NEWSLETTER MAY and JUNE 2017

Comments

Some significant events for PEEMS have occurred during the months of May and June, one being the Doncaster show which was in the middle of May, and Mike and Pat Sayers' Garden Party which was in the first week of June. It was therefore deemed appropriate to have a combined May/June newsletter this time. There have been successes and disappointments during this period, but this is to be expected in a vibrant life and so the lows will be reported on as well as the highs.
One of the highlights of this period was the completion of the PEEMS workshop, and as of writing, just a few final touches are required for the shop to be "Open For Business".
Our thanks go out to Richard Gretton, for his enthusiastic organising, setting up and expediting of all the essentials for a successful exhibition at Doncaster. As our Chairman commented at the last PEEMS meeting, Richard fulfilled one of his business slogans ~ "Getting Things Done Through People Better". Richard has kindly provided his impressions of the show later in this newsletter.
Another significant event in the calendar was Mike and Pat Sayers' Garden Party, which was another success, and raised significant funds for two important local 'care in the community' projects. More of that later.
Several people have said that when reading the newsletter on the web site, they cannot "Zoom" into pictures by rolling the centre mouse wheel as explained in the previous newsletter. It should have mentioned that you have to hold down the Ctrl key (bottom left hand corner on most keyboards) while rolling the wheel, for this to work. This will be useful when reviewing the Doncaster and Garden Party photos!
Finally, you will have noticed that the PEEMS logo has now resumed its rightful place at the top of the newsletter. Many thanks to Les Hulme, who after many battles with his computer, was able to retrieve the logo for our use.

Workshop Matters

Here are some photographs of the near "finished state" of the workshop:

Bob Polley's Open Day ~ Sunday 7th May.

Bob Polley generously opens his grounds up every year for model and model railway enthusiasts. This year although the weather was cloudy, and as Bob admitted, attendance not as high as expected, there was still sufficient interest for those of us interested in track running locomotives, and Bob's many ongoing and "still to be resurrected' cars and machinery in his long shed. One of Bob's latest projects is a fully working model of a watermill. This will be a memorable visit because of the expert working knowledge on the building and running of model engines, the friendly conversations and encouragement from the experienced model engineers who attended, and especially Bob himself who was welcoming and knowledgeable.

Nevile

Here are two of the locomotives running on the track that day:

Doncaster Show ~ Friday 12th, Saturday 13th, Sunday 14th May.

The Thursday morning saw the almost simultaneous arrival of Mike, Tony, Peter, Brian, Ron, Chris and myself with the famous award winning PEEMS stand. Unloading close to the entry, (our allocated position was just inside the doors) the stand took shape in a well honed operation which was completed by lunchtime and the well timed arrival of our chairman Jim.
Exhibit receipts were obtained from Exhibition reception, which allowed us to bring in our models and arrange them on the stand. There were 13 members exhibiting 46 items ranging in size from Chris Bramley's 'Thrashing' Machine to my small drill sharpening jig.
Friday morning saw a large queue awaiting entry making for a busy exhibition until mid afternoon. Our stand seemed to provide lots of interest keeping our stewards busy throughout the day. Saturday and Sunday were not quite as busy, but also kept our stewards on their toes most of the time. Mike was glued to his stool overlooking his Bentley engine all weekend, but I believe every exhibitor visited the show at some time along with a few other members from the club.
On Sunday we knocked the stand down in almost a record 25 minutes (no breakages) and were away by 5.40 pm tired but happy. A magnificent effort, and particular thanks to those who helped, and transported stand and exhibits.
The distance to Doncaster may have put off the visit by more of our club members, but it's not a great deal further than Harrogate. The consensus seems to be that we had a good show, there was lots to see on other stands, the helicopter and drone flying were awesome. I was slightly disappointed with the trade stands, which get fewer every year, particularly the second hand stalls.

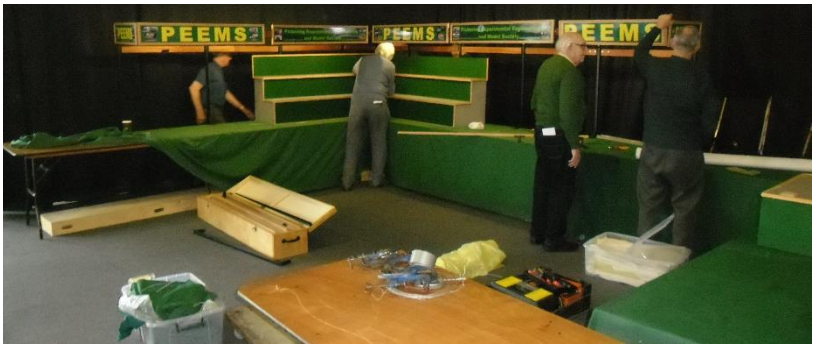
Start getting your exhibits ready for next year.
Once again, thanks to everyone who exhibited and helped on the stand. Special thanks to those who transported, erected, and cleared the PEEMS stand.

Richard

For your interest, “Mr Crispin”, who has a well known series on YouTube detailing a “build from scratch” steam locomotive, has made a 5 minute video of the Doncaster show, which features a certain 1/3rd scale Bentley engine 2 minutes in. The video can be found at the web site:
https://www.youtube.com/watch?v=s4BMikPd9jU .

Ed.

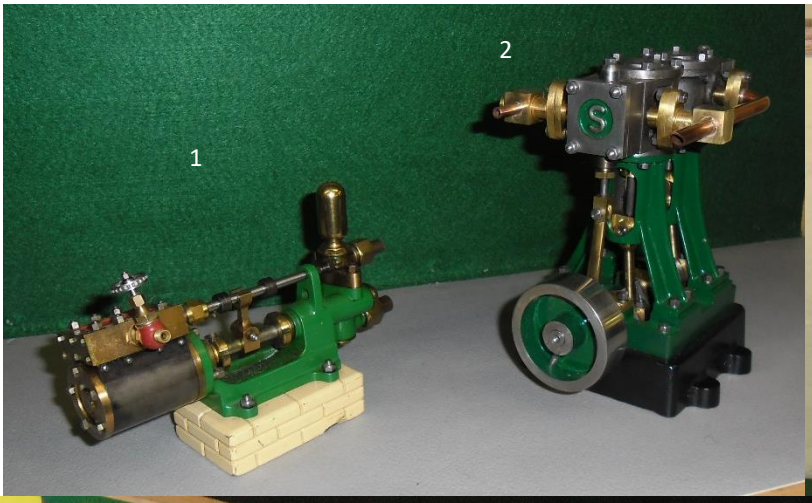
Setting Up The Stand:



Some Exhibits :

Chris Bramley and His ‘Thrashing’ Machine

Brian Stephenson ~ M^{c}Conie Engine


1
2


Record Breaking Flash Steam Hydroplane built
by Paul Windross
3


EEMS
PEEMS
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23

The stand attracted a lot of interest :

….and finally “Fish ‘n Chips” on Saturday night!

