



Protocab

NEWS

THE NEWSLETTER OF CLUB PROTOCAB MANAGED BY ACC+ESS LIMITED- MANUFACTURERS OF THE PROTOCAB WIRELESS MODEL RAILWAY CONTROL SYSTEM

Acc+Ess announces the 0201 Direct Controller



From your feedback....

In this newsletter we'd like to let you know of a development with the user interface of Protocab. We have listened to the many modellers who have asked for a physical control knob as opposed to a touchscreen controller. We have also heard that most modellers we have spoken to want a simple entry to the Wonderful World of Wireless!

Above all, most modellers who have visited us on the stand at exhibitions or have sent emails, or commented on social media site that they are often space constrained and, as a result, only have a few locomotives. The result is the Acc+Ess Protocab 0201 Direct Controller shown and described alongside.

Acc+Ess Limited announces the 0201 Direct Controller. It is intended for the modeller with a small number of locomotives and who does not require the advanced control functions of the Protocab app.

The 0201 communicates directly with the Pilot Series Locomotive Control Unit, and removes the need for an Acc+Ess Protocab Concentrator in a limited use situation. Users can migrate to the enhanced facilities provided by the Concentrator which will still be required where multiple operators are in control or where the user wants the advanced functions provided by the Protocab Android app to run on a smartphone or tablet.

Ease of Use

We have tried to make operating the 0201 as simple as possible. We have particularly taken notice of modellers' concerns that it is important for those with visual impairment that we provide clear indications on the controller.

The 0201 is fully self contained and battery operated with a rechargeable battery inside the case, charged through a micro USB socket on the side of the case. We have designed the 0201 for around 2 - 3 hours

operation from a single charge which will take no more than two hours for a full recharge. The battery will not need to be discharged completely and can be topped up at any time.

A slide switch on the side of the 0201 turns the controller on and off and a power indication on the face of the controller also acts as a network traffic indicator, showing radio communications in operation.

As requested by several Club members who commented on the images in Newsletter 5, there are 9 buttons on the controller, one per loco.

When you switch on the loco battery using the Protocab Locoswitch installed on the loco, the respective button on the 0201 will glow with a green light. Press the button to select the loco to drive and the button light will change to red. We understand from sight specialists that this combination of colours is best for modellers who are partly sighted or who are colour blind.

Centre off control knob

The control knob is a familiar centre-off rotating knob, with 150 degrees of travel to full speed in either direction.

Simulation mode

Alongside the control knob is a push button which enables you to select *direct* or *simulation* modes.

Direct means that the loco speed will respond immediately to the speed set by the position and the direction of the control knob.

Pressing the button to the down position selects a simple *Simulation* mode. In this mode, the direction of the loco is still dictated by whether you turn the control knob to the left or the right, but now the position of the knob dictates the acceleration rate of the loco. Turn the knob fully and the loco will accelerate more quickly to the maximum speed (see below) than if you turn the knob slightly less. With the loco in motion, returning the control knob to the centre position causes the loco to coast. To apply the brake, turn the control knob to the *opposite* direction of travel. The further round you turn it, the most powerful is the brake application.

The emergency stop is implemented either by returning the control knob to the centre-off position in *Direct* mode, or by pressing the red loco select button to deselect the loco.

Other features of the 0201

Small white panels above each button enable you to write the number of your loco for easier identification.

The power indication shows green for the fully charged 0201 battery, yellow when the battery needing recharging and red when the battery state is critical. The indication flashes when the 0201 is communicating with the selected LCU.

The microUSB connector on the edge of the 0201 casing also enables updates for the 0201 to be downloaded from the protocab.com website.

Updating the 0201

Where a Protocab system includes the Concentrator, the Wi-Fi connection from the Concentrator to the internet enables downloads from the protocab.com website to update the on-board software on the Concentrator, LCUs or controllers. The operator drives the download process from the smartphone or tablet via the Protocab app.

The 0201 doesn't provide the same interface, so we have devised an alternative.

For updates to the 0201, the operator interface is a program running on a Windows-based personal computer (support for other operating systems is planned). You plug a cable from the 0201 into a spare USB slot on the computer and the smaller end into the microUSB slot on the edge of the 0201. You will be able to run a program downloaded to the personal computer from the protocab.com website which enables you to download the latest upgrades.

