

GDPR and Club Protocab

As you probably know, the General Data Protection Regulation comes into force on 25th May, a few days after this Newsletter is published. Although at Acc+Ess we believe that we are already compliant with the terms of the Regulation, it is timely to ensure that you know that we hold data about you on our secure servers. You are welcome to request details of the data we hold.

We do not canvass for new Club Protocab members, and most certainly we would never buy a database from a third party - the data is most likely to be completely irrelevant! You become a Club Protocab member by one of the following means: providing your information (as much or as little as you want to give us) through the Contact page on protocab.com; at an exhibition by completing an enrolment form requesting progress reports on Protocab or by telephoning or emailing Acc+Ess to request more information, at which time you give your consent to have your details added to our database.

At any time, you can ask to be removed from the database either by an email to unsubscribe@protocab.com or by a telephone message. The covering note to this newsletter gives you the option to unsubscribe. If you telephone to request that we remove your details, we will send you a confirmatory message. However, different policies apply if you are a Protocab Owner, because we have to retain non-financial personal data, including order history for the purposes of our guarantee and service support.

Please be aware that we may also record other relevant data, such as your preferred modelling scale, number of locos, current control method and other similar data, only for the purposes of product planning and market research or for example, if you've filled out an annual survey of modeller's interests. Again, we only record this if you have provided it, so, for example, if we read of your modelling activities in a magazine we would not add these details to our database unless we first obtained your approval. Regarding the holding of data on minors, we ask you to tick a box on the Contact page to say that you are over 18. The new Regulation demands that we obtain parental consent for minors aged 13 or below. Thus our checks are more stringent than the law demands. We are updating the privacy and data retention policy statements on protocab.com in time for the new Regulation coming into force.

If you wish to receive a statement on the data we hold about you, please send an email to club@protocab.com, or a letter to Acc+Ess on the address on the back page of this Newsletter. If the latter, please enclose a stamped return addressed envelope. We will provide the information we hold about you within one month.

We are taking this opportunity of the new Regulation to make sure that our database is both relevant and up-to-date. Therefore, we are asking you specifically to agree to maintain your membership of Club Protocab to receive future newsletters, by clicking this link protocab.com/gdprconfirm or by writing to Acc+Ess requesting to remain on our database.



Coming to a Scaleforum near you in September! The new Minerva GWR Pannier is described on page 6 and is seen climbing the bank on the wire-free 'Tregorran' branch line. The civil engineer is repairing the boundary fence in time for the summer season, hence the fence post lying on the grassy bank...

From the Editor's Desk

Firstly, a warm welcome to all our new Club Protocab members, who have joined us since the last newsletter in December! When penning this editorial a couple of weeks ago, I had written 'now that the better weather is upon us...' but getting the newsletter ready for publication, this was a bit premature. So with the hope that the weather has not curtailed your modelling activities too much, we are now entering the busy modelling season between the time when it's too cold to get into the modelling room and too warm not to find an excuse for mowing, painting and decoration and visiting heritage railways! At least with Protocab, you won't need to spend the first hour or so of your modelling time cleaning the rails!

Reading this editorial again, it is very UK-centric and this is no longer pertinent, because we have an ever growing number of Club Protocab members from other parts of Europe, particularly France, North America and, notably, Australia and New Zealand. We explain later in this issue how we are preparing to serve our friends in those territories and the obstacles that we have to overcome. It is particularly galling that we have strong support and demand which we can't fully address - yet. Please bear with us while we get over the hurdles and we can truly be a world-class player!

Order online: www.protocab.com or by telephone 07831 231164

N Gauge Progress

Over the last couple of years we've been delighted and excited to receive interest in Acc+Ess Protocab from a significant and growing number of N gauge modellers. The possibilities of using Protocab for N gauge is enticing and having built an N gauge layout for Alex and Dan back in the day (when they were young - 'Dad, it's stopped working again' - usually dirty rails or a track joint coming loose), I can sympathise with the problems that our N gauge members of Club Protocab tell us.

