



RAYNET DATA WORKING SETTING UP THE EQUIPMENT & SOFTWARE

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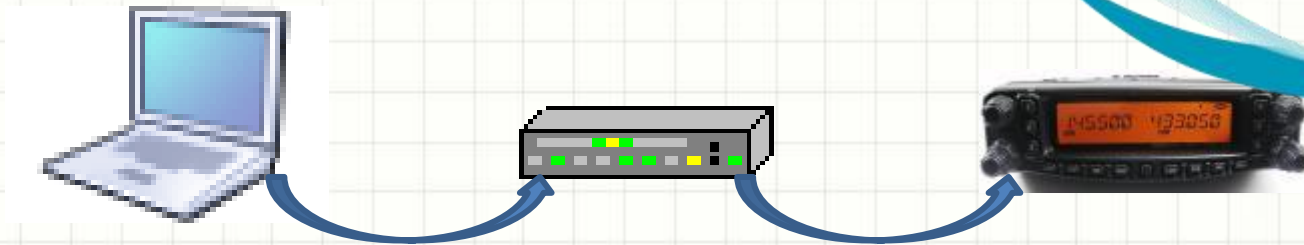
Deputy Coordinator (West) SWRA &
Controller West Devon Raynet

Raynet Data Communications

Data communications is

- fast and accurate
- can pass information at near broadband speeds
- Typically a CHALETS message takes ~ 5 minutes by voice
- Can take longer when conditions are poor.
- By data comm's takes between 7 and 20 seconds!
- Will be received 100% accurate even when you may not be able to hear the other station.

You will need...



To use Raynet data comm's you will need...

- A computer/laptop or Netbook
- A Data Interface unit
- A radio with a data port or handheld.
- The latest version of the FLDigi and EasyPal software
- A copy of the current Raynet macro file
[ICEmacros_v\(x\).mdf](#)
- A copy of the SWRA Operations Guides.

Data Interfaces...

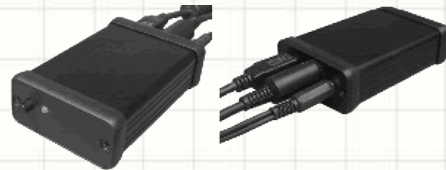
There are several suitable interfaces available. However...

Local Authorities have stipulated that they **Must** be:-

- **USB driven** &
- **“Off the shelf” - commercially available**
 - *(No Home Brewed kit is permitted.)*

Data Interfaces tested...

The interfaces extensively tested by SWRA and found suitable are the G4ZLP Datamaster Mini & Pro+ range



and the

Tigertronics Signalink USB



although others are available...

Connecting the Data interface...

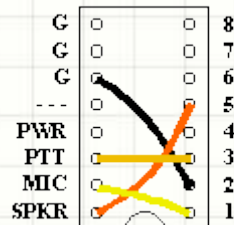
- Since the interfaces are 'plug & play' the main connections are simply to plug them in to a USB port and the Data port on your Radio – usually a 6-pin mini-din style.
- Avoid using the microphone socket if at all possible to avoid the internal microphone pre-amp distorting the data signals.
- However...

Tigertronics Signalink USB



- The Signalink USB has an internal soundcard and so avoids problems with a computers soundcard
- but there are a series of internal links that must be set up for each radio inside.
- You must check the setting for each of your radios.

JP-1



Pin-out

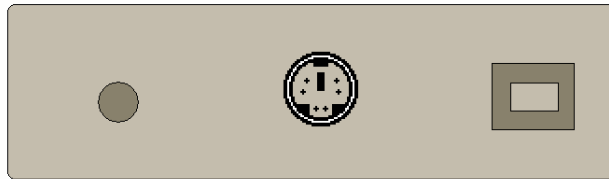
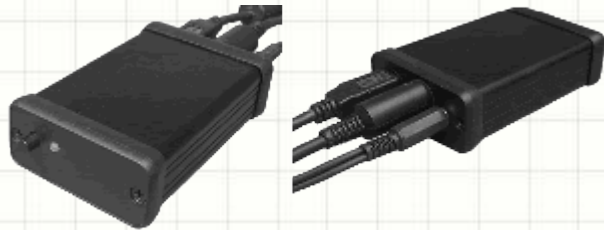
Pin 1 – Data In
Pin 2 – Ground
Pin 3 – PTT
Pin 4 – 9600 Out
Pin 5 – 1200 Out
Pin 6 – Squelch

Radio Models

IC-207H/208H
IC-2720H series
IC-2800 / IC-2820
IC-703/706MKIIG**
IC-746PRO**
IC-7000** / IC-7400
IC-910H / IC-9100
FT-7800/FT-8800/FT8900

