



Futurecom Systems Group, ULC

PDR8000 Portable Digital Repeater Programming Guide

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Document Revisions

Revision	Date	Notes & References
R1.0	2017-05-24	Initial Version
R2.0	2017-10-02	Release R2.0 updates, newsletter signup info

The PDR8000 operation described in this document requires the following:

Repeater Module Firmware 4C088X01: R2.0

IF Module Firmware 4C088X05: R2.0

Tweaker Programming Software 6V088X01: R2.0



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Publicly Available Software List

Name: MFC Grid Control

Version: 2.24

Modified: Yes

Software Site: <http://www.codeproject.com/KB/miscctrl/gridctrl.aspx>

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1 RF ENERGY EXPOSURE COMPLIANCE, AWARENESS AND CONTROL INFORMATION AND OPERATIONAL INSTRUCTIONS

This radio equipment is intended for use in occupational / controlled conditions, where users have full knowledge of their exposure and can exercise control over their exposure to meet FCC limits. This radio device is NOT authorized for general population, consumer or any other use.

ATTENTION!

Changes or modifications not expressly approved by Futurecom Systems Group, ULC. could void the User's authority to operate the equipment. To satisfy FCC/IC RF exposure requirements for mobile transmitting devices, the minimum separation distances specified in the RF Safety Booklet (available on the Futurecom website: <http://www.futurecom.com/support/documentation-software/>) should be maintained. To ensure compliance, operations at closer than this distance is not allowed.

ATTENTION!

Futurecom requires the PDR8000 operator to ensure FCC Requirements for Radio Frequency Exposure are met. The minimum distance between all possible personnel and the antenna is specified in the RF Safety Booklet (available on the Futurecom website: <http://www.futurecom.com/support/documentation-software/>). Failure to observe the Maximum Permissible Exposure (MPE) distance exclusion area around the antenna may expose persons within this area to RF energy above the FCC exposure limit for bystanders (general population). It is the responsibility of the PDR8000 operator to ensure MPE limits are observed at all times during transmissions. The PDR8000 operator must ensure at all times that no person comes within MPE distance from the antenna.

2 PDR8000 PROGRAMMING BASICS

2.1 INSTALLING AND UNINSTALLING THE TWEAKER PROGRAMMING SOFTWARE

Operating Systems	Windows 7 Windows 10
Processor	400MHz or higher Pentium grade processor
Peripherals	USB Port

If you have an older Tweaker version already installed, you can either uninstall it first OR you can simply install the new Tweaker in a new folder.

To uninstall Tweaker – go to the Control Panel, Add and Remove Programs, find the PDR8000 Tweaker and select the Remove option.

To access Tweaker programming software, download the application from the Futurecom Support Portal into the desired location on your PC.

2.2 USING THE TWEAKER PROGRAMMING SOFTWARE OFF-LINE

The Tweaker programming software can be used off-line to review, modify and save new personality templates (.dpd) files.

2.2.1 VIEWING PDR8000 PERSONALITY FILES

Run the Tweaker.

Select **File → DPD Files (Templates) → Load DPD File** and specify the dpd file location and name when prompted.

2.2.2 MODIFYING PDR8000 PERSONALITY FILES

Once a dpd file is successfully opened (as described in the previous section), the dpd settings are available for reviewing and modification off-line.

2.2.3 SAVING PDR8000 PERSONALITY FILES

After editing the personality setting, the dpd file can be saved by selecting **File → DPD Files (Templates) → Save DPD File** and specifying a new or the same dpd file name and location.

2.3 USING THE TWEAKER PROGRAMMING SOFTWARE ON-LINE

To use the Tweaker on-line the following is required:

1. Tweaker software installed on the PC.
2. Powered up PDR8000.
3. Programming cable (USB cable directly connected to the PDR8000).

2.3.1 COM OPTIONS: PORTS

Field Name	Options / Units	Description	Notes
COM Port		Drop down list of ports available when connecting directly to the PDR8000 USB Port.	

2.3.2 READING THE PDR8000 ELECTRONIC LABEL

The Electronic Label of the PDR8000 contains information regarding the firmware currently loaded in the PDR8000, the hardware model and serial number.