We now have the first possible solution for our N gauge friends, in the form of the 0554 LCU and small form batteries to support it. At the Model Rail 2018 show in Glasgow at the end of February, we showed the form of the 0554 for the first time, and we were, frankly, astonished by the amount of interest, albeit extremely welcome, from N gauge modellers who came to the stand. Since then we have had follow-ups from our visitors with

a number of requirements which we can summarise as:

- sound (almost universal)
- wireless charging
- support for small tank locos

We want to fulfil these wishes but I have to sound a word of caution as to the art of the possible.

A scratch or kit built loco enables a choice of motors and gearboxes to be chosen, there is usually space built in and the modeller has much more choice in the design of the completed loco or item of rolling stock. A ready to run loco is a different proposition, plastic bodies, in particular. Up to a few years ago, the only consideration in terms of control is that provision needed to be made to take the electricity from the wheels to the motor terminals, after that the designer of an RTR model has freedom to design in as much mass as possible to provide adhesive weight.

The challenge for early DCC adopters was to find space for the decoder, and this was alleviated once RTR designers made provision

for what would become 'DCC Ready' or 'DCC fitted' models, culminating in the blanking plates and DCC sockets that are now built in.

The next challenge for the modeller was to find space for the sound speaker and, in the most recent RTR models, this requirement has been catered for.

N gauge ready-to-run models must contain a 12V DC motor, because they will be sold to modellers who have DC or DCC-controlled layouts. In order to get the small form for the 0554, we have to limit the voltage boost and the maximum voltage output is 5V, but we are planning a 9V variant. The alternative is to remotor the locomotive with a smaller motor e.g. 5V or 6V and we are currently experimenting with a variety of such motors before we source them for resale. Our experiment features a Graham Farish Stanier LMS Black 5, with a large enough tender to house the 0554 and an experimental small form battery.

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Tutorial: the importance of calculating power requirements

It's some time since we reviewed an important topic for battery powered considerations, so we are including it here and hope that our earlier members will be able to enjoy it as an *aide memoire!*

Why is the question of power so important?

Conventional systems deriving power through the rails comes directly from the mains via a voltage transformer and can be considered to be unlimited (until you see the amount on the next electricity bill!). Thus, while you might care how many miles to the litre you get from your car's engine, you might not have cared about how much electricity your model locomotives are consuming. A battery, however, has a finite amount of electricity available to drive the motor and other features and we are trying to make the battery output last as long as possible.

So what is POWER? In our case, power is defined variously as the energy consumed when work is done or the rate of work being done. In simpler

terms, it means how much is needed to do the job that we want it to do, it being the locomotive or a lamp, or a point motor, anything on the model that does something and needs energy to do it.

Power is measured in Watts, or more relevant in the scales we model, milliWatts (one thousandth of a Watt). The great thing about power is that no matter what it is, whether electrical power, mechanical power, heat power, lighting, it is always measured in Watts, and, in theory, is indestructable, you can only convert energy from one form to another.

Switch on your room light and electrical energy has been converted to light and heat energy.

Therefore, to get Watts out, you have to put Watts in. Regrettably, the perfect engine (power generator) is yet to be invented, because along the way between the source of the energy and the use of the energy, some power is being used up. A motor turns on bearings and these create friction which generates heat

(=Watts); an electrical component such as a resistor also generates heat as the electrons pass through it, so this also consumes the energy that we want to conserve.

Your Protocab battery has a certain amount of energy and we want to use this wisely. The flow of electricity from the battery is known as 'current' (measured in 'Amperes' - usually shortened to 'Amps') and it can be 'pushed' from the battery with a certain force or pressure, and this is measured in 'Volts' (this is actually known as the 'Pressure Difference' or 'Potential Difference' and the best analogy is to imagine a vertical tube full of water, closed at the bottom and open at the top. There is only atmospheric pressure acting on the water at the top but at the bottom of the tube there is all the pressure of the weight of the column of water. If there was no atmosphere, you could say that the pressure difference was between the pressure at the bottom and zero. Electricity always flows to the Earth, or 'ground' and this is the

zero, so the Voltage is the difference between the pressure at the start of the circuit and the zero of the ground. Why all this is important is described now... To get a certain and required quantity of power to the 'engine' where it will do the work, you need the current (the flow rate, measured in amps) and the pressure behind it (measured in volts). Multiply the two and you get the power rating or 'watts'. So, for our model locomotives, the first, and most important, consideration is just how much power will be needed to do the work.