This is an index of the models shown on the previous page, but it should be noted that these are only half of models (46 total) which were presented on the PEEMS stand. This list, however, serves to show the variety of models on display at the show :
(Apologies to any misidentified here)

1. Mike Sayers:- Southworth boiler feed pump
2. Tony Leeming:- Stuart Turner D10 twin cylinder engine.
3. Richard Gretton:- Experimental vertical axis windmill.
4. Richard Gretton:- 12000 rpm drill/mill head.
5. Ron Baier:- model aircraft Tiger Moth.
6. Ron Baier:- Model speedboat ,Miss Britain lll,
7. Ian Bryce:- Stuart Turner D10 twin cylinder engine.Lathe
8. Trevor Goodall:- Seth Thomas 24 hr clock.
9. Trevor Goodall:- Barograph.
10. Graham Tinkler:- Ring & sliding gear,3” Fowler engine.
11. Brian Stephenson:- 4 cyl oscillating engine.
12. See No 1
13. See No2
14. Ron Baier:[- Tellurious. Earth Moon Sun orbiter.
15. Mike Sayers:- Horizontal steam pump.
16. Peter Bramley:- McOnice diagonal engine.
17. Richard Gretton:- Whitworth bullet mould.
18. Brian Stephenson:- McOnice angular oscillating engine.
19. Brian Stephenson:- Twin cyl experimental engine.
20. Brian Stephenson:- Lathe fixture for screwcutting.
21. Tony Leeming:- Lathe tailstock lever advance.
22. Mike Sayers:- Flat 4 aero engine.
23. Tony Leeming:- Speedy 0-6-0 Loco Chassis.

The Railway: At The North Yorkshire Moors Railway's ~ "Behind The Scenes Family Weekend" at Levisham Station on Saturday 20th and Sunday 21st May.

This was a disappointing weekend for the PEEMS railway, with hardly any customers and very small takings. The club really appreciates all the hard work that goes into running these events, and as stated by our Chairman at the club meeting on the 7th June, setting up the railway, especially lifting, installing and dismantling the track with our "ageing" members will have to be reviewed sooner rather than later.

Tony and Peter, taking some "down time":

Mike And Pat Sayers' PEEMS Garden Party Sunday 4th June.

The weather was good for Mike and Pat Sayers' PEEMS Garden Party. There were many interesting model engineering projects to view, and a number of vintage and classic cars. The party was very well attended by all ages, and the PEEMS railway and Ken Hopper's car were made good use of.
Thanks to Pat and her band of willing helpers, the catering was excellent, and in addition to the hog roast and barbeque, cakes, biscuits, coffee and tea were available all day. PEEMS thanks Pat and her volunteers for what it seems was constant washing up! Thanks too, for all those who contributed additional desserts, cakes etc.

Of course the main purpose of the day was to support two important local "care in the community projects" :

- 'Rydedale Special Families', founded in 1977 by a group of parents of disabled children, is an independent charity, whose work is managed by parent trustees and supported by an advisory panel of special needs professionals.
- 'Next Steps' is a mental health centre which supports people with mental health problems in Ryedale, North Yorkshire. This is done by providing a drop-in-centre, activities and outreach groups in the local area The ultimate aim is to develop self confidence for members, to improve their work prospects and access to statutory services, and help support positive family relationships.

The total raised was £2700. Thanks to all who have contributed so generously.

The best way to illustrate the day, is of course with photographs (*thanks: Tony and Roger*) :

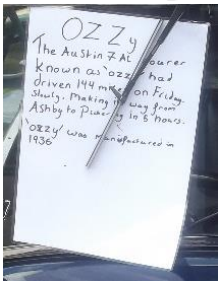

CUW 204


RH 8780


CMX 783


DBW
850


CUW 204

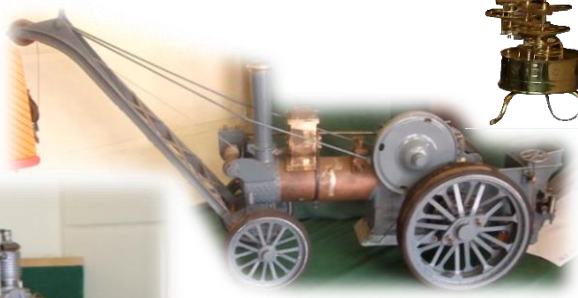

OZZY
The Austin 7 AC tourer
known as 'Ozzy' had
driven 144 miles on Friday
slowly. Making its way from
Ashby to Prior
'Ozzy' was manufactured in
1936


88


AG 493

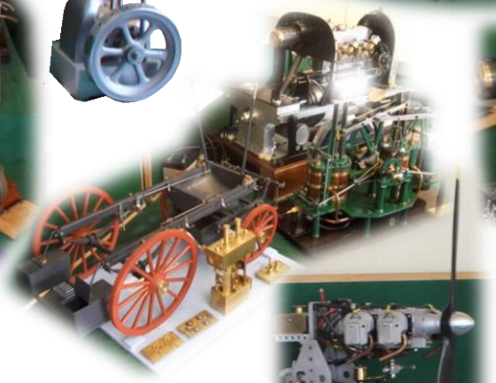

DRM 156


DX 986



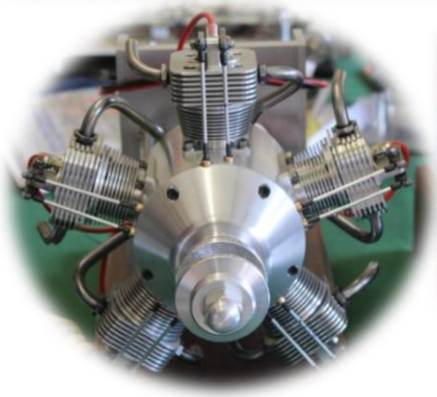












The Railway at Welburn Hall School 13th June

A very successful day at Welburn Hall for all concerned. The young people had a great time having rides behind two traction engines belonging to Charles Hill and Mark Angus. The PEEMS railway seemed to be in constant use too, with the teachers enjoying the rides as much as the young people. Much interest was shown in Ron Baier's planetariums, and John Powell's street organ.
The contributors received an excellent buffet lunch prepared by the Food Technology class.

Forthcoming Events

- **Scarborough North Bay Railway ~ Wednesday 19th July 7.00pm**

A visit to the historic Scarborough North Bay Railway has been proposed for the evening of Wednesday the 19th July. David Humphreys, who owns the railway is expecting us at 7.00pm. There is a catering facility there which offers scampi and chips, and also a small bar with soft and alcoholic drinks. There will a steam trip out to the Sea Life Centre and there will also be other locomotives for us to inspect.
We will meet at the railway which is located just beyond the roundabout off the northern end of Marine Drive, and opposite the entrance to Peasholm Park. There is 'Pay and Display' parking on Marine Drive, but there is also free parking nearby in Ryndle Crescent.
The visit will be suitable for families, and it would be good if the train is full. As there will be a meal after the ride, numbers will need to be known for catering before July 19th.

- **PEEMS Model Exhibition At Pickering Station 24th to 28th August. (Thurs-Mon)**

PEEMS will be mounting an exhibition of models at Pickering Station over the above dates. This is now a fixed date in the calendar, but arrangements still need to be made. The exhibition will be in same location as before, in the room on Platform 2

- **The Railway**

Some updates :

The railway has an extensive season this year with six outings, and volunteers are required for setting up, running the railway and dismantling.

