diode thermometer for ecological work. (55).
- Details of a modification of the iron sulphate/phenosafranine method for estimating dissolved oxygen content. The sample is sealed in a syringe, dye and titrant being injected into the sample via a syringe valve. (78).

### Microscopy.

- Schedule of tests used to evaluate 'O' grade microscopes. (7).
- Specification for microscopes for 'O' grade. (9).
- Specification and test procedure for 'O' grade microscopes. (48).
- Correction to name of diatom used in the 'O' grade microscope test procedure above. (50).
- Summary of tests on three 'O' grade microscopes. (54).
- Summary of tests on three 'O' grade microscopes. (72).
- Summary of microscopes suitable for work up to 'O' grade. (68).
- Test procedures for assessing 'H' grade microscopes. (14).
- Specification and test procedure for 'H' grade microscopes. (46).
- Correction to test procedure for 'H' grade microscopes above. (47).
- Summary of tests on 11 'H' grade microscopes. (14).
- Test summaries on two 'H' grade microscopes. (43).
- Summary of tests on four 'H' grade microscopes. (53).
- Summary of tests on three 'H' grade microscopes. (59).
- Discussion on factors which need to be borne in mind when choosing 'O' and 'H' grade pupil microscopes. (65).
- Discussion on microscopes for teacher demonstration and on microprojection. (66).
- Summary of microscopes suitable for 'H' grade, C.S.Y.S. and teacher demonstration. (66).
- Note on method for measuring eye separation distances for establishment of a norm for use in stereomicroscope tests. (41).
- Notes on the test procedure for stereomicroscopes, and statement on eye separation distances of first year pupils. (51).

- Specification and test procedure for stereomicroscopes. (42).
- Test summaries on four stereomicroscopes. (47).
- Summary of tests on four stereomicroscopes. (57).
- Notes on slides and transparencies for the biology syllabus. (52).
- Hint for microprojection using a microscope and slide projector. (35).
- Hint on construction of an eyepiece pointer from thin wire. (52).
- Constructional details for a microscope viewing head made from a flower pot. (67).
- Constructional details for a microscope eyepiece attachment which allows the image to be projected horizontally onto a screen. (67).
- Description of a method for producing photomicrographs without using a camera. The method uses a slide projector as a light source, the microscope image being projected onto bromide paper or sheet film. The production of photomicrographs of known magnification is described. (73).
- Husbandry.
- Note on the supply of Pharbitis nil seeds. (60).
- Details of an instant cold frame for seed boxes. (32).
- Recipe for preparing an Amoeba culture. (15).
- Notes on the construction of a tank for adult Xenopus laevis. (50).
- Hint on the use of 'bubble' liquid containers from toy shops as locust egg tubes. (45).
- Hint on storing Drosophila melanogaster specimens by freezing. (33).
- Addendum on storing Drosophila melanogaster above. (35).
- Tidal aquarium. Constructional details of a dual tank aquarium wherein the water is alternately filled and emptied from tank to tank, using a standard aquarium pump to simulate tidal action. (6).
- Account of methods not requiring electric mains supply for aerating aquaria. (38).
- Constructional details of a aquarium aerator based on the water supply. (38).
- Constructional details for a low voltage aquarium aerator using the current in a solenoid to raise a soft iron plunger and allowing it to fall in the manner of a pile-driver. The pump will operate from a 12 V car battery during power cuts or over the weekend. (49).

## Physics Notes

The following items of surplus equipment are still available and from item 561 onwards we give details of items not previously listed. Customers should note that we have received a further batch of Teltron tubes, and these are all listed amongst the new stock. For items previously notified the number in brackets gives the bulletin in which details will be found.

Item 371.	(67)	Motors, £1 - £2.
Item 375	(67)	Wire recorder, £5.
Item 436.	(72)	Developer, 10p.
Item 438.	(72)	Linagraph paper, 50p.
Item 451.	(72)	Nylon gears, 5p.
Item 485.	(74)	Steel calipers, 10p.
Item 486.	(74)	Cellacetate sheet, 10p.
Item 493.	(74)	Telephone switchboards, £1.
Item 494.	(74)	Transistors, 1p.
Item 495.	(74)	Power transistor, 10p.
Item 497.	(74)	Rat cage top, 30p.
Item 500.	(77)	Moving coil meter, £1.50.
Item 501.	(77)	Moving coil meter, £1.50.
Item 502.	(77)	Multi-way connectors, 10p.
Item 503.	(77)	Multi-core cable, 5p.
Item 504.	(77)	Silicon diode, 1p.
Item 505.	(77)	Mixed value potentiometers, 30p.
Item 506.	(77)	Mixed value resistors, 10p.
Item 507.	(77)	Mixed value resistors, 12p.
Item 508.	(77)	Twin-ganged potentiometer, 10p.
Item 509.	(77)	Coaxial shaft potentiometer, 10p.
Item 517.	(77)	115 V motor and reduction gear, (used in our flask shaker design, Bulletin 80), 50p.
Item 518.	(77)	Transformer, £1.
Item 528.	(77)	Dry battery, 1p.
Item 532.	(77)	Dry battery, 1p.
Item 534.	(77)	Dry battery, 1p.
Item 535.	(77)	Dry battery, 1p.
Item 541.	(77)	Developer, 20p.
Item 542.	(77)	Colour film chemical, 50p.
Item 544.	(77)	Colour film chemical, 50p.
Item 545.	(77)	Colour film chemical, 50p.
Item 548.	(77)	Bromide paper, £2.50.