If you have a 12Volts Direct Current motor, the vast majority of models have them installed, you may have found out that the current it draws is 'an amp' (or whatever). This is fairly meaningless, unless you know how much *power* the motor needs to develop in order to start the train and how much it needs to keep it going.

Speed (scale mph)	Volts	Amps	Watts
0-2	3	2	6
10	5	1.2	6
20	6	1	6
30	7	0.85	-6
40	8	0.75	6
50	10	0.6	6

This is a very simplistic chart to demonstrate the effect of what *might* happen when the motor starts to pull and then accelerate the train. You'll notice that the power in watts is constant, and as the pressure is applied via the controller, the volts increase and the current being drawn by the motor reduces.

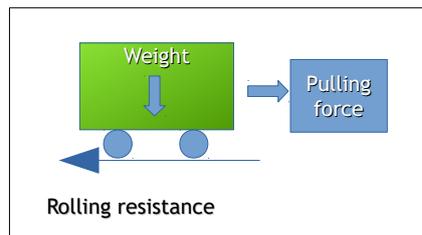
The reason that the chart is simplistic is that the power output is *not* constant due to a number of factors such as gradients, the rolling resistance of the train being pulled etc. But it will suffice for the purposes of this tutorial. Energy costs money and the designers of the full sized locomotive will always try to minimise the energy required for

'the mission' i.e. the job that the loco is being designed to handle. If the marketing objective is to move the train as fast as track conditions will allow, it stands to reason that a more powerful locomotive will be required (to overcome air resistance, for example) than a shunting loco, whose maximum speed is low (when I was working, briefly, on the BR APT project back in the early 1970s, I learnt that to get the train from 125mph to 155mph required twice the power to get it to 125mph!). However, a powerful loco is also required where maximum speed may be low, but the trailing load is great, e.g. a 2,000 tonne freight train.

This is where Protocab mimics real life, the full sized loco will be designed to get every last drop of usable power from the energy being input.

One size doesn't fit all!

So, as modellers, we should consider the 'mission' that our models are being asked to handle and design our power system around it. Time for some maths! (But before we start, we apologise to the engineers in our Club membership. What follows is a much simplified description of the dynamics involved, but we want to make a point, summarised in the conclusion.)



You, the General Manager of your 7mm/ft railway, have a fiddle yard and a station and require your trains to be a maximum of 6 carriages or 20 wagons. For convenience sake, the trains weigh the same, the 6 carriages and 20 wagons both weigh, collectively, 2.5 kilograms. The maximum speed that they will travel in both cases will be a scale 60kms/hour (40mph). The 'rolling stock' (as we will call the carriages and wagons), exert a downward force on the track due to gravity and this is, roundly measured as 10 Newtons per kg (it's actually 9.81, so 10 is a good

round number for this purpose), thus a total of 25N.

We have no tight curves or gradients of any significance (add 3% for a 1.5m radius and 10% for a 2% gradient - a rough estimate, we can ignore for this exercise).

We can ignore the weight of the loco, because we haven't designed it yet, so we don't know it! We will also ignore air resistance as the train moves through it.

Now, to pull that train along, and to overcome the 25Newtons that is acting as a resistance, we can calculate the power required, but before that we need to calculate the *rolling resistance* needed using the following formula:

$$R \text{ (Rolling resistance)} = RC \text{ (Rolling resistance coefficient)} \times \text{Weight (in Newtons)}$$

Did you know that the tyres on your car have a higher RC if the tyres are not properly inflated, and are thus using more energy (fuel)? It's exactly the same for model railways: an unsprung wagon has a significantly higher RC than a sprung one. The diameter of the wheels is also a factor in calculating the RC.

Worry not about calculating the RC, we have done the sums and for an unsprung trailing vehicle, assume an average RC of 0.2, and 0.13 for a sprung one in O gauge (and not a lot different for 4mm/ft).