2nd July (Sun) ~ Malton Show. The railway will be setup on the Saturday afternoon and evening.
22nd/23rd July (Sat/Sun) ~ Wolds Vintage Rally ~ Fangfoss. This will be the first time at this rally.
25th July (Tues) ~ Ryedale Show
12th/13th August (Sat/Sun) ~ Driffield Steam Rally. This event is now confirmed for the railway.

We are hoping to make at least £200 from each event.

- **Workshop Morning ~ Tuesday 20th June 10 to 12 noon**

A chance to inspect the renovated facilities.

- **Club Meeting 5th July ~ Mike Sayers Trophy**

"Clock Focus Group"

John Powell is setting up a "Clock Focus Group" for those interested in all aspects of clock construction, repair, tool making and joint projects in the workshop. The dates of Focus Group meetings will be determined later.
Anyone interested should contact John Powell or Richard Gretton at grcgretton@btinternet.com

Club Meeting Wednesday 7th June

Ted Fletcher. "Electrical Hints and Tips for the Home Workshop".

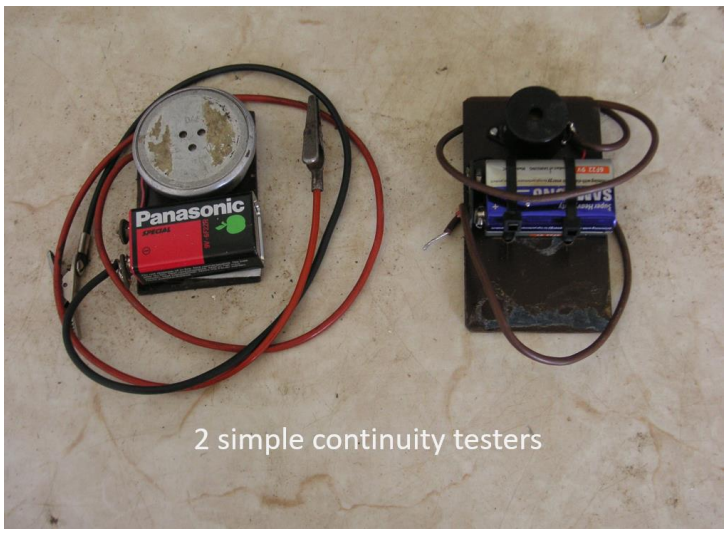
At the club meeting we had a very informative talk from Ted on how we can achieve electrically safe workshops. Emphasis was placed on the fact that inexpensive, (and actually improvised) kit, with well thought out procedures, ensure that each visit to our workshop shouldn't prove to be our last, at least as far as workshop safety is concerned.
Other safety issues and electrical tips were provided, and these follow.

As an opener Ted gave us a warning :

When testing a 240 volt mains operated piece of equipment, always have one hand in your pocket and the other guiding the meter probe. Hand to hand electric shocks are extremely dangerous. Two milliamps and you're a goner!

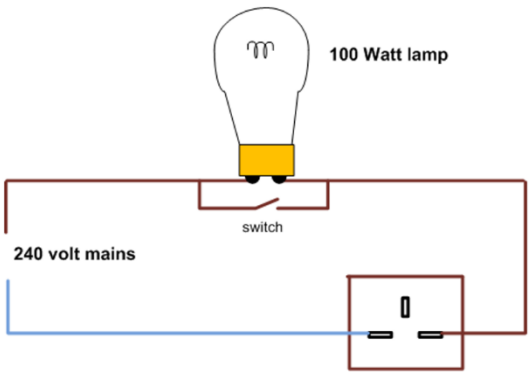
i) Circuit Continuity Testing

Ted showed us a continuity tester, which determines if an electrical path can be established between two points, that is, if an electric circuit can be made. This worked using a tone from a telephone earpiece.



Another useful piece of equipment for circuit testing is a lamp limiter :

This simple device can be easily made, and is useful when testing suspect light current devices for short circuits. With the switch open and an appliance connected to the 13 amp socket outlet, if there is a short circuit the lamp will be bright. If all is well the lamp will glow, and when the switch is closed the lamp will be fully illuminated and will receive full voltage. This device can be easily made using a one-way switch, a batten type lamp holder, a 13 amp socket outlet, a length of three core flex from a discarded household appliance and a piece of wood. Whilst not shown an earth is required.



ii) Low Voltage Power Supplies

Need a low voltage variable current and volt supply? Connect a 12 volt battery charger and a 12 volt battery in series observing polarity, and if you have a variable voltage power supply unit that can also be used.

iii) Battery Charging

2 x 12 volt battery chargers in series for a 24 volt battery charging. Positive to Negative etc.
Note: But not on a modern Switch Mode type.

iv) PSU (Power Supply Unit) Alternative

- Charging a 12 Volt Battery.

If you have only a 24 volt charger, connect a 12 volt head light bulb of the appropriate wattage in series with the battery, and then to the charger (36 watt for 3 amps).

- Charging a 6 Volt Battery.

The same can be done with a 12 volt charger, this time using a 6 volt bulb of course.
If you need to charge low amperage batteries connect a side light bulb in series. If you are likely to use this arrangement you can make up a charging board with half a dozen different bulbs.

v) Jumping Nickel-Cadmium (Ni-Cad) Batteries

When Ni-Cad batteries were the power source for cordless power tools, they eventually failed to hold a full charge. If you took the battery box apart, often all that was wrong was one cell had gone high resistant or one had gone reverse polarity.
Locate the faulty cell using a multimeter, then connect the chain of cells to the charger in the usual way. Using a pair of wander leads connected to a 12 volt car battery, connect one lead to the battery Ni-Cad Negative, intermittently flash the other to the defective cell positive.
Ted finds that after a couple of flashes the cell should restart charging. Ted notices that he doesn't get full capacity as when the battery was new but at least the drill is up and running once again, and not in the scrap box.

NB. Don't let the battery over heat!

A Selection Of
Ni-Cad Batteries

vi) Fumes

When soldering electronic components using cored solder, Ted finds the fumes unpleasant.
The fumes are not good for your health either.
Ted uses an ex computer fan to blow away the fumes. A 12 volt fan running on 6 volts doesn't cool the work piece, but does displaces the fumes from the solder and flux.

vii) De-Magnetising

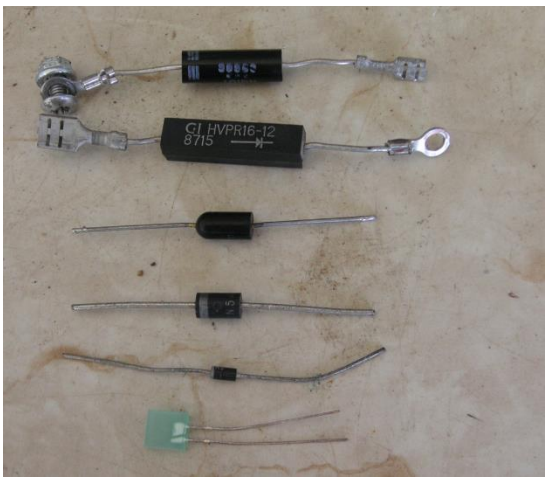
Screw drivers, hand tools and milling cutters somehow become magnetised. Ted uses his solder gun as a de-magnetiser. Ted demonstrated this to us by just passing the cutter or tool through the gun tip/loop and demonstrated the demagnetisation, with metal filings falling from the tool.
You can make a de-magnetiser using an old type valve heater transformer, and by winding on a couple of turns of thick copper wire. Mount it in a heat resistant plastic box with wire sticking out ready for use.