To read the PDR8000 Electronic Label, open the Hardware/Software Information window in Tweaker.

The electronic label can be read either on-line or by loading a previously saved .epf or .dpd file.

The Electronic Label is also stored in the .dpd file, even though the information contained in it does not overwrite the electronic labels of the DVRs during 'cloning'.

NOTE:

An .epf file contains the personality and calibration data of a specific PDR8000 unit. A .dpd file contains the personality settings of a PDR8000 unit. Used for 'cloning'.

2.3.3 READING FROM THE PDR8000 (UPLOADING DATA)

To read a PDR8000 unit:

1. Establish On-Line communication with the PDR8000.
2. Select **PDR → Load Data from PDR Repeater** OR Press **F2**.
3. The personality data of the currently connected PDR8000 unit will be loaded into the Tweaker memory for reviewing and / or editing.

2.3.4 WRITING TO THE PDR8000 (DOWNLOADING DATA)

2.3.4.1 APPLYING DPD FILE ('CLONING')

Select **File** → **DPD Files (Templates)** → **Apply DPD to The Repeater**. Specify the desired .dpd file name and location when prompted.

2.3.4.2 WRITING SELECTED CHANGES TO THE PDR8000

If any changes are made while reviewing the personality data of a PDR8000 (On-Line), the fields containing changes are shaded in green (if the changes are valid). If the changes are not valid, the fields will be marked red and the new settings cannot be saved to the repeater.

After making the necessary changes to all the settings on the various Tweaker screens, the new personality can be saved to the PDR8000 by executing any of the following:

- **F4**
- OR
- **PDR** → **Save Changes to PDR Repeater**
- OR
- **PDR** → **EEPROM Maintenance (Ctrl+E)** → **Changes ->PDR**
- OR
- Click on the EEPROM Maintenance Icon → **Changes -> PDR**

Reset the repeater (after the changes are saved) in order to ensure the changes are in effect. Resetting of the PDR8000 can be done by executing any of the following methods:

- **PDR** → **Reset PDR Repeater**
- OR
- **F3**
- OR
- **EEPROM Maintenance** → **Reset Repeater**

When the DVR personality has been changed and the changes are not causing any detected errors, the EEPROM maintenance icon is flashing yellow. Clicking on the icon opens the EEPROM screen which offers the options of saving the changes to the DVR and resetting the PDR8000. If the data changes contain errors, the EEPROM icon is flashing red and the screens containing conflicting data will be marked with a red exclamation mark. In this case, the changes cannot be written to the PDR8000 EEPROM until the errors are eliminated.

2.4 PDR CONFIGURATION

2.4.1 FREQUENCY BAND CONFIGURATION

Field Name	Options / Units	Description	Notes
Selected Frequency RX Band	MHz	Indicates the band supported by this hardware platform. VHF R1 138 - 174 UHF R1 380 - 430 UHF R2 450 - 470 UHF R3 470 – 512 700 764 - 806 800 851 - 870	
Selected Frequency TX Band	MHz	Indicates the band supported by this hardware platform. VHF R1 138 - 174 UHF R1 380 - 430 UHF R2 450 - 470 UHF R3 470 – 512 700 764 - 806 800 851 - 870	
Base Rx Frequency	MHz	Indicates the base receive frequency for this PDR8000.	This field is read only. The value in brackets is the factory default.
Max. Rx Frequency	MHz	Indicates the maximum receive frequency for this PDR8000.	This field is read only. The value in brackets is the factory default.
Base Tx Frequency	MHz	Indicates the minimum transmit frequency for this PDR8000.	This field is read only. The value in brackets is the factory default.
Max. Tx Frequency	MHz	Indicates the maximum transmit frequency for this PDR8000.	This field is read only. The value in brackets is the factory default.
Channel-0 Base Frequency	MHz	Indicates the lowest frequency for this PDR8000- either transmit or receive.	This field is read only. The value in brackets is the factory default.
Adjacent Channel Offset/FM Deviation	12.5 kHz/1.5 kHz	Offset indicates the width of each channel; used to determine the frequency of the next channel.	P25 ASTRO
Channel No. Spacing	2.5000 kHz* 5.0000 kHz* 7.5000 kHz* 6.25000 kHz 12.50000 kHz 18.75000 kHz 25.00000 kHz * valid for VHF only	The width of each channel; used to determine the frequency of the next channel.	Channel-0 Base Frequency plus an integer multiple of this field defines the valid values for Rx Freq. and Tx Freq. fields in the Channel Configuration window. The value in brackets is the factory default.
Rx Synthesizer Frequency Step	2.5000 kHz* 5.0000 kHz* 6.2500 kHz * valid for VHF only	Frequency step size used by the receive synthesizer.	The value in brackets is the factory default.