So now we can work out the rolling resistance for our train above:

$$R \text{ (in Newtons)} = 0.2 \text{ (all unsprung)} \times 25 = 5 \text{ Newtons.}$$

Now we have that key figure, we can calculate the power required. 40mph=0.418metres/second, and we multiply this by the rolling resistance of 5Newtons to arrive at the power requirement of

$$2.1 \text{ Watts}$$

Now go back to an earlier part of this tutorial, where we discussed conventional control systems, such as DC and DCC and where the units of volts and amps were mentioned. If you want to drive your loco at around 40mph with a reasonable trailing load, a fairly efficient motor would probably draw 0.5A at around 8V. But that's 4Watts, which is *twice* what we have calculated above. And it's not unusual for motors used in model locos to be drawing over an

Continued on next page

Protocab outside the UK

We have a substantial number of Club Protocab members outside the UK and, of course, we want to provide you with the advantages of Acc+Ess Protocab as soon as possible.

There are three reasons why we cannot supply a number of regions immediately.

The first, and most complex and expensive to address, is the regulatory environment. We fully support the reasons for having the regulations in place and are committed to full compliance. At Acc+Ess, we will never knowingly take short cuts, or pay lip-service to the regulations, which are there for very good reasons.

Protocab has three elements which are particularly subject to regulations, the fourth, which applies to all products, Protocab or not, is the safety aspect, also covered by regulations.

In the EU, we sign a Declaration of Conformity to the extent that our products (specified) are compliant, but this would be highly unwise, and possibly fraudulent, if we did not have clear evidence. We could purchase very expensive test equipment, but such is the complex nature of our product that there would need to be a wide range of such equipment. Thus, we choose to use test houses/laboratories with the required equipment, and, equally important, certified technical expertise to carry out the tests. The standards are continually developing and retests may be required if the standard(s) under which the Protocab component(s) were tested are deprecated. We believe that experience in the field, with the massive increase in electronic device use, is driving the need for the standards to be monitored and amended where necessary. After all, public safety is paramount.

This is nowhere more pertinent than in the USA and Canada, and the relevant standards that cover Protocab components are determined by the Federal Communications Commission (FCC). Unlike the EU where we can self-certify our compliance, the FCC require independent qualified assessment. Some of the FCC standards are less stringent than the equivalent EU standard, some more. In any case, without proof of compliance, we cannot legally trade in the North American continent.

Our growing base of members in Australia and New Zealand are covered in those countries by a third set of standards, some of which are covered by what is known as 'C-Tick'. The good news is that compliance with the EU Directives provides exemption from separate C-Tick testing for a number of the standards - but not all. There are two bits of less good news. The first is that independent testing costs a lot of money. This overhead has to be spread across each product, so a clear understanding of potential sales is vital for us to move forward.

The second is that, in Australia and New Zealand, we are required to have a local agent in place, if Acc+Ess does not have a local presence as an Australian or New Zealand registered company. In fact, we would want this. It is impractical for Acc+Ess to try to support overseas Owners from our base in Scotland, notwithstanding time zone and language differences, where English is not the main language. Thus we consider that our overseas expansion cannot take place without local support in the territories in which we wish to provide Protocab products and services.

Tutorial: the importance of calculating power requirements (continued from page 3)

amp in 7mm, which is 8Watts or more. This is the main reason why, using conventional track power, you can turn the control knob and the train shoots off at high speed, and we employ all sorts of gizmos to try to effect slow running, when, all the time we could be imitating the prototype and simply use motors that develop *just enough* power.

So why, if you can get unlimited power out of a track-powered system, doesn't the motor continue to accelerate the train until it goes into orbit?

This will be part of the second tutorial, where we discuss motors and how to select the *correct* one for the mission. So, in summary, if you can dictate the power that the motor develops e.g in a kit or scratch build, or you can remotor a ready built loco, you'll be helping to maximise the running time you get from your battery. Equally, you'll be able to benefit from the smaller components we are designing for smaller 4mm and larger 2mm locos. It's all about what is physically possible with present technology and things are improving all the time.

In the Press...

We've had another review, this time in the Hornby magazine and, thanks to a great write up by Editor **Mike Wild**, several new Club members have joined as a result of reading the review and we also have had a number of new Owners.