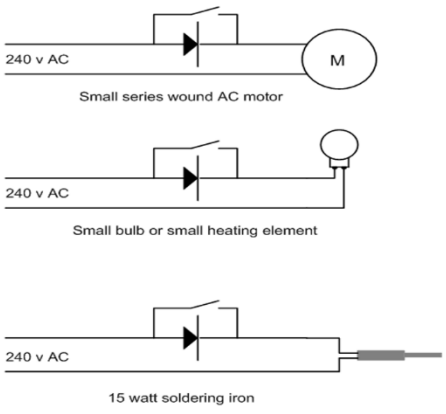
A Typical Soldering Gun Used
For De-Magnetising Tools

viii) Adding A Diode

If you have a small universal motor, such as a sewing machine motor, and it revolves too fast for the job in hand, try fitting a diode in series in the main lead, it doesn't matter if it's live or neutral.
Try the diode idea before buying an expensive speed controller, as this arrangement will give you about half speed. Ladies' hair-driers use the same idea for two speed and two heat controls.
A diode when connected in series with your soldering iron will keep the iron warm and ready for use without overheating the tip. Then, with a single pole foot operated switch, connected across the diode, (shorting it out when the switch pedal is pressed), full heat will be provided.
Also, when using a relay on DC, it's good practice to connect a diode across the coil to discharge the energy created when switching off. The diode should be connected with the BAND end (Cathode) to the positive rail.

Some diodes, and use of diodes in circuits.





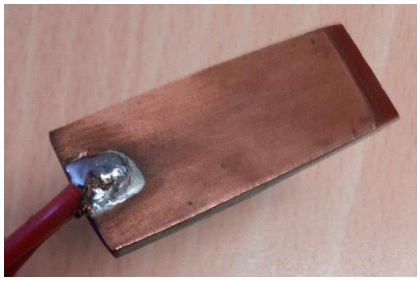
ix) Resistors In Series Or Parallel

Series, is just like two 15mm water pipes end on, double the friction. Higher resistance.
Parallel, two 15mm water pipes side by side less friction more water. Lower resistance.

x) Ammeters A.C. or D.C.

When testing a 240 volt mains powered piece of equipment have one hand in your pocket. Hand to hand shocks are very dangerous. BE VERY CAREFUL

Ammeters are always connected in series with the load. If you are to insert an ammeter into a 240 volt mains operated circuit, connect it into the Neutral.
When repairing battery powered electric gadgets, its often an advantage to be able to measure the load current, especially when one or more AA batteries are connected in series.
Make a small gadget comprising of a piece of double sided printed circuit board. Solder two leads, one either side. Taper the end of the board so that it can be pushed between cells and connect an ammeter on the milli-amp range (AVO-meter).



Ammeter Adapter For Testing Cells

xi) Capacitors As Fitted To Single Phase Motors.

Motor start capacitors are a special electrolytic type (with a tolerance of +/- 20%) and are short time rated.
Motor run types are continuously rated with a tolerance of ± 10%.
You can use motor run for either application.
Discharge lighting, power factor correction are useful here.

A Typical Start Capacitor

xii) Residual Current Devices (RCDs)

Always use an RCD device. They are not 100% effective, but they do give a lot of electrical protection.
The longer your extension leads, the more possibility there is of an electrical leakage, and under fault conditions the slower the disconnection time.
It takes some time, (no matter how brief), for electric current to reach a level such that the fuse blows.
In that time you may be the recipient of an electric shock.
Don't couple extension leads end on!
Those skimpy things supplied with garden equipment should be banned !

xiii) Are Your Motors Getting Hot?

If you have a motor which is running rather warm or even hot as felt by hand, just imagine how hot the winding must be for the exterior to be hot.
A simple way to check the winding temperature (not the stator external temperature, but the internal winding temperature), is to measure the winding resistance at room temperature say 20°C. After running for some time, measure the resistance a second time. Divide the second measurement by the first, subtract 1, divide that figure by .004 (which is the temperature coefficient of resistance of copper), and then add the original temperature to find the total.

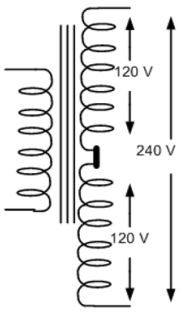
Example calculations are shown in the Appendix of this newsletter.

xiv) Contactor and Starter Operating Coils

Here are some tips if you have a motor starter fitted with a No-Volt release, but the coil is 415 volt and you would like to use the starter on a 240 volt supply.
Changing the coil is possible if the starter is not old. They are expensive and tricky to install.
It is possible to remove about 50% of the coil wire turns (240 ÷ 415), so that the starter will pull in on 240 volts.
First measure the coil resistance using an ohm-meter. Next, using a piece of wood shaped so that it is a tight fit, yet passes through the centre of the coil former, lightly fit the piece of wood between centres on a lathe, free to move yet under control.
Pulling very carefully, start removing turns. Be extremely careful as the wire is very thin. You might need to warm the coil in an oven to soften the resin (but not if the coil former is plastic).
Keep checking the resistance. When near to 60% of the original resistance, reassemble the starter, carefully connect up to the 240 Volt mains, and see if it will pull in the contactor assembly.
If you have a machine with an elderly make of motor starter fitted, with an operating coil which cannot be modified as previously suggested, all is not lost. With a bit of very careful experimentation you can modify a transformer to give you 415 volts. Most transformers are isolating types, that is, no electrical connection between the two coils which are 'input' (primary) and 'output' (secondary).
Some transformers have multi voltage outputs, and these can be connected in series to increase the output voltage, within reason. (Fig 1).
You might consider reconnecting the transformer into an Auto transformer type. (Fig 3). Unfortunately, these types do have a common winding /connection, **so great care is required**.
A lot of audio equipment is, or was fitted with Toroidal type transformers (Fig 4). These are a bit fiddly to wind, but can be modified to power a 415 volt starter coil. Maplin used to sell a transformer with 240 volts input and 240 volts output. If you are a bit of an electrical/electronic person, one of these is very handy when experimenting for personal safety reasons. These transformers can readily be connected in auto transformer mode to provide 480 volt (**but be very careful here).**
You may think that putting 480 volts into a coil which is designed for 415 volts is heading for a burn out. Well, most coils are 415/440 volts rating and sometimes 550 volts. If you go down this route, Ted suggests you connect up the starter, and monitor the set up for a couple of hours. Ted hasn't done this recently, but when he did, he would switch **OFF** and touch the coil to see if it was over heating.