- Item 552. (77) Polaroid film, 50p.
- Item 553. (77) Eyeshield, 1p.
- Item 554. (77) Polythene bottle, 1p.
- Item 555. (77) Polythene drum, 25p.
- Item 556. (77) TEL 520, planar diode, £7.
- Item 557. (77) TEL 522, luminescent tube, £8.
- Item 558. (77) TEL 534, double beam tube, £15.
- Item 559. (77) TEL 532, gas-filled triode, £10.
- Item 561. TEL 524, Perrin tube, £9.
- Item 562. TEL 525, e/m deflection tube, £13.
- Item 563. TEL 523, Maltese cross tube, £9.
- Item 564. TEL 521, planar triode, £8.
- Item 565. Dictofax cylinder dictating machine, with microphone, foot control and operating instructions, £3.
- Item 566. Typewriters, standard keyboard, in working order, but each has its own idiosyncrasy due to wear, £1.
- Item 567. Lexicon 80E electric typewriter by Olivetti, £3.
- Item 568. Adding machine by Burroughs, £1.
- Item 569. Calculating machine, Marchant 8ADX by Block and Anderson, 8 digit input capacity, £3.
- Item 570. Madas calculating machine, 10 digit input capacity, £3.
- Item 571. Radiation monitor, operates from 7.5 V battery, separate detectors for alpha, beta/gamma, and X-rays. 3-range ratemeter giving 10, 100 and 1000 counts per second f.s.d. Earphone output with earphone, £5.
- Item 572. Nickel cadmium cell, 25 Ah, plastic case, screw terminals, 28 x 80 x 210 mm high, £1.
- Item 573. Uniselector switch for 110 V operation, 4 bank 20 way, 20p.
- Item 574. Keyswitch panel, containing 10 keyswitches, most have 8 change-over contacts, 30p.
- Item 575. Mains transformer, standard primary, secondaries 31 V, 25 mA; 16 V, 200 mA; 34.5 V, 250 mA; 43 V, 825 mA; 19 V, 800 mA, 20p.
- Item 576. Mains transformer, standard primary, secondaries 21 V, 1.6 A; 5 V, 1 A, 20p.
- Item 575. Promicrol ultra fine grain developer, to make 2½ l, 20p.
- Item 578. Metol hydroquinone high contrast developer, to make 4½ l, 20p.
- Item 589. Bromide paper, Kodak WSG3S hard, 8 x 13 in, box of 100 sheets, £1.50.
- Item 580. As above, but WSG1S, soft, £1.50.
- Item 581. As above, WSG1S, 12 x 16.5 cm, box of 100 sheets, 50p.

- Item 582. As above, WSG1S, 5½ x 5½ in, 50p.
- Item 583. As above, but WSG3S hard, 50p.
- Item 584. As above, but WSG4S extra hard, 50p.
- Item 585. Intercom control unit. Contains 6 toggle and one wafer switch, 3 pots, two valves, two 15 mm fuse holders and other components, 30p.
- Item 586. Centrifugal liquid pump, a.c. mains operated, flow rate 25 l/min, inlet and outlet 23 mm outside diameter.
- Item 587. Photographic print washing bath in stainless steel, dimensions 42 x 60 x 14 cm deep.
- Item 588. Electronic flash gun by Clive Courtenay; xenon tube output 100 or 50 joules. Requires 480 V battery, no longer obtainable; with operating instructions, £2.
- Item 589. Aircraft periscope; optical path length 50 cm. The instrument gives a backward, upright but laterally inverted and reduced image, £1.
- Item 590. Rotary wafer switches, 2-pole, 2-way and 2-pole, 3-way (both ceramic); 1-pole, 2-way (bakelite); each type, 5p.