Reviews are very important in giving potential Protocab Owners an unbiased, independent view of the system and its possibilities. Have you considered sending an article featuring Protocab or a mention on an online forum? If so we'd be delighted to hear from you and find out how Protocab makes a difference to how the hobby is enjoyed. And articles that you submit for this newsletter are very much appreciated by other Club members.

Stand by for Protocab Convention 2019!

We're planning a convention in 2019 where every layout and exhibit will have at least one Protocab-fitted loco. If by Summertime next year, you might have a wire-free layout (points and signal controls excepted!) and would like to bring it along, we'll have more details in future newsletters. Ideas for where we should hold the Convention gratefully received!

Product Development News

As mentioned later in this Newsletter, technically the new products outlined last year are well advanced but there are some commercial considerations to overcome before they can be made available.

The **0241 Touch Controller** has been tested for basic functions including Management Mode and is now undergoing tests for over-the-air updating including passing data through to its adopted LCUs. We are leaving the style and presentation of the screen until later when more modellers have had a chance to look and feel the controller and offer their suggestions for the appearance of the screen. We'll make some cosmetic adjustment shortly and publish some layouts for your consideration in future Club newsletters. We have investigated a bespoke ABS case but the tooling cost puts it out of reach on the basis of currently predicted volumes. The 3.5" touch screen we are using is proving to be reliable, however. If you have any views on the use of a slider rather than a rotary knob for the speed control. we'll be very interested to hear them.

We've mentioned the **0554 LCU** in the section on N Gauge progress, and the developments we are making on this are relevant to the other LCUs in the planned range. We have shown that the 0554 works well with the 0241 Touch Controller. We have demonstrated how the 0241 switches on the 0554, which, as reported previously, no longer has the Locoswitch, but is turned on from the controller.

Regarding the other new LCUs in the range, these will follow soon after the tests on the 0554 are completed, including the higher current 0515 and 0525 which will require a new boost circuit to handle the relatively high currents for larger O gauge and above loco motors.

A key feature of the new series LCUs will be the ability to recognise where the voltage is present and automatically charge the Protocab battery. With no significant memory effect on a lithium battery, this means that the battery can be 'topped up' regularly, so a long running session from a battery charge is no longer needed, thus a much

smaller battery can be installed - *as long as it is capable of delivering the current required by the motor*. This is an extremely important point that might be missed. For example, the larger 1902-653042 has a rating of 820milliAmp hours, meaning that it can deliver 820milliAmps at a nominal 3.7V for one hour (known as '1C'). It can be stressed to 2C, delivering 1640mA at 3.7V for half an hour. The smaller 1902-902030 has a 1C rating of 500mAh, and can be stressed to 2C, 1A at 3.7V for half an hour. The Protocab 0502 LCU boosts this voltage as required, so if you move the control knob on the 0201 so that it instructs the 0502 to press, say, 8V to the motor, the larger battery can only deliver around 750mA (the boost circuit is not 100% efficient and takes some of the battery power - also the 0502 will cut off the current at 500mA). The smaller battery in that case can only deliver around 400mA. And bear in mind that towards the end of the battery charge, the output voltage decreases to around 3V, so has to pass more current at that voltage to achieve the required power at the motor.

The two new battery charging methods are moving ahead well. The **9650 Wireless Induction Charging** system is technically complete. We still have an issue in finding a suitable coil for use between the rails of a OO track and we are considering an alternative that still avoids having to touch the loco, more of which anon.

At time of publication, the bulk of our development is on the **9610 Contact Charging** system and its potential alongside the 0554 LCU for use in locos where the 9601 and 9650 would be too big.

The 9610 is designed to pick up charging current from an external source and differs from the 9601 Plug Charging Unit in that the input voltage does not need to be a regulated 5Volts. The 9610 will recognise where a voltage between a minimum 5V and maximum 17V is present at its input and transform the voltage to the 5V required by the integral charging circuit. It will also rectify an alternating current to

direct current, so can use e.g. 16V AC coming through the rails.

There is even better news from the 9610 Contact Charging Unit, which is actually going to be known as the '*Contact Charging and Collection Unit*'. This is because the new series LCUs can be configured to switch the power to the motor from the battery or the track - *automatically!* You will thus be able to retain the pickups on the loco, place it on a track which has power in it (quite often requested from Owners) and automatically and instantly switch over to battery power when the lack of track power is recognised. You could thus build a layout with the pointwork completely dead, and just the plain track powered. You are not sending control signals through the track, simply raw electricity. The new series LCUs still get their instructions wirelessly from your Protocab controller.