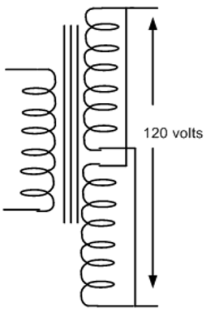
Transformer Connections Each With 240 Volt Input

Figure 1



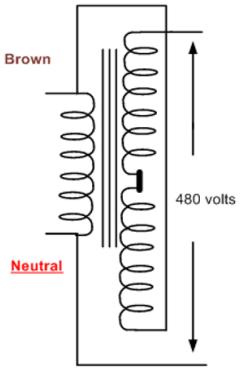
One to one ratio
Not Connected
To Earth

Figure 2



Half the voltage
Twice the current
Two Coils In Parallel

Figure 3



Auto transformer **NO** isolation
Neutral Common Connection

Figure 4

Toroidal Transformer ~ Must have insulation

xv) Temperature Measurement In The Workshop

Ted showed us a handy laser temperature measurement gun he bought on E-Bay for £3.

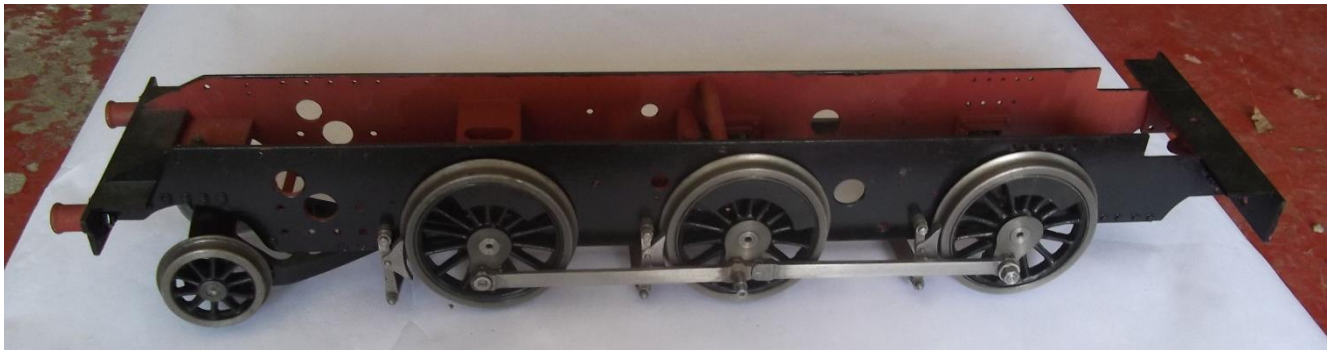
Appendix: Ted provided us with tables, and example calculations for estimating motor temperatures, resistance, voltages and power factors. For those people interested in these, they are presented in the Appendix of this newsletter

Locomotive Build Project

I recently took possession of two locomotive rolling chassis, some running gear and two tenders (without wheels), which had been lying on the shelves at Mike Sayers. Because of the renovation of the workshop these either had to be adopted by someone or had to be put to sleep, most likely in a council recycling plant. John Heeley had originally donated these to PEEMS, after deciding to no longer pursue the projects. Unfortunately, (or fortunately?) he sold off the boilers which means that these will need to be constructed from scratch, along with other essential components.
In addition to these chassis and tenders there were 324 unidentified components, some in vintage 'baccy' tins, and five drawings. A photographic inventory of all the components was sent to John. This determined that only 131 of the components were relevant to the two chassis, and none of the drawings were relevant.

The relevant components are :

1. A 2-6-0 rolling chassis in 3½ in. gauge.

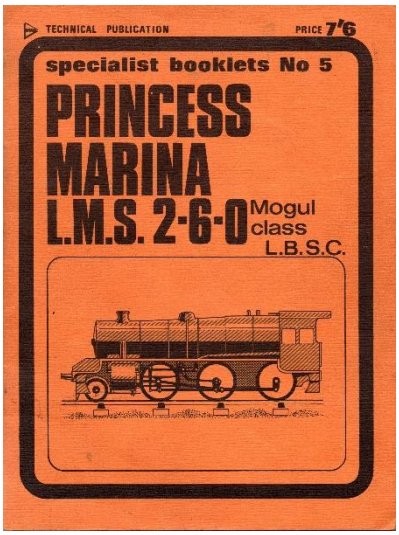


This chassis would be suitable for a Stanier Mogul build.

The London Midland and Scottish Railway (LMS) **Stanier Class 5 2-6-0** or **Stanier Mogul** is a class of 2-6-0 mixed traffic steam locomotive. Forty were built between October 1933 and March 1934. Although they were all built at Crewe Works, they were designed at Horwich Works, and were developed from the 'Horwich Mogul', otherwise known as the LMS Hughes *Crab* 2-6-0. They had the addition of several features brought over from the Great Western Railway by newly arrived Chief Mechanical Engineer William Stanier, most notably the taper boiler. Due to a higher boiler pressure than the *Crabs* the cylinders were 3" smaller in diameter and so the cylinders could be mounted horizontally: the only Stanier design to do so. Like the *Crabs* they were connected to a Fowler tender that was narrower than the locomotive. When built, the first ten locomotives had no water pick-up gear fitted to their tenders. They were initially numbered 13245–13284 (following on from the *Crabs*), but as standard locomotives, in the LMS 1933 renumbering scheme they were renumbered 2945–2984, (the *Crabs* becoming 2700–2944). BR added 40000 to their numbers so they became 42945–42984. They were always painted black, and this was lined out except during the austere periods of the 1940s and towards the end of steam. From the end of 1934 Stanier turned to a larger 4-6-0 for his mixed traffic class, this being the LMS Black Five Class.
(*reference Wikipedia)*

Stanier Mogul

Unfortunately, none of the drawings supplied with the parts were relevant to either chassis, so with regard to the 2-6-0 chassis, a copy of the “Specialist Booklet No. 5 Princess Marina LMS 2-6-0 Mogul Class” by L.B.S.C was purchased online from a specialist bookshop.



This is a basic guide which gives rudimentary dimensions and is essentially a build guide. Drawings may need be purchased on-line later.

In addition to this booklet, John kindly gave me two books :

- ‘Simple Model Locomotive Building’ introducing LBSC’s ‘Tich’
- ‘Model Locomotive Valve Gears’ by Martin Evans.

For those who are not familiar with model locomotive building, L.B.S.C, and Martin Evans were the two of the U.K’s most prominent locomotive modellers.

Lillian "Curly" Lawrence, known as LBSC, was one of Britain's most prolific and well known model or scale-steam-locomotive designers. LBSC were the initials of Britain's London, Brighton and South Coast Railway. LBSC, “Curly” to his friends, was born 27 September 1883 Curly loved steam locomotives from the time he was a child and spent several years in the employ of the LBSC Railway, from which he later adopted his pen name. LBSC then wrote construction articles for various British model engineering magazines from 1923 until 1967, including nearly 2,600 articles for ‘Model Engineer’ Magazine from January 1922 (initially in the form of letters to the Editor and then from April 1923 as a full-time contributor) to May 1959 and then again from January 1966 until October 1967. During this time, LBSC designed 166 different locomotives.
Martin Evans was a major contributor to ‘Model Engineer’. He was promoted from Technical Editor to Editor of the magazine in January 1966. His editorship, along with a change in almost all other staff on the magazine, is credited as having saved it from decline. The next year, 'Curly' Lawrence, aka LBSC, died. At this point, Martin Evans took over the serialisation of locomotive designs, apparently rivalling LBSC in his output. *(ref Wikipedia)*

There are a few parts supplied which can be used in the 2-6-0 build, for example:

Cylinders:

A Pony Truck :

Apart from these, it appears all other components will need to be sourced or manufactured.

