NEWSLETTER December 2018

COMMENT

Wishing all our readers a happy Christmas and a fruitful New Year. There will be no Club Meeting in January, but we will start again in February with what should be a very interesting talk by Graham Sykes about his steam bike and his programme for speed record attempts. This should begin the club year on a good footing.

FORTHCOMING EVENTS

- **Workshop Morning:** Tuesday 15th January 10-12 noon
- **Club Meeting:** Wednesday 6th February ~ **A Talk By Graham Sykes on *"Force of Nature"*** – A Steam Rocket Bike to be used for speed record attempts. Graham will describe its design and construction.

CLUB MEETING: Wednesday 5th December.

Chairman Colin Bainbridge called the meeting to order and started with the usual housekeeping and other announcements. Primarily these were the final arrangements for the BHI visit on the 10th December and the fact that the 2019 Subscriptions were due – and please pay the membership secretary (David Proctor).

- **Workshop**
  Colin explained to the meeting that with the evolution of the club's workshop there were a few items of tooling and stock that were deemed surplus. Under the guidance of John Powell and George Gibbs, these items would be valued and made available to purchase at future meetings. He went on to explain that all members should be encouraged to use the facilities available either on a Tuesday or Thursday, but to first check with John or George to arrange a convenient time.
- **Railway**
  The meeting was informed of the Committee's decision to only support two events in 2019 owing to the difficulties of finding sufficient members to volunteer and run the railway.
  The two outings in 2019 will be to Welburn Hall School and The Ryedale Show. Following these deployments, a review will be held as to their success so the future of the railway can be assessed ahead of the 2020 season.
- **Traction Engine**
  Following the proposal put forward by Peter Bramley at the last club meeting, Colin asked Peter if he wished to say anything further, ahead of the members being given the opportunity to express their opinion. Peter explained that he had started by contacting the events the club has supported in the past, and enquired whether it was possible for PEEMS to deploy a Traction Engine to provide rides. As yet he has not received much feedback.
  Peter concluded by asking the members if they would support the idea of the club running a Traction Engine at events.
  The members' view was that they did not feel the idea was something they wished to support at this time.
  In thanking Peter, Colin suggested that whilst the idea was not considered viable at this time, perhaps there might be a compromise in the future. For example, instead of the Traction Engine being owned by the Club, maybe an individual or a small group of members may wish to purchase a machine of their own, but allow for it to be used at events in the future as part of a PEEMS deployment.

i) Mini 'Bring and Brag'

- Peter Bramley started the mini Bring-and-Brag' by showing his wheel spoke and *'Fellows'* jig.
- Tony Leeming presented the LBSC designed lubricator he had made for his *'Speedy'* project.
- Paul Windross described both his crankshaft alignment and balancing tool and his propeller balancing jig.
- Ted Fletcher explained how he had reground his lathe bed – and then had to shim the tailstock to maintain centre height integrity. Ted used an MT2 to MT2 gauge to assist him in this.
- David Proctor presented the progress made on his Myfordboy stationary engine.
- Finally, Colin Bainbridge explained how he serendipitously came across an article in a discarded *'Engineering in Miniature'* on an update to the design of a 'Swing Clear Boring Tool' – which Colin had presented at a previous society meeting.

ii) A Talk By Ted Fletcher On *'Power Factors How and Why'*

Colin introduced the speaker Ted Fletcher, who gave us an explanation of what *Power Factor* is, why it is important and how, in an industrial context, the effect can be mitigated. Ted reassured us that there are no real financial issues for the general home workshop.