There is a prototype for this, of course. With a third rail or overhead catenary powered and the return feed through the running rails, all of which can be bonded together, you can realistically model electrified railways!

We won't have the 9610 ready for demo at Pickering, but we aim to have it ready for demo at Scaleforum in September.

The **97xx Lighting Auxiliary Units** are developed and under test and we will be able to show a demo at Pickering.

Sound, however, is our most requested feature and we are in the early stages of developing our solutions. Our biggest issue will be to obtain effective sound waveforms for different prototypes and we will address this shortly. If you have any ideas, please let us know!

A Welcome to Our New Club Members!

With every new edition of the Club Protocab Newsletter, we are delighted to welcome many new members added since the last edition! There is certainly no shortage of interest in Acc+Ess Protocab and the wonderful new method of operating model trains without having to take valuable modelling time both in wiring the layout and, subsequently, cleaning the rails to maintain essential contact between rail and wheel. When we attend exhibitions, we often hear remarks that the rail tops are much more realistic than rails which have been finely polished with a track cleaner. After all, only railways which have an extremely frequent passage of trains would have such shiny rails. 'Normal' railways, which might see a few trains an hour, have enough time between trains to add a slight patina to the rail tops. A branch line, which many of us model, might see so few trains that a dull finish with a hint of the steel beneath is typical.

'Get Together' at Pickering

If you are thinking of going to the North York Moors Railway this year, Sunday 17th June would be a good day!

Courtesy of the General Manager of the railway and thanks to Club Member **Alex O'Donnell**, Acc+Ess has been allowed the use of the training room on platform 2 at Pickering station and we are holding a 'Get Together' from 2.00p.m to 4.30.

Come along and meet the Acc+Ess team, hear about battery power and wireless control and see demos of the Protocab system in action, along with the latest developments. We'll also have products for sale!

Places are limited, so please let us know that you will be coming by a note to club@protocab.com or telephone 07831 231164 or a letter to the address below. Bring a friend who isn't already a Club Protocab member and we know of at least one Club who are thinking of coming *en masse*!

But that is not all. So many of our customers (whom we affectionately call 'Protocab Owners') report the pleasure of seeing their locomotives glide over trackwork, particularly points and crossings, whereas previously those same locos juddered and, more often than not, stopped during their passage. Don't take our word for it - we are holding a 'Get Together' in June and we hope that, if you haven't already become a Protocab Owner, but are trying to decide, you will come along and meet some of them and get a 'warts and all' story from some of them attending the event, described below.

We always strive at Acc+Ess to give an honest and fair view of the capabilities of Protocab, and we also have plans for new products and better ways of using the current Pilot Series. So, we are also giving you our honest and fair view of the future in our article below entitled 'Where next?'. We are very aware that the hobby is going through a difficult

time, with at least one mainstream manufacturer reporting adverse financials and price increases being reported by Far Eastern suppliers. But we have a strong responsibility to our Owners and prospective Owners and the need for steady growth backed by effective cash management has never been more important.

Should this give you cause for concern, that Protocab will follow several other initiatives that have sunk in the past? Well, we haven't spent the last ten years virtually full time bringing this 'wonderful product' (again, not our words) to market to fail now. And our real future lies with our Owners and prospective Owners. So, we'll be doing our bit to give you 'the future of model railway control' (again, guess what?) and strongly believe in our Owners' confidence that we can give you the ideal system for a very long time.

N Gauge Progress

Continued from page 2

The maximum output we can get from the 0554 is limited to 350mA at 5V (2,000mW) and this means that we have to find a battery that can deliver up to 700mAh.

We hope to have the Black 5 ready for Pickering on 17 June to demo the capabilities of Protocab in N gauge. We'll keep you posted on developments on Facebook and on protocab.com.



