When you first start with HRD / DM780, you need to define a few Navigator parameters to the program so it can communicate with your radio through the Navigator. The items that need to be defined are:

DM780: PTT port
DM780: USB Audio Device (sound card)
DM780: TX to RX offset to zero
DM780: Soundcard levels
DM780: Waterfall 1 parameters
DM780: Navigator Options settings
HRD: Rig Type, CAT Port

This document describes how to set and optimize these parameters. The procedures assume that HRD / DM780 has not been setup for the Navigator before, so that when you start, you do not yet know the address of the CAT control. The procedure you will bypass the HRD Connect step and go directly to DM780. The last step will be to set the Connect parameters for HRD.

DM780 has an excellent tool to help you with setup of your Navigator: The "Navigator Manager".

DM780 / Tools / Navigator Manager

DM780 has an integrated manager for the Navigator Interface. It combines an improved Windows style Device Manager, and the functions normally provided by the US Interface NavOptions Program. On the main screen of DM780, go to the Tools menu and select Navigator Manager. You will get a screen similar to the one below.

🚾 US Interface -	Navigato	or Manag	ger (Cha	inges are	applied imm	ediately)		
Navigator Connection Serial Ports Logfile Help								
COM255 💌	COM255 Compact		Pot	rt	Location		Description	
	Conno		Ż	COM1	Intel(R)	82801EB LPC Inte	Communications Port	
Select the Naviga	tor Config p	port,	N	COM4	Navigator	PTT CW Squelch	Navigator CAT & PTT CW Squelch	
then press conno			N	COM5	Navigator	WinKey	Navigator WinKey & FSK	
General			N	COM6	Navigator	FSK	Navigator WinKey & FSK	
	Normal		N	COM7	Navigator	RS232 Port	Navigator RS232 & Config	
	15 dB		N	CON8	Navigator	CAT	Navigator CAT & PTT CW Squelch	
	Normal		N	COM255	Navigator	Configuration	Navigator RS232 & Config	
WinKey PTT:	DIF							
		~						
CAT LED State:		~						
FSK								
Polarity:	Normal	~						
Sidetone:	On	~						
PTT:	On	~						
Baud Rate:	45.45	~						
	1.5	~						
Save As	Save As Default							
Restore D	Restore Defaults							
Visit USInterface.	com on the	e web						

Click on the "Connect" button in the upper left of the screen, and you will see both the NavOptions functions on the left, and the improved Device Manager function on the right.

DM780 / Tools / Navigator Manager (cont'd)

The screen looks like the one below after the "connect".

🔚 US Interface - Navigator Manager	r (Changes are	applied immediately)	
Navigator Connection	Serial Port	s Logfile Help	
COM255 V Close	Port	Location	Description
	🍠 сомі	<pre>Intel(R) 82801EB LPC Inte</pre>	Communications Port
Firmware: Ver 1.00	N COM4	Navigator PTT CW Squelch	Navigator CAT & PTT CW Squelch
	N COM5	Navigator WinKey	Navigator WinKey & FSK
General	N COM6	Navigator FSK	Navigator WinKey & FSK
CH1 Attenuation: Normal	N COM7	Navigator RS232 Port	Navigator RS232 & Config
CH2 Attenuation: 15 dB	N COM8	Navigator CAT	Navigator CAT & PTT CW Squelch
BF Attenuation: Normal	<i>ℕ</i> COM255	Navigator Configuration	Navigator RS232 & Config
WinKey PTT: Off			
LED Brightness: Dim			
CAT LED State: Polling 🗸			
FSK			
Polarity: Normal 🔽			
Sidetone: On 💌			
PTT: On 💌			
Baud Rate: 45.45 💌			
Stop Bits: 1.5 💌			
۱			
Save As Default			
Restore Defaults			
Visit USInterface.com on the web			

Note that all of the option setting functions are on the left, and can be changed and saved just like in the NavOptions program. A significant improvement of the DM780 version is that the Configuration COM port is known, so there is no need to scan the ports and probe for the Config port.

