

# **P4dragon vs. PTC-II**

**Commands Overview for the P4dragon DR-7800**

**in Comparison to the PTC-II**

**SCS** Special Communications Systems



# Commands Overview for the P4dragon DR-7800 in Comparison to the PTC-II, Firmware 4.0

(P4dragon Firmware 1.10, December 2011)

## 1. New Commands

### PTCComp

Default setting: 1

Value range: 0 - 2

Activates the PTC-II compatibility mode. In mode 1 (default setting), the switch on message and the answer to the Version command is given out in the appropriate form for the PTC-II. In mode 2, the answer to the “Ver#” command is also adjusted.

For software which has been written for the PTC-II modems, the PTCC parameter should be set to at least 1. This is for example particularly required for Airmail.

In compatibility mode 1 and 2, the argument “3” in the MYLevel command automatically changed to “4”. The command “MYLevel 3” thus results in a parameter value 4 for MYLevel. In order to set MYLevel to 3, the compatibility mode must be turned off.

### SAP

“Save All Parameters”. This command saves all the presently set command parameters (e.g. your own callsign which has been set using MYcall) in non volatile EEPROM memory. Directly after switching on the modem, these parameters are read out from the EEPROM and used as presets. The SAP command is especially useful when used with software which is not specially written for the DR-7800 and thus does not set all required parameters correctly when started. In this case it is sensible that pre-set parameters (e.g. MYcall, PSKAmpl, FSKAmpl) are used – so that they must not be newly configured after every new switch on of the modem. With SAP it is for example possible to set the modem permanently in compatibility mode 2.

### LAP

“Load All Parameters”. Manually loads the parameters stored using SAP

## The Display, Commands and Functional Description

As the main command for controlling the OLED display, the DISPlay command has the following subcommands:

### DISPlay

```
cmd: h disp
```

```
DISPlay:
```

```
-----
```

```
controls the tuning display parameters.
```

```
First argument determines "sub command", second argument is the  
(optional) parameter which can be changed:
```

```
DISPlay Mode 0-2: 0=Waterfall, 1=Spectrum, 2=Small Waterfall (DEFAULT: 0).
```

```
DISPlay Mode 0-2: 0=Waterfall, 1=Spectrum, 2=Small Waterfall (DEFAULT: 0).
```

```
DISPlay Autodimm 0-10: (DEFAULT: 2 minutes).
```

```
    Sets the auto dimm timeout in minutes.
```

```
    0 disables the auto dimm function.
```

```
DISPlay Bandwidth 1200, 2400, 4800: (DEFAULT: 2400).
```

```
DISPlay BRight 1-15: (DEFAULT: 15).
```

```
DISPlay CONdisp 0-1: (DEFAULT: 1).
```

```
DISPlay DIMMOFF 0-1: (DEFAULT: 0).
```

```
    Turn display off after dimm (1 = Yes, 0 = No).
```

```
    Usefull for 24/7 operating stations to preserve the display.
```

```
DISPlay DIMMCON 0-1: x(DEFAULT: 1).
```

```
    Dimm display while connected (1 = Yes, 0 = No).
```

```
DISPlay Speed 0-3: (DEFAULT: 0).
```

```
DISPlay SMOothing 0-63: (DEFAULT: 15).
```

```
DISPlay TYpe 0-1: (DEFAULT: 1).
```

### General

The middle of the frequency range is clearly marked by a specially thick (slightly arrow shaped) marker. This serves especially for 1200 and 2400 Hz bandwidth for easier adjustment (on the center frequency used of 1500 Hz)

Further there are small markers approx.  $\pm 100$  Hz around the center frequency so the symmetrical setting of signals with 170 / 200 Hz shift is made easier.

A specialty in mode 1 (Spectrum) is that an AGC tries to place the spectral peaks at the upper end of the display range. This eases the correlation between the spectral peaks and frequency values, as the frequency scale is brought to the upper end of the spectrum. With very high

DISP-Smoothing values for (see below) and with white noise for example, an almost smooth null line at the upper end of the spectrum display range

The following Display commands are implemented:

## DISP Mode

Default setting: 0 (Waterfall)

Value range; 0, 1 (Waterfall, Spectrum).

Switches between “Waterfall”, “Spectrum” and “Small Waterfall” Display. If the Mode 2 (“Small Waterfall”) is used, the lower half of the display remains free for text output. Here, for instance, appears text that is generated by the Auto-Decoder (see section “Auto-Decoder”). “Mode 2” is especially useful if the output of the Auto-Decoder should permanently be displayed, i.e. when RTTY, Navtex and PACTOR-I transmissions are monitored.