Upgrades for LCUs are also downloaded to the 0201 which then communicates the updates to the LCUs in turn.

Characterising the 0201 and LCUs

The personal computer program also enables you to allocate LCUs to buttons and to characterise the LCUs.

The serial number on the label of the LCU is entered into the computer program and an available button allocated to the LCU. A separate screen enables you to change the characteristics such as entering driving wheel diameter, motor speed and gearbox ratio and acceleration rate. These are passed to the LCU from the 0201 via its radio link. Characteristics can be changed at any time by connecting the USB cable and running the program.

FAQs on the 0201

What are the limitations of the 0201?

The 0201 has been designed for simplicity. It does not show loco speed or battery charge state. It does not show the LCU data such as the loco fleet number or name, such as would be displayed on a smartphone. However, a small write on panel above each button aids identification. The 0201 can select up to 9 locos, but buttons can be reassigned through the Windows characterisation program if required.

The 0201 is designed in response to modellers' suggestions for a simple one-operator controller. It would be possible to have more than one 0201 in operation, but each controller has to have the specific LCUs assigned to it, e.g. locos 1, 4 and 5 on controller number 1 and locos 2, 3, 6, 7, 8 and 9 on controller 2. In this case each 0201 cannot access the other's LCUs.

Does this mean that the Protocab Concentrator is not now necessary?

Far from it! The 0201 is intended for the small layout, limited to 9 locos, typically operated by one modeller and with very basic controls. The Concentrator takes the Protocab user into the next stage where, for example, the layout requires multiple operators (as in a club or exhibition situation), where advanced control and characterisation facilities are required, or where the controller is a smartphone or tablet. The 0201 can then be configured to act as a controller to the Concentrator rather than operating directly to the loco.

Development and testing of the

Concentrator will be fully resumed as soon as the 0201 is available for sale.

When will the 0201 be available?

The 0201 is technically ready now. But we have final tests to complete and obtain the certification that enables us to include the CE, FCC, RoHS etc quality marks. We are inviting beta testers now (see the article further in this newsletter).

Will I need a Wi-Fi router to operate the 0201?

No, the 0201 communicates directly with the LCU using the IEEE 802.15.4 wireless standard.

As an aside, then, why does the Protocab Concentrator need a Wi-Fi router?

..because the intended control devices such as a smartphone or tablet normally communicate using Wi-Fi (the IEEE 802.11x standard). The Concentrator means that we can adopt different wireless standards as they become available in future without having to change other network standards. This is known as *protocol conversion*. Advanced control features, including simulations, are typically best made available through smartphones or tablets with the Concentrator handling much of the processing. The Concentrator also acts as the 'traffic regulator' where more locos are in operation than the 0201 can handle, or there are several operators. There are many more features on the Concentrator which will be described as we finalise developments.

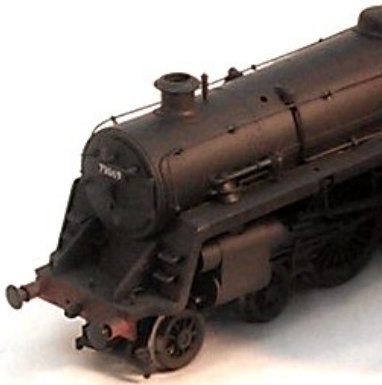
The Final Furlong!

After two and a half years since we first showed Protocab, and over 8,000 hours of development, we are nearly there! In this newsletter, we are announcing the beta test during which modellers outside of Acc+Ess are to test the system before we finally release it for production. We are grateful to everyone's continuing support and patience and gratified by the supportive comments we receive. It's true to say that we *could* have had something available a year ago, but thanks to modellers'

feedback and input, the Protocab product we are about to release is a world away from our early prototypes.

We have attended the spring events - Scalefour North in Wakefield and ExpoEM in Bracknell - and the first of the autumn events - ExpoEM North in Manchester - as a result of which Club Protocab now has many new members whom we warmly welcome. It's very interesting to hear difficulties that modellers
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Class 5 Surprises!