*This list is not exhaustive.
Check your own radio.*

G4ZLP Datamaster Minipro

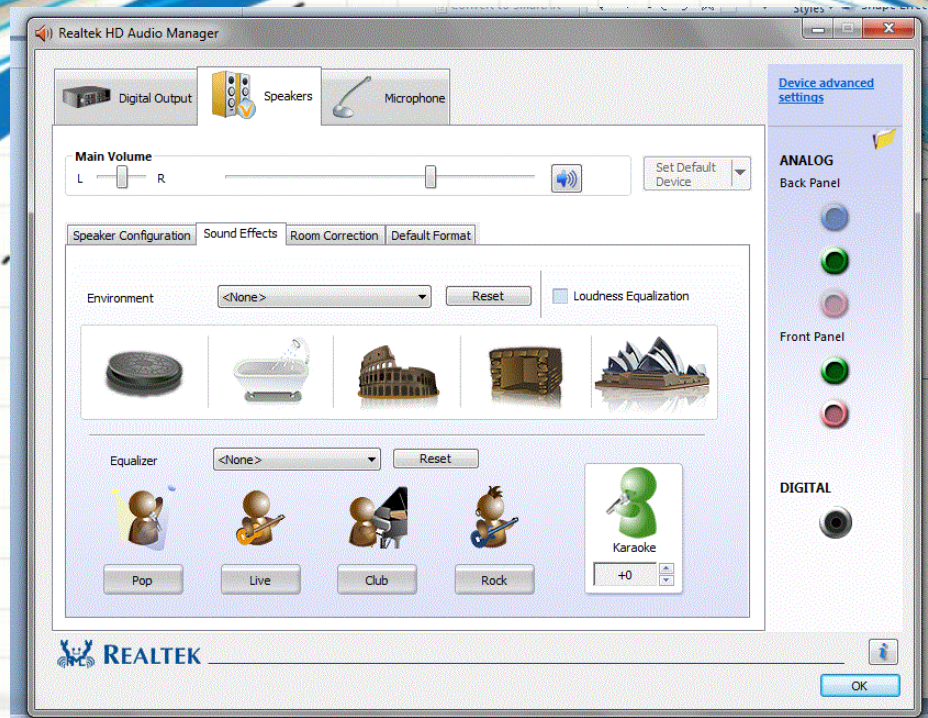


| | | |
|---|------------------------------|------------------|
| 3.5mm Stereo Jack/skt to Twin Jacks | 6 pin minidin to radio | USB 'B' to PC |
| Yellow PC Audio IN | | |
| Green (or Red) PC Audio OUT | | |

- The Datamaster Minipro has 3 connections
 - Audio to and from the PC
 - Data to and from the radio
 - Data to and from the PC
- Make sure the Yellow lead is connected to the PC Audio IN (mic line)
- The Green (or Red) is the PC audio out (Speaker)

Setting up the PC for FLDigi & EasyPal

- If you are using a USB sound card, plug it in and wait for Windows to configure it by monitoring the pop-up messages from the System Tray.
- Right-click on the “Speaker” icon in the System Tray and select “Recording Devices”. A Microphone should be listed. Make a note of what it is called, e.g. “Realtek High Definition Audio”. (This phrase will be used later in the Fldigi & EasyPal software configuration.)
- Click on the “Microphone” and then click on “Properties”.
- Under the “Listen” tab, make sure “Listen to this device” is not selected.
- Under the “Levels” tab, slide Microphone” to 100% and set Boost to 0 db.
- Under the “Enhancements” tab, ensure “Disable all sound effects” is ticked.
- Click OK.
- You are returned to the “Recording” tab. Now click on the “Playback” tab.
- Make a note of the name of the “Speakers”. Usually it is the same as microphone (e.g. “Realtek.....”) (This phrase will also be used later in the Fldigi configuration.)
- Click on “Levels” and make sure the main audio slider is 100%. If there is a slider for “Microphone”, click on the small speaker icon to Mute it.
- Important: Click on the “Enhancements” tab and ensure “Disable all sound effects” is ticked.
- Press “OK”.
- You are now back in the “Sound” screen. Click “OK”.
- Reboot the computer.