In my research there are some excellent articles in ‘Model Engineer’ 2015:

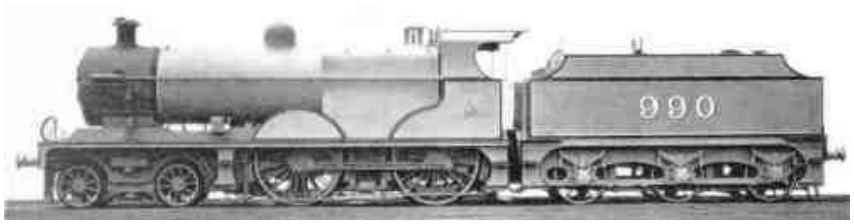
- One series is a step by step guide to the build of a LNWR 4-6-0 ‘Claughton’ by Alan Crossfield.
- There is also an article by Clive Fenn on the build of a boiler for a 5in gauge Pacific.

I think that these articles, in conjunction with John’s two books will provide some decent guides for a novice like me.

2. A 4-4-0 rolling chassis in 3½ in. gauge.

Please note the two internal cylinders. The rolling chassis was also provided with the relevant Deeley 'Scissor' valve gear, which is illustrated later.

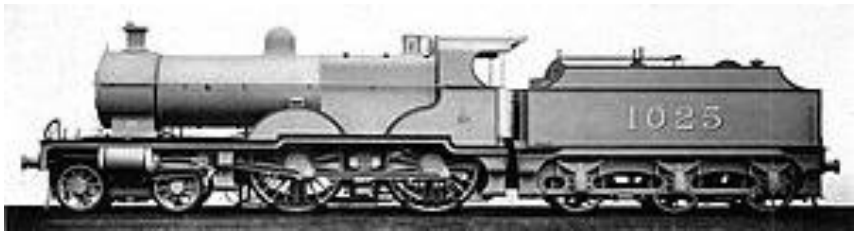
Research has shown that this rolling chassis is for a Midland Railway Class 990 'Deeley' 4P 4-4-0. These locomotives were well known for their work north of Leeds, over the demanding Settle and Carlisle route.



Ten were built by the Midland Railway in 1907–1909, and compare with the 1000 class compounds(see below), with which they shared many features. They passed to the London, Midland and Scottish Railway (LMS) in 1923 and were withdrawn between 1925 and 1928. The locomotives of the Midland Railway followed its small engine policy. The small engine policy served the Midland well when its network was confined to the English Midlands, which is largely free of steep gradients. As the company expanded into other parts of Britain the policy's downsides began to cause problems. The company's own main line to Scotland (the Settle-Carlisle Line) and the Somerset and Dorset Joint Railway, (where the Midland was responsible for providing locomotives), were renowned for their steep gradients and the locomotive stock proved badly suited to the task. Nonetheless the small engine policy remained and double-heading or banking was used to make up for the shortfall in power. This indirectly caused two accidents on the Settle-Carlisle Line (at Hawes Junction (1910) and Ais Gill (1913)) where trains stalled due to insufficient power, even with multiple engines. The small engine policy was, perhaps, carried on too long, giving rise to the derisive poem:
M is for Midland with engines galore/Two on each train and asking for more

Type and origin	[hide]
Power type	Steam
Designer	Richard Deeley
Builder	Derby Works
Build date	1907–1909
Total produced	10
Specifications	[hide]
Configuration:	
• **Whyte**	4-4-0
• **UIC**	2′B n2, later 2′B h2
Gauge	4 ft 8½ in (1,435 mm) standard gauge
Leading dia.	3 ft 3½ in (1.003 m)
Driver dia.	6 ft 6½ in (1.994 m)
Loco weight	58 long tons 5 cwt (130,500 lb or 59.2 t)
Fuel type	Coal
Boiler	MR type G9A, later G9AS
Boiler pressure	200 lbf/in² (1.38 MPa)
Cylinders	Two, inside
Cylinder size	20½ in × 26 in (521 mm × 660 mm)
Valve gear	Deeley
Performance figures	[hide]
Tractive effort	23,662 lbf (105.3 kN)
Career	[hide]
Operators	Midland Railway London, Midland and Scottish Railway
Class	MR: 990
Power class	4P
Numbers	990–999 (801–809 from 1926)
Withdrawn	1925–1928
Disposition	All scrapped

Comparing the 1000 (3 cylinder) and the 990 (2 inside cylinder) series:



Cylinders	Three, one inside high-pressure, two outside low-pressure
High-pressure cylinder	19 in × 26 in (483 mm × 660 mm)
Low-pressure cylinder	21 in × 26 in (533 mm × 660 mm)
Valve gear	Stephenson
Valve type	HP: piston valve, LP: slide valves

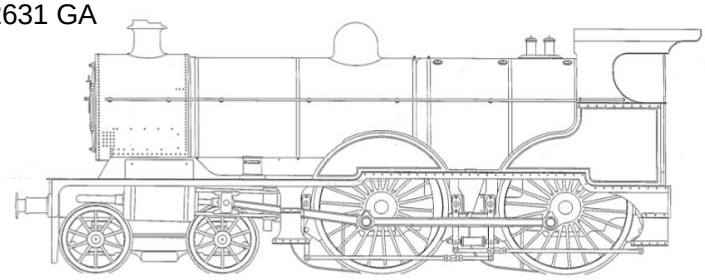
Reference: Wikipedia

Again, there are no drawings for this locomotive. A search of the internet has produced this:

Midland Compound designed by Mike Smart. A full set of drawings for the loco and tender are available; these drawings by Mike Smart incorporate a wealth of design information. Mike has successfully built this model and ran it for a number of years. Although no specific castings are currently available, castings from other popular models can be adapted and appropriate guidance is given on the drawings.

Johnson Compound Express Loco (1902) No. 2631 GA
GA LMS Compound (1925) No. 1184
Boiler LMS type G9AS+(G7S) **
LMS/MR Tender 3500 gal T3500M

** Note: The Boiler type is as specified for 990 class on the previous page



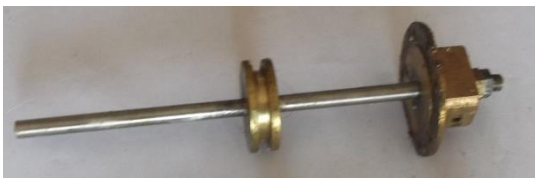
The LMS Compound (1925) is a 1000 class, with external cylinders rather than a 990 class with internal cylinders, so the search goes on. However, these drawings should prove useful later if I need dimensions for the boiler and superstructure etc.

The Deeley Scissor Valve Gear will need to be researched further because the excellent book on valve gear by Martin Evans, given to me by John, does not cover this system, and it looks like the valve gear system in the above drawings with be for a Stephenson type.

