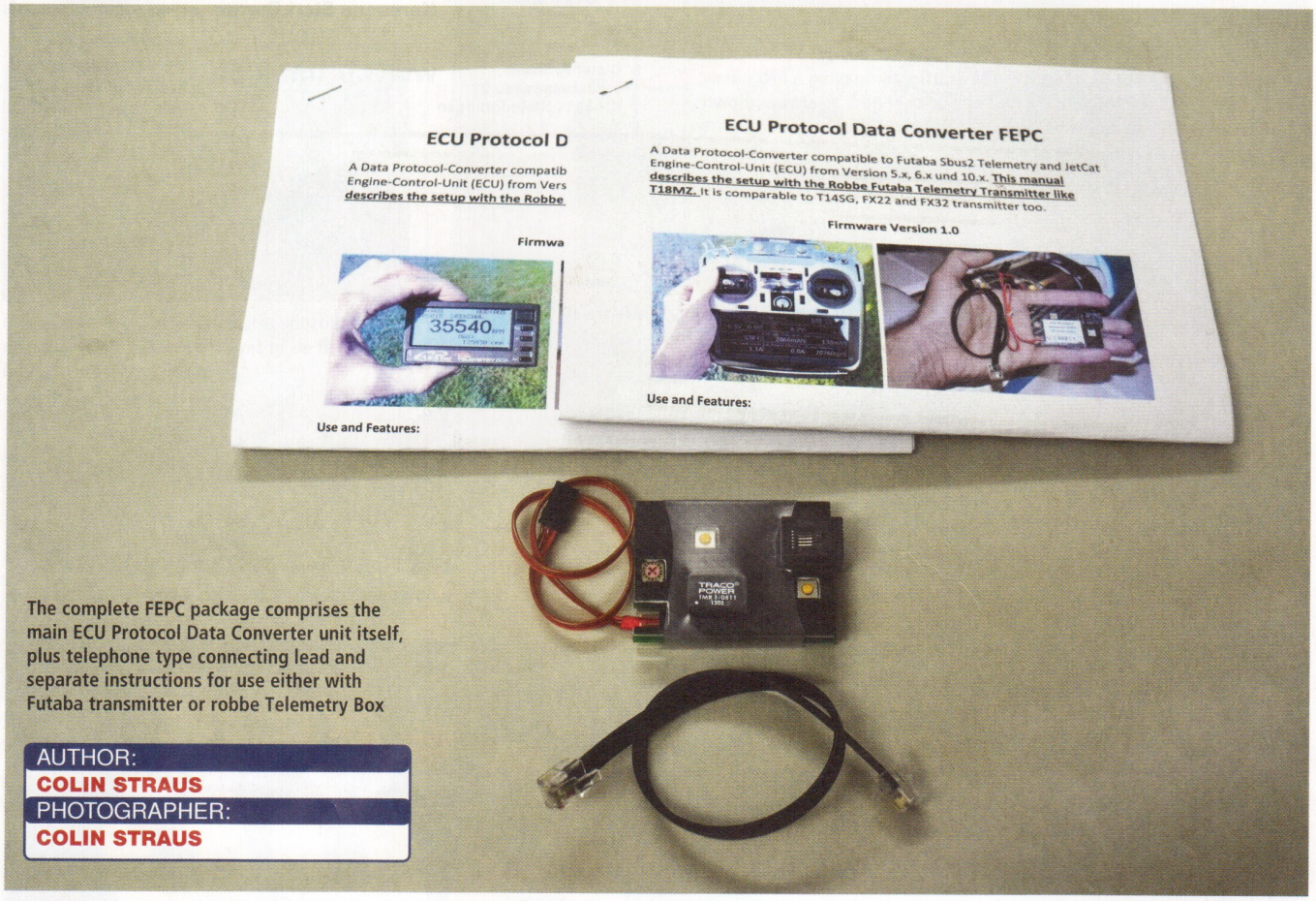
ECU Protocol Data Converter FEPC

Colin Straus takes a look at a new and very useful bit of telemetry kit from CB Elektronics



The complete FEPC package comprises the main ECU Protocol Data Converter unit itself, plus telephone type connecting lead and separate instructions for use either with Futaba transmitter or robbe Telemetry Box

AUTHOR:
COLIN STRAUS
PHOTOGRAPHER:
COLIN STRAUS

Over the last couple of years on-board telemetry systems have seen dramatic developments, and have progressed from being an occasionally seen technical rarity to the stage they are now of ever increasing acceptance, with almost all new radio systems incorporating some kind of telemetry.

