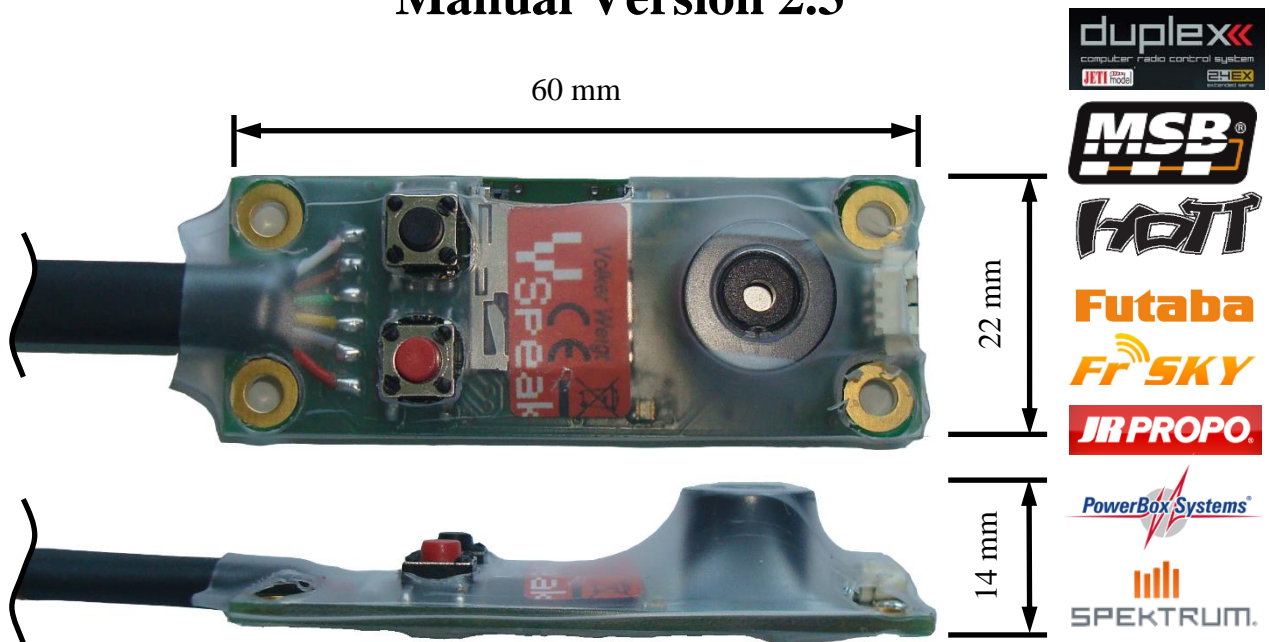




ECU2 converter HORNET

Manual Version 2.3



Introduction

The VSpeak ECU Converter for HORNET ECUs is emulating the IO-BOARD and the TERMINAL. Data, which is shown on the STATUS DISPLAYs of the TERMINAL can be sent via telemetry to the radio. To avoid unwanted electrical effects between the ECU and RC-system the VSpeak ECU Converter is galvanically isolated.

The ECU Converter can interpret and transmit data from the HORNET III and older HORNET II ECU.

The VSpeak ECU Converter can be software-updated by the user.

The current version has been tested with the following ECUs/Versions:

HORNET II V7.1B

HORNET III V2.5A

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1 Hardware

1.1 Description



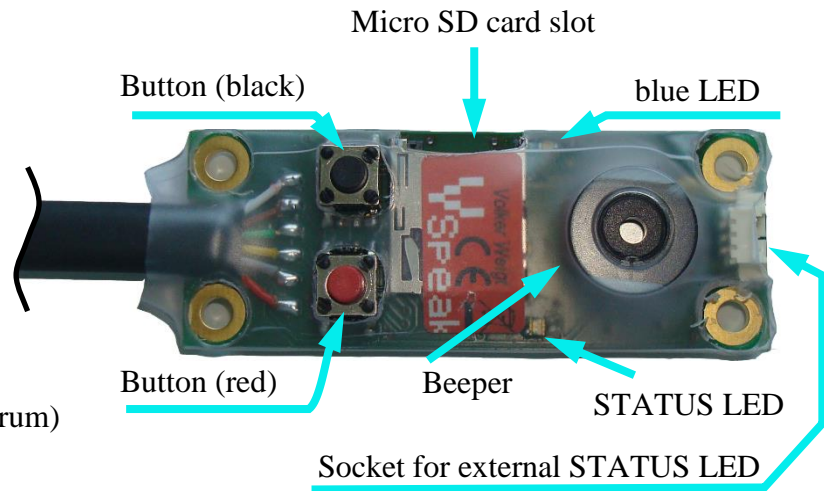
RJ12-Westernstecker



X-Bus-Stecker (only for Spektrum)



UNI-Servostecker (for Jeti / MSB / HoTT / Futaba)



Beeper, STATUS LED and function buttons work like the corresponding components on the IO- BOARD (please refer to the manual of the HORNET ECU for details).

The IO boards are available in different versions. The function of the black button of VSpeak ECU converter is associated with the manual pump control. The red button on the ECU converter is associated with the functions of the second button (at IO boards which are provided with 2 buttons).

On the VSpeak ECU Converter STATUS LED and function button has additional functions (see section 2.0 and 2.9.2).

The Micro SD card slot is used for updates.

The blue LED is blinking every second to signal the normal function of the ECU Converter.

1.2 Installation

The ECU Converter can be mounted inside the model with M3 nylon standoffs and screws or something similar. The optional available external STATUS LED can be mounted using the LED mount in trunk / cockpit etc.

1.3 Connection

The RJ12 Western plug has to be connected DIRECTLY to the "TERMINAL" socket on the HORNET ECU. Since the ECU converter simulates the complete functionality of the IO board and the TERMINAL, the IO board can be eliminated (weight saving).

- For Jeti Duplex, Multiplex (and ACT), HoTT, Futaba, FrSKY, JR PROPO and PowerBox the VSpeak ECU Converter is shipped with an 3-pin connector to connect to the telemetry port of the RC system.
- For Spektrum systems the VSpeak ECU Converter is shipped with a 4-pin connector for the X-Bus port of the telemetry module.

2 Telemetry

The voltage for the VSpeak ECU Converter is supplied by the HORNET ECU. As soon as you switch on the HORNET ECU and apply a valid signal to the throttle channel (either from the radio or a servo tester) you will get telemetry data. Otherwise no data is generated.

The telemetry of the ECU Converter can be used to switch between the systems Jeti Duplex EX, HoTT, Multiplex, Futaba, FrSky, JR PROPO and PowerBox. The ECU Converter for Spektrum comes with the special XBus connector, so no switching for another telemetry system is possible here.

2.0 Settings

The telemetry system can either be set using the button on the ECU converter or using the programming adapter available as an accessory and the HORNET Terminal. With the programming adapter, further settings are also possible.

2.0.1 Selection of the telemetry system (button, ECU converter)

When you turn on the Telemetry System is signaled by a LED for a period of 3 seconds. While the blue LED flickers, the STATUS LED shows the chosen telemetry system:

- green Jeti Duplex EX (s. section 2.1)
- red Multiplex (s. section 2.2)
- green (flickering) HoTT (s. section 2.3)
- red (flickering) Futaba (s. section 2.4)
- red (flashing) Futaba V10 (s. section 2.5)
- green (flashing) FrSky S.Port (s. section 2.6)
- red/green (flashing) JR PROPO (s. section 2.7)
- red/ red/green (flashing) PowerBox (s. section 2.8)

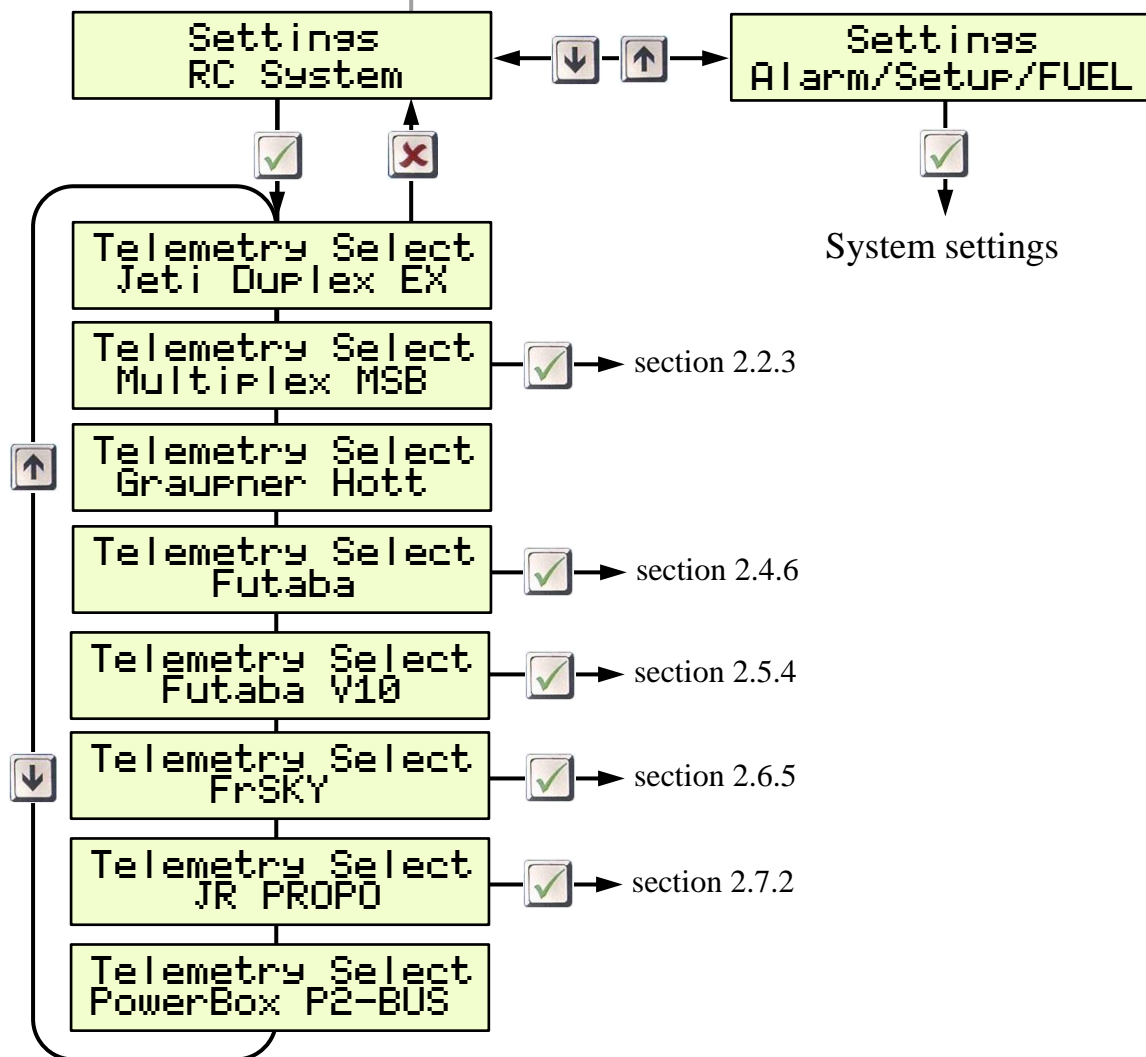
Double-click on the black function button (similar to the double click of a computer mouse), the telemetry system can be switched. This is acknowledged by the signal generator with a short sound (frequency up and down). At the same time, the LEDs indicate the newly recruited telemetry system. To preserve safety during the selection of the telemetry system, the ECU Converter does not transmit any information until a restart. The setting is saved.

2.0.2 Selection Telemetry system / System settings (programming adapter)

The telemetry system can be set using the programming adapter (see section Accessories) and the HORNET Terminal.

If the ECU converter, HORNET Terminal, receiver or turbine battery is connected to the programming adapter, the parameterization starts after a short initialization with a short display of the version number.

The handling of the Terminal is done in the usual way, parameter selection with , break / back with and change values with or . Each time the parameter is changed, the previously changed value is stored in the ECU converter.