POWER FACTOR

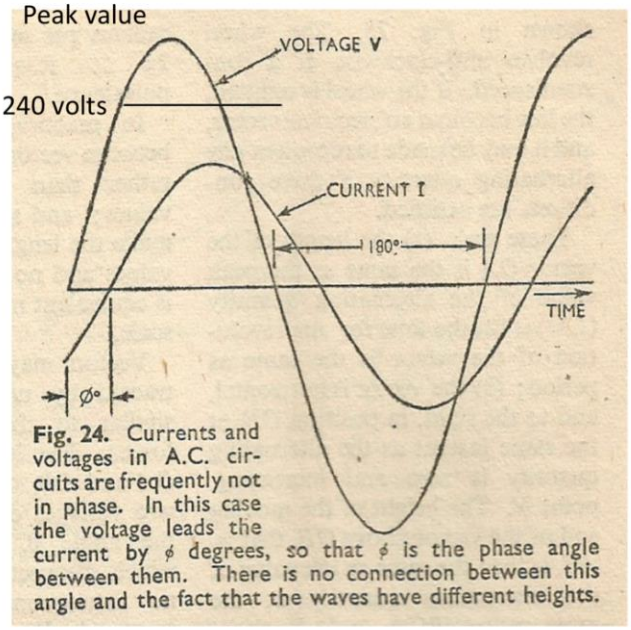


Fig. 24. Currents and voltages in A.C. circuits are frequently not in phase. In this case the voltage leads the current by ϕ degrees, so that ϕ is the phase angle between them. There is no connection between this angle and the fact that the waves have different heights.

When looking on the name plate of your electric motor, you will see :

a) The Operating Voltage,
b) Current,
c) RPM,
d) KW (or HP if it's not a modern one),
e) Single or Three Phase and
f) Star or Delta mode of connection,
g) **The Motor Power Factor**, sometimes just a symbol ϕ ,cos ϕ, or Pf.
The average motor has a Power Factor of 0.7 (Note: there are no unit's for Power Factor, it's a ratio).

- Motor Power Factor

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: True Power (Watts) ÷ Apparent Power (Volts x Amps) (Not the same as on DC).

Without getting too technical, Power Factor relates to the power required for the actual work done to move the load *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 foot deep swimming pool- it doesn't normally have much use, but is necessary.

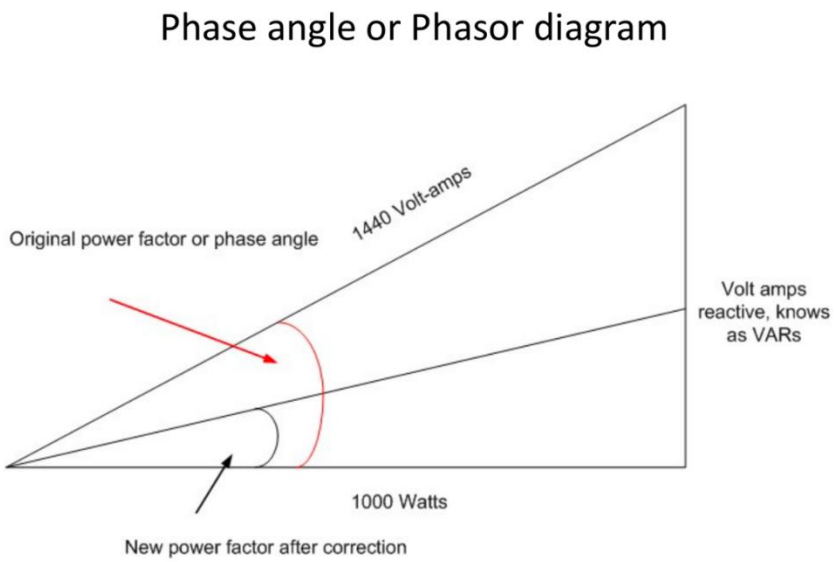
One way of supplying these VARS is by using capacitors, which when connected across the mains supply, give a leading power factor, and are known in the trade as *Power Factor Correction Capacitors*.

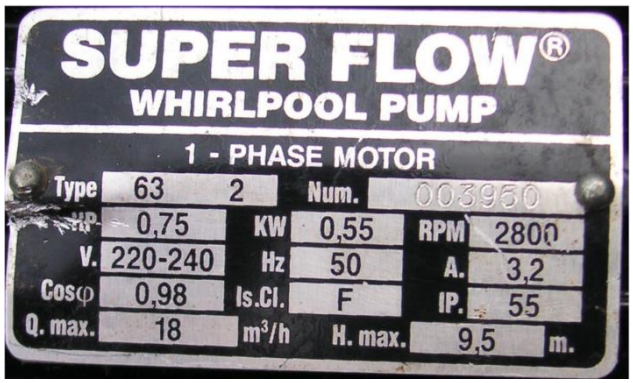
Almost all the older type of fluorescent lights have within the fitting, a *Power Factor Correction Capacitor.* These capacitors are quality ones, continuously rated with a high working voltage and fitted with a discharge resistor.