The Deeley valve gear is, however, present in the pile of components removed from the PEEMS work shop. In addition to this there are other 4-4-0 parts:

a) Brakes ~ to be fitted first

b) Pistons



c) Deeley Valve Gear

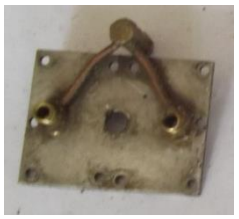
Valve Rods x 2

Valve Rod

Valve Gear

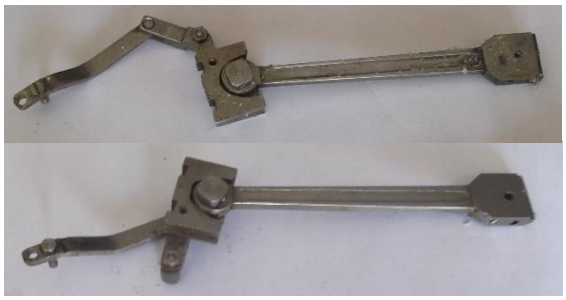
Valves

Valve Chests



Valve Chest Cover

d) Connecting Rods



e) Reverse Gear and Shaft

f) Big Ends

g) Water Pump

The 4-4-0 needs the water pump to be driven off the tender centre axle as there is no room on the loco.

In addition to the 2-6-0 and 4-4-0 rolling chassis and parts, there are two tenders, without wheels etc :

i) A Stanier Black 5 Tender that should work with the Stanier Mogul 2-6-0.

ii) A Fowler Tender which is appropriate for the 4-4-0, (and also the 2-6-0) and in John's opinion "*very badly made, you can do better!"*

The Project

There we have it, a complete novice, and two very complex builds.

I think it would be a good idea though to tackle both, and see how far I can get, especially as I have the newsletter to explain the processes through which I need to go through for success. I hope to report each month on the progress of the builds, and this gives me a personal incentive to continue.

John has helpfully suggested, that as all the valve gear and con rods etc. are present for the 4-4-0, I should assemble these first so that the assembly runs on air.

Maybe this should be my goal for Doncaster next year !!

I would also like to tackle one of the boilers, again for Doncaster.

Some research on the 'Deeley Valve System' will need to be carried out, because currently I have a box of parts without any drawings on how they go together!

Nevile

Contact

If you would like to make a contribution to the Newsletter, the contact is:
Nevile Foster Tel 01751 474137 or e-mail nevf123@outlook.com

Appendix : . "Electrical Hints and Tips for the Home Workshop".

During his talk Ted Fletcher presented some representative calculations, formulae, tables and diagrams.

For those interested in these, the relevant data is presented in this Appendix to the newsletter.

i) Are Your Motors Getting Hot?

Example. A single phase motor has winding resistance of 20 ohms and the workshop temperature was 20˚ C. After running for some time the resistance had risen to 26 Ω.

What is the final temperature of the windings?

26 ÷ 20 = 1.3 1.3 - 1 = 0.3

Now 0.3 ÷ .004 = 75° C + the original 20 ° = 95° C. (where 0.004 = Temperature Coefficient Of Resistance Of Copper.)

or,

the difference between the original temperature and the new temperature which is 6, therefore.

6 ÷ 20 = 0.3 0.3 ÷ .004 = 75° C + original 20° C = 95 ° C.

ii) Calculating Single Phase Motor Capacitor Values

- If at any time you have a single phase motor with a fault start capacitor and the value is not apparent you can calculate the value as follows. From the motor name plate you can obtain its full load current (amps) and voltage
- Capacitor value = 3200 x full load current ÷ the working voltage (the value 3200 is not exactly true but near enough for practical usage).

240 volt single phase motor **starting** capacitors.

Motor size	Typical capacitor value
KW	µF (micro farads)
0.093	20/30
0.124	30/40
0.185	40/70
0.249	60/80
0.373	80/110
0.56	108/140
0.746	138/182

240 volt single phase motor **run** capacitors

Motor size	Typical capacitor value
HP/Watts	µF(micro farads)
1/8 HP/.125 Watt	4/5
1/2HP/.373 Watt	10
1-2. 746/1492 Watt	10/15
3HP/2238 Watt	20
5/3730 Watt	Max 40

iii) Capacitor Details

To increase the circuit capacitance, connect capacitors in parallel.
2 x 10µF = 20µF

To reduce the capacitance, connect them in series.
10µF ÷2 = 5µF

Series connection are not often used in power circuits.

For safety reasons a capacitor should discharge to about 50 volts in about 60 seconds, be very cautious when handling capacitors. I always assume they hold a charge and carry out a discharge test using a resistor. If in doubt leave it alone, **they have vicious bite.**
To enable this to take place a discharge resistor of the appropriate value and working voltage should connected permanently across its terminals. Shorting the terminals of a large capacitance capacitor with a screw driver is a sure way to spoil a good tool. **Don't do it!**

iv) Calculating The Discharge Resistor Value

Time constant T = R x C Where R is in MΩ

(M =millions Ohms, very large) C in µF (Micro Farads which a millionth of a Farad very small)

R = 20 Meg Ω ÷ C where C is in µF

The voltage rating should be 450 volts or better.

The power rating should be $V^2 \div R$. Therefore = $450^2 \div 0.36M\Omega$ or $360K\Omega$ = 0.56 watts approx, but using experience a 0.5 (½) watt will be OK.

v) Typical Resistances

The heating element

1 Kilowatt heater is 60 ohms

2 Kilowatts 40 ohms

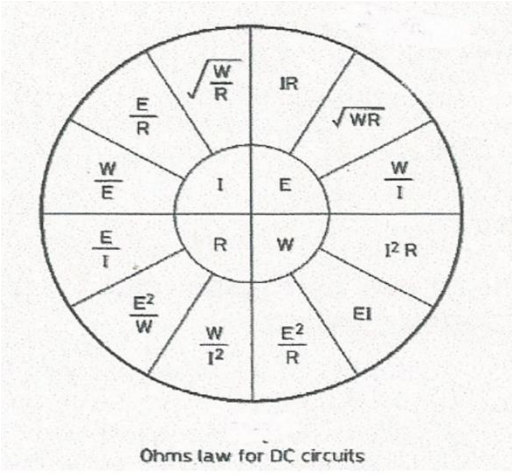
3 Kilowatts 20 Ohms.

12 volt DC car type relay 100 Ohms

other type up to 400 ohms.