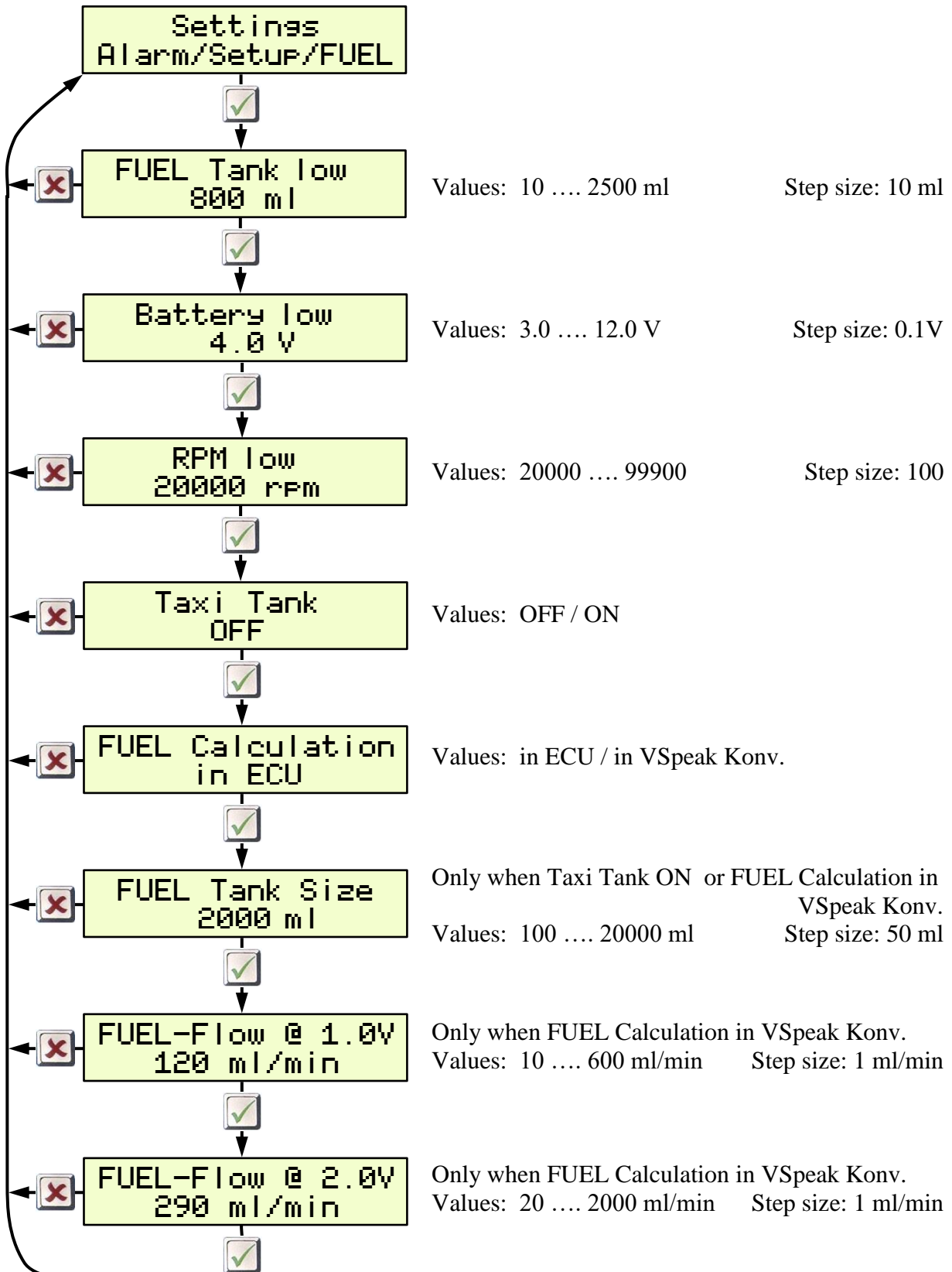


With Jeti, HoTT, and PowerBox all other settings can be made directly from the transmitter. For all other remote control systems further specific settings can be made (follow the respective section).

System settings

The System settings menu contains all the parameters that are effective for several telemetry systems (The parameters are largely self-explanatory, the set values on delivery are shown in the graphic):

Alarms: Lower values as "low" thresholds trigger alarms. The "low..." alarms are activated after at first exceeding the "Low ..." alarm threshold. The low RPM alarm ends at Pump = 0.0V, which means that these alarm is suitable for signaling a **turbine flameout**.



2.0.2.1 Option Taxi Tank

For models where a taxi tank is plugged into the main tank until the model is lifted off, set "Taxi Tank = ON". Then the tank volume of the main tank can be set at "FUEL Tank Size".

- If FUEL Calculation "in ECU" is set, then the tank volume in the HORNET ECU must be set to a value greater than the volume of the main and taxi tanks together.
- If FUEL Calculation "in VSpeak Konv. " is set, then the value set as tank volume in the HORNET ECU has no more meaning..

If the turbine is in the status "AUTO" or "AUTO-HC", then when THROTTLE = 80% is exceeded for the **second time**, the FUEL will "reset", ie the displayed FUEL is only once set to "full" (the value set at "FUEL Tank Size") again at this time.

2.0.2.2 Selection FUEL Calculation

Here you can choose whether the fuel consumption is calculated in the HORNET ECU - or in the VSpeak ECU converter.

- If "in ECU" is selected, the corresponding parameters must be set in the HORNET ECU, see section 2.0.3.
- If "in VSpeak Konv. " is selected, the parameters "FUEL Tank Size" and the characteristic curve parameters "FUEL-Flow @ 1.0V" or @ 2.0V pump voltage required for the calculation must be set in the VSpeak converter.

2.0.2.3 FUEL-Flow @ 1.0V respectively 2.0V

FUEL-Flow are the two parameters for the current fuel flow at 1.00V or 2.00V pump voltage.

The two parameters can be determined with the help of a flow meter - or, if you don't have one at hand, in the following way: You can run the turbine with 1.00 or 2.00V pump voltage for a period of 1 minute and measure it fuel used. A more precise result can be obtained by carrying out the measurement over several minutes and dividing the amount of fuel consumed by the number of minutes.

2.0.3 HORNET 3

2.0.3.1 Activation Wireless Telemetry

In order to transfer the turbine battery voltage BATT and the fuel consumption FUEL, the "Wireless Telemetry" must be activated in the HORNET3.



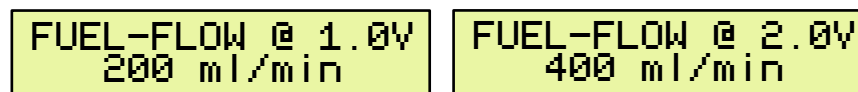
A repetition rate of 5x / second is completely sufficient.

The settings for "COM-CHANNEL" are not relevant for the ECU converter.

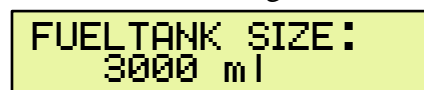
Attention: If the ECU is switched on without the VSpeak converter, the ECU automatically sets WIRELESS to OFF. This means that whenever the terminal is plugged into the ECU, "Wireless Telemetry" must be reactivated as the last step.

2.0.3.2 FUEL consumption

The fuel consumption is calculated **in the HORNET3** on the basis of the relationship between the pump voltage and the resulting fuel flow. All adjustments related to this must be made **in the ECU HORNET3**



These two parameters are decisive for the accuracy of the fuel consumption measurement. If the values have not already been set by the turbine manufacturer, these can be easily determined by running the turbine at 1.0 or 2.0 V pumping voltage for 1 minute and measuring the fuel consumption. A more accurate result is obtained by performing the measurement over several minutes and dividing the amount of fuel consumed by the number of minutes.







To the FUEL TANK SIZE an alarm can then be generated in the VSpeak-ECU converter to the "reserve" warning threshold which can be adjusted there.

2.0.4 HORNET 2 - Limitations

If you connect a HORNET 2 to the VSpeak ECU converter, there are some limitations:

- The ECU itself has no fuel consumption calculation, i.e. if you want a FUEL display, the "FUEL Calculation" parameter must be set to "in VSpeak Konv." and the associated parameters (see section 2.0.2.2).
- There will be no value for throttle transmitted. The value is set to "0".
- Battery and Pump Voltage are only refreshed, if the following symbols are on the HORNET STATUS DISPLAY in front of the voltage.

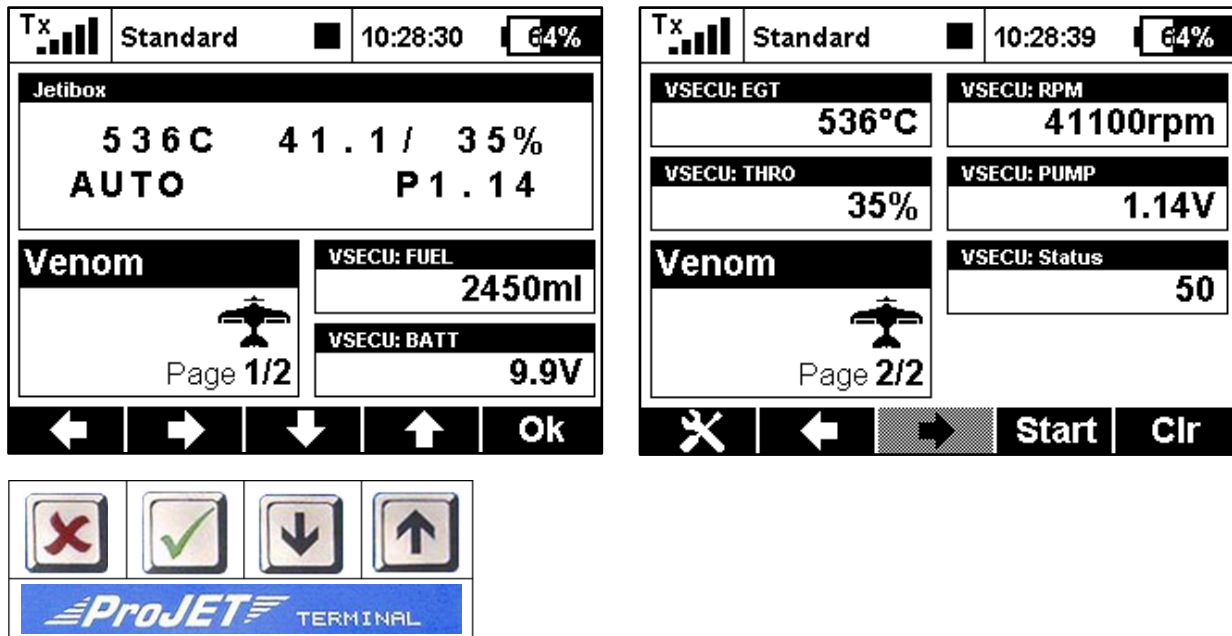
- Battery Voltage:  ,  or 
- Pump Voltage: 

2.1 Jeti Duplex EX

2.1.1 EX-data DC/DS-radio

The EX-Protocol is partially backwards compatible. On older non-EX devices you get only Jetibox functions. On EX devices like the DC/DS radios and the Jeti "Profibox" you get additional data.

(VSECU ... VSpeak ECU Converter):



































2.1.2 Jetibox

On the Jetibox all data of the HORNET ECU normally displayed on the TERMINAL are shown (except characters that cannot be displayed on Jeti Systems).

Furthermore you can use the Jeti-keys to edit all values available on the TERMINAL. Please refer to the HORNET ECU's manual.



2.1.2.1 Special Characters

The TERMINAL supports some special characters which cannot be displayed on Jeti-systems. Please refer to the following table how these characters are "translated":

		
		battery full
		battery normal
		battery empty
		Glow plug defective
		Temperature sensor defective
		Pump running / Pump voltage
		switch operation
		unit "°C"
		unit "ml"
		button "up" (eg in test menu)
		button "down" (eg in test menu)
		button "Enter" (eg in test menu)
		"empty" Bargraph HORNET III Voltage/Fuel
		"full" Bargraph HORNET III Voltage/Fuel
		Ignition

2.1.2.2 Turbinestatus – numerical Values

The turbines status messages are also displayed numerical values. The assignment is given in the following table.