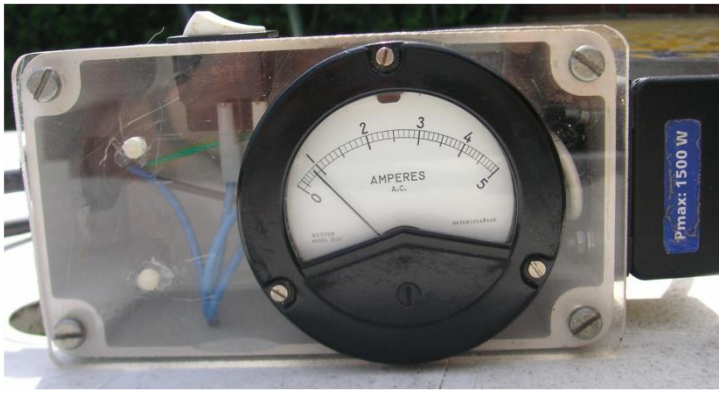
Power factor for us in our home workshops doesn't affect us at all, as our electricity is metered KWh and not KVA or KVAR as happens to commercial customers.

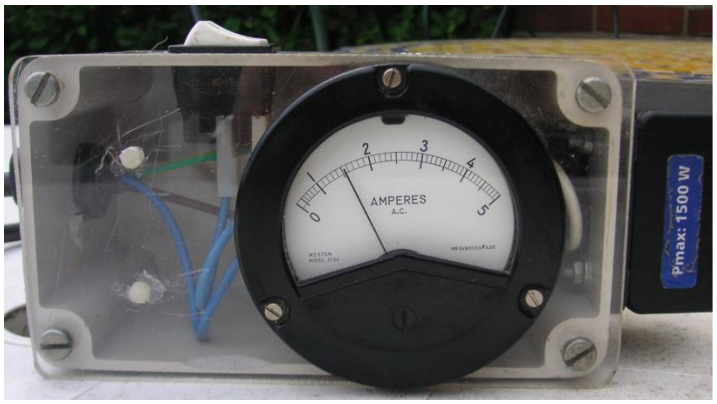
For a motor to work efficiently it needs to be working hard, that is when the power factor is near unity (0.9 or 25°), which is good.

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.









Example.

- A motor connected to 240 volt supply takes a current of 6 amps.
- The power input is 1KW therefore 240 x 6 = 1440 VA,
- Now, Watts ÷ volt x amps = Pf (Power Factor) and, in this case 0.69 or an angle of 46°.
- Now, by a connecting a capacitor of the appropriate value across the motor terminals, the current can be reduced to 4 amps and the power factor will become 0.96 or an angle of 16°. The KVA in turn will be reduced, resulting in a smaller energy bill for a commercial customer, however not for the domestic customers in home workshops.
- By connecting a capacitor of the appropriate value, as previously mentioned, across the motor terminals and reducing the current down from 6 to 4 amps, the motor will have the same power out, but 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)

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

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

$$C = \frac{2 \times 10^6}{(2 \times \pi \times 50 \times 240).} = 26.5\ \mu F.$$

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 money saved via the electricity bill. However when Power Factor Correction is applied, it will pay for itself in around 18 months and will continual to do so thereafter.

iii) Christmas Raffle

The evening finished with a raffle which raised £*63 – to be donated to "Next Steps" a local charity*.

