

# **P4**dragon Firmware Update

Description of the upgrade / improvements

Firmware-Version 2.00.00 (10/2013)

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# Firmware Update Information for P4dragon DR-7X00

(P4dragon Firmware 2.00.00, October 2013)

## 1. General

The firmware 2.00.00 replaces the firmware 1.17.00 (and the following beta versions), and offers the new operating mode **Packet Radio** at 1200 Bd (“AFSK”) and 9600 Bd (G3RUH compatible, “Direct FSK”). Besides that, the new firmware provides a greatly improved and extended **Channel Busy Detector** for PACTOR and thus is very suitable for the new “Radio Only RMS” project of the Winlink system. A few further improvements and the fixing of some programming errors round out the new firmware.

## 2. New features

### 2.1 Packet Radio

#### 2.1.0 General

#### **What information does this document contain?**

As from firmware 2.00.00 the Dragon modems offer the operating mode **Packet-Radio (PR, AX.25)**. This document describes the specialities of the PR implementation on the P4dragon modems as well as the differences to the PTC-II-series of equipment. The complete basic information concerning the PR functionality together with the complete command list can be found in the handbook of the PTC-IIpro, and is thus not contained in this document.

#### **Dualport operation (PACTOR/PR)**

The **DR-7800** AUX-Port can be configured as an independant physical port for simultaneous PR/PACTOR operation, similar to the legendary PTC-IIpro modem. There is however always only **one** PR port available. Either the MAIN or the AUX port can be chosen. The second port remains always the HF/PACTOR port.

The Single-Port-Modem **DR-7400** also allows without switching (in contrast to the PTC-IIIusb) connects in PACTOR and also PR, and is thus ideally adjusted for an HF/VHF transceiver.

#### **Possible Packet Radio Modulation types**

The Firmware 2.00.00 supports the following PR modulation types: **1200 Bd (A)FSK, 9600 Bd FSK (G3RUH)**.

#### **Software compatibility**

PR is supported in so-called **Terminal mode** and also in **Hostmode** as well as in **KISS/SMACK** mode. Hereby, attention has been paid so there is almost complete compatibility with the PTC-II modems. Relevant differences to the PTC-II modems will be described in the following sections.

The firmware 2.00.00 works extremely well in PR with for example the software **SCSmail, Paxon 2.0, Airmail 3.4, Alpha 3.2 and RMS Express 1.2.14.3**. For Paxon, Airmail, Alpha and RMS Express the PTC-II compatibility mode **must** be chosen (cmd: PTCC-Parameter set to 1!) in order that the software acknowledges the modem.

## 2.1.1 Display- and LED-information with Packet Radio operation

### DR-7800

The display of the DR-7800 switches into the so-called **PR-Display mode** when PR operation is running (active connection, active DCD). Hereby, the lower half of the display (which normally shows a “waterfall” display is used to display the PR-monitor headers. The area of the waterfall frequency scale serves in PR-display mode for showing the call-sign of the connected station as well as for signaling the send status (“TX” is displayed next to the call-sign) and the DCD (“CD” is shown next to the call-sign) – see Fig. 1.

If multiple connects are operating or are become established in parallel, then the DR-7800 shows the call-sign cyclically every second. Before the call-sign is displayed the relevant PR-channel of that connection.



Fig. 1: PR-display mode

If no present PR-connections are running or being built then the PR-display mode remains active after the reception of a new monitor header for MONTimer seconds (see below). With an existing PR-connection, the PR-display mode is continuously turned on, as long as no PACTOR-connects are running or being built up.

With an active PACTOR-link, the DR-7800 always switches over to the PACTOR- “connected” display. As from firmware 2.00.00 however, even in this display, PR-call-sign information is displayed in the (new) 2<sup>nd</sup> line, identically to the PR-display mode. See Fig. 2.



Fig. 2: PACTOR-“connected”-mode with additional PR-line

## **Limitations of the auto-decoder display with PR-activity**

As long as a PR-connection is active (also whilst being built up), switching to the auto-decoder screen is blocked. The PR-display mode is always kept even when the auto-decoder is active (e.g. automatic RTTY reception). In the upper most display line, however, is shown whether the auto-decoder is active (PACTOR – as well as channel status). Here, depending on mode, after “CH” at the far right, instead of “BUSY” or “FREE” an abbreviated display of the actual decoded operating mode, e.g. “PT1” or “RTTY” is shown.

## **DR-7400**

### **LEDs during PR-operation:**

- **TFC/ERR** lights **orange** with active DCD.
- **CON/ISS** lights **green** with active (in present operation or being built up) PR-connections.
- **CON/ISS** lights **red**, when a PR-Signal is sent out.

## **2.1.2 Additional functions (compared to the PTC-IIpro)**

### **Additional commands**

The following commands are additionally available for use in Terminal mode (pac: menu):

#### **MONTimer**

Value range: 10-300

Default setting: 10

Sets how long the PR-display-mode (displays the monitor-header-output in the lower half of the display – see above) remains active on the display after giving out a new PR-monitor header, providing no actual connection exists. When a connection exists, then the PR-display is always turned on, as long as no PACTOR connection is active in parallel.

Further influences of the MONTimer-command: After disconnect of the last PR-connection, MONTimer / 5 seconds until it is returned to the normal display (waterfall).

After the “CD”-display (and simultaneously no PR-connection and also no present new monitor-output) then the PR-display remains MONTimer / 5 seconds active.