The display in the modes 0-2 looks like following:

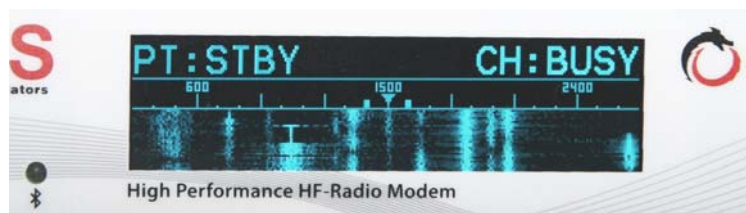


Fig. 1: Display Mode 0 (Waterfall)

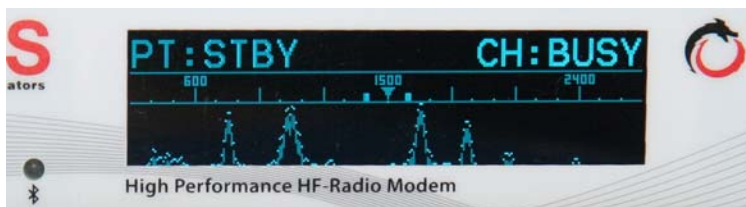


Fig. 2: Display Mode 1 (Spectrum)



Fig. 3: Display Mode 2 (Kleiner Wasserfall)

## **DISP Autodimm**

Default setting: 2

Value range: 0-10

Controls the automatic display dimmer. The value 0 switches the dimmer off; the OLED-Display is never automatically dimmed. Values greater than 0 are interpreted as minutes. After this time, the OLED-Display is dimmed to its lowest brightness value. At every command input and every PACTOR link start, the brightness of the display is returned to the preset brightness value. The time to the automatic dimming is then set again.

Autodimm is mainly useful when the modem is in continuous operation. Very long operation of the OLED display with full brightness and always the same display can cause unwanted loss of brilliance (aging) of the pixels used (“burn-in” effect).

## **DISP Bandwidth**

Default setting: 2400

Value range: 1200, 2400, 4800

Sets the frequency range in mode 0 as well as in mode 1

Range:           1200:  $1500 \pm 600$  Hz  
                  2400:  $1500 \pm 1200$  Hz  
                  4800:  $2400 \pm 2400$  Hz

## **DISP BRightness**

Default setting: 15

Value range: 1-15

Sets the OLED brilliance. Corresponds with the normal Brightness command in cmd:-main menu. If the parameter (range 1 – 7) is changed in the main menu, then this relates also to the parameters in the DISP menu and vice-versa.  $DISP\ BR = (BR * 2) + 1$ .

$BR = DISP\ BR = (BR - 1)/2$

## **DISPlayCOndisp**

Default value: 1

Value range: 0, 1

Sets the operating mode of the display during a PACTOR link. The value 1 has the effect that during a link, a detailed link status is displayed. The value 0 however causes only a minimal link status display in the upper display line. The display does however, even in this operating condition, show the “waterfall” or spectrum during a link.

## **DISP Speed**

Default setting: 0

Value range: 0-3

Sets the update speed (or the number of FFTs / second). Effects both modes. The higher the speed, then the slower (naturally) is the resolution in the frequency direction (only “washed out” spectral details can be seen). In the waterfall display (mode 0), higher speed values give a higher waterfall “flow speed” (scroll speed). However, the resolution is less. In the spectrum display (mode 1) a higher speed produces a poorer resolution (“round spectrum”): the higher display change frequency however is only useful for signals with fast spectral changes and additionally with a relative low setting of the Smoothing parameter.

## **DISP SMoothing**

Default setting: 15

Value range: 0-63

Functions only with spectrum display (mode 1). Sets the averaging effect in the time direction. The larger the Smoothing value, the slower the spectrum changes – short time changes are increasingly smoothed out with higher Smoothing values, and disappear. Only longer lasting spectral parts are displayed. High smoothing values can thus serve to average the spectrum over a longer time frame, thus freeing it from short term fluctuations. It is thus possible for instance to detect even a very weak sine wave signal under noise.

The smoothing parameter does not work linearly. A high Smoothing value gives increasingly greater averaging. The value 63 works approximately double so strongly as the value 62. A number of values should be tried for optimum results.