When we first developed Protocab, we knew that the available battery technology would be the other limiting factor along with the size of components we can fit inside the loco. We therefore suggested that you install the *largest* battery that your space would permit. We had not really done extensive tests on how long the batteries inside 'Lady Emily' (currently in works for a refit), the SR Q and GWR Grange and others would last. We just knew that they would run all day at an exhibition, get refilled overnight and then we would take them back to Caithness and there would still be life available. It was at the Caithness Science Fair back in March that we had cause to investigate further.

The Mainline Warship 'Hermes' (vintage 1980?), fitted with a 1901-1970 battery was put to the extreme punishment of around 100 very young people running the loco up to full speed and then stopping it suddenly, reversing it, top speed, sudden stop.... The loco was running for five hours, virtually without stopping, and when we took it back home we got at least another three hours out of the same battery.

This wasn't supposed to happen. Our readings on the motor gave a stall current of around 800mA and we have always used a 50% running current as the average. We estimated therefore that the battery should have given around four and a half hours (2,200mAH reduced by 10% for the current draw from the LCU and LIU, say, 2,000mAH divided by 400mA (50% of 800mA)). This gives a potential of 5 hours, but because the LCU/LIU cuts off above the minimum discharge voltage to provide a safety margin and to prolong the life of the battery, we estimated four to four and a half hours from the full charge. But certainly not nearly eight hours!

We ran 'Hermes' with four Mainline BR Mark 1 coaches and measured the running current at moderate speed not at 400mA but at less than 200! Given that this motor is fairly basic and around thirty years old, we could expect even better results from a more modern motor.

With that in mind, we took a very new but second user Bachmann BR Standard Class 5 and looked inside to see what sort of room we had available. As usual, the large chassis gave no room for the LCU or LIU and the boiler was too small a diameter for our standard cylinder batteries. But what about the tender? The BR1D looked capacious so it was judiciously taken apart. Interestingly, Bachmann have used a BR1 tender as the basis of the model and glued the larger sides of the BR1D on top. To get the maximum volume inside the tender, the moulding of the BR1 was cut out - carefully! The body gives a maximum width of 30mm, so the plan to adopt lithium polymer (LiPo) flat form batteries in due course was brought forward. We ordered up a 48mm long 30mm wide LiPo and connected up the LCU and LIU which all fitted neatly inside the tender cavity. Now the acid test. This battery is only rated at 950mAH, less than half the 1901-1970, so it would be interesting to see how long it would last inside this large loco. Four hours later with five Bachmann Mark 1 behind (admittedly very free running bogies), the train was still going strong. We managed to get just over 250 minutes out of the one charge. The multimeter registered stall current of 400mA and a running current of 150mA.

The important thing is that apart from the surgery in the tender, we only did three things to the loco itself: remove the pickup wires from the motor and solder the Protocab wires and the noise suppressor to it. The two wires to the motor were run back to the tender and simulate the water and vacuum brake pipes.

We showed the loco and train at ExpoEM and Scalefour North and on both occasions, added the four coaches from 'Hermes' for the final half hour of 9 bogies at 50 scale mph! We are revising our recommendation for the batteries and we will be doing a lot of tests with smaller batteries. After all, we haven't come across anyone yet who needs eight hours

THE FINAL FURLONG!

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have with conventional and even modern control systems and how much we have forgotten when we were building model railways before we had Protocab to play with.

The Brighton 75A demo layout is coming on well, and the latest news of developments will be described in the next newsletter. The other conversation we have with modellers is how many additional features they want from Protocab beyond the Pilot Series. We want to provide them as soon as possible, but Rome, as they say, wasn't built in a day! We have some ways to discuss with you to accelerate the development programme and we invite your ideas to add to our own.

from their locos before recharging! Needless to say, until we carry out many more tests we can't say that this is the sort of battery life you will get because different locos will draw different levels of power. But performance so far is encouraging.



Protocab

on Twitter and Facebook

We are inviting Club members to 'follow' Protocab on Twitter and Facebook. Simply look for @protocab on Twitter and /protocab on Facebook, add us to your follow list and every day or so we'll be adding notes and updates.