		Status
DEV.DELAY	-	30
EMERGENCY	-	10
OFF		0 1 (Throttle =OFF)
COOL-DOWN		10
SLOW DOWN		20 - 20 (Throttle =OFF)
STANDBY		30
PROP IGNIT		31
PROP-HEAT		32
PUMPSTART		33
BURNER ON		34
FUELIGNIT		35
FUELHEAT		36
RAMP DELAY		37
RAMP-UP		38
STEADY		40
CAL IDLE		41
CALIBRATE		42
WAIT ACC		43
GO IDLE		44
AUTO		50
AUTO-HC		51

If for Status the value of the lower alarm threshold is set to e.g. -15, then it can be used to signal a alarm for a "flame out".
SLOW DOWN = (minus) 20 can only occur in Throttlevalues between 0 and 100% - but NOT at Throttle = "OFF".

These status values can be used in Jeti radios, e.g. in logical links, or in LUA-supported radios for LUA scripts.

In addition to the status messages listed above, the following messages can also be displayed in the Jetibox:



Contact problem with one or both external contacts of the 6-pin telephone cable - or - WIRELESS TELEMTRY not set, s. section 2.0.3.1







Contact problem (loose contact) with one or both external contacts of the 6-pin telephone cable





Contact problem (loose contact) with one or both innermost contacts of the 6-pin telephone cable

2.1.2.3 Alarms / Parameterization

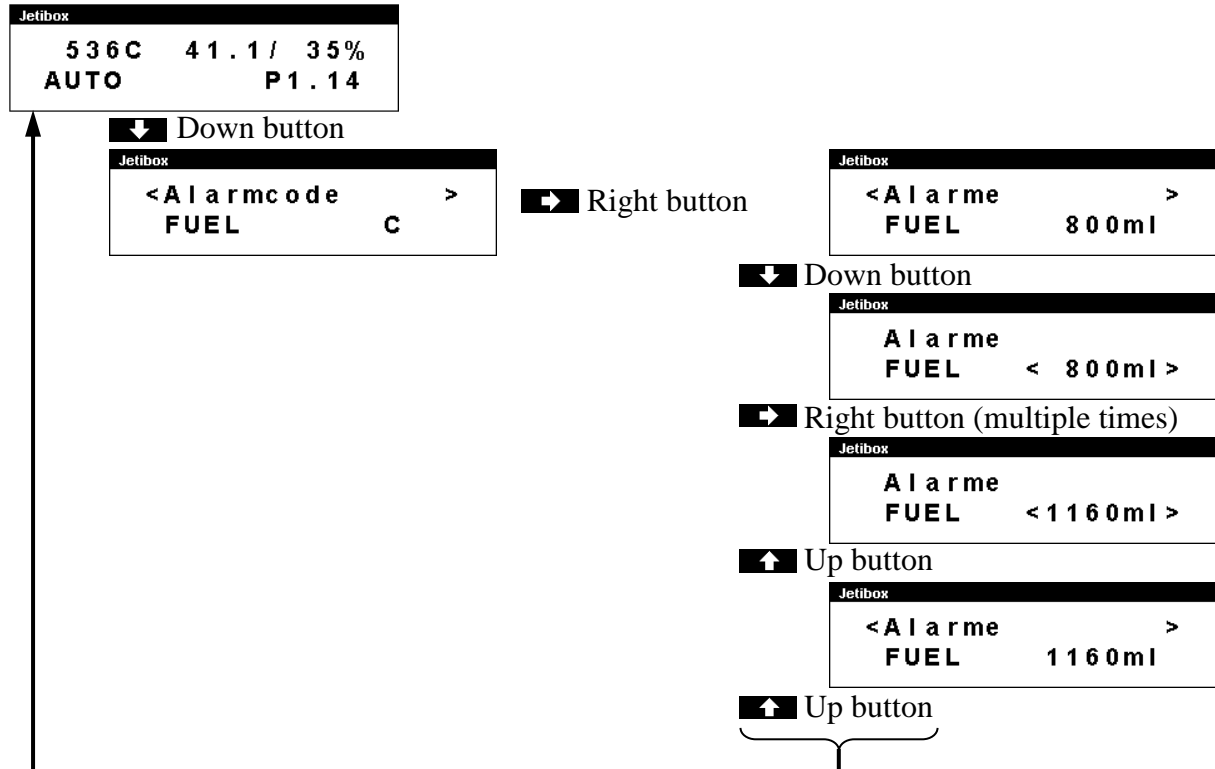
From the STATUS DISPLAY 1, the parameter display can be accessed by pressing the  Down button.

With the  Up button the parameter display will left (..to STATUS DISPLAY 1). Within the parameter display you can scroll with the  Right button - or -  Left button between the parameter groups "Alarme", "Alarmcode", "Taxi Tank", "Fuel Calculate", "Fuel Tank Size", "F-Flow/Pump-V" and "ECU-EX-Name".

When the desired parameter group is selected, the parameter can be changed by using  Down and  Up button.

Value changes are made with the  Right button – or-  Left button

Example of parameter selection and parameterization:



Parameter group	Parameter	Value range	Step size	Set-Value (Default)
Alarme	FUEL	10 ... 2500 ml	10 ml	800 ml
	BATT	3.0 ... 12.0 V	0.1 V	4.0 V
	RPM	20.000 ... 99.900 rpm	100 rpm	20.000 rpm
Alarmcode	FUEL	A, B, C, . . . , X, Y, Z		C
	BATT			U
	RPM			V
Taxi Tank		OFF, ON		OFF
Fuel Calculate		ECU, Konv.		ECU
Fuel Tank Size		100 ... 20.000 ml	50 ml	2000 ml
F-Flow / Pump-V	@ 1.0 V	10 ... 600 ml/min	5 ml/min	120 ml/min
	@ 2.0 V	20 ... 2.000 ml/min	5 ml/min	290 ml/min
Jeti-Sensor	EX Name	VSECU, L-ECU, R-ECU, 1LECU, 2RECU		VSECU

The description of the parameters **Taxi Tank**, **Fuel Calculate**, **Fuel Tank Size** and **F-Flow / Pump-V** can be found in sections 2.0.2.1 . . . 2.0.2.3

The rotation speed monitoring is activated by reaching the AUTO status and deactivates when the pump voltage reaches 0.00V. A speed alarm can signal a "turbine flameout".

In a 2-turbine model 2 VSpeak ECU converter can be used on Jeti Systems via an expander or CentralBox. The EX names are:

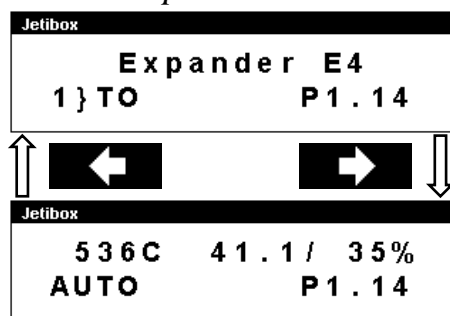
"1LECU" for Left turbine ECU on input 1 and

"2RECU" for Right turbine ECU at the expander input 2.

If a value reaches the alarm threshold, the alarm code is signaled or a speech output of the associated alarm code.

Prolonged alarms are repeated only three times.

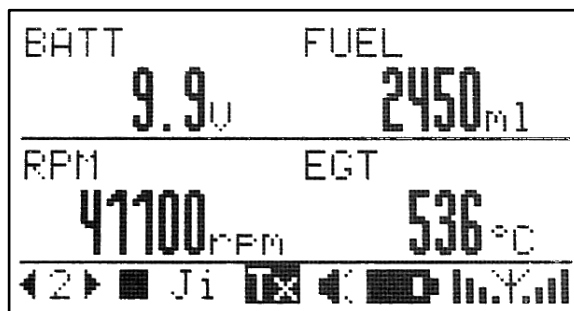
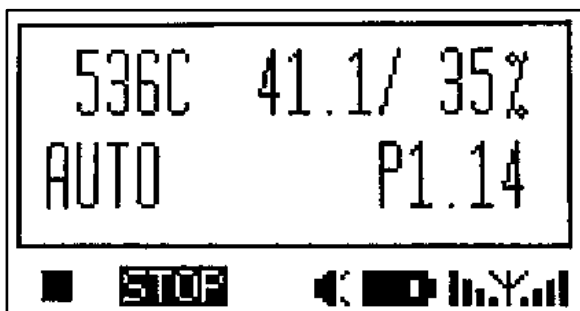
2.1.2.4 Expandermenu



If the VSpeak ECU Converter is connected to an Expander or Centralbox and the ECU Converter display is activated with the Right button, the only way back to the expander menu is pressing Left button in STATUS DISPLAY 1.

2.1.3 Profibox - autonomous telemetry system for HORNET-ECU

Using a Jeti Profibox incl. RSat receiver and the VSpeak ECU converter the telemetry data from a HORNET ECU can be transferred completely self-sufficient to the pilot. Not only the settings using the Profibox can be made, as was shown in the previous chapters - all EX-data and the important alarms are displayed: fuel level, ECU battery voltage and minimum rotation speed are given as voice messages again.





2.2 Multiplex MLink (MSB)

The MSB (Multiplex Sensor Bus) is only uni-directional. You can only see the telemetry data, but you cannot change parameters of the HORNET ECU.



2.2.1 Adress-Assignment

The VSpeak ECU Converter at delivery uses following addresses:

	 address	comment
	2	Pump Voltage in V
FUEL Alarm	3	Fuel Level in ml *)
EGT	4	Exhaust Gas Temperature in °C
RPM Alarm	5	Turbine RPM
BATT Alarm	6	Battery Voltage in V
Status	7	Turbine-Status (non on evo and royal)
THRO	8	Throttle Value in % *)
FUEL in percent	9	Fuel Level in % *)

*) Throttle not on HORNET 2

For the values marked "Alarm" in the above table, alarm thresholds can be set using the

	
AUTO	RUN (reg.)
AUTO-HC	RUN ...
BURNER ON	PreHeat1
CAL IDLE	LearnLO
CALIBRATE	LearnHI
COOL-DOWN	Cooling
DEV.DELAY	
EMERGENCY	
FUELHEAT	PreHeat2
FUELIGNIT	Ignite...
GO IDLE	Stabilise
OFF	-OFF-
PROPHEAT	PreHeat2
PROP IGNIT	Ignite...
PUMPSTART	MainFStrt
RAMP DELAY	AccelrDly
RAMP-UP	acceler.
SLOW DOWN	SlowDown
STANDBY	Stby/START
STEADY	Stabilise
WAIT ACC	acceler.

HORNET Terminal (s. section 2.0.2).

Furthermore, the MSB addresses can be set arbitrarily with the help of the HORNET Terminal (s. section 2.2.3), an address double assignment within the ECU converter is excluded.

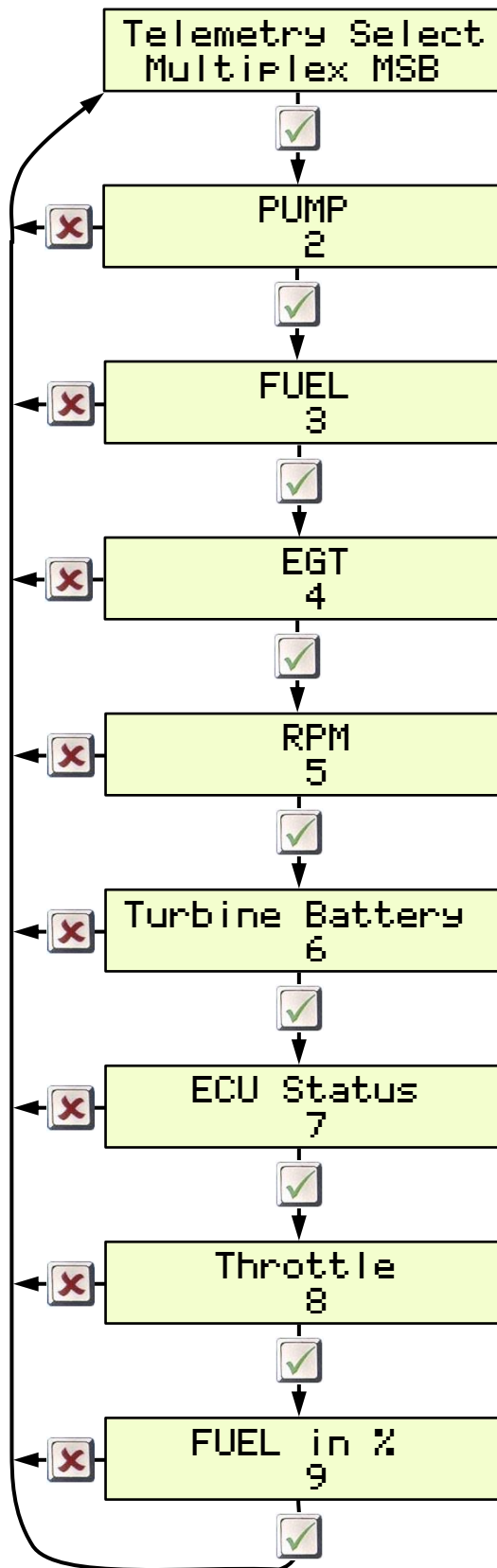
2.2.2 Turbine-Status

To display the turbine status there are various preset messages in the radio or in the external display. These do not match the normal ECU messages 1:1, so the closest match has been chosen. Please refer to the table on the left.