Field Name	Options / Units	Description	Notes
Tx Synthesizer Frequency Step	2.5000 kHz* 5.0000 kHz* 6.2500 kHz * valid for VHF only	Frequency step size used by the transmit synthesizer.	The value in brackets is the factory default.

2.4.2 PERSONALITY INFORMATION

Field Name	Options / Units	Description	Notes
DAY	2 digits	Indicates the day for the date of programming for this personality template.	
MONTH	2 digits	Indicates the month for the date of programming for this personality template.	
YEAR	2 digits	Indicates the year for the date of programming for this personality template.	
Personality Name	Maximum 14 alphanumeric, characters	Name used to reference this personality template.	
Personality Description	Maximum 32 alphanumeric characters	Descriptive text used to reference this personality template.	

2.4.3 HARDWARE/SOFTWARE INFORMATION

This screen is for information purposes only and displays information relating to the Repeater Module and the IF Module: serial number, part numbers, revision/version numbers and release dates.

2.5 PERSONALITY DATA

2.5.1 CHANNEL CONFIGURATION

Field Name	Options / Units	Description	Notes
Ch. #	1-16	Identifies the current channel as one of 16 possible channels.	This field is read only.
Enabled	No Yes	Used to enable/disable channels relevant to the location the PDR8000 is deployed in.	This field is also updated based on Repeater Operation (as configured in the RF Configuration window).
Channel Mode	F.Duplex Simplex H.Duplex	Determines the PDR8000 mode of operation for the current channel – Full Duplex, Half Duplex.or Simplex	- Repeater Mode: only Full Duplex Channels are enabled - Base Station Mode: Full Duplex, Half Duplex or Simplex channels are enabled
Rx Freq. (MHz)	MHz	Receive frequency for the current channel.	When Hardware Platform is set to Satellite Tx or channel mode to Simplex, this field is read only and is disregarded. Must equal Channel-0 Base Frequency plus an integer multiple of Channel No. Spacing as defined in Frequency Band Configuration window. Must also match the PSU Transmit Frequency.
Tx Freq. (MHz)	MHz	Transmit frequency for the current channel.	When Hardware Platform is set to Satellite Rx, this field is read only and is disregarded. Must equal Channel-0 Base Frequency plus an integer multiple of Channel No. Spacing as defined in Frequency Band Configuration window. Must also match the PSU Receive Frequency.
Tx Pwr (dBm)	20-43 dBm 37.81 dBm	Specifies the transmit power at the output of the PDR8000	When Hardware Platform is set to Satellite Rx, this field is read only and is disregarded.
Tx Pwr (Watts)	0.1-20 Watts 6 Watts	Specifies the transmit power at the output of the PDR8000.	This field is read only and is disregarded.
Channel Name	Maximum 15 alphanumeric characters	Name that identifies the channel.	
A. C. Table Index	1-16	Identifies which of the 16 possible Access Code Tables applies to the current channel.	