Most of the systems require individual on-board sensors to provide data on specific parameters, for example airspeed, height, position etc., and most of these sensors are available from the mainstream radio manufacturers, but when more jet specific data is needed there has been a lack of the required sensors or interface, particularly when it comes to providing real time data on the turbine and associated parameters.

Well this is no longer the situation with the release of the ECU Protocol Data Converter FEPC, from CB Elektronics, Germany, which has been developed to enable data from JetCat ECU's V5.x, 6.x and 10.x to be transmitted via Futaba's S-Bus2 telemetry system to 14SG, 18MZ, FX22 and FX32 transmitters.

What You Get

Supplied in the package is the FEPC unit which comprises a main PCB sandwiched between a fibreglass sheet and what appears to be a piece of carbon fibre, and which measures 60 x 44 x 18 mm (at its deepest part), weighing 42 grams without the included ECU interconnecting lead.

Also supplied were two sets of clearly written English language instructions, one for use with suitable Futaba transmitters and the second for the robbe Telemetry Box. The unit is suitable for use with receivers operating on anything from 4.5 V to 9.0 V, and offers galvanic separation of the ECU and Rx.

Connecting the unit up is simplicity itself, the ECU interconnecting lead plugs into the GSU port in the JetCat I/O board, whilst the JR type lead plugs into the S-Bus2 port of a Futaba FASSTest receiver.

It should be noted that when operating with version 5.x and 6.x ECU's it is not possible to have both the GSU and FEPC connected simultaneously, as the power supply of the ECU may be overloaded, however with version 10.x ECU's simultaneous operation of the Mini GSU and FEPC is possible.

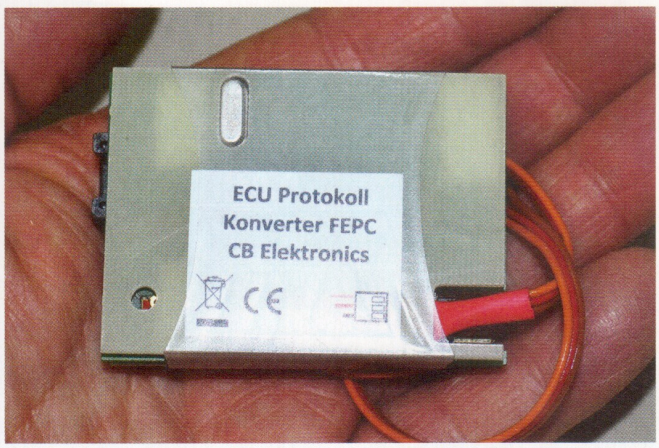
Operation

The FEPC unit operates by taking the information available from the ECU and converting it into data that can be understood and communicated via the Futaba Telemetry system, allowing it to be displayed on the transmitter LCD screen. This data includes:

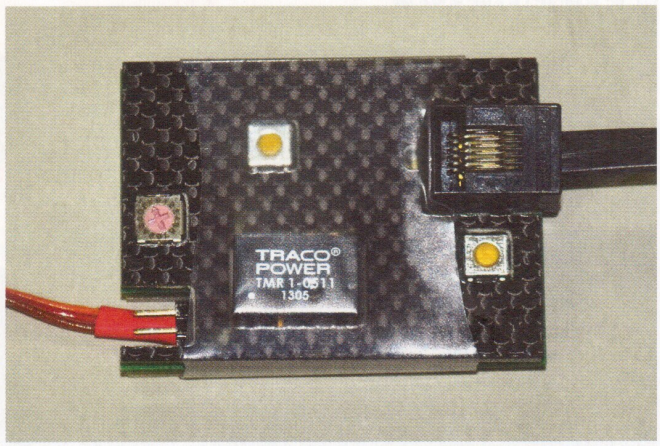
- ECU Battery Voltage – with Adjustable Low Voltage Warning
- Fuel Pump Voltage*
- EGT (Exhaust Gas Temperature in C°)*
- Turbine rpm*
- Fuel Level Remaining – with Adjustable Low Fuel Alarm
- Fuel Flow Rate*
- ECU Status
- ECU Last Off Condition

*Note that upper and lower Alarm values can be set in the transmitter.

Setting up the system is quite straightforward, just requiring the use of 8



Underside view of the unit showing the size and that the lower surface is produced from a fibreglass laminate



Top view of the unit, the telephone type connector and JR type lead for connection to the S-Bus2 port of the receiver can be seen

slots of the 31 available in an 18MZ transmitter, these being set to the specific sensor type/number needed, so for example the first slot utilises TEMP125-F1713, the next three have CUR-F1678 etc.

Once this has been done each of these sensors requires naming as required, but this must be done carefully as two of the sensors emulated cover three slots each, so that the name entered must cover all three, for example the first CUR-F1678 sensor type I have named STAT/VOLT/TANK where the first display is Turbine Status, the second ECU Battery Voltage and the third Fuel Volume remaining.

It is here that a limitation of the current Futaba software becomes evident, in that it is impossible to select a specific unit of measure, for example capacity, voltage, current etc., only the Futaba defaults being usable.

The outcome of this is some of the information is shown with correct units of measure, for example Turbine EGT is shown in degrees centigrade with the exact information, whereas the Turbine Status mentioned above is shown as x.xA, the ECU Voltage is correctly shown whilst the Fuel Volume remaining is displayed as mAh!

The instructions cover this issue in detail, and a laminated card is also supplied which allows the displayed information on Turbine Status and Off Condition to be deciphered, the remaining information being relatively straightforward to interpret, at least with the 18MZ I was using, however specific naming as detailed above is not possible with the current software of the 14SG, FX22 and FX32 transmitters, so deciphering the data will be a little more involved.

It is to be hoped that Futaba will allow more flexibility with the naming and measure of the telemetry data as part of their regular software update programme, so that this rather limited flexibility in the displaying of data will no longer result in such limitations.

With the transmitter settings completed the system was switched on and immediately data began to be displayed on the transmitter screen. The JetCat GSU was used to programme the fuel tank size into the ECU, as this is required if the fuel level is to be displayed accurately, after which the JetCat P180-RX I was using for the tests was mounted onto my test rig, and prepared for ground running.

The engine was started normally using the transmitter and the telemetry screen showed the increasing rpm and temperature figures as the engine went through its start-up routine. With the engine running at idle it was possible to see the real time fuel flow figure, as well as being able to watch the volume of fuel remaining in the tank reducing, once the engine was brought up to full power this became particularly noticeable!