The panel on the right shows all COM port assignments in your computer, with the actual function listed under "Location". The device name of the dual UART is shown under "Description" on the right. In the normal Windows Device Manager, you see what is shown under Description, but you do not know the Location detail until you double click on the PORT number in the Windows Device Manager. This screen combines all of the information you need.

The consolidated screen provided by Simon Brown in DM780 really helps in initial setup with the Navigator. You can have this screen up while you are doing configuration items for easy reference.

The rest of this document shows how to configure your Navigator with DM780. Remember that your actual port numbers may vary from the ones in this example – just use Navigator Manager to tell you what your port assignments are.

PTT SELECTION

On the main DM780 screen, click on "Options". You will see the following screen with tabs to define the DM780 variables.

Program Options					N
Changes are applied immediately		Click here for Logbook options			
Skinning Soundcard Sounds Storage Supe Clock Modes Mode:CW PTT Callsign Lookup	rBrowser:1 QSO:Gene	SuperBrowser:2 ral QSO:Receive	Theme QSO:Tran	Waterfall:1 Ismit Radio	Waterfall:2 Recording
Format GMT/UTC 03:15:51 Zulu Cocal	Move the m display the Select 'Cloo menu.	iouse over the clock date. :k' from the View	. to		
Appearance Default Custom Face Bold The Arial	☐ Italic				

To setup the PTT, click on the PTT tab. You will get the screen on the following page.

PTT SELECTION Cont'd

Program Options				X
Changes are applied immediately	options			
Skinning Soundcard Sounds Storage Clock Modes Mode:CW PTT Callsign Lo	SuperBrowser:1 ookup QSO:Gener	SuperBrowser:2 al QSO:Receive	Theme Wa QSO:Transm	aterfall:1 Waterfall:2 it Radio Recording
COM Port Enable PTT using a serial (COM) port Port: COM4 On TX: Set DTR (data-terminal-ready) Set RTS (request-to-send)	Ham Radio Delu O Enable PTT DM780 mus	uxe via Ham Radio Deli it be connected to H See notes below	uxe - RD.	None No PTT
COM Port To use a COM port for PTT: • Select (*) Enable PTT • Select the COM port; this must • Select DTR, RTS or DTR and RT When you switch to TX DTR and/or RTS Note: this port cannot be used by anoth exclusive use by DM780.	not be in use by S. are set (raised) her program such	another program , when you return 1 as HRD - it mus	n, n to RX the t be availa	y are cleared. ble for
Ham Radio Deluxe To use HRD the radio pane must be con In the View menu select Radio In the Radio pane press Config. The Radio pane must have a To Note: If you use Ham Radio Deluye for	inected to HRD: ure and read the X button displaye	instructions!	ia a rear o	appertor (pot
Note: If you use Ham Radio Deluxe for the microphone connector) make sure y using PTT via a software command, sor	PTT <i>and</i> you con your radio will ac ne radios such a	nnect the audio v cept audio via th s the TS-2000 wi	ia a rear c e rear coni Il not!	onnector (not nector when
None				M

Use the group in the upper left corner to define the COM port for PTT. In this example, PTT is controlled by COM4. Click on the "Set RTS (request-to-send) box to define RTS as the control for actuating PTT on the Navigator. Do not check the "Set DTR" box. In the Navigator, the DTR function is used as an alternate way of keying CW, if the WinKey is not supported by the application software. DM780 has full support for the Navigator WinKey controller, so DTR must not be used.

SOUND CARD

Next, go to the options group and select the Sound Card Tab. You will get this screen:

Program Options	×
Changes are applied immediately	Click here for Logbook options
Clock Modes Mode:CW PTT Callsign Lookup QSD:General Skinning Soundcard Sounds Storage SuperBrowser:1 Su	QSO:Receive QSO:Transmit Radio Recording uperBrowser:2 Theme Waterfall:1 Waterfall:2
Input (Receive) Device: USB Audio CODEC Source: Automatic gain control: Increase signal level to 100% Default sample rate: 8 kHz 3 48 kHz (recommended) Output (Transmit) Use input device Device: USB Audio CODEC Source: Wave Output Attenuation: Output Attenuation: Output Attenuation: Show Supported Formats For recording and playback of wave files see: Recording	Input (Receive) Device: Select the soundcard used for receiving signals, the line in is connected to the audio output from your radio. Source: Select the input source - usually Line in. This fader is shown in the soundcard's RX pane, use it to adjust the input level. Not all soundcards have input sources - for example the SignaLink USB does not have any user-selectable input sources. Automatic gain control: Increases the signal level to 100% - for use when testing new encoding / decoding software. Default sample rate: Usually 48kHz, some high-end soundcards can be switched to actually sample at 48kHz in hardware - check your soundcard documentation. The 48kHz signal is reduced (decimated) to 8kHz and passed to the DM780 decoders. Dutput (Transmit) Device: Select the soundcard used for transmitting signals, the speaker output is connected to the audio input on your radio. This is normally the same as the input device.