240 volt AC mains relay 7250 Ohms

Motor starter coil. 700/900 Ohms



Ohms law for DC circuits

vi) Power Factor

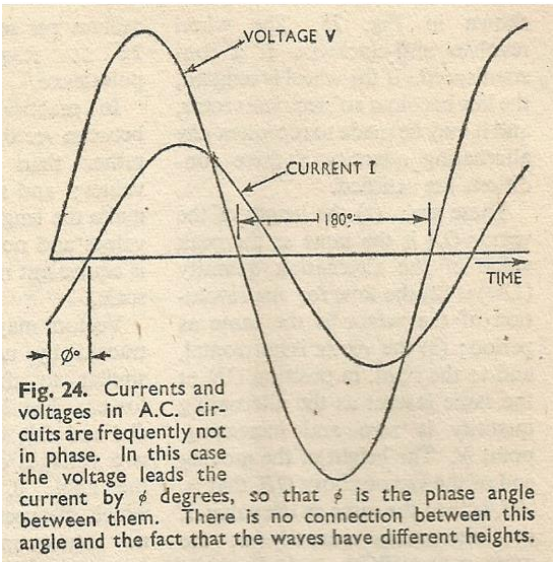
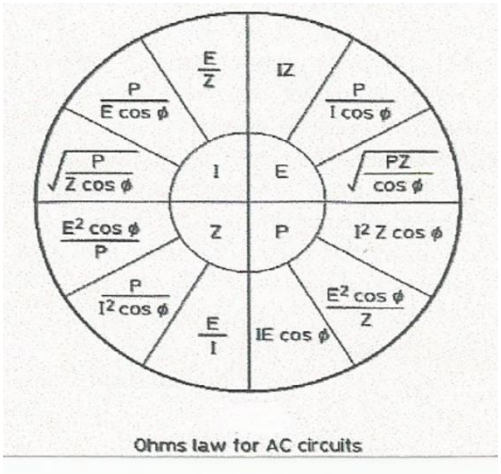


Fig. 24. Currents and voltages in A.C. circuits are frequently not in phase. In this case the voltage leads the current by ϕ degrees, so that ϕ is the phase angle between them. There is no connection between this angle and the fact that the waves have different heights.



Ohms law for AC circuits

When looking on the name plate of your electric motor, you will see the operating voltage, current, rpm, KW or HP if it's not a modern one, single or three and Star or Delta mode of connection There is also the motor power factor, sometime just a symbol ϕ, cos ϕ, or Pf.

The average motor has a power factor of 0.7 (no units for power factor, it's a ratio).

All electric motors, and all other similar devices fitted with a coil of copper wire operating on alternating current, have a lagging power factor. Power factor is a ratio of apparent power (line current x line voltage) to the actual power (watts), (not the same as on DC) required to move the load.

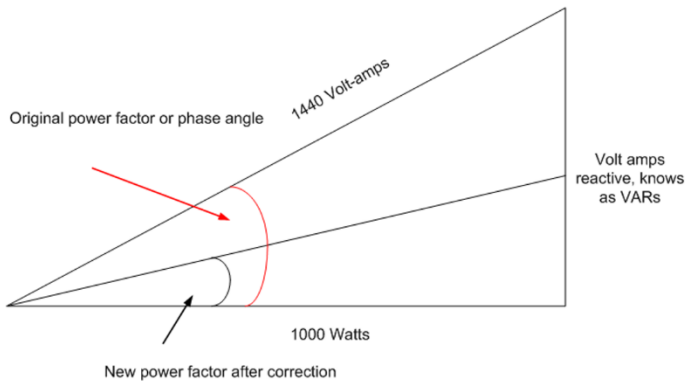
Without getting too technical, the power factor relates to power required for actual work done, versus the amount of power required to magnetise the iron in a motor, or " fill it up" with electrical current, so that it can do some work. This magnetising current called Volt Amps Reactive (in industry KVARS) can be likened to the bottom 4 feet of water in a 7 feet deep swimming pool- it doesn't normally have much use, but is necessary.

One way of supplying these VARS is by using capacitors, which when connected across the mains supply give a leading power factor. These are known in the trade as power factor correction capacitors. Almost all fluorescent lights have within the fitting, a power factor correction capacitor. These capacitors are quality ones, continuously rated with a high working voltage and fitted with a discharge resistor.

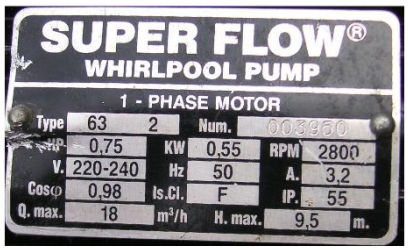
Power factor for our home workshops doesn't affect us at all, as our electricity is in metered KWh and not KVA or KVAr, as happens to commercial customers.

For a motor to be work efficiently it needs to be working hard, and that is when the power factor is near unity 0.9 or 25°, which is good. Don't get the idea that you are being kind or generous to a motor by obtaining a 2 hp motor, when a 1hp would be more than adequate.

Phase angle or Phasor diagram



Here is how electrical information, including Power Factor is presented on a typical pump,



Example. A motor connected to 240 volt supply takes a current of 6 amps.

The power input is 1 KW, so:

240 x 6 = 1440 VA

now watts ÷ volt x amps = Pf, and in this case 0.69 or an angle of 46°.

Now if by a connecting a capacitor across the motor terminals of the appropriate value, the current becomes 4 amps then the power factor will be 0.96 or an angle of 16° which would be very good, and the KVA will be reduced. This results in a smaller energy bill for a commercial customer.

This however, does not happen for domestic customers in home workshops.

If by connecting a capacitor (of the appropriate value), across the motor terminals, we can reduce the current down from 6 to 4 amps and as the motor has the same power out, there will be a saving.

Scale everything up by 10 or a 100 and you can soon see the saving.

So, how do we calculate the capacitor size in terms of Micro Farads (µ F).

As always, there is a formula.

Ic = Vc ÷ Xc. (Ic = Current Vc = Voltage Xc = Resistance)

Capacitor Reactance $Xc = \frac{1 \times 10^6}{(2 \times \pi \times f \times C)}$.

Now f is the mains electric frequency which is 50 Hz here in UK, and π is 3.14 (3 is accurate enough for these calculations) and C is the bit we need to calculate.

Transposing the formula it becomes

$C = \frac{Ic \times 10^6}{(2 \times \pi \times f \times C)}$.

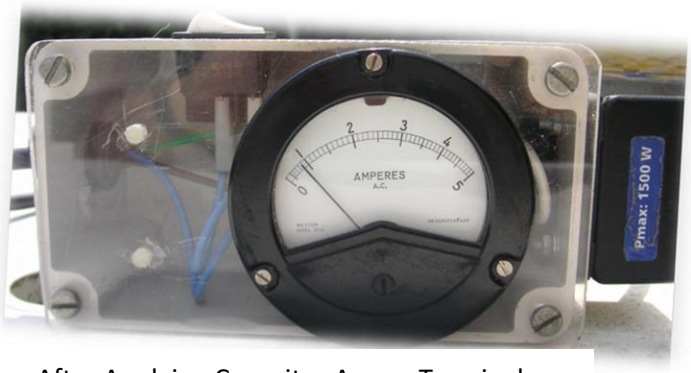
So, Ic = 2 amps f = 50 Hz Vc = 240 Volts and $C = \frac{2 \times 10^6}{(2 \times \pi \times 50 \times 240)}$ = 26.5 µ F.

Capacitors of this type have a tolerance of ± 10% so 25 will be OK.

Generally speaking, it's not commercially economical to improve the power factor beyond 0.9 as the cost of the capacitors is greater than the money saved via the electricity bill. However, when power factor correction is applied, it will pay for itself in around 18 months and will continue to do so thereafter.

Here is a situation before and after applying a capacitor across the motor terminals:

Before Applying Capacitor Across Terminals



After Applying Capacitor Across Terminals