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Getting ready for 'beta'

If the 'alpha' testing is what we do inside Acc+Ess lab, then 'beta' testing involves modellers outside the company getting hold of pre-production components and testing them on our behalf. When we first showed Protocab at Wakefield in 2012, a number of modellers offered to be beta testers. Since it's now two years on, we are looking for Club members to help us to carry out the beta test. At the moment, we expect the test to be carried out over a two week period, currently from mid-late October, but the actual test dates are to be confirmed.

The purpose of the beta is to carry out tests in real life situations outside the lab. In other words, Protocab should work out of the box as it will when purchased by modellers.

We are testing the functions of the system, not how easy or otherwise it is to install in a locomotive. This is because we can't say which locos the modeller will want to have the system installed in, nor how they will locate the components.

We'll supply beta testers with pre-production units, the 0201 Direct Controller, one LCU, LIU and PCU and a battery.

Beta testers have to provide a locomotive to install the component. The locomotive doesn't have to be

any particular type, model or scale. We are not testing the fitting of components inside the loco as this will vary from modeller to modeller. All that is required is for the pickups to be unsoldered from the motor terminals and the Protocab wires soldered instead. Of course, you don't even need track, but it will help! After the test, the pickups can be restored to the loco motor. Beta testers won't be charged for the equipment and we will provide a pre-paid package for the equipment to be returned.

It is important that the tests are carried out over a specific two week period, as we will be manning a beta test help desk during that time. Another requirement of beta testers is that they have a personal computer and an email connection so that we can download any updates that occur during the test. We also ask for email feedback.

We'll provide full instructions on how to conduct the test which includes test report forms to be completed. If you would like to participate in the beta test, do please email club@protocab.com. We are hoping for around six modellers to participate in the test, so we'll email you in return the full terms of the test and an application.



One of the many positives of the Protocab wireless approach to loco control is the time saved in layout construction, especially for complex pointwork. With this assembly completed, there are now only five more turnouts to construct out of the 28 required for the 75A Brighton layout. Tony says: "Although the track has long been lifted, assembling Brighton MPD has been an interesting experience as these tracks as so familiar from all those years ago spent trainspotting every Saturday morning."

Martin Wynne's Templot provides the wherewithal to achieve the very odd angles of the irregular double slip and maintain the geometry, as well as preserving the pleasing curvature of the trackwork. Alan Austin's (AMBIS) point blade stretchers are used to advantage and are extended beyond the stock rail to move the blades in prototype fashion. The double slip required sixteen stretcher brackets, and a very strong pair of Optisor magnifiers!

Even without point motors in place (the above assembly is still on the workbench), a Hymek has been used to test point blade clearances and, of course, the rail heads did not require cleaning.

The assembly took around six weeks to complete working at around five to six spare hours a week.

A Postscript for the 0201

If you are coming to Scaleforum, we'll have a mechanical prototype to show you the look and feel of the 0201, and we will welcome your comments. By then, we should have finalised costs and have a good idea of the likely price.

We have already been asked if the 0201 can work with layouts other than Protocab and we have had to reply that it can't. Although the output uses the 802.15.4 network, the actual data stream that it communicates with the locomotive is specific to Protocab. This includes a number of security features which, among other things, prevents your loco from doing its own thing if radio communications are temporarily lost or if the 0201's battery runs out while a loco being controlled by it is on the move.

In that respect, the 0201 acts very much like a Protocab Concentrator, and, indeed, the same LCU/LIU will

operate with either the 0201 or a Concentrator.

If the battery on the 0201 *does* run out, you can connect the charging cable to the 0201 and carry on operating while the 0201 battery is recharging. In that case, you are now tethered to the cable, but if this is a problem, one option is to use a third party portable battery pack. We use a 'Pebble', but there are others around that also supply the required five volts through a USB cable. Having said that, we expect the battery to last on a full charge for several hours, the actual performance is still under test.

In conclusion, the 0201 gives you the advantages of being able to get up and running quickly with Protocab if you have fewer than ten locos and are not looking for the full features of Protocab that will be available with the Concentrator. We hope you like the 0201 Direct Controller!