## **DISP TYpe**

Only implemented for compatibly. Presently has no effect.

# The Auto-Decoder, Commands, Functional Description

## General

The DR-7800 modem contains an automatic demodulator/decoder for diverse signals and systems found on HF channels. This automatic decoder works fully independently from the PACTOR-unit of the modem. This means the Auto-Decoder does not influence in any way the PACTOR standby condition of the modem. For example, even with an activated auto decoder, the modem can still be called and linked to in PACTOR.

As soon as the Auto-Decoder “discovers” a decodable signal, the display is automatically switched to Mode 2 “Small waterfall”. See the DISPlay command and Fig 4 below. In the lower half of the display appears the decoded text or additional information concerning the presently received signal.

With the present firmware, the following signals and systems can be decoded automatically:

- **Navtex** or Amtor-FEC/Sitor-B
- **PACTOR-I**
- **RTTY** (Baudot-Code, 45 und 50 Bd)
- **PACTOR-Free-Signals**
- **PACTOR-Call-Packets**

If a signal is decoded, then the mode of the decoded system is displayed in abbreviated form on the upper right of the display - according to CH:

With PACTOR-I, PACTOR-Free-Signals  
and PACTOR-Call packets - displays: **CH:PT1.**  
With Navtex or Amtor-/Sitor-FEC - displays: **CH:NAVT.**  
With Baudot-RTTY - displays: **CH:RTTY.**

With all systems using 2-FSK modulation (i.e. two keyed tones), such as Navtex PACTOR-1 or RTTY, the signal must be adjusted to be on the two “thicker” markings in the waterfall or spectrum display (for the actual mark-/space tone setting) so that the Auto-Decoder can do its work. See fig 4.



Fig 4: Small Waterfall / Auto-Decoder-Display

The decoder has a frequency lock-in-range of approximately  $\pm 150$  Hz, so that the adjustment must not be too exact. Many modes can work well with the standard setting for Mark/Space with a shift (difference between the mark and space tones) of 200 Hz. With RTTY-SYNOP using 450 Hz shift it is recommended that an adjustment be made using the TONES – and MARK- and SPACe commands (TONEs 2, MARK 1725, SPACe 1275).

All text that is produced from the Auto-Decoder is always stored in the Auto-Decoder text buffer. This has a length of 20,000 characters, and can then (even afterwards) be read again (See “ADEC Buffer” command).

# Special remarks concerning the modes which can be decoded

## Navtex

The Auto-Navtex-Decoder encompasses all Navtex compatible transmissions (also Sitor-B as well as Amtor-FEC) and is active as soon as the Idle/Synch-sequence is recognized. These sequences are usually sent at the beginning of the Navtex message, and with longer messages also scattered in between. The automatic clock error correction compensates for errors of up to  $\pm 200$  ppm. So that even “poorer” Navtex stations can be received error-free.

The Auto-Navtex-Decoder works with an “**Auto Reverse**” function, and thus also decodes transmissions with inverted Mark-/Space tones. In this case, the display shows the additional status information “**reverse**” under the information CH:NAVT. With normal tones the message “**normal**” is displayed.

During Navtex reception, further status information concerning the type and quality of the presently received characters are displayed on the right, next to the normal/reverse display:

<b>tfc</b>	means	“a correctly received character”
<b>err</b>	means	“an incorrectly received character”, and a fill character has been “inserted”
<b>idle</b>	means	“a non displayable fill characters received - transmitter sends Synch sequence
<b>corr</b>	means	“a correctly received character through the error correction algorithm – the probability the character is falsely displayed is relatively large”.

If the Navtex signal becomes too bad for decoding during the reception, the Auto-Decoder breaks off the reception after a while (without signal approx 30 seconds) and awaits a new synchronisation signal.

The received data is also given out over the normal user interface (USB/Bluetooth) in cmd: mode providing it is switched to the „Amtor prompt“ (\*\*-A-\*\*) by using the AMTOr command.



## PACTOR

The Auto-PACTOR-Decoder encompasses all PACTOR-1 transmissions as well as PACTOR call and Free Signal packets. This for instance allows for the PACTOR-“FEC-ID” with Winlink as well as the callsign of the called station to be read.

Also the PACTOR-Decoder works with the “**Auto Reverse**” function, because the tones in PACTOR-1 can easily be inverted. Of course the monitoring of PACTOR-1 transmissions also automatically allows both possible speedlevels (Speedlevel 1 and Speedlevel 2) to be recognized and decoded.

