ASET Professional Development Day 28/4/2025 – Jo's notes

Presenter : Bob Death

MINI ALLEN keys from Bunnings handy to open multimeters/get to fuses etc

Shelleys power grip is a great strong all purpose glue for rubber/wood/plastic. Let dry for 24 hours before use.

Note acetone is hygroscopic

Multimeters

- MMs check for voltage/to test fuses/VDG etc
- Only need to test on DC (if DC works then AC works)
- Generally put at 12-15 Volts
- Testing induction coils – often there is a ceramic fuse in these that can blow but can also be replaced easily.

Resistance Ω

Make sure you turn off HOLD button to get a live reading.

1 or 0L means you haven't got a circuit connected yet

Testing a fuse on VDG/microscopes

Test on 200 Ω or you can put on CONTINUITY  to test with a BEEP

Testing a lead – should get very low resistance reading

Cheaper kinkable leads prob only have 5 strands of wire inside – one kinked this means wires prob broken and will work less effectively and only take 2 amps.

You can't check how much current a lead can take but you can check if it's still functional.

Jaycar stronger leads more expensive but have up to 40 strands and will take up to 20 amps. Silicone coating best. Haines also have these lead's but they are more $$$

Testing power packs

Can check that voltage reading on knob is actually what is being put out. Hook them up on 2V and might find it reads 3V. Test at all volts on knob. Often they are up to 1 volt out. This is why it's a good idea to run INDUCTION COIL etc at lower volts than they are rated for, as fuse can burn out faster. Run a 6V induction coil at 4V and 12V induction coil at 10V to reduce chance of damage. Pop a sign on the induction coil to remind teachers.

Ammeters

- Be aware these may have variation between ammeters of up to 15%. Nichrome wires gauges vary between devices in analog models ($30)
- Digital meters ($69) are surge protected and harder to blow up/overload. They have battery, will last longer and are multirange. If buying these then 20Amp one prob best – will go down to 10 milli amps
- Avoid buying combined ammeter/voltmeter as break very easily.
- Checking ammeters
    - Set power pack on 2Volts
    - Use 2 leads to check it takes a reading – compare with other ammeters. Switch leads if needle points backwards.
    - Cant calibrate, can only change zero point with small screwdriver.
    - To reduce risk of overloading cover low amp ranges with electrical tape and only take of when needed for senior classes. Mostly will need 5A

Voltmeters

- Terminals often come loose but other than that the analog ones are pretty hardy
- DC ⎓
- AC ~ senior only

Balances

- Easily overloaded when kids lean on these
- Check 12V/6V cables and that you have correct power cable for each balance as can overload them. Colour code the power packs/cords with balances or store separately and labelled as pairs in containers.
- Cords can be
    - centre negative or 
    - centre positive 
- Make up a set of weights in jars labelled to calibrate or do fast check of balances
- Jaycar has 9V plug in cords for balances
- 9V battery DC connector Ezy cable $6.50

Van De Graaf

Natural Rubber belt (original ones) better than latex/silicone ones they have put out more recently. Note that 40% + humidity will decrease effectiveness of static build up.

Things to check

- Change belt when gets degraded or loose/stretched.
- O rings on combs
- You want a 1mm gap between belt and comb.
- Check earth lead is connected properly on the discharge wand
- Using hairdryer when it's a rainy day won't help to increase static build up

- Don’t wind cords too tightly
- Expect about 4-5 years from each belt
- Store belts/machine out of the sun and make sure it has a cover over dome. Wipe off dust before use.
- If Dome or wand is dented then replace them – will not work properly.
- Clean any rust off with WD40
- Note if your model has Perspex sides around belt these can twist/warp especially in hotter areas

Induction Coil/Rhumkoff

- Older ones are 6V, newer ones are 12V. Check and put a sticker on MAX 4V and Max 10V in case power packs are reading lower voltage than they are actually giving out.
- Bronze metal plate at end can be adjusted slightly with screw but do not deform/bend it by turning too far.
- They use 3AG fuses and blow easily. Can get 5A fuses from jaycar which are easy to replace – check first with multimeter to see if fuse has gone if your induction coil is having issues
- Contacts can get dirty between arcs so need to clean occasionally. Clean needles with WD40 and pull needles further apart to decrease arc – push in to increase it.

Batteries

- Winc/officeworks ones tend to leak after a year and corrode and damage expensive equipment. Either use Duracell/energizer/eveready branded ones or remember to remove batteries in long downtime periods.
- If a small leak can use Winegar and a cotton tip to clean but always use a fresh cotton tip with water to clean off the acid/vinegar and dru before replacing batteries.

pH meters

- Never use these in running water, just a still sample jar. Can easily break membrane
- Can have sample splash into probe – beware
- Fill with distilled water or 2M KCl – note newer probes don’t unscrew and cant replace.
- If you leave the membrane/probe dry for 3-4 months its likely membrane will be damaged and break.

Stopwatches

- Remove battery at end of year to stop leakage if use cheapies
- Good batteries may last up to 2 years

Tickertimers

- Adjust knob between plug ins to make metal strip be able to vibrate just enough to touch carbon paper
- Rubber grommet may perish but wholesalers can get you new ones

Microscopes

- Stage stop screw can stop scope from focussing
- Stage tension screw opposite the focus knob can tighten stage
- If having trouble finding incandescent bulbs
    - EISCO – 10 for $3.90 – 230 20Watt BD15? Send EISCO a photo of what you need to be sure you get right ones
    - AIS (Australian instrument service) $27 each
- "POT" to change light intensity
- Keen scopes on low intensity light to save fuses. Will blow much faster if turn onto max light each time.
- Make sure you get correct LED and spares
- Use isopropanol + kimwipe or cotton buds with wood stems (isoprop will melt plastic stems)
- Have a test slide
- When buying scopes monocular is best

Stereo Scopes

- Put straight ruler under to check if head is columnated – if so cannot fix it
- Can get lamps from REPCO (carlamps) – take old ones with you