Field Name	Options / Units	Description	Notes
Access Code Table	Link, Maximum 10 alphanumeric characters	Identifies by name and provides a link to open up the Channel – Access Code Table ASTRO NAC Assignments window associated with the current channel.	This is a read only field that displays the name of the Access Code Table only when configured in Channel – Access Code Table ASTRO NAC Assignments window.
PTT Priority	W>R R>W R=W	Specifies priority order of two types of PTT requests: • W = Wireline • R = Repeater	<ul style="list-style-type: none"> • W > R: Wireline has priority over Repeater • R > W: Repeater has priority over Wireline • R = W: Repeater and Wireline have equal priority. Whichever occurs first takes and maintains PTT control.
RSSI Thresh. (dBm)	-50 to -127dBm -115dBm	Received Signal Strength Indicator Threshold specifies the signal level at the input of the PDR8000 receiver , required to validate the signal	
W.T.O.T. (sec)	0-2550 seconds, in increments of 10 seconds (0 = disabled, displays as OFF) 120 seconds	Wireline Time Out Timer specifies the maximum amount of time the transmitter may be continuously activated by the console through the wireline.	Any value entered that is not an increment of 10 is rounded up to the next valid value.
R.T.O.T. (sec)	0-2550 seconds, in increments of 10 seconds (0 = disabled, displays as OFF) 60 seconds	Repeater Time Out Timer specifies the maximum amount of time repeater mode may be continuously activated by subscriber through receiver.	Any value entered that is not an increment of 10 is rounded up to the next valid value.
R.D.O.D. (sec)	0-2550 seconds 0 seconds	Repeater Drop Out Delay specifies the amount of time repeater mode is maintained following loss of received signal.	
Monitor Before Data Tx	Disabled Enabled	<p>Disabled: PDR8000 does not monitor or notify the infrastructure of any co-channel users.</p> <p>Enabled: PDR8000 monitors the Rx channel for co-channel users and notifies the infrastructure</p>	Enabled: If a co-channel user is detected, the station will notify the infrastructure (wireline) every 5 seconds. The PDR8000 will not transmit data once it receives this message. When co-channel activity stops, the station will again notify the infrastructure (wireline). The PDR8000 will resume data transmission once it receives this message.

Field Name	Options / Units	Description	Notes
Tx Inhibit	Disabled Enabled	Disabled: PDR8000 transmits on the selected channel. This is default setting. Enabled: PDR8000 does not transmit if this field enabled.	
Base Station ID	Maximum 20 alphanumeric characters (uppercase letters only)	Used for automatic, periodic, over-the-air transmission of the PDR8000's call sign.	Assigned on a per channel basis, allowing pre-configuration of different call signs on channels that are used for different geographical deployments.
NOTE: In the Options/Units column, the option in bold text indicates the default value.			

2.5.2 HARDWARE CONFIGURATION

Field Name	Options / Units	Description	Notes
RSSI Off Hysteresis	2-20dB 5 dB	Sets the Received Signal Strength Indicator Off threshold in dB below the Received Signal Strength On Threshold (see Channel Configuration)	Typically set to 5dB.
RSSI Speed	1-10ms 5ms	Sets the Received Signal Strength Indicator averaging integration time.	Typically set to 5ms.
Temperature Alarm	50 –100 deg C 0 = OFF	PDR8000 activates the temperature alarm if the RF transmitter module temperature exceeds this threshold.	Typically set to OFF
Output Power Alarm	1-5dB 0 = OFF	PDR8000 activates the output power alarm if the difference in the measured RF Tx power and programmed Tx power exceed this threshold.	Typically set to OFF
Antenna Switch	Disabled Enabled	Specifies whether the external antenna switch is used for single antenna operation.	This field is only accessible when Repeater Operation is set to Base in the RF Configuration window.
Low Voltage Alarm	0, 10 - 14 Volts (0 = disabled, displays as OFF) 0 Volts	Voltage level that triggers the Low Battery Alarm.	If set to 0, the alarm will be disabled. Typical setting is 0V.
High Voltage Alarm	0, 16.0V to 17.0V (0 = disabled, displays as OFF) Disabled	Voltage level that triggers the DC Voltage High Alarm.	If set to 0 the alarm will be disabled.
NOTE: In the Options/Units column, the option in bold text indicates the default value.			