If the listen parameter is set to 1, the received data is also given out via the normal user interface in cmd:-mode.

As soon as the Auto-PACTOR-Decoder has accepted a valid signal, the display shows **CH:PT1** on the upper right. Underneath is displayed some additional status information:

With PACTOR-I data packets:

<b>SL 1</b>	means	“Speedlevel 1”
<b>SL 2</b>	means	“Speedlevel 2”
<b>RPT</b>	means	“repeated packet, the information contained is not displayed”
<b>OK</b>	means	“Correctly received packet, the information contained is displayed”
<b>REV</b>	means	“reverse - reversed Mark and Space tones”

With call and Free Signal packets:

<b>Normal Call</b>	means	„normal calling packet”
<b>Robust Call</b>	means	“Calling packet in Robust format”
<b>Free Signal N</b>	means	“Free Signal, uncoded format“
<b>Free Signal C</b>	means	“Free Signal, coded format”

Call and Free Signal packets are additionally in the format [**CALL: CALLSIGN**] displayed in the text area of the display (Mode “Small Waterfall”). CALLSIGN means here that the callsign of the called station (this is contained in the call packet) or that of the Free Signal server is presently being received.

Note: Also in regular PACTOR connections with the modem, the callsign of the opposite station in format [**PTCON: CALLSIGN**] is written in the text area of the display (Mode “Small Waterfall”). These messages are not from the Auto-Decoder, but from the PACTOR process of the modem, and serve only as a small “history” of the finished PACTOR-connection with your own modem. The message can be displayed “mixed” with the messages from the Auto-Decoder, e.g. when the Auto-Decoder recognizes call packets and displays them as [CALL: ...].

## RTTY

The Auto-RTTY-Decoder encompasses all Baudot-RTTY transmissions with any stop bit length in the speed range from 45 and 50 Bd. The decoder also works with the “Auto Reverse” function. The shift polarity (normal or reverse tones) is correctly detected and displayed by the decoder.

The received data is also given out on the normal user interface (USB/Bluetooth) in cmd:-Mode, if it is switched to the “RTTY prompt” (\*\*-R-\*\*) using the BAUdot-command.

As soon as the RTTY-Decoder receives a valid signal, the display shows on the upper-right the information **CH:RTTY**. Underneath is additional information status information displayed:

<b>45 Bd</b>	means	“Present speed 45 Bd”
<b>50 Bd</b>	means	“Present Speed 50 Bd”
<b>normal</b>	means	“normal tones”
<b>reverse</b>	means	“reversed ”-, exchanged Mark- /Space tones

# Configuration of the Auto-Decoder

The command ADECoder serves for the configuration of the Auto-Decoder:

## ADECoder

```
cmd: h adec
ADECoder:
-----
```

controls the ADECoder (Auto-Decoder) parameters.

First argument determines "sub command", second argument is the (optional) parameter which can be changed:

```
ADECoder All      0-1: 0=Off, 1=On, Main Auto-Decoder Switch (Default: 1).
ADECoder Navtex   0-1: 0=Off, 1=On, Navtex Auto-Decoder Switch (Default: 1).
ADECoder Pactor   0-1: 0=Off, 1=On, Pactor Auto-Decoder Switch (Default: 1).
ADECoder Rtty     0-1: 0=Off, 1=On, RTTY Auto-Decoder Switch (Default: 1).
ADECoder Buffer    0-20000: Shows number of bytes of Auto-Decoder Buffer
ADECoder Delay    10-300: Automatic Small-Waterfall Display timeout
                    (seconds, Default: 30).
```

The first parameter determines the sub-command. The sub-commands **All**, **Navtex**, **Pactor**, **Rtty**, **Buffer** and **Delay** are supported.

## Description of the individual sub-commands and parameters

### ADECoder All

Default setting: 1 (On)

Value range: 0, 1 (Off, On)

Allows the general switching off of the Auto-Decoder, independently of the mode-dependent parameters (ADEC Navtex, Pactor, Rtty). If the "ADEC All" parameter is set to 0, then the Auto-Decoder is fully inoperative. If the "ADEC All" parameter however is set to 1, then the mode-dependent parameters regulate if the appropriate Auto-Decoder (e.g. for Navtex or RTTY or PACTOR) are active or inactive.