For HORNET status messages without a corresponding MSB message (grey fields in the table) the last message is shown until a new message, which can be translated, is shown.

2.2.3 Setup

With the help of the HORNET Terminal, the MSB addresses can be set arbitrarily - an address duplication within the ECU converter is excluded. Values that should not be displayed can be set to "OFF".



2.3 Graupner HoTT

Using the HoTT System there are 2 ways to transmit telemetry data, on the one hand as „text“ and on the other hand only the pure values.

Using text mode it is possible to establish a bi-directional data transfer, meaning you can use the keys of the radio or the Smartbox in order to change/enter values in the sensor. Using speech output is not possible in this mode.

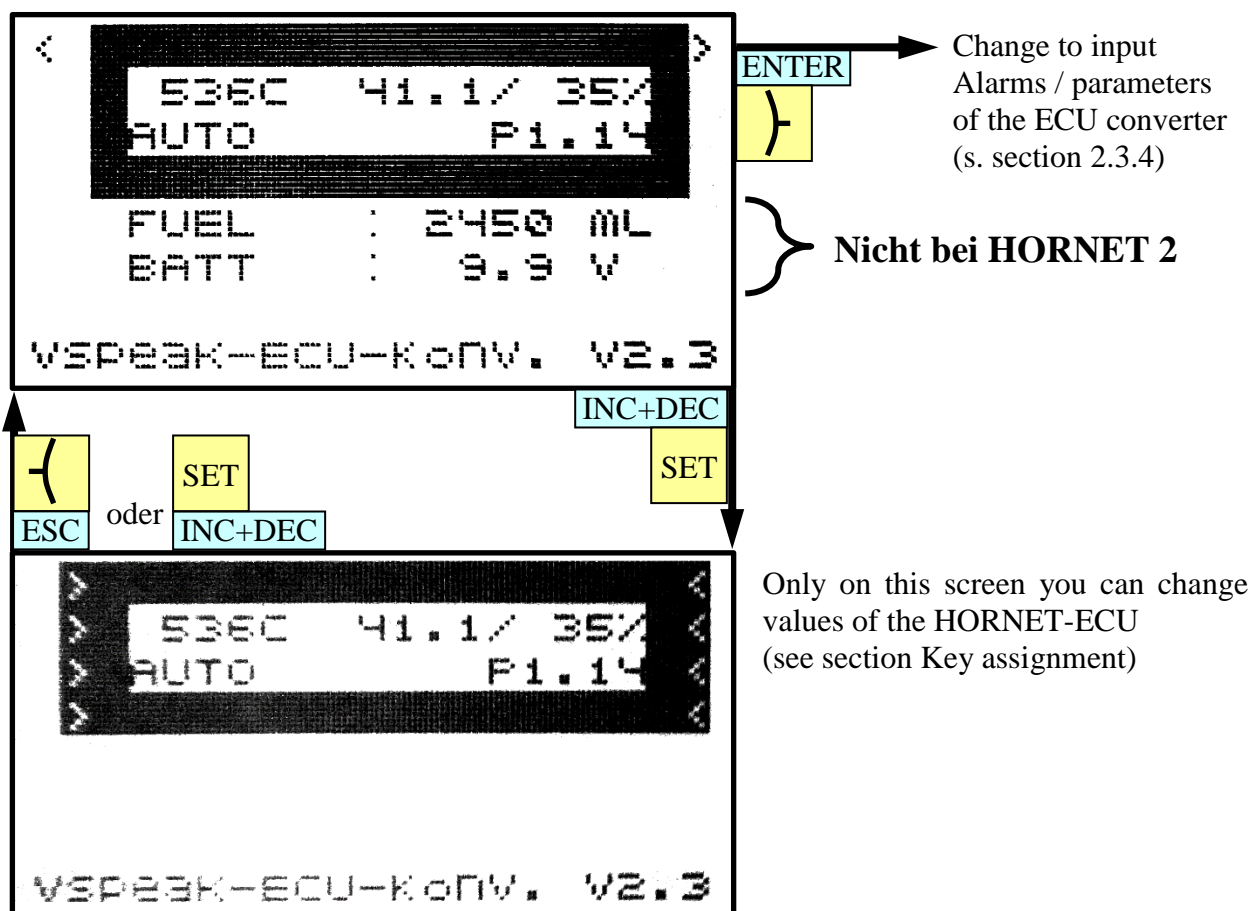
In data-mode the values are only transmitted in a fixed format in one direction. The format is defined by the sensor type. In this mode it is possible to have speech output for the sensor values.

2.3.1 Sensortype

The VSpeak ECU Converter for HoTT is a GAM (General Air Module) , a ESC sensor (Electronic Speed Control) , or a VAR sensor (Vario). Please select this sensor-type on your radio or Smartbox.

2.3.2 Textdisplay



































Using the text-display you can see the current HORNET-ECU data and you can also change parameters of the ECU.









With the HoTT-keys it is possible to emulate the full functionality of the TERMINAL. For further details on the specific values please consult the manual of the HORNET ECU

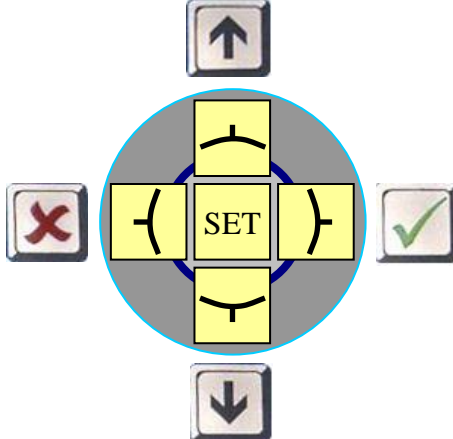
2.3.2.1 Special Characters

The TERMINAL supports some special characters which cannot be displayed on HoTT system. Please refer to the following table how these characters are "translated":

		
		battery full
		battery normal
		battery empty
		Glow plug defective
		Temperature sensor defective
		Pump running / Pump voltage
		switch operation
		unit "°C"
		unit "ml"
		button "up" (eg in test menu)
		button "down" (eg in test menu)
		button "Enter" (eg in test menu)
		
		"empty" Bargraph HORNET III Voltage/Fuel
		"full" Bargraph HORNET III Voltage/Fuel
		Ignition

2.3.2.2 Key assignment

				
	ESC	DEC	INC	ENTER

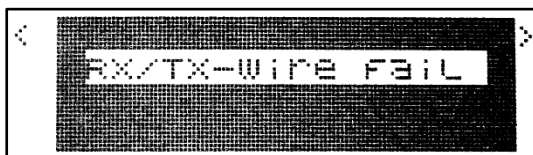
MX-12 MX-16 MC-16 MC-20 MC-32 ⋮	
--	---

2.3.2.3 Turbinestatus

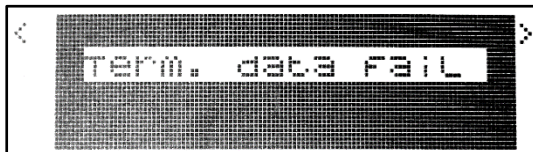
In addition to the status messages listed above, the following messages can also be displayed in the Jetibox:



Contact problem with one or both external contacts of the 6-pin telephone cable - or - WIRELESS TELEMTRY not set, s. section 2.0.3.1



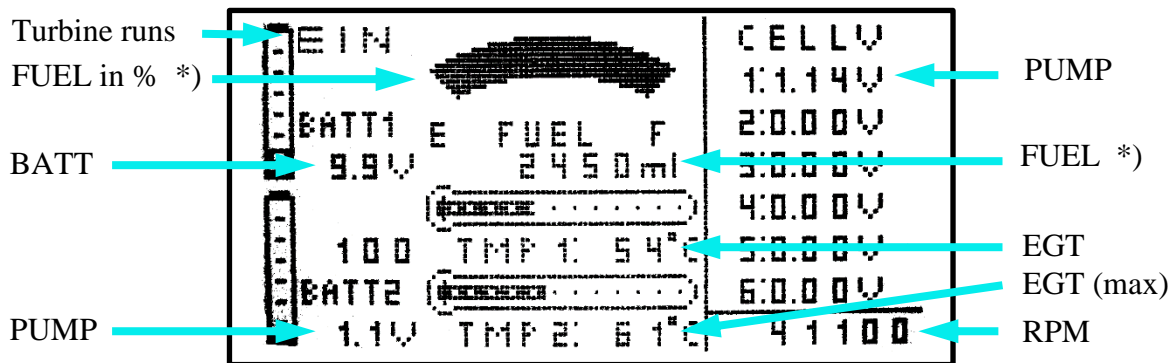
Contact problem (loose contact) with one or both external contacts of the 6-pin telephone cable



Contact problem (loose contact) with one or both innermost contacts of the 6-pin telephone cable

2.3.3 Data-Display/Speech

2.3.3.1 GAM - General Air Modul



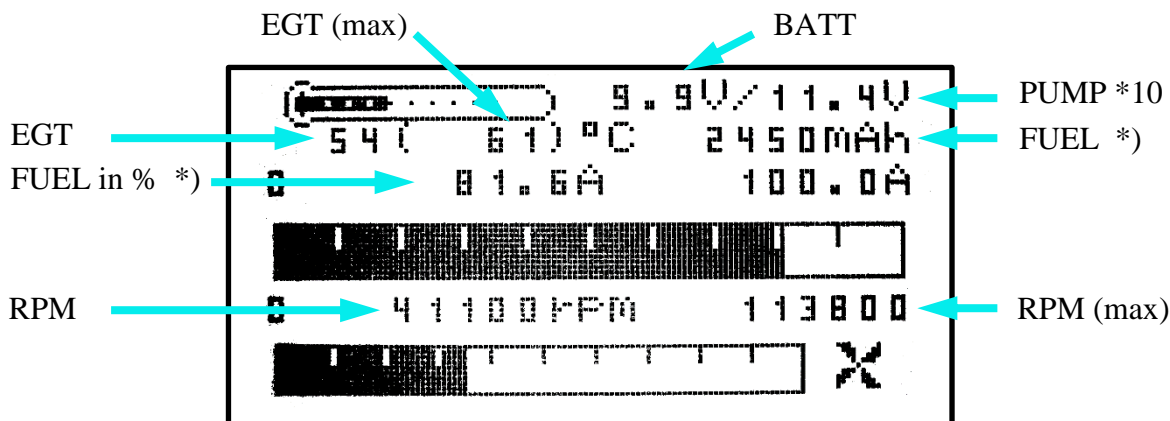
*) FUEL, and FUEL in % not on HORNET2

Since the GAM can only display temperatures up to 235°C, the temperature is divided by 10. If you see a value of 54°C on the display, you have a “real” temperature of 535-544°C.

The pump voltage is displayed as “Cell Voltage 1”, ranging from 0V up to 5.10V (accuracy 20mV). It is also displayed as “Batt 2” (bigger values than 5.1V possible, accuracy 100mV).

The fuel level is shown as gauge in % and as numbers in ml. The 100% value is set at startup. The value in ml transferred during the powerup of the ECU is used as 100% value for calculation.