Test

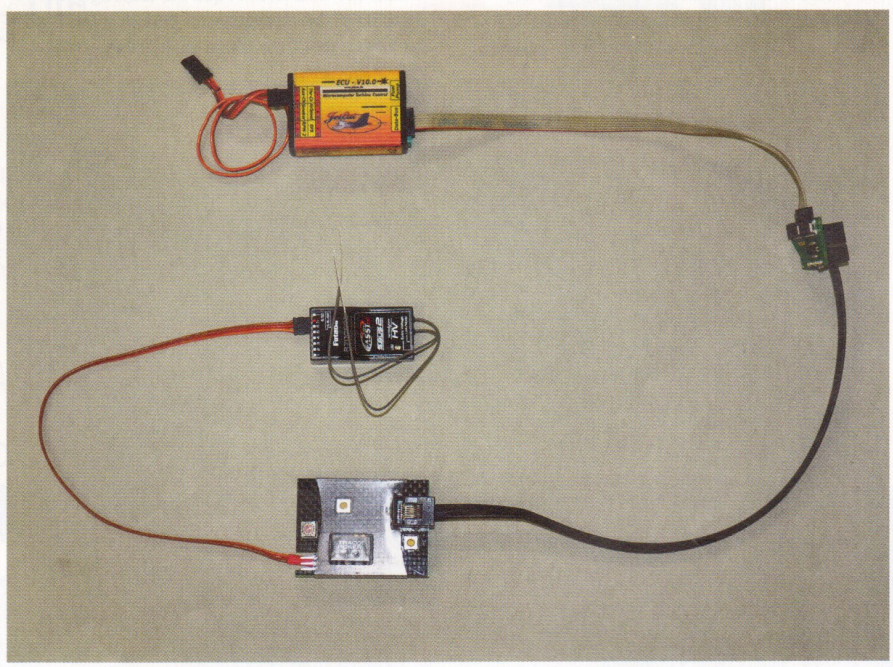
To check how accurate the fuel consumption data produced by the JetCat ECU and displayed by the transmitter was I ran a consumption test by running the engine through a simulated flight, with periods of full power, idle and then across the thrust range, with the fuel weight being recorded at start and finish, whilst at the same time noting the figures shown on the transmitter screen.

At the conclusion of this test the actual volume of fuel consumed was 2,222 cc, however the figure calculated by the ECU was almost exactly 10% lower than this at 1,992 cc. This result suggest that a couple of flights should be made when the system is first used, and a visual inspection made of the fuel remaining after each flight, this being compared with the data displayed on the transmitter, so that a safe total consumption level can be noted and then used for all flights from then on.

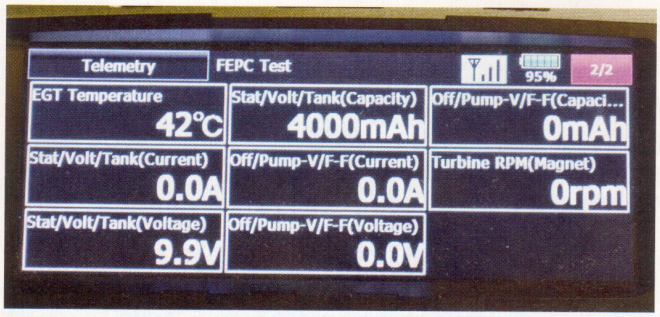
If for example a 3 litre tank is being used and the 10% error is taken into account, thereby making the volume being displayed as 2.7 litres, a safe, minimum fuel level in flight of say 0.4 litres might be adopted.

Of course it should be remembered that this error is nothing to do with the telemetry system, it occurs within the ECU, as this calculates the fuel burn dependant on the thrust level, temperature etc.

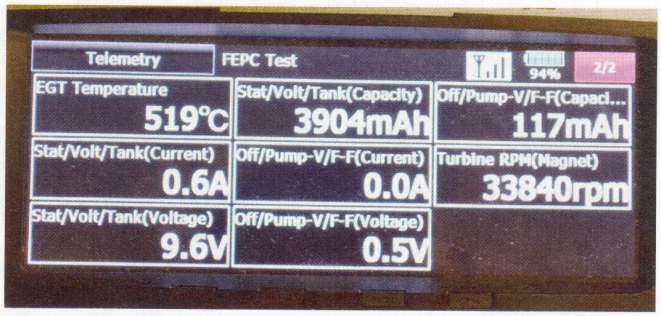
Particularly useful will be the alarm facility, which covers most of the individual data fields,