2.5.3 STATION/WIRELINE CONFIGURATION

Field Name	Options / Units	Description	Notes
Station Name	Maximum 31 alphanumeric characters except for _ '? ' % * .	A unique name or alias that identifies the PDR8000.	
Hardware Platform	PDR Satellite Rx Satellite Tx	Identifies the hardware platform for this PDR8000.	
System Type		System type supported is Conventional.	This is a ready only field.
Station Type		Station type supported is ASTRO CAI (Digital).	This is a ready only field.
Site ID	1-62 1	When the Wireline Interface is set to V.24, this field is used as the Terminal Endpoint Identifier number.	
Wireline Interface	None V.24	Indicates if V.24 Wireline support is enabled.	If None is selected, the other Wireline Configuration fields are disabled.
V.24 Transmit Clock	Internal External	This specifies the source of the V.24 Tx Clock. This is needed for PDR cross connect (RT/RT) and some microwave modems Internal: The base radio provides the clock. This choice is typically selected when the radio is connected directly to an infrastructure device. External: An external device (e.g. a channel bank) is providing the V.24 clock.	This field is disabled when Wireline Interface is set to None.
RT/RT Configuration	Disabled Enabled	Disabled: PDR8000 cannot be used in RT/RT configuration. Enabled: PDR8000 used in RT/RT (back to back) configuration.	When Wireline Interface is set to None, this field is disabled.

Field Name	Options / Units	Description	Notes
Fallback In-Cabinet Repeat	Disabled Link Failure Link Failure or Timer	<p>Disabled: when the V.24 link failure is detected, the PDR8000 does not automatically activate its local repeat capabilities.</p> <p>Link Failure: when the V.24 link is disconnected, the PDR8000 does automatically activate its local repeat capabilities.</p> <p>Link Failure or Timer: when the V.24 link is disconnected, or the Fallback Determination Time expires, then the PDR8000 does automatically activate its local repeat capabilities.</p>	<p>This field is not applicable to channels in Half Duplex or Simplex Mode.</p> <p>When Wireline Interface is set to None, this field must be set to Disabled.</p>
Fallback Determination Time	50-10000ms 180ms	Amount of time the PDR8000 waits for an outbound payload from the infrastructure after sending an inbound payload via the V.24 link.	<p>This timer is used when the Fallback In-Cabinet Repeat is set to Link Failure or Timer.</p> <p>This field is disregarded when Fallback In-Cabinet Repeat is set to Disabled or Link Failure.</p>
Local PTT Test Tone	Check box	<p>When disabled, pushing the Local PTT button transmits an RF carrier on the active channel.</p> <p>When enabled, pushing the Local PTT button transmits a 1011 Hz test tone on the active channel.</p>	
NOTE: In the Options/Units column, the option in bold text indicates the default value.			

2.5.4 RF CONFIGURATION

Field Name	Options / Units	Description	Notes
Repeater Operation	Base Repeater	Specifies whether station is operating as a Base Station or a Repeater.	Base- local repeat is unavailable (Full Duplex, Half Duplex and Simplex all supported) Repeater- local repeat available on Full Duplex channels only (depending on Gate Parameters)
Repeater Gate Update	Disabled Enabled	Specifies how the station determines its state after a reset. Enabled: the station comes up in the state last requested by the console (Repeater Set Up or Repeater Knocked Down) Disabled: the station comes up in the state specified by the Repeater Gate Startup State field.	This field is only accessible when Repeater Operation is set to Repeater.
Repeater Gate Startup State	Repeat Set Up Repeat Knocked Down	Specifies the station's state after a reset: Repeat Set Up or Repeater Knocked Down	This field is only accessible when Repeater Operation is set to Repeater AND Repeater Gate Update is Disabled.
Start on Last Active Channel	Disabled Enabled	Specifies if the station starts on the last active channel after a reset.	
Startup Channel	1-16 1	Specifies the channel to which station is set after a reset.	This field is ignored when Startup on Last Active Channel field is set to Enabled.
BSI Interval	1-60 minutes 15 min	Specifies the time interval at which the FCC assigned station call sign is broadcast.	
Repeat Packet Data	Disabled Enabled	Specifies whether data is repeated.	
Wireline Data Drop Out Delay	0-255 sec 0 sec	Specifies the duration of the transmission of idle packets following the transmission of an infrastructure originated data packet.	A value of 0 means disabled.
Astro Fade Tolerance	1-3 frames 3	Specifies the number of missed frames before ASTRO message is considered terminated.	
P25 Frame Sync Detection Timer	30-255 ms 100ms	Specifies for how long the PDR8000 digital decoder waits for P25 digital signaling (Frame Sync) before it assumes that the received signal is analog.	
P25 Preamble Length	7.50-265.00 ms 40ms	Specifies the duration of bit sync preamble packets that are sent at the beginning of all ASTRO transmissions.	
NOTE: In the Options/Units column, the option in bold text indicates the default value.			