2.3.3.2 ESC - Electronic Speed Control



*) FUEL, and FUEL in % not on HORNET2

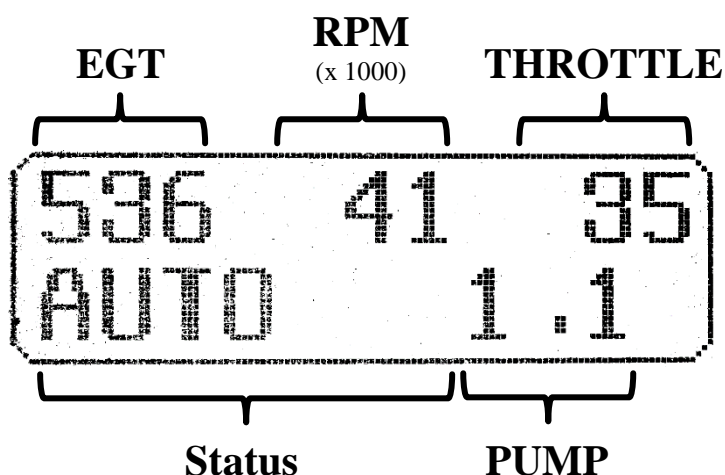
The ESC temperature display is limited to 235 ° C, so the turbine jet temperature is shown divided by 10, or the other way around: 54 ° C in the display corresponds to 535 ... 544 ° C (digit is rounded).

The pump power is indicated by a factor of 10, ie, 11.4V correspond to a pump voltage of 1.14V.

The tank level is displayed on the display as capacity value, ie, 2450mAh are 2450ml. On the other hand, the percentage tank level is displayed as the current, ie, 81,6A correspond to 81.6% tank level. The tank level is thus easy to read via the associated bar display. The 100% value is set at startup. The value in ml transferred during the powerup of the ECU is used as 100% value for calculation.

2.3.3.3 VAR - Vario

The HoTT Vario offers the possibility to display texts, in the example two lines with an MC20. However, since the displayable number of 21 characters is less than in the two-line display of the HORNET (2x 16 characters), the display was "compressed" as follows:



The tank level is converted in a percentage and displayed as altitude, e.g. 76m corresponds to 76% tank level (can be used for the speech output). The 100% value is set at startup. The value in ml transferred during the powerup of the ECU is used as 100% value for calculation.

Furthermore, the alarms according to section 2.3.4.1 are also effective here.

2.3.4 Parameterization

The change of sides takes place with Enter and ESC button of the SmartBox or with the appropriate buttons on the HoTT transmitter.

The parameter is selected with the INC- and DEC-buttons of the SmartBox (or the buttons of the Hott transmitter) „>“.

With **INC+DEC** or **SET** the value of the selected parameter is enabled for change (inverted).

With **INC** the value can be increased,

With **DEC** it can be reduced.

Stored is after **INC+DEC** or **SET**

2.3.4.1 Alarms / Sensor setting

Settings		
Value range	Step size	Signal tone
10 ... 2500 ml	10 ml	U
3.0 ... 12.0 V	0.1 V	P
20.0 ... 99.9 x 1000rpm	100 rpm	T

GAM / ESC / VAR

Upon delivery, the warning thresholds are set as shown in the picture.

If a value falls below the warning threshold, the set signal tone will sound or a speech output of the associated signal tone.

Prolonged alarms are repeated only three times.

The rotation speed monitoring is activated by reaching the AUTO status and deactivates when the pump voltage reaches 0.00V. A speed alarm can thus signal a "turbine flameout"

2.3.4.2 FUEL -Einstellungen

Settings	
Value range	Step size
OFF, ON	
ECU, Konv	
100 ... 20.000 ml	50 ml
10 ... 600 ml/min	5 ml/min
20 ... 2.000 ml/min	5 ml/min

Upon delivery, the warning thresholds are set as shown in the picture, except **F-Calc = ECU**

The description of the parameters **Taxi Tank**, **Fuel Calculate**, **Fuel Tank Size** and **F-Flow / Pump-V** can be found in sections 2.0.2.1 ... 2.0.2.3.

2.4 Futaba S.BUS2

The S.BUS2 is only unidirectional, that means the sensor data is transmitted from the receiver. It will not transmit data from the transmitter to the sensor. A parameterization of the HORNET ECU is not possible with this system.

The VSpeak ECU converter is fully compatible with S.BUS2. Registration and connection are established as with any other S.BUS2 sensor

Caution:

We generally recommend a strict separation between sensor values and servo data. Although the S: BUS 2 can transmit servo data, the S.BUS2 should exclusively be used for the transmission of sensor data and only the S.BUS1 should be used for the servos. In this way, the servo data are excluded from influencing on failure of a sensor.

2.4.1 Registration at the transmitter

The VSpeak ECU converter must be registered on the transmitter like any S.BUS2 sensor.

The slot allocation is required only once, this can be done manually or by the transmitter.

Manual Slot Allocation:

1. Select the desired sensor at free slot addresses on the transmitter (see Table Mapping Sensor - ECU Values).
2. Using the HORNET Terminal, set the slot addresses set in the transmitter in the VSpeak ECU converter (see section 2.4.6).

Slot allocation by the transmitter:

To do this, the orange contact must be pulled out of the 3-pin UNI servo plug of the VSpeak connection cable and replaced with the white telemetry contact (also previously removed from the servo plug).

Connect the ECU converter with the modified UNI servo plug to the "S.I / F" socket of the transmitter.

Now you can register the VSpeak ECU Converter - please refer to the instructions of the respective transmitter. For transmitters without supply voltage at the "S.I / F" socket, a receiver battery must also be connected via V-cable.

Since the VSpeak ECU converter displays its data using a total of 4 sensors, the registry has also be done 4 times.

After completing the registration, the cables must be restored to their original state.

2.4.2 Mapping Sensor – ECU Values

No	Sensor name	Slots	Start (default)	original Sensor value	ECU value
1	CUR-F1678	3	24	CURRENT	Turbinestatus (s. section 2.4.3)
				VOLTAGE	BATT in V
				CAPACITY	FUEL in ml *) (fuel consumption, s. section 2.4.4)
2	SBS-01RM/O	1	27	R.P.M	RPM in rpm
3	SBS-01V	2	28	BATTERY	PUMP in V
				EXT-VOLT	THROTTLE in % *)
4	SBS-01T	1	30	TEMP	EGT in °C

*) FUEL and THROTTLE not on HORNET 2

E.g. using a T18MZ transmitter: The sensors are displayed after registration as seen below:

Sensor			Eurofigther			100%		1/2
Slot	Sensor	ID	Slot	Sensor	ID	Slot	Sensor	ID
1	CUR-F1678	3456	7	Temperature	3456	13	Inhibit	
2	CUR-F1678		8	Inhibit		14	Inhibit	
3	CUR-F1678		9	Inhibit		15	Inhibit	
4	RPM	3456	10	Inhibit		16	Inhibit	
5	Voltage	3456	11	Inhibit		17	Inhibit	
6	Voltage		12	Inhibit		18	Inhibit	

The T18MZ has the ability to rename the sensors:



Telemetry		Eurofigther		100%	
Receiver	External	Stat/Batt/Fuel(Capacity)	Pump/Throttle(Ext. Batt...)		
5.0V	0.0V	-2380mAh	52.0V		
Stat/Batt/Fuel(Current)	4. RPM(Magnet)	7. Temperature			
50.0A	83298rpm	532°C			
Stat/Batt/Fuel(Voltage)	Pump/Throttle(Battery)				
8.5V	1.3V				

-2380mAh is a example for alarm fuel consumption (s. section 2.4.4)

Thus the speed is displayed correctly, you have to set the magnetic and transmission factor to 1.

2.4.3 Turbinestatus – numerical „Current“-Values

The turbines status messages are displayed numerically as current values. The assignment is given in the following table.

	
DEV.DELAY	- 30.0 A
EMERGENCY	- 10.0 A
OFF	0.0 A 1.0 A (Throttle =OFF)
COOL-DOWN	10.0 A
SLOW DOWN	20.0 A - 20.0 A (Throttle =OFF)
STANDBY	30.0 A
PROP IGNIT	31.0 A
PROP-HEAT	32.0 A
PUMPSTART	33.0 A
BURNER ON	34.0 A
FUELIGNIT	35.0 A
FUELHEAT	36.0 A
RAMP DELAY	37.0 A
RAMP-UP	38.0 A
STEADY	40.0 A
CAL IDLE	41.0 A
CALIBRATE	42.0 A
WAIT ACC	43.0 A
GO IDLE	44.0 A
AUTO	50.0 A
AUTO-HC	51.0 A

If the current value of the lower alarm threshold is set to e.g. -15.0A, then it can be used to signal a alarm for a "flame out".
SLOW DOWN = (minus) 20.0A can only occur in Throttlevalues between 0 and 100% - but NOT at Throttle = "OFF".

2.4.4 Alarms

The Futaba System generates alarms in the transmitter or the telemetry box. The alarm thresholds can be set for each value. It's not possible to set an alarm in the sensors.

Fuel consumption / FUEL

The VSpeak ECU Converter generates an alarm for the fuel consumption (not with HORNET2). The fuel consumption is shown as a capacity value in the sensor CUR-F1678. The fuel consumption (e.g. 1560mAh = 1560ml) is calculated by the difference of the tank volume at start (e.g. 3000ml) and the current decreasing tank volume (e.g. 1440 ml).

The alarm threshold value should be set to e.g. 2200mAh for a tank volume of 3000ml to have a reserve of 800ml. The Futaba system has not the ability to quit an alarm. So it would be active until powering down. This could be very annoying and it blocks all other alarms. Therefore the VSpeak ECU Converter has an alternative:

Bei Unterschreiten der mittels Jeti- oder HoTT-System einstellbaren Alarmschwelle FUEL für den Tankfüllstand (im Auslieferungszustand = 800ml) wird der Wert für den Kraftstoffverbrauch im Abstand von 10 Sekunden für die Dauer von 5 Sekunden als negativer Wert übertragen. Um beim Beispiel mit den 3000ml Tankvolumen zu bleiben, wird bei einem Kraftstoffverbrauch größer 2200ml der übertragene Wert abwechselnd mit negativem Vorzeichen übertragen. Ist nun im Sender/Telemetry Box nur die Alarmschwelle auf Unterschreiten von z.B. MINUS 100ml aktiviert, dann erfolgt die Alarmmeldung für 5 Sekunden, im Wechsel mit 10 Sekunden Alarmpause. Dieser Alarm lässt sich auch „Quittieren“, indem für einen Moment der Throttle-Wert unter 10% gesendet wird.

Set the alarm value for FUEL with the Jeti or HoTT System. Factory set value is 800ml. When falling below this value the VSpeak ECU Converter displays the fuel consumption as a negative value for 5s every 15s. E.g. with a tank volume of 3000ml and a fuel consumption of more than 2200ml the value is transmitted as a negative value. Set the alarm value of your transmitter to e.g. MINUS 100ml and the alarm will be active for 5s with a following pause of 10s. You can quit this alarm by setting the throttle below 10% for a small moment.

Turbine flameout / Status

The status messages are transmitted as numerical current values as described in section 2.4.3.

If the current alarm value is set to MINUS 15.0A a turbine flameout will be active with the status message SLOW DOWN = MINUS 20.0A.

When powering down (means THROTTLE = OFF) no alarm will be generated because SLOW DOWN -> PLUS 20.0A is transmitted

2.4.5 Telemetry Box



On the Telemetry Box, the data of the VSpeak ECU converter can also be displayed (in the picture e.g. fuel consumption 1560ml) and alarms corresponding section 2.4.4 are generated:

STATUS, BATT, FUEL und RPM

With the latest software (V1.003 - as of May 2015) the sensors **SBS-01V** and **SBS-01T** are not supported yet.