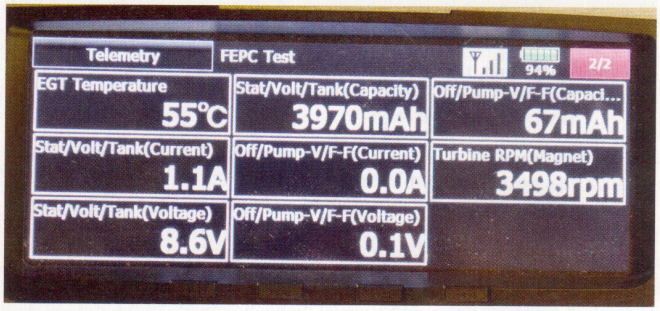
The simple connection arrangement of the FEPC unit is evident, just a single connection to the receiver and a second to the GSU connector of the ECU



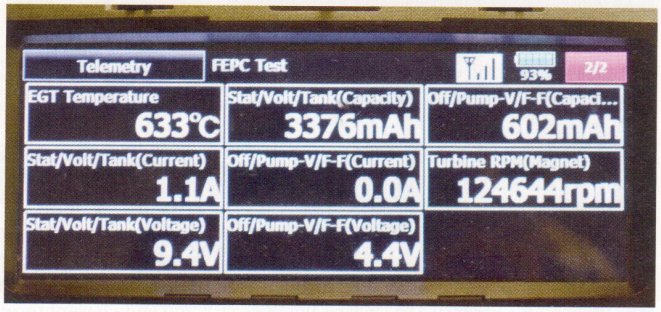
The telemetry screen on the 18MZ showing that the engine is not running, its temperature is 42°C (it had a test run earlier and had not fully cooled down), and that the fuel tank size has been set as 4000 cc



With the turbine at idle, the ECU voltage has recovered as the current reduces, and the rpm and temperature have stabilised, note also the amount of fuel consumed



Early on in the start sequence, and the engine is accelerating, the temperature increasing, whilst the ECU pack voltage is dropping as higher current is being consumed



Now at full power, the much higher fuel pump voltage is noticeable, as is the fuel consumption of 602 cc per minute (shown as mAh, see text for explanation)

many of these allowing both upper and lower alarm values to be set, for example the alarm on turbine rpm would be useful for most models, as this would give any immediate indication of a flameout, as the rpm dropped below the alarm rpm level selected, this being particularly useful for a twin engine model, utilising an FEPC unit with each turbine.

Of course the unit also enables audio information to be provided, this being quite simple to set-up on the 18MZ transmitter – during testing the turbine rpm and EGT were selected for this and the speech output cycled between the two parameters, the frequency this occurs can be set within the transmitter.

Of course any particular parameters can be selected for this audio output, with the most useful probably being the Fuel Volume remaining and then either the EGT or turbine rpm, as either of these would give useful information about the turbine's status.

Although all testing was carried out with my Futaba 18MZ, it should not be forgotten that the FEPC unit will also work together with the robbe Telemetry Box, using the R6308SBT receiver, enabling any Futaba FASST transmitter to be used. The Telemetry Box then shows a single data field on the screen, so it is necessary to scroll through the screens to obtain the data field required, although this does have the advantage of enabling the text to be larger, and thus more easily read.

LEFT: As an alternative to displaying the information on a transmitter screen, the robbe Telemetry Box may also be used, this allows use with a Futaba FASST transmitter and R6308SBT receiver

As well as the FEPC unit reviewed, CB Elektronics also offer other units to suit alternative radio systems:

HEPC	For Graupner/SJ HoTT radios
EMPC	For Multiplex MSB radios
JJXC	For Jeti radios

Conclusion

The FEPC unit from CB Elektronics as tested is a great boon to Futaba users with telemetry-enabled radios, as it enables real time and very valuable data on the critical power source of our models. I am sure that it will not be too long until units such as this become commonplace in jets, as our models tend to have rather heavy wing loadings, and with scale jets in particular, not much of a glide, so making reliable power even more vital.

The information provided by the FEPC should almost completely eliminate any possibility of running out of fuel without warning, and would give early warning of a flameout, perhaps enabling a safe landing rather than a desperate battle to extend the glide of a model that had already lost most of its airspeed before the flameout was detected. I look forward to more innovative electronic products in the future from this go-ahead company!

Contacts
www.cb-elektronics.de/Index%20english.html