2.6 SERVICE

2.6.1 MONITORING

Field Name	Options / Units	Description	Notes
PDR Operating Mode	Normal Service	Specifies the current mode of operation Normal: PDR8000 is operating as programmed Service: PDR8000 is operating with user initiated PTT Tx only	User configurable. When PDR8000 is operating in Service mode, transmissions are initiated only by using the front panel PTT button or the PTT configurable field in this window.
Channel	1-16	Identifies the current channel of the 16 possible channels	
PDR Status	Idle Active	Displays the current PDR8000 status	
PTT	PTT OFF PTT ON CARRIER PTT Analog In Test Tone V.52 Test Pattern	PTT OFF: PDR8000 not transmitting PTT ON: PDR8000 transmitting (factory use only) CARRIER: Tx Carrier only PTT Analog In: factory use only Test Tone: Tx 1011Hz digital test tone V.52 Test Pattern:digital test tone	User configurable- available in Service Mode only
Repeater State	Repeat Set up Repeat Knocked Down Base station	Indicates the PDR8000 operation as Base station or Repeater	Programmable in the Tweaker 'RF Configuration' menu
Repeater Activity		Specifies the Repeater Activity	
Receiver Activity			
Rx	Idle Active	Specifies the Repeater Activity	
RxNAC		Displays the received NAC from the Subscriber	
Subscriber ID(decimal)		Displays the Subscriber ID in decimal format	
TalkGroup		Displays the Subscriber Talkgroup ID	
Transmitter Activity			
Tx	Idle Active	Specifies the Repeater Activity	
TxNAC		Displays the transmitted NAC to the Subscriber	
Tx Source	Inbound Outbound	Displays if the PDR is receiving from the Subscriber or transmitting on V.24 Link.	
TalkGroup		Displays the Talkgroup ID	
Infrastructure Activity			
Link State	Fail Pass	Current State of the V.24 Link	

Field Name	Options / Units	Description	Notes
Link Type	V.24	Current Link type	
Rx	Idle Active	Specifies the Link Activity	
Tx	Idle Active	Specifies the Link Activity	
RSSI			
RSSI	dBm	Received signal strength in dBm	
RSSI	uV	Received signal strength in uV	
RF Power			
RF Power	dBm	PDR8000 transmitting RF power in dBm	
RF Power	W	PDR8000 transmitting RF power in W	
Ant. Sw.			
Ant. Sw.	Normal Reverse	Current antenna switch position	
Temp	Celsius	PDR8000 internal temperature	
PA_Temp	Celsius	RF Power Amplifier temperature	
Synth	Locked Out of Lock	Current state of the Synthesizer	
DC Voltage	Normal High Low	DC Voltage	
P25 Rx Modem Test			
BER Rx Test	NO YES	Bit Error Rate P25 Rx Modem Test control	User configurable- available in Service Mode only
BER	%		Service Mode only
BERm	%		Service Mode only
NOTE: Fields in this screen are populated only when connected to PDR8000.			
NOTE: In the Options/Units column, the option in bold text indicates the default value.			

2.6.2 STATUS REPORT

Field Name	Options / Units	Description	Notes
Get Status		Gets the PDR8000 Status Report	
Save Status		Saves the Status Report as text file	
Clear All		Clears the contents	

2.6.3 STATUS LOG

Field Name	Options / Units	Description	Notes
Get Status		Gets the PDR8000 current Status Log	
Save Status		Saves the Status Log as text file	
Clear All		Clears the contents	