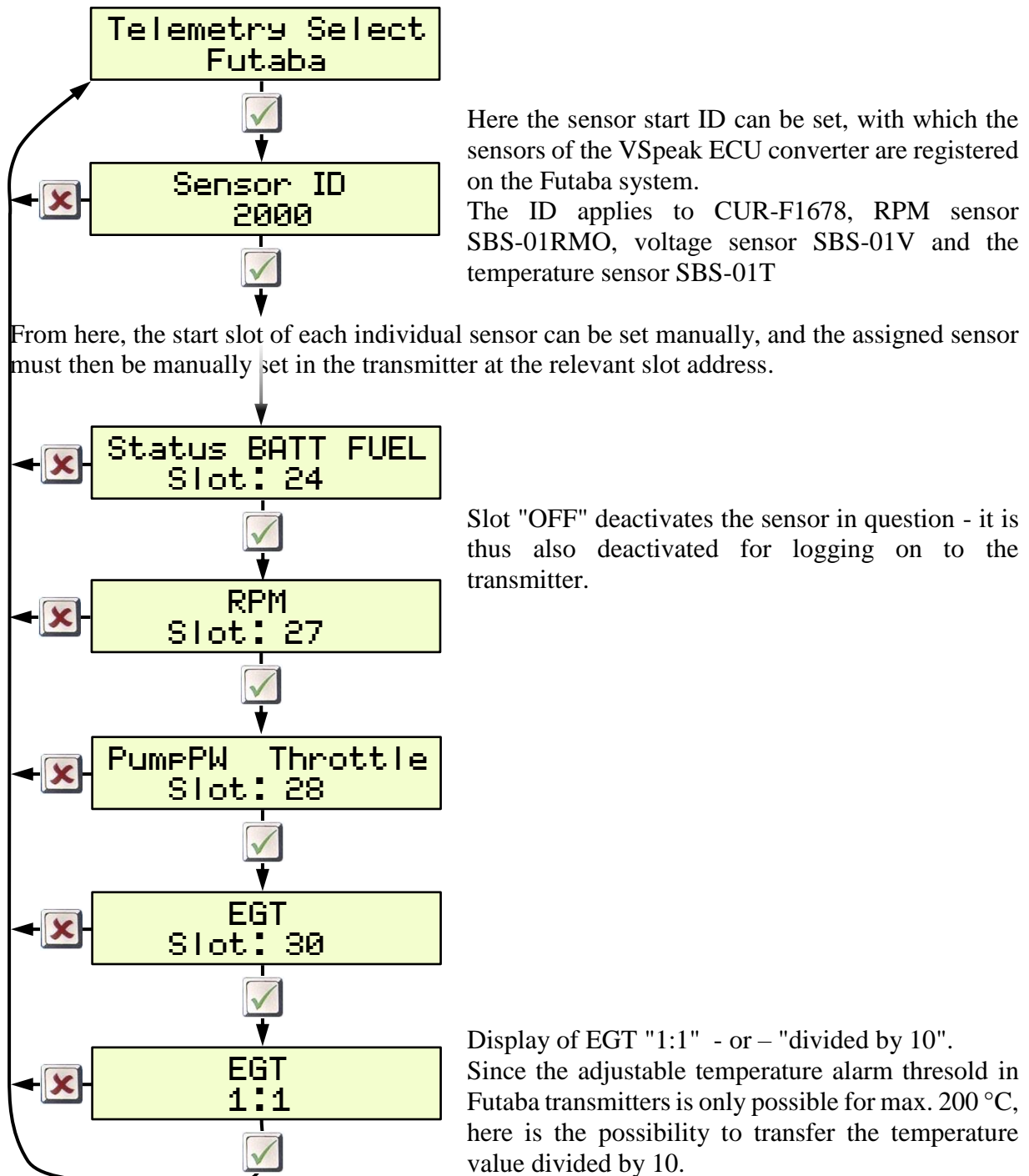
Caution:

The VSpeak ECU converter sends its data **always taking advantage of all sensors**, including the sensors 1 x SBS-01V and 1 x SBS-01T. These occupy the slots in accordance with the table in section 2.4.2 - or the last saved values.

2.4.6 Setup

For the Futaba SBUS2 system a variety of settings in VSpeak ECU converter using the HORNET Terminal can be made.

In the overview the complete menu structure for all possible range of settings is shown.



2.5 Futaba S.BUS2 V10

The S.BUS2 is only unidirectional, that means the sensor data is transmitted from the receiver. It will not transmit data from the transmitter to the sensor. A parameterization of the HORNET ECU is not possible with this system.

The VSpeak ECU converter is fully compatible with S.BUS2. Registration and connection are established as with any other S.BUS2 sensor

Caution:

We generally recommend a strict separation between sensor values and servo data. Although the S: BUS 2 can transmit servo data, the S.BUS2 should exclusively be used for the transmission of sensor data and only the S.BUS1 should be used for the servos. In this way, the servo data are excluded from influencing on failure of a sensor.

2.5.1 Registration at the transmitter

The VSpeak ECU converter must be registered on the transmitter like any S.BUS2 sensor. For this purpose, the UNI-servo plug of the VSpeak ECU converter must be connected with a V cable and a receiver battery to the "S.I/F" jack of the transmitter. Furthermore, the ECU converter must first be connected to the terminal port of the powered HORNET.

Now the registration of VSpeak ECU converter can be done - please look up into the instructions for the transmitter.

In contrast to the 4 standard sensors in section 2.4, here the slots of the special sensor JetCat V10 are used to display the ECU data (not every Futaba transmitter supports the JetCat V10 sensor).

Sensor		J10		100%		1/2	
Slot	Sensor	ID	Slot	Sensor	ID	Slot	Sensor
1	Inhibit		7	Inhibit		13	JetCat V10
2	Inhibit		8	JetCat V10	1408	14	JetCat V10
3	Inhibit		9	JetCat V10		15	JetCat V10
4	Inhibit		10	JetCat V10		16	JetCat V10
5	Inhibit		11	JetCat V10		17	JetCat V10
6	Inhibit		12	JetCat V10		18	JetCat V10

Telemetry		J10		100%		1/2	
Receiver	External	8. JetCat V10(Pump)	8. JetCat V10(Fuel co...)	5.0V	0.0V	1.34V	0ml
8. JetCat V10(RPM)	8. JetCat V10(Set RPM)	8. JetCat V10(Fuel flow)		83300rpm	0rpm	0ml/min	
8. JetCat V10(Temper...)	8. JetCat V10(Thrust)	8. JetCat V10(Altitude)		532°C	0.0N	0m	



Telemetry		J10		100%		2/2	
8. JetCat V10(Fuel qu...)	8. JetCat V10(Speed)			52%	0km/h		
8. JetCat V10(Battery)	8. JetCat V10(Status)			8.50V			
8. JetCat V10(Current)	8. JetCat V10(Second ...)			50.0A	0rpm		

2.5.2 Mapping JetCat V10 – ECU Values

The JetCat V10 sensor occupies 14 slots, the assignment to the values of the HORNET ECU is as follows

No	JetCat V10	HORNET
1	RPM	RPM
2	Temperature	EGT
3	Pump	PUMP
4	Set RPM	-
5	Thrust	-
6	Fuel consumed	FUEL (consumed)
7	Fuel flow	-
8	Altitude	-
9	Fuel quality	THROTTLE
10	Battery	BATT
11	Current	ECU State as numerical current value (s. section 2.5.3)
12	Speed	-
13	State	-
14	Second Shaft	-

2.5.3 Turbinestatus – numerical „Current“-Values

	
DEV.DELAY	49.0 A
EMERGENCY	48.0 A
OFF	0.0 A 1.0 A (Throttle =OFF)
COOL-DOWN	10.0 A
SLOW DOWN	20.0 A 55.0 A (Throttle =OFF)
STANDBY	30.0 A
PROP IGNIT	31.0 A
PROP-HEAT	32.0 A
PUMPSTART	33.0 A
BURNER ON	34.0 A
FUELIGNIT	35.0 A
FUELHEAT	36.0 A
RAMP DELAY	37.0 A
RAMP-UP	38.0 A
STEADY	40.0 A
CAL IDLE	41.0 A
CALIBRATE	42.0 A
WAIT ACC	43.0 A
GO IDLE	44.0 A
AUTO	45.0 A
AUTO-HC	46.0 A

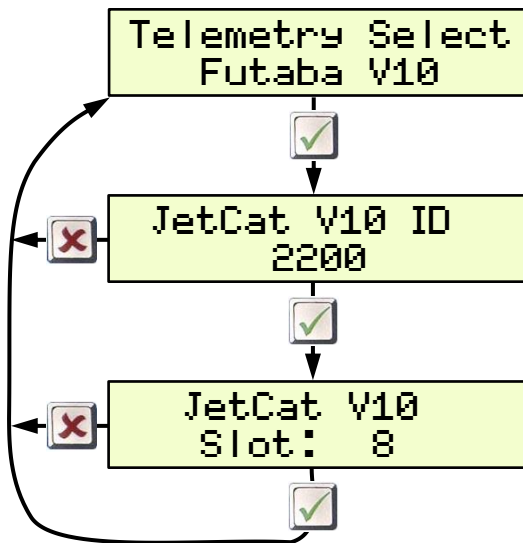
The turbines status messages are displayed numerically as current values. The assignment is given in the table.

If the current value of the upper alarm threshold is set to e.g. 115.0A, then it can be used to signal a alarm for a "flame out".
SLOW DOWN = 55.0A can only occur in Throttlevalues between 0 and 100% - but NOT at Throttle = "OFF".

2.5.4 Setup

For the Futaba SBUS2 system a variety of settings in VSpeak ECU converter using the HORNET Terminal can be made.

In the overview the complete menu structure for all possible range of settings is shown.



Here the sensor start ID can be set, with which the **Jetcat V10** sensor of the VSpeak ECU converter is registered on the Futaba system.

Here, the StartSlot can also be set manually, in the sender then also manually set **Jetcat V10** at the relevant slot address.

2.6 FrSKY S.Port

The data of the VSpeak ECU converter is available on the FrSky Smart Port as follows:

FrSky ECU Daten	HORNET
A3	BATT in V
A4	PUMP in V
Fuel	FUEL (remaining fuel) in ml
RPM	RPM
Thro (...before Fuel)	THROTTLE in %
Tmp1	EGT in °C
Tmp2	ECU Status as Temperature (s. section 2.6.3)





For the provided LUA scripts on the website of VSpeak exactly this spelling is necessary, otherwise the LUA script does not work correctly.

The second "Fuel" value with the unit% has been renamed "**Thro**".

For "Fuel" the PREZISION should be changed from 0.00 to 0.- - ml, and for A3 (BATT) from 0.00 to 0.0 V.








2.6.1 LUA script for Taranis

(X9D und X9E)

 RPM x1000 79.6	 FUEL (ml) 1820	THROTTLE 49 %
 EGT 493	STATUS AUTO	 9.1 V PUMP 1.32 V



On the website of VSpeak you can download the packed file [VS_Taranis LUA.zip](#) for free, a **Readme.pdf** file is included.

2.6.2 LUA script for Horus (openTX)

Demo			  15 Jul 08:09
 RPM x1000 79.6	 FUEL (ml) 1820	Throttle 49 %	
 EGT 493	STATUS AUTO	 9.1 V PUMP 1.32 V	
HORNET			

On the website of VSpeak you can download the packed file [VS_Horus LUA.zip](#) for free, a **Readme.pdf** file is included.

2.6.3 Turbinenstatus – numerical „Temperature“-Values

	 Tmp2
DEV.DELAY	- 30 °C
FLAME OUT	- 20 °C
EMERGENCY	- 10 °C
OFF	0 °C
ON	1 °C
COOL-DOWN	10 °C
SLOW DOWN	20 °C
STANDBY	30 °C
PROP IGNIT	31 °C
PROP-HEAT	32 °C
PUMPSTART	33 °C
BURNER ON	34 °C
FUELIGNIT	35 °C
FUELHEAT	36 °C
RAMP DELAY	37 °C
RAMP-UP	38 °C
STEADY	40 °C
CAL IDLE	41 °C
CALIBRATE	42 °C
WAIT ACC	43 °C
GO IDLE	44 °C
AUTO	50 °C
AUTO-HC	51 °C

The turbines status messages are displayed numerically as temperature values. The assignment is given in the table.

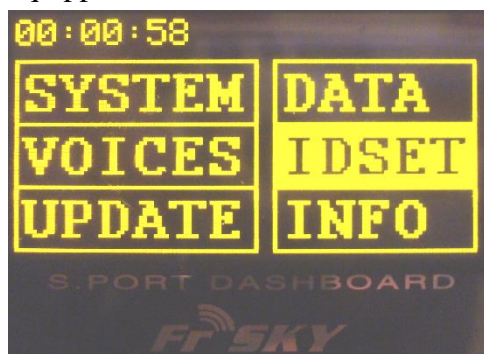
Status = SLOW DOWN and Throttle **not** OFF

Status = OFF and Throttle is **not** OFF

2.6.4 S.Port ID

On delivery, the ID of the VSpeak ECU converter is set to 28.

With the help of the FrSky DASHBOARD the converter can be set to IDs from 1 ... 28. This is useful if another sensor with the same ID is already connected to the S.Port bus, or a model is equipped with several turbines.