### ADECoder Navtex

Default setting: 1 (On)

Value range: 0, 1 (Off, On)

Dictates if the Auto-Navtex-Decoder is on or turned off.

## **ADECoder Pactor**

Default setting: 1 (On)

Value range: 0, 1 (Off, On)

Dictates if the Auto-PACTOR-Decoder is on or turned off.

## **ADECoder RTTY**

Default setting: 1 (On)

Value range: 0, 1 (Off, On)

Dictates if the Auto-RTTY-Decoder is on or turned off.

## **ADECoder Buffer**

Default setting: (without argument): 1000

Value range: 0 - 20000

The parameter value dictates how many characters from the Auto-Decoder text buffer should be read out. (All received data bytes from the Auto-Decoder are stored using the FIFO principle, with a FIFO length of 20,000 bytes). It allows for example 2000 of the last received characters to be read again by giving the command "ADEC B 2000".

If without argument, the last 1000 characters are always given out. If fewer characters have previously been received (since the last modem reset or switch on) than should be given out, then the entire text received to date is given out.

## **ADECoder Delay**

Default setting: 30 (seconds)

Value range: 10 - 300 (seconds)

Regulates the time in which the display returns to the previously set display mode after the end of the of Auto-Decoder reception (with its automatic switching to the "Small Waterfall" display).

If for example, the normal "large" Waterfall is set as display mode, the display switches automatically to the "Small Waterfall" when Navtex is received, and gives out the received text in the lower half of the display. After the end of the Navtex reception, this display stays for approximately 30 seconds (the text can be read), until it is then switched again to the "large" waterfall (without a text area).

If the display mode is set to the value 2, then the "ADECoder Delay" parameter has no meaning.

## **SYS SCANSTOP Command, Scan Stop Signal**

The Scan Stop signal serves for rapid control of external hardware, which must react depending on the link condition (Presently PACTOR link active?), e.g. external frequency scanner or antenna tuner etc. As soon as a PACTOR link is established, the Scan Stop signal is also “active”. Various hardware pins can be configured as the Scan Stop signal. The configuration takes place using the SCANSTOP command in the SYStem-menu:

### **SYS SCANSTOP**

Default setting: 0

Value range: 0-3

0: Scan Stop Signal turned off.

1: Scan Stop Signal uses PTT of the Aux port (only when Aux is not used for something else).

2: Scan Stop Signal uses RTS of the TRX Control Port.

3: Scan Stop Signal uses RTS of the TRX Control Port - with inverted levels.

As Scan Stop signal output, the RTS (TTL / V24) of the TRX control port, or the PTT of the Aux port can be chosen. The Scan Stop signal becomes “active” immediately on a connect (also even on recognition of only a part of a connect packet). “Active” means that the RTS-V24 signal jumps from -10 to +10 volts. The RTS-TTL signal on the other hand has a high level in STBY condition and in “active” condition drops to low level.

The V24-signal is available for use when a transceiver type with V24 levels is chosen.

When PTT is chosen, the Aux-PTT is “active” (conducts to earth) during the Scan Stop condition,

With parameter value 3 the Scan Stop signal is set to “TRX control RTS INVERTED”. This means that the RTS-V24 signal is “low” during the link (-10V) and the RTX-TTL signal “high”.

## **2. Commands with Modified Function**

### **CW-ID**

With PACTOR links as well as PACTOR Unproto transmissions, a CW identification can also be transmitted. This takes place using the MARK-tone (See MARK command) and always with a speed of 100 LpM / 20 WpM. The amplitude of the CW signal is always 3 dB lower than the value of the FSKAmpl set using the FSKAmpl command, and is thus dependent on the FSKAmpl command.

For configuring the CW ID, the CWid command in the cmd:-menu is used.

### **CWid**

Default setting: 0 0

Value range: 0-5 0

There are two parameters allowed in order to remain compatible with the appropriate PTC-II commands. The second parameter has however presently no meaning with the DR-7800 modem.

The first parameter configures the CW ID, which (differently to the PTC-II) is always sent in modem "Audio only" – i.e. without CW keying of the PTT line. The PTT line remains continuously on "send" during the entire CW ID.

The following values are possible:

- 0: CW ID not active.
- 1: CW ID with PACTOR-ARQ and at link end on the ISS side.
- 2: For compatibility reasons the same function as parameter "1".
- 3: CW ID with PACTOR ARQ, ISS link end as well as PACTOR Unproto.
- 4, 5: As 2 and 3, but also CW ID with IRS link end.