Select the USB Audio Codec for input device. Check "Automatic gain control" and the default sample rate of "48kHz (recommended)". Next check the "Use input device" box for Output. The source should be Wave, as shown. Set Output attenuation to 0dB.

QSO General – TX to RX Offset

On the options screen, click on QSO:General tab. This screen allows you to set a transmit offset to compensate for differences in frequency from the sound card between TX and RX. The Navigator USB Audio Codec is run at a sampling rate of 48000, and does not require any compensation. *The transmit offset should be set to 0 Hz* as shown below.

NOTE: Tests run on the Navigator for both the XP and Vista operating systems show that the TX to RX difference is on the order of 5 PPM at the 48000 sampling rate. This equates to a difference of 0.005 Hz at a waterfall of 1000 Hz. To put it in perspective, an incoming PSK signal will be vary in frequency a Hz or so, due to signal path length changes during the QSO. Because of this, you should always lock your TX frequency when in QSO so that you always return to the starting frequency when it is your turn to transmit.

Program Options	×		
Changes are applied immediately	Click here for Logbook options		
Skinning Soundcard Sounds Storage SuperBrowser:1 Su Clock Modes Mode:CW PTT Callsign Lookup QSD:General	uperBrowser:2 Theme Waterfall:1 Waterfall:2 QS0:Receive QS0:Transmit Radio Recording		
General © <u>Create QSD windows maximised (recommended)</u> Remember input (transmit) window contents between sessions Show multiple sets of tags (displays the <u>I</u> ags toolbar) Memory Usage Regularly remove as many pages as possible from the working set (minimises physical memory usage).	Transmit Offset Adjust the transmit frequency to compensate for soundcard or radio offsets. D Hz		

SOUND CARD LEVELS

Exit the "Options" group and go back to the main DM780 screen. At the top of the main screen, click the Soundcard button. You will see a screen like the one on the left side of the example below. Both sliders for TX Master and Wave should be at the top of the range. Once you set this, you can collapse the Sound Card screen by clicking X. Actual levels for output and input are controlled by the knobs on the front of the Navigator. CH1 IN controls input level, and RF OUT controls output level.

If you operate other application software with the Navigator, it is possible that that software will change these settings. If you notice that your RF output level has changed when you start using DM780 again, you should check the Soundcard setting to be sure the sliders are all the way up.



You only need to check the TX setting. The level control for RX is built into the Navigator and is under control of the CH1 IN and CH2 IN controls.

WATERFALL 1

Now go back to "Options" again, select the Waterfall1 tab. Set your options similar to this example:

Program Options			
🔔 Cha	nges are applied immediately		Click here for Logbook options
Clock Modes Mo Skinning Soundc	de:CW PTT Callsign Looku ard Sounds Storage Sup	p QSO:General QSO:F perBrowser:1 SuperBrow	Receive QSD:Transmit Radio Recording wser:2 Theme Waterfall:1 Waterfall:2
Mode Materfall Spectrum Input	Waterfall Options F Spectrum N Grid Height: 50%	Passband Min: 0 💉 Hz Max: 3500 🖌 Hz	Speed Update speed 1 2 3 4
Appearance Background Text The Courier	■ Max ■ Bolo New	simise contrast d	Other Erase when changing frequency Show soundcard in window title Show radio control macro buttons
Frequency Show RF frequency	uency (radio + audio, requires a ra	dio connection) 9Hz to -9,999Hz)	
Waterfall Display N O Root - data is O Log - data is 1 O Log (as above Clipping: 10%	tode (Does not affect decoding) 4th root of linear FFT power 0log() of FFT power a) with 10% to 90% baseline clippin	ng max	Use clipping to shift the data so that baseline noise is at the bottom of the screen, thus giving a larger viewing dynamic range. Defaults