The 0554 with temporary LCU to motor lead and the experimental battery with the tender body into which they will be inserted. The 5V motor is alongside the chassis

Minerva Models Corner



We are delighted to announce that, by agreement with Minerva Model Railways Ltd, we are able to supply their O gauge locos ready fitted with Acc+Ess Protocab, with or without the 0201 Direct Controller. The first

of the Minerva locos to be available is the GWR Pannier tank in several variations and available now to purchase from protocab.com/shop.

Our demo loco will be on show at Pickering and we are impressed by the level of smooth control and operation that can be achieved. We are particularly impressed by the level of detail incorporated on the loco, yet still available at what we consider to be a very reasonable price for such a quality loco.

For anyone contemplating starting in O gauge, the Minerva Pannier fitted with Protocab is an ideal choice!

How the law makes sure that Acc+Ess' products are safe to use

We thought it might be useful for our new Club members in particular, to be given guidance on the sort of regulations that are required in the battery powered wireless control environment.

The three regulations to which Acc+Ess Protocab is subject are:

1. *Electro-magnetic compatibility (EMC)*, which requires us to prove that Protocab components are not affected by and do not affect other electro-magnetic components in the vicinity. If you run a current through a length of copper wire, it will generate a magnetic field, albeit tiny and almost immeasurable. The size of the components makes little difference, even the tiniest component that we have, say, on the 0502 LCU could be capable of affecting other devices.

2. *Radio emissions*. There are huge advantages to having a wireless based system for model railway control, but it depends on broadcasting a radio signal which an appropriate device can intercept and act on. In the case of a Protocab 0201 Direct Controller, for example, the signals that it transmits are picked up, not only by the 0502 LCU that the signals are intended for, but every other device within radio range operating on that frequency. Those other devices might be affected if we, at Acc+Ess, don't comply with the international standards that are designed to prevent interference that might seriously affect other devices. Of course, we want the radio transmitters on the 0201 and 0502 to transmit data signals between each other, and these transmitters are known as 'intentional radiators'. By design, we control not only that the frequencies and channels that the data is transmitted over remain steady and regulated, but there is always an area either side of the channel where the radio signal 'strays' into other channels, albeit at very much reduced strength. One purpose of the radio emissions regulations is to ensure that the Protocab components' emissions don't stray too far or too strongly. However, the other aspect of circuit design is that

it does not induce 'unintentional radiators', and this is much more difficult to address, but, nevertheless, need to be avoided. The smaller the overall board, where we trying to cram as much as necessary into the smallest footprint, are especially prone to creating unintentional radiation, and require the very most care to be taken in designing the circuit board.

3. *Lithium-based batteries*. It has been well-documented that lithium batteries will catch fire and explode, sometimes inside aircraft in mid-air. It has also been reported in the press that lithium batteries inside handheld devices carried in the trouser pocket have caught fire, injuring the wearer. The number of such reported incidents runs to the low hundreds, whilst the number of devices currently in use around the world run into the billions. This is not to be flippant, the danger of lithium batteries is very real if misused. The International Air Transport Authority (IATA) have issued guidance to all airlines on the transport of a variety of dangerous goods, including lithium batteries. These include packaging instructions. In the USA, the United Nations and Underwriters' Laboratories (UL) have issued their own guidelines on the construction of lithium batteries, and this has been echoed by the International Electrotechnical Commission (IEC), based in Switzerland. Most of the postal authorities, particularly those who carry post by air, have adopted these standards and apply them in their own regulations. This is particularly important where a consignment passes from one postal authority to another. In that case, the tightest regulation usually applies. In the case of the construction of rechargeable batteries, the regulations that apply are UN38.3, UL1642 and IEC62133, now in the process of being standardised to the IEC standard. The only way that we can maximise the chance of customer safety is if we control the quality of the batteries that are integral to the Protocab system, and this is why we supply the batteries as part of the

range. We insist, therefore, that the manufacturer of the battery has certified the batteries to the above standards and that, importantly, they supply us with the certification. This leads us to the postal regulations with which we have to comply. Within the UK, the Royal Mail allows us to send the lithium batteries loose only if they are sent WITH the equipment that they are to power and only within the UK. We cannot send batteries that are NOT connected to the equipment to international addresses. We may occasionally use couriers but their charges and delivery times are considerable greater than Royal Mail. The key standards for transport of lithium batteries is covered by two UN regulations which have arisen from safety research in air transport, UN3480 for batteries sent loose, and UN3481 for batteries sent in or with the equipment. There are two IATA Packaging Instruction PI965 and PI966 respectively, the former includes the requirement to place a caution label on the outside of the packet (image below).