If the modem detects a signal on the PR-port, i.e. “CD” is signaled, the mode is switched to the PR-display mode. This eases recognizing actual activity on the PR-channel.

#### **PRPort**

Value range: DR-7400: 1, DR-7800: 1-2

Default setting: DR-7400: 1, DR-7800: 2

Sets the physical Packet Radio port. 1 means “MAIN-port”, 2 means “AUX-port”.

With the setting 1, PACTOR and PR are simultaneously processed on the “MAIN-port”. The “AUX-port” has then no function.

#### **Version**

Value range: -

Default setting: -

Gives out a firmware version string.

#### **KISS 2**

switches instantly into the SMACK mode. Starting KISS mode using the command “KISS” and giving the command argument “2”, starts the SMACK mode immediately. (Usually SMACK will only be started after the first SMACK packet with a correct CRC has been received.)

## **Specialities of the PR-Implementation on P4dragon-Modems**

The PR-decoder uses a new, and especially fast Algorithm for the DCD-recognition. (“Fast-DCD”). This leads to an especially fast reaction of the DCD. In addition, the DCD works absolutely flicker-free, thus the possibility of collisions is reduced.

The DPLL clock synchronization is also using a new more robust Algorithm. This increases the reception performance on weak signals with a SNR near the possible limits.

## **2.1.3 Not implemented / changed Functions compared to the PTC-IIpro**

### **Terminal mode**

#### **General**

Any forms of data (also monitor-header and -data) are only given out in Terminal mode (Term-parameter smaller than 5) when the pac:-menu is activated.

The Converse mode operation on a virtual channel is always started using the string “CONVERSE (X):”, if the Term-parameter is smaller than 5. X represents the current virtual channel.

Essentially, the commands that are needed to service the internal mailbox are not available, as in firmware 2.00.0 the mailbox function is not implemented. In addition, APRS is not available.

#### **Commands in Detail**

**APRS** presently without function. APRS function presently not implemented.

**Baud** allows only one argument. As Baudrate only 1200 and 9600 are supported.

**CBell** presently without function.

**CMSG** presently without function.

**CText** presently without function.

**FSKFilter** without function.

**MText** presently without function.

**MYAlias:** As this is a single port system, no cross-digipeating is possible. Only normal digipeating via the MYAlias-callsign is supported.

**MYMail** presently without function.

**PACLen** presently without function. PACLen is always set to 255. As “Sendpack character” the <CR> is always used. The packet length is always automatically serviced in Hostmode by the Hostmode program. In general, use of small packet lengths under normal channel conditions is not useful.

**Port** is only implemented for compatibility reasons. Possible parameter value : 1. (P4dragons have the use of ONE physical PR-port. The other port is e.g. in the DR-7800 always configured as an HF/PACTOR-port)

**PRBox** presently without function.

**SLottime** default value changed to 10ms.

**TRACE** presently without function.

**Users** has no influence on the mailbox-function. (Even using Y0 will not initiate a mailbox access, as the mailbox function is presently not available.)

## **Hostmode**

The **U** command has presently no function.

## **2.2 Channel Busy Detector**

### **2.2.0 General**

With firmware version 2.00.00, the extended “Channel Busy” features (that were first implemented in beta firmware 1.17.8\_beta) are available as part of a regular update the first time. The new “Channel Busy” algorithms provide a very sensitive and selective possibility of evaluating the actual channel occupancy. Knowing that a channel is “busy” helps to avoid mutual interference because of double seizure of a channel, i.e. new call attempts on channels that are already in use. That is, for example, very advantageous for the new “Radio Only RMS” project of the Winlink system.

### **2.2.1 Commands**

The new command

#### **CBdetector**

of the cmd: menu allows to configure the Channel Busy Detectors.

Valid parameter range: **0-2**, Default: **0**.

**0** = “normal”, **1** = “emphasizing PACTOR”, **2** = “PACTOR Only”.

Generally, firmware 2.00.00 applies newly developed detectors for evaluating the channel occupancy. There is a universal “FFT detector” that is sensitive for “spectral peaks” and there are special PACTOR selective P1/P2/P3/P4 detectors.

On **CB = 0**, all detectors work in parallel, the FFT detector looks for spectral “anomalies” (channel occupancy) through the entire 300-2700 Hz frequency range.

On **CB = 1**, the FFT detector only checks the frequency range 1500-1700 Hz in order to detect narrow bandwidth P1/P2 signals that could not yet be detected by the PACTOR sensitive detectors.

On **CB = 2**, the FFT detector is completely switched off. The modem only looks for PACTOR signals.

### **3. Improvements and clearing up of errors**

- New command  
cmd: “**DISP SMALLfont**” (parameter range: 0-1, Default: 0).  
Configures if text data (PR, RTTY, PACTOR, Navtex, lower display half) is displayed using the normal 6x8 font or the very small 4x6 font on the OLED display of the DR-7800.
- REStart command now does no longer reset the “status byte” to the default value.  
(Avoids occasional RMS Express starting problem.)
- RESEt command does no longer cause a complete “reboot” of the modem but only reloads the parameters (from the EEPROM – or, if no EEPROM parameter set has yet been defined using the SAP command, the “factory settings”).
- Update bargraph quirk solved.
- Command “UTCOffset” removed until further notice.
- System log (sys log ...) now shows a timestamp.
- Hostmode command “I” (definition of the MYCALL) improved. If a new mycall was defined using the I command, that new mycall was not immediately used for PACTOR robust mode connections (C %MYCALL) but only after the first PACTOR disconnect occurred.

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