You may want to change some of the waterfall parameters to suit your operating style. This is a good starting point. In the bottom left is the "Waterfall Display Mode" group. You will probably want to set a baseline clipping value. 10% to 20% seems to be a good number for the Navigator. What this setting does is define the level at which you will start to see signals on the waterfall. The "no signal" floor will be set about -80 to -70 dB with a 10% setting. It corresponds to about a -80 dB dynamic range. *It is always a good idea to operate with some clipping*. When a strong signal comes on the waterfall, the AGC of the radio kicks in and depresses the apparent noise floor seen by DM780. You want to allow for some movement so that weak signals are not pushed down to the -100 dB level of the Audio Codec. Also, even though the internally generated noise of the Navigator is very small, raising the noise floor level will significantly reduce the impact of internally generated noise on the decode of the signal.

When you rotate the CH1 IN knob on your Navigator and you start to see signals showing, you are defining the level above which signals will appear on the waterfall. The waterfall example below is properly adjusted. "No signal" is dark blue and signals appear in strong contrast to the background. Adjust the CH1 IN to get a display that suits your taste. In this example, the "Max Contrast" button (7th from the left with two ^ marks) is off. I use the Max Contrast sparingly, since it brings band noise way up in the waterfall.

NOTE: Remember that the waterfall is provided as an aid for the operator. If weak signals don't show up on the waterfall, the DM780 software still "sees" the signal and can decode it if it is above the noise level. In the discussion on clipping levels on the previous page, if a strong signal makes other signals seem to disappear from the waterfall, the software can still detect it.

Waterfal	👻 🗸 🗸
BPSK-31 BPSK-63 QPSK-31 USB CW CW (WinKey) MCW DominoEx-4 DominoEx-8 DominoEx-16 MFSK-16 Olivia 250/8 RTTY AFC DominoEx-8 DominoEx-16 MFSK-16 Olivia 250/8 RTTY AFC	
💷 📲 🔂 🖉 Center 🖸 🕼 😣 🕮 🙌 🕢 🔺 80m 40m 30m 20m 17m 15m 12m 10m 🖪 « » 🕨 🤤 Faves	
7.070.00 7.070.30 7.070.60 7.070.90 7.071.20 7.071.50 7.071.80 7.072.10 7.072.40 7.072.70 7.073.00 7.0	73.30
Waterfall Quick.log	

You can now exit the Options screen group.

HRD CAT Setup

If you have not already set up the connect parameters for HRD, go back to the HRD screen and click the Connect Icon. Then click "New" on the connect screen. This will bring up the screen below. Select your rig type, the COM port of the Navigator CAT port.

In this example, the radio is an ICOM IC-706 MkII, CAT port is COM8, the baud rate and other parameters, such as the CI-V Address are shown for the ICOM rig. Other rigs may have other parameters to set. They will appear on this screen when you identify the Radio.

For the Navigator, leave DTR and RTS unchecked, they are not used for this CAT connection.

Finally, click "Connect" and you will connect to your rig. The next time you start HRD, this selection will appear on the first connect screen.

Connect: KK7UQ in United States				
Company: ICOM Radio: IC-706MkII COM Port: COM8	Visit <u>http://hrd.ham-</u> radio.ch/downloads.html for 'A basic guide to CAT and Audio interfacing' which contains many designs for both CAT and audio interfaces for use with			
Speed: 19200 CI-V Add: 4E Flow control / Interface power □ □TS □ □TR	Ham Radio Deluxe. Solve the problems connecting to your radio goto the <i>Problem Solving</i> section at the end of this help text for assistance.			
<mark>⊖ Connect</mark>	Company Select your radio manufacturer from the dron-down list. The Dem-o-Matic radios	•		

This concludes the procedure for setup with the Navigator. Set up for CW operation and FSK RTTY will be covered in separate documents.