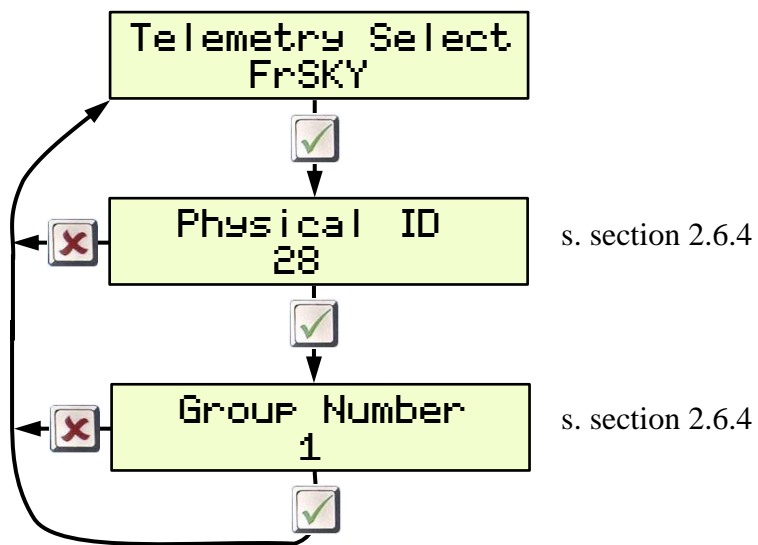


For this purpose, the UNI-servo plug of the VSpeak ECU converter must be connected with a V cable and a receiver battery to the FrSky DASHBOARD. Furthermore, the ECU converter must first be connected to the terminal port of the powered HORNET ECU.

2.6.5 Setup

For the FrSky system a variety of settings in VSpeak ECU converter using the HORNET Terminal can be made.

In the overview the complete menu structure for all possible range of settings is shown.



2.7 JR PROPO

The JR telemetry data system is only unidirectional, that means the sensor data is transmitted from the receiver. It will not transmit data from the transmitter to the sensor. A parameterization of the HORNET ECU is not possible with this system.

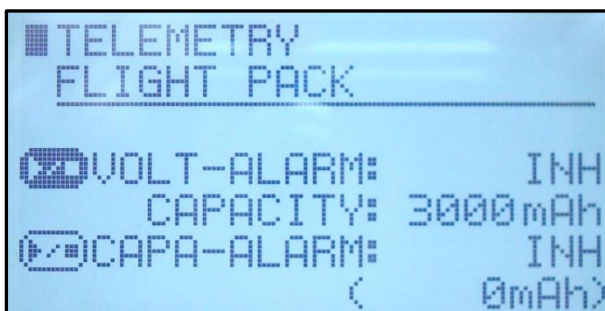
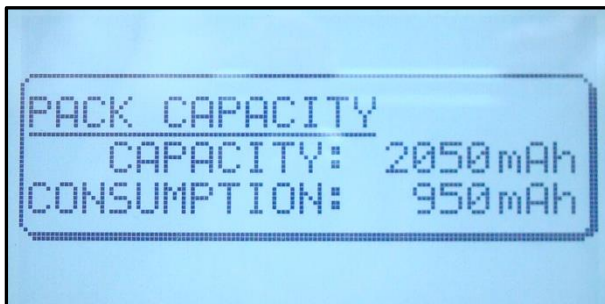
The displays are described below using the example of an XG8.



JR Display (Ex. XG8)	HORNET
F-PACK A	ECU- Status as numerical current value (s. section 2.7.1)
F-PACK W	THROTTLE in %
F-PACK V	BATT or PUMP voltage
F-PACK C	FUEL (remaining fuel) in ml
TEMP.	EGT
RPM	RPM

In order to display the rotation speed correctly, the parameters for RPM must be set to: GEAR RATIO , PROPELLER and MAGNET POLE to INH.

The parameter type (MAGNETIC , OPTICAL or MOTOR) does not matter.





The ECU converter transmits the consumed FUEL (950ml) – but on the radio the remaining fuel is displayed.

This means that the actual tank size must be parameterized in ml in the settings in the radio, here in the example the main tank has 3000 ml volume, which is set as capacity 3000mAh.

The tank size in the ECU should be greater than or equal to the actual tank size (see section 2.0.2.2).

2.7.1 Turbinestatus – numerical „Current“-Values

The turbines status messages are displayed numerically as current values. The assignment is given in the following table.

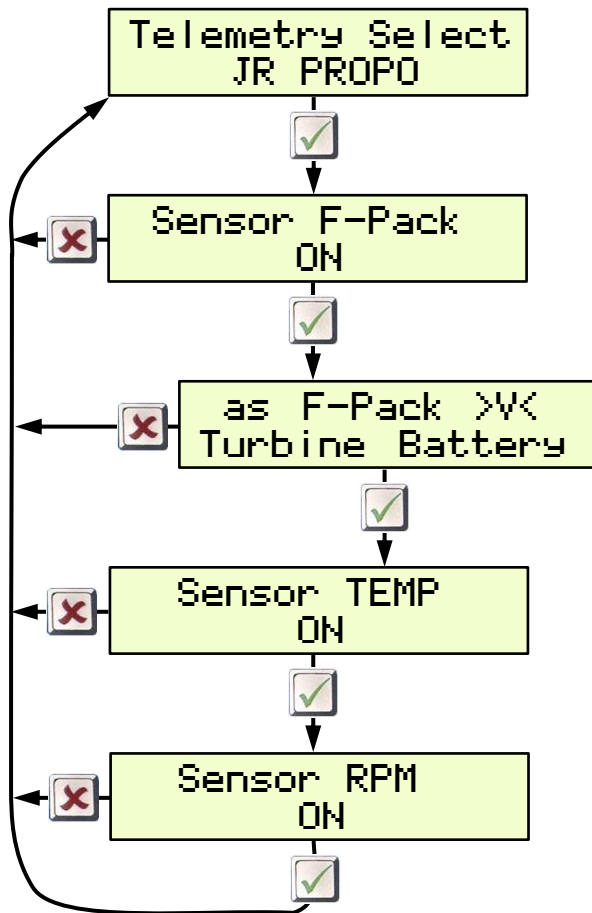
	 F-PACK A
DEV.DELAY	130.00 A
EMERGENCY	110.00 A
OFF	0.00 A 1.00 A (Throttle =OFF)
COOL-DOWN	10.0 A
SLOW DOWN	20.0 A 120.0 A (Throttle =OFF)
STANDBY	30.00 A
PROP IGNIT	31.00 A
PROP-HEAT	32.00 A
PUMPSTART	33.00 A
BURNER ON	34.00 A
FUELIGNIT	35.00 A
FUELHEAT	36.00 A
RAMP DELAY	37.00 A
RAMP-UP	38.00 A
STEADY	40.00 A
CAL IDLE	41.00 A
CALIBRATE	42.00 A
WAIT ACC	43.00 A
GO IDLE	44.00 A
AUTO	50.00 A
AUTO-HC	51.00 A

If the current value of the upper alarm threshold is set to e.g. 115.00A, then it can be used to signal a alarm for a "flame out".
SLOW DOWN = 120.00A can only occur in Throttlevalues between 0 and 100% - but NOT at Throttle = "OFF".

2.7.2 Setup

For the JR PROPO system a variety of settings in VSpeak ECU converter using the HORNET Terminal can be made.

In the overview the complete menu structure for all possible range of settings is shown.



With "ON" / "OFF" you can set whether the relevant sensor is used for data transmission from the ECU converter.

F-PACK, as voltage in V:

- Turbine Battery
- Pump Voltage

2.8 PowerBox P²Bus

On the P²Bus the turbine data are transmitted as shown in the following picture:



Furthermore, the 2 display lines of the TERMINAL can be displayed.

In the case of turbine malfunctions, the respective "Status" message is additionally provided with an alarm.

After the initialization (status: **telemetry init**) the following additional status messages are possible to display:

- WIRELESS NOT SET** Contact problem with one or both external contacts of the 6-pin telephone cable - or -WIRELESS TELEMTRY not set, s. section 2.0.3.1
- RX/TX-wire fail** Contact problem (loose contact) with one or both external contacts of the 6-pin telephone cable
- Term. Data fail** Contact problem (loose contact) with one or both innermost contacts of the 6-pin telephone cable

2.8.1 setup

All relevant settings can be made directly from the PowerBox transmitter.

Changes to the parameters marked with a **yellow background** are only effective after a sensor rescan.

2.8.1.1 FUEL



Taxi Tank

For models where a taxi tank is plugged into the main tank until the model is lifted off, activate "Taxi Tank". Then the tank volume of the main tank can be set at "Tank Size".

- If Fuel Calculation "in ECU" is set, then the tank volume in the HORNET ECU must be set to a value greater than the volume of the main and taxi tanks together.
- If Fuel Calculation "in VSpeak Konv. " is set, then the value set as tank volume in the HORNET ECU has no more meaning..

If the turbine is in the status "AUTO" or "AUTO-HC", then when THROTTLE = 80% is exceeded for the **second time**, the FUEL will "reset", ie the displayed FUEL is only once set to "full" (the value set at "Tank Size") again at this time.

Fuel Calculate

Here you can choose whether the fuel consumption is calculated in the HORNET ECU - or in the VSpeak ECU converter.

- If "in ECU" is selected, the corresponding parameters must be set in the HORNET ECU, see section 2.0.3.
- If "in VSpeak Konv. " is selected, the parameters "Tank Size" and the characteristic curve parameters "FuelFlow @ 1.0V" or @ 2.0V pump voltage required for the calculation must be set in the VSpeak converter.

Tank Size

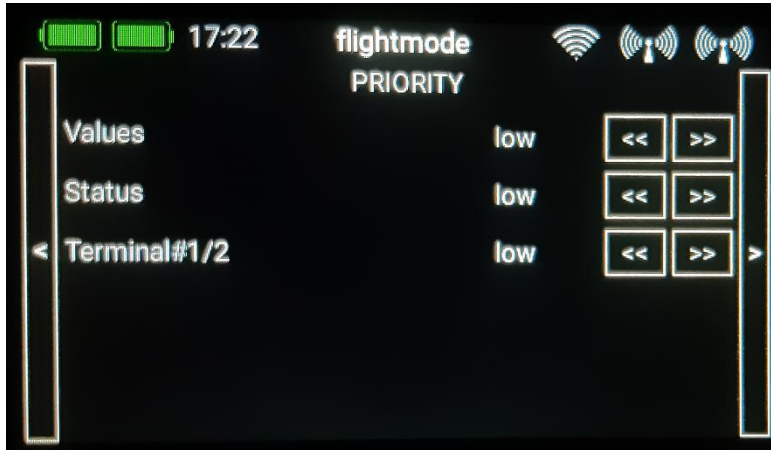
Volume of the main tank in ml (is only effective when the "Taxi Tank" option is activated or the parameter Fuel Calculate is set "in VSpeak Konv. ").

FuelFlow @ 1.0V or 2.0V

The two parameters FuelFlow are only effective, if Fuel Calculate is set "in VSpeak Konv. "

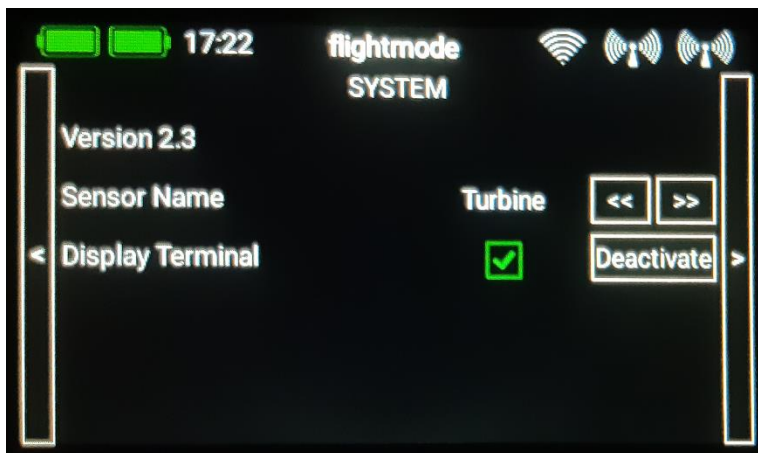
The two parameters can be determined with the help of a flow meter - or, if you don't have one at hand, in the following way: You can run the turbine with 1.00 or 2.00V pump voltage for a period of 1 minute and measure it fuel used. A more precise result can be obtained by carrying out the measurement over several minutes and dividing the amount of fuel consumed by the number of minutes.