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Following on the controversy of wood versus steel for flame-proof cabinets, we resolved to construct our own wooden cabinet, and have it tested by the fire authorities. Part of the design we evolved required that the outside be coated with fire-resistant paint. This is not a material which one can buy off the shelf in any d.i.y. store, and we had to take 5 litres, which was much more than we needed.

Being curious to learn how the paint functioned we placed a wooden tile, which had had two coats of the paint, over a burner. The material puffs up, due to evolution of what we later found to be carbon dioxide, and forms a spongy mass of carbon about 20 mm thick. After 15 minutes of this treatment the tile was removed and the carbon scraped off, showing the wood beneath to be no more than blackened by the heat. The experiment illustrated very well the insulating effect of the gas trapped in the sponge. Turning the tile over and heating the untreated side with same Bunsen for the same length of time shows how effective is the insulation. The existence of carbon dioxide being evolved can be shown by heating some scrapings of the original paint in a test-tube.

Since there is much good science associated with the paint action, since we think it has more appeal than pot handles and woollen mufflers (and since we had no other use of the remaining paint), we are offering 15 cm square chipboard tiles, painted on one side only with two coats of white fire-resistant paint, at 10p per tile, so that teachers may try the experiments for themselves.

## Trade News

Owing to the unavoidable delays in examining and re-testing customer-owned cylinders, the British Oxygen Company are trying to avoid wherever possible the outright sale of cylinders into customer ownership. Instead a deposit scheme for small industrial gas cylinders has been introduced which is similar to the scheme used by Calor for cylinders of l.p.g. (propane or butane) for caravans etc.

In cases where the customer already owns his cylinders, the owners can use them to join the deposit scheme at no initial monetary outlay. They join by contributing their cylinder or cylinders to the pool which then become BOC property. Further deposits are requested 12 years after the date of manufacture of the cylinder, but in any event, not before 1978.

The big advantage of the full-for-empty service is that there is no waiting time for a cylinder to be filled - only one trip is involved and there are no rental or statutory cylinder testing charges. Transfer into the system is available at BOC branches in Aberdeen, Dundee, Edinburgh, Glasgow and Inverness.

The current deposit charge for the F size cylinder (48 ft<sup>3</sup>) is £25 exclusive of VAT and this includes the gas charge at the first fill. Deposits are renewable after 12 years at the rate then applying. For a customer withdrawing from the deposit scheme a portion of the deposit is refunded when the cylinder is returned, the amount depending on the time the customer has been a member of the scheme.

Membership.	Amount of deposit refunded.
1 year	80%
1 - 2 years	60%
2 - 3 years	50%
3 - 4 years	40%
4 - 5 years	30%
5 - 12 years	£2.00

The gas charge is £2.00 per cylinder for oxygen, air, or nitrogen, plus a fixed charge of £2.65 per transaction. Customers who transport their cylinder(s) to and from a BOC branch will have these charges reduced by £1 per cylinder.

Bausch and Lomb have moved to a new address which is given in the address list to this bulletin.

T. Gerrard and Co. has recently become a member of the Gallenkamp/Griffin group of companies. As a result, Griffin Biological Laboratories have transferred from their Tonbridge address to Gerrard House. All orders or other communications to either company should now be directed there. We have also been informed that all Gerrard items will still be available for some time to come under their own catalogue numbers. No major revision of catalogue numbers for items from either firm is envisaged at present. However, some 'rationalisation' of lines offered and of catalogue numbers is expected when the new Griffin catalogue is issued sometime in 1977.

S.S.S.E.R.C., 103 Broughton Street, Edinburgh, EH1 3RZ.  
Tel. 031 556 2184.

Eausch and Lomb Optical Co. Ltd., Lenten House, Lenten Street,  
Alton, Hampshire, GU34 1JD.

Block and Anderson Ltd., Banda House, Cambridge Grove, Hammersmith,  
London, W6 0LE.

British Oxygen Co. Ltd., 150 Polmadie Road, Glasgow, G5 0HN.

Burrough's Machines Ltd., Heathrow, Bath Road, Hounslow,  
Essex, TW5 9QL.

Clive Courtenay Ltd., Horsham Road, Dorking, Surrey.

T. Gerrard and Co. Ltd., Gerrard House, Worthing Road, East  
Preston, West Sussex, BN16 1AS.

Griffin Biological Laboratories Ltd., Gerrard House, Worthing Road,  
East Preston, West Sussex, BN16 1AS.

British Olivetti Ltd., 30 Berkeley Square, London, W1.

Tayside Schools Technology Centre, 152 Perth Road, Dundee, DD1 4JW.

Teltron Ltd., 32 - 6 Telford Way, London, W3 7DH.