The CW ID is repeated during the PACTOR transmission, after (at least) every 9.4 seconds link time on the ISS side

# PACTOR-Unproto

## Unproto

New modes 401...420 for P4:

```
cmd: h u
```

```
Unproto:
```

```
InitiatesPactorunproto transmission (Pactor FEC).  
PT FEC can be disabled by typing the QRT-character or  
using the Disconnect command.
```

```
Possible arguments: 1..10 / 30..41:
```

```
1,2=100/200 Bd FSK.
```

```
3,4,5,6=100/200/400/800 Bd DPSK/short cycle,  
7,8,9,10=100/200/400/800 Bd DPSK/long cycle.
```

```
30,31,32,33,34,35=100/300/700/1400/2400/3200 Bd PT3 short cycle,  
36,37,38,39,40,41=100/300/700/1400/2400/3200 Bd PT3 long cycle.
```

```
401...410 = PT4 speedlevel 1..10 short cycle,  
411...420 = PT4 speedlevel 1..10 long cycle.
```

```
*1, *2, ... *5 defines packet repetition time.
```

Specialties with P4: There is no RQ header sent with RQ packets, but the normal header is re-sent. RQ concerns only the packet counter. This primarily supports time-diversity, but the P4 inherent MARQ logic is not supported. There can however, even without prior knowledge of the speedlevel be immediate synchronization of discrete packets. This is not possible with the P4-RQ header.

## **Version ##**

"Ver ##" returns the correct Dragon-modem string, independent of the PTCC value.



## Specialities with WeFax / Audio Sampling

With @f, all parameters are accepted which were also accepted by the PTC-II (0,1,2,17,18), but only the WeFax parameters (there is presently no AMFax implemented) (1, 17) switch on the Fax mode or the FM-fax demodulator. Parameter value 2 and 18 are ignored, and produce no action. @f0 switches the Fax-demodulator off. As long as the Wefax demodulator is active, the display shows in PACTOR STANDBY condition, in the middle of the upper line “Fax”. If there is no packet polled by the operating software via the Hostmode channel 252 for an approx 4 second period when the Fax-demodulator is active, then the FM-fax demodulator switches automatically off and “Fax” disappears from the display.

The bit 4 in the parameter values is always ignored. The sampling rate on the Hostmode channel 252 is always 3500 samples/second. It is derived from the unchangeable output SERBaud rate (always 115200). (SERBaud / 32).

@f can always be activated and can be run in parallel to all other modes. In particular normal PACTOR operation (also connects from outside) is possible during @f operation.

@s can always be activated, also (as opposed to the PTC-II) when @f has not been previously switched on.

### **3. Commands without a function**

The following commands are implemented purely out of compatibility reasons and are presently without any form of function:

ACheck, ANSwer, BAKup, BMsg, BOOT, CText, CWMoni, CWSpeed, CWWeight, DE-  
lete, DIR, FEc, Gate, LIN, Llist, LOCK, LOGIn, MYSelc, NAVtex, NUL, Phase, RCU, Read,  
RELOad, RLe, Send, SFile, SQuelch, USer, USOs, VERIfy, Write, XUser

The following commands deliver a PTC-IIprocompatible message:

ADdlf, APower, AQrg, ARX, BC, BELL, Box, CHOBell, CMsg, CYcle, HCr, LICENSE, Lis-  
ten, LOG, MAil, MAXDown, MAXSum, MAXTry, MAXUp, REMote, SERBaud, SHow,  
TNC, TR, UMLauts

To the previously not supported functions also belong Amtor, BAUdot, CWTerm, MONitor  
,PSKTerm und PACket. The respective sub-menus are fully complete but have absolutely no  
function.

In detail these are

**trx:**

Channel, Down, DWell, List, Ptime, RType, TIme, Wait, XGate, XScan

**fax:**

Amfax, Fmfax, Jvfax, JVComm, Sstv, FSk, Comperator, PR300, AGain, AResolut, SResolut,  
FSKBaud, SMode, TXComp, HSynch, JSynch, ASynch

**pac:**

Aprs, Baud, Connect, CONVerse, CStatus, DIGIpeat, Disconne, KISS, MFilter, MYAlias,  
MYMail, PACLen, Port, TRACE, TXLevel, Unproto

**aud:**

Delay, Bandwidth, Center, CWFilter, Invert, Notch, Peak, Through

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