2.8.1.2 PRIORITY



Here you can set the prioritization of the data request for the group of ECU **Values**, the **Status** and the EDT lines (**Terminal # 1/2**), you can choose between: low / high / higher / at highest - whereby low is sufficient.

2.8.1.3 SYSTEM



Version

Current software version

Sensor Name

It can be connected simultaneously several VSpeak ECU converter at P²Bus, for example, in multi-beam models. The assignment of the sensor address manages the PowerBox transmitter - please read this in the manual of your PowerBox transmitter.

To distinguish between several simultaneously active ECU converters, different names can be selected for Sensor Name, for example:

Turbine Turbine [1] [2] [3] [4] [A] [B] [C] [D] [L] [M] [R] ...

Display Terminal

































Display of the two TERMINAL lines.

If Display Terminal#1/2 is deactivated, the two Terminal lines are not only not displayed, they are also not transmitted on P²Bus, thus relieving the P²Bus protocol.

2.8.2 Special Characters

On the HORNET TERMINAL characters can be displayed that can not be displayed in the displays Terminal#1 or Terminal #2 on the PowerBox Core.

The following table shows an overview of the special characters and their replacement for the core representation:

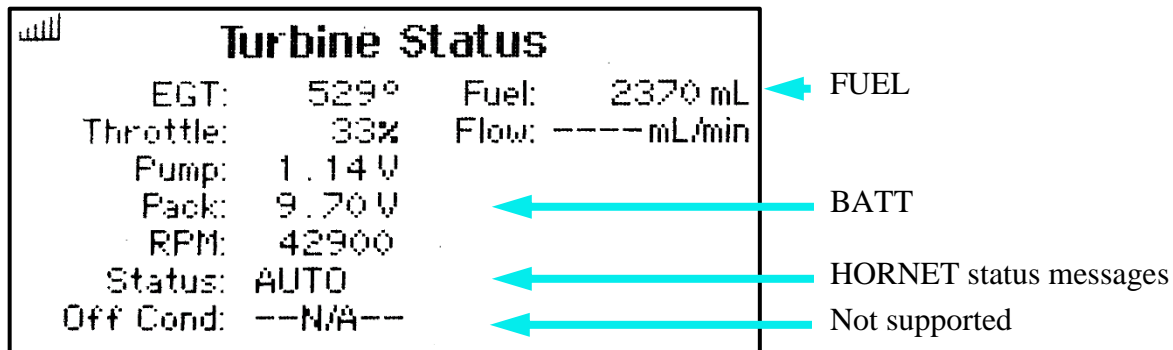
		
		battery full
		battery normal
		battery empty
		Glow plug defective
		Temperature sensor defective
		Pump running / Pump voltage
		switch operation
		unit "°C"
		unit "ml"
		button "up" (eg in test menu)
		button "down" (eg in test menu)
		button "Enter"(eg in test menu)
		"empty" Bargraph HORNET III Voltage/Fuel
		"full" Bargraph HORNET III Voltage/Fuel
		Ignition

2.9 Spektrum (X-Bus)

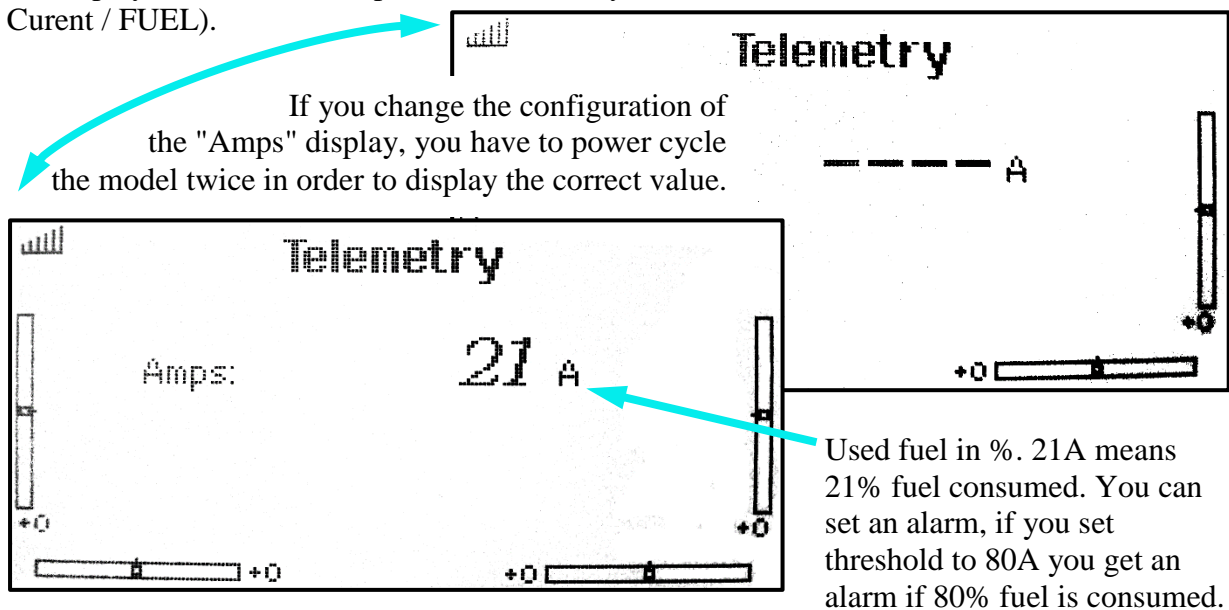
The Spektrum Telemetry System is only uni-directional. You can only see the telemetry data, but you cannot change parameters of the HORNET ECU.

You need at least a DX9 in order to view ECU Telemetry (using JetCat Sensor). DX6, DX7s and DX8 do not support this sensor.

2.9.1 Telemetry display



To display the fuel consumption the telemetry sensor "Curent/AMPS" is used (see section Curent / FUEL).



2.9.2 Curent / FUEL

Fuel consumption is converted into % and the level is displayed in the current/Amps display. The 100% value is set at startup. The value in ml transferred during the powerup of the ECU is used as 100% value for calculation. So after powerup you get a consumption of 0% (0A).

You can change the value displayed on "Amps" by double-clicking the black button on the VSpeak ECU Converter. Please refer to the table below.

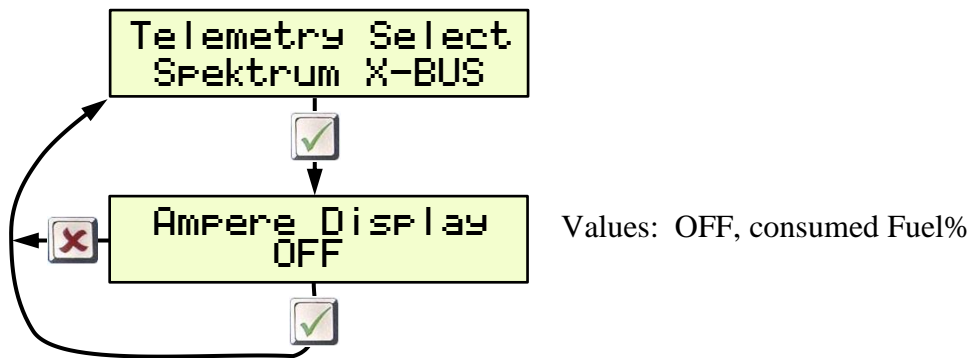
The Display-change will be acknowledged by a short beep, frequency rising and falling.

	Current display Ampere	LED
1	----	
2	Consumption: 0 ... 100 A	

Double click

2.9.3 Setup

With the help of the HORNET Terminal the following settings can be made.



3 Update

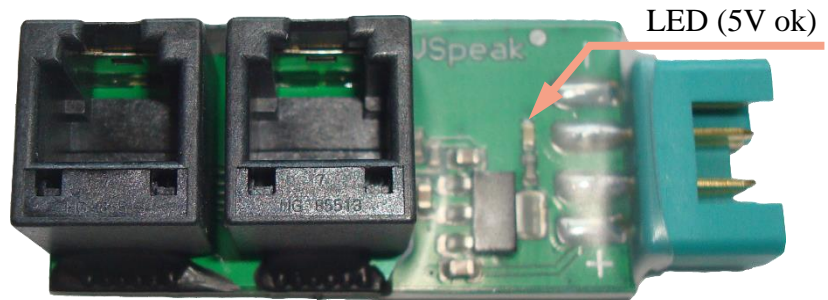
The processor on the ECU Converter contains a SD bootloader with a version counter.

If firmware updates are available they will be sent via mail. The data-files attached to the e-mail have to be copied to the Micro SD card (formatted FAT or FAT16), this card has to be inserted into the ECU Converter and the power has to be switched on. The boot loader will recognize the new software version and will install it (blue LED "flickers") and is then up to date.

4 Accessories

4.1 Programming adapter

The VSpeak ECU converter can be programmed using the Programming adapter and the HORNET Terminal (setting the remote control system, alarm thresholds, etc.).



The Programming adapter is the power supply of the Terminal and the VSpeak converter from a 2-3 cell LiPo / LiFe / LiIo battery (for example receiver or turbine battery).

The LED indicates that 5V supply voltage is available for the GSU and converter.

The programming adapter is **NOT included in the scope of delivery**, as it is not required for the systems Jeti, HoTT and PowerBox.

4.2 External STATUS LED



At www.vspeak-modell.de an external STATUS LED can be ordered. This has a suitable connector and a 20 cm long connecting cable for "clean" installation in fuselage / cockpit etc. The external status light comes with a mount.

The external STATUS LED is **NOT included in the scope of delivery**

4.3 Micro SD card

For the installation of updates, a Micro-SD card is needed. The Micro SD card is **NOT included in the scope of delivery**

You can obtain a matching card at www.vspeak-modell.de.

4.4 Western cable connector

Western cable connector available at www.reichelt.de: WB 2X6-6



4.5 Y Western cable connector

VSpeak ECU Converter and HORNET Terminal can be operated "parallel". For this, a "Y-Western socket" is available at www.reichelt.de: WB 3X6-6



5 Technical data

Power supply	3,5 ... max. 12V from HORNET ECU
Power usage	~20 mA (at 5V from HORNET ECU)
Telemetry connection	3,5 ... max. 9V from receiver
Dimensions	60 x 22 x 14 mm
Weight	18 g (incl. connection cables)
Connections	RJ12 Western plug (cable length ~ 25 cm) UNI servo plug (cable length ~ 30 cm) Jeti / MSB / Hott / Futaba / FrSky / JR PROPO / PowerBox X-Bus plug (cable length ~ 28 cm) Spektrum

6 Instructions for disposal



Equipment marked with the symbol should not be disposed of within household waste.

7 EG Declaration of Conformity

Manufacturer

VSpeak-Modellbau (Volker Weigt)
Priestewitz



We hereby declare that the product

VSpeak ECU Converter

complies with the following European directives:

2004/108/EC EMC Directive
2006/95/EC Low Voltage Directive (LVD)
2011/65/EC Restriction of Hazardous Substances (RoHS)

The presumption of conformity is taken by applying the following harmonized standards:

EN60065 Audio-, video- and similar electronic apparatus - Safety requirements
EN60332 Tests on electric and optical fibre cables under fire conditions
EN60950 Information technology equipment - Safety
EN61000-6-1 Electromagnetic compatibility (EMC)
EN61000-6-3
EN55022 Information technology equipment - Radio disturbance characteristics

Priestewitz, 2015/05/01

.....
Signature
Volker Weigt
Managing Director

8 Version history

Vers.	Date	Comment
2.0	05.2015	first retail version
2.1	08.2015	adjusting the timing to all telemetry systems Spektrum: Display Fuel capacity in ml
2.2	11.2016	Value FUEL-FLOW is no longer transmitted Jeti: ECU Status messages as numerical EX data max. 3 Alarm repeats HoTT: ECU data transfer as Vario sensor max. 3 Alarm repeats Futaba: JetCat V10 – data display Spektrum: The HORNET 3 status messages are displayed 1:1 FrSky S.Port and JR PROPO are supported
2.3	01.2020	Option Taxi Tank for FUEL display Option fuel calculation in the VSpeak converter Parameterization using the programming adapter PowerBox P ² Bus supported Futaba V10 revised Jeti, HoTT and P ² Bus: new Status messages

9 Contact

Volker Weigt

www.VSpeak-Modell.de

mail: volker.weigt@vspeak-modell.de