We send our 0001 Starter Sets and 0052 Locomotive Sets under UN3480/PI965 because they contain a loose battery which will power the included 0502 LCU.

We cannot send a loose battery through Royal Mail without the LCU, and Owners who return the battery to Acc+Ess, for whatever reason, MUST not return them loose. We advise Owners that they must contact us before attempting to send the battery to us.

Where Next?

We launched Protocab in October 2015 with the Pilot Series that arose from demonstrating the system in late 2012 and adjusting the prototype in the light of comments from modellers who saw it. From 2015, we have grown our Owner base steadily and gained much valuable user feedback as well as our own researches. As a result, we laid down the plans for further products in the Protocab range and launched our plans to the modelling public in February 2017. The range planned for release included a new touch screen based controller, four new models of LCU which would address the requirements for smaller OO and larger N gauge locos as well as higher current OO and small to medium O gauge models, two new battery charging methods and an increased range of batteries, plus support for lighting.

Naturally, we are often asked what is happening to these plans and when the products will be available. This is our answer.

Technically, all the products, with the exception of the larger LCUs are developed, as described earlier, with some small aspects of the development to be completed, notably in repeatable reliability and upgrade ability. Backwards compatibility with the Pilot Series has been tested satisfactorily, notably ensuring that the 0502 will operate with the new controller, although, as might be expected,

some of the advanced features in the new products may not be available to the Pilot Series products. So why aren't we making the new products available?

There are two main areas of cost that are involved in bringing the products from prototype stage to production. The one-time costs include compliance testing which run to several tens of thousands of pounds; there is a degree of tooling costs to be absorbed, but these are relatively minor. In the case of compliance testing, we need to place as many products as possible for testing, rather than repeat testing for each product as they become available, with the consequent multiplication of costs. We also need to purchase stock to construct the products and in volumes that attract discounts that help us to achieve the target price points. Again, several thousand pounds will be needed. In the main, these are paid upfront, although we are increasingly able to attract credit as we develop the business.

We could, of course, borrow the money required to finance both of these aspects. However, this would be unwise as described below.

All of these costs are predicated on a forecast level of take up by our customers and the reason why we cannot yet bring the products to market is that we have not yet reached that level, in fact, well below it. Were we to borrow the money, the interest payments, let

alone the repayment of the capital would rapidly turn the company insolvent without a firm indication of sales increase. At the moment, we don't have that confidence.

So we are financing the finalisation of the developments of the new products from our own resources which have meant diversifying into other areas of income, of course a much slower method of achieving the financing of the new products. This will lead us to providing a limited beta test, which in turn will enable us to appeal to potential customers of the new products for pre-orders which we hope will yield the required level of demand to enable us to carry out compatibility tests and place the initial orders for production components.

For us, therefore, demand is everything. For you, our customers, availability of the product, preferably with some pedigree is the important thing, which we fully understand. In the meanwhile, we will continue to produce and support the Pilot Series, minimise our overheads as far as is practical and work as fast as possible to bring the new products to market. We can easily continue on current demand with our existing service levels so there is no danger of Acc+Ess going under.

However, you can help now. If you have not already done so, please let us know of your interest in the new products so that we can increase our level of confidence of forecast sales levels.

A REMINDER.....

If you want to stay a member of Club Protocab and receive newsletters and other information from Acc+Ess Limited, go to protocab.com/gdprconfirm, or write to Acc+Ess Ltd at the address below, saying that you wish to remain a member of Club Protocab and consent to Acc+Ess Ltd holding the data you have supplied to us on our secure servers.

If you are coming to the 'Get Together' in Pickering on 17th June, please telephone Acc+Ess on the number below or email club@protocab.com to let us know that you are coming.

Did you enjoy this edition of the Club Protocab Newsletter? We'd love to hear from you which bits you like and which you don't. We also welcome articles, letters, comments, experiences, including installation reports. This is your newsletter, so please let us know how we can improve it.

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