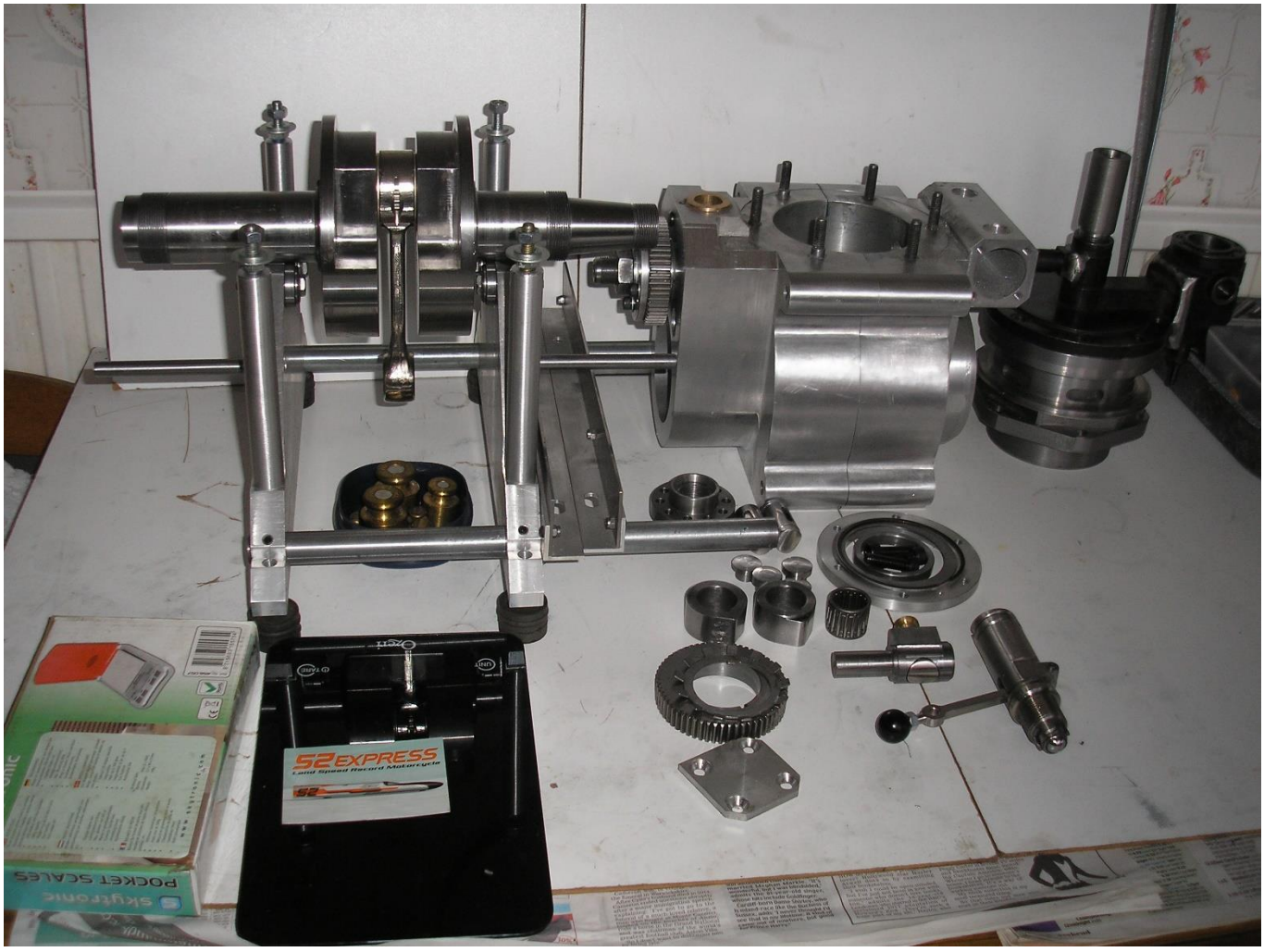
Colin thanked everyone for attending and reminded members that there is not a club meeting in January but that the next workshop morning will go ahead in January as usual.

Paul Windross encouraged everyone to attend the February Club Meeting when Graham Sykes will be talking about his steam powered rocket motorbike…….....should be very interesting !

iv) Further Progress On Paul Windross' Steam Engine For A Motor Bike Or Three-Wheeler.

Paul has informed us that he is making further progress on his full scale steam engine for a motor bike (or three wheeler), which he displayed at the *'Bring and Brag'* last October.

Here we see a crankshaft on the aligner with some of the other engine parts:



At the moment in the workshop, Paul is performing some weight reduction on the piston before working out the balance factor for the crankshaft.

Contact:
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