You must remember to turn off all sound enhancements and effects on your PC

Create a Raynet Folder

- Create a folder in which to keep all RAYNET related documentation and forms. Right-click on the Desktop and select “New” → “Folder”. Change the name to “RAYNET Data Files”.
- Double click on the “RAYNET Data Files” and in the empty folder create the following folders using the same sequence: “Documentation”, “macros”, “Pending Files”, “Received Files”, “Templates Copy” and “Transmitted Files”.
- Using the weblink in the Resources section at the end of this document, download the “CHALET Text Form Master.txt” into the “Templates Copy” folder.
- Also download the latest “*ICEmacros_v(x).mdf*” file into the “C:\....\fldigi.files\macros” folder after installing FLDigi

Setting up the G4ZLP Digimaster Minipro Interface


- Attach the USB cable from the computer to the Digimaster.
- Windows should identify the Digimaster and use the correct drivers to enable the interface. When Windows has configured the port the red LED indicator on the Digimaster Pro+ flashes red/green three times. The LED when green indicates power is on and the interface is in receive. When red, the LED indicates TX, either DATA or CW.
- Locate the USB Virtual COM Port in use on your machine. (depending on version of Windows used)
- Make a note of the exact COM port number, which will be needed when the software is configured.
- Attach the audio cable from the computer to the Digimaster.
 - Yellow to the Microphone socket on the PC,
 - Green (or Red in later models) to the speaker socket.
- Attach the cable from the Digimaster to the Radio. Check your manual for the correct pin outs.

If the Radio has a CAT interface, it is recommended that you do not connect or use the CAT cable as it may conflict with some operational parameters.

This completes the Digimaster installation.

Setting up the Signalink USB interface

- The Tigertronics Signalink USB is very similar in operation and set-up to the Digimaster . However it has an on-board Sound Card with level controls on the front panel, plus a delay control to 'hold' Tx/Rx actions. All audio connections to the computer is via the USB line.
- A major difference however is that the Signalink USB has an internal series of jumpers which must be configured for each radio. The exact settings for each radio must be determined by reference to the Tigertronics Signalink USB website.
www.tigertronics.com/sl_wirebm.htm or the product CD

| | | |
|--|---|--|
| <p>JP-1</p>  <p>Diagram showing the JP-1 jumper block configuration. The block has 8 pins. The connections are: Pin 8 to Pin 5 (black), Pin 7 to Pin 3 (orange), Pin 6 to Pin 2 (black), Pin 4 to Pin 1 (yellow), and Pin 3 to Pin 1 (yellow).</p> | <p>Pin-out</p> <p>Pin 1 – Data In Pin 2 – Ground Pin 3 – PTT Pin 4 – 9600 Out Pin 5 – 1200 Out Pin 6 – Squelch</p> | <p>Radio Models</p> <p>IC-207H/208H IC-2720H series IC-2800 / IC-2820 IC-703/706MKIIG** IC-746PRO** IC-7000** / IC-7400 IC-910H / IC-9100 FT-7800/FT-8800/FT8900</p> <p><i>This list is not exhaustive. Check your own radio.</i></p> |
|--|---|--|

Setting up the Signalink USB cont.

- Push its power button in.
- Set the three front panel controls (transmit, receive and delay level) to the 9 o'clock position.
- Attach the USB cable from the computer to the Signalink USB and power on the Signalink.
- Windows should identify the Signalink and use the correct drivers to enable the interface. The green LED when indicates power is on and the interface is in receive. The red LED indicates TX, either DATA or CW.
- Locate the correct COM port by the computer's Hardware manager. It reports on a COM port interfaces with information such as: ***"COM 4 Signalink USB port"***
- Make a note of the exact COM port number, which will be needed when the software is configured.
- Go to the Audio Device manager on your computer. You should now see a new audio Communications device. Enable this device and mute all other input and output lines. Set this as the default for communications.
- It is possible to monitor the audio via the Speaker socket on the back of the Signalink USB.
- Attach the cable from the Signalink USB to the Radio.

This completes the basic Signalink USB installation.

Setting up the Radio

Radio Mode

For the purpose of RAYNET operations on VHF/UHF, data modes will be used on the same frequency as audio, so there is no need to change the “Mode” away from FM. (On HF operation, you would change to use “DIG” mode.)

But the baud rate and connections must be set to **1200bps**.

CAT interface

It is strongly recommended that you ***do not*** use the CAT interface for Raynet data operations at VHF/UHF, due to conflicts with some operational parameters.

If you are using the CAT interface, (i.e. for non-Raynet work), you must make sure your radio is correctly configured. Use the configuration buttons on the radio to set the CAT interface speed and assignment per the user manual.

RF Power level

Data modes need to operate over a linear part of the power amplifier in the transmitter. Therefore, do not run the RF Power level at 100% as this will distort the audio frequencies leading to garbled data transmission and resulting in over-modulated distortion. Set the RF power level to about 40% of the maximum rating of the transmitter. e.g. 40W on a 100W rated transmitter.

Installing the software

Raynet data operations uses 2 programs...


- FLDigi for text based traffic &
 - Fldigi downloads: <http://www.w1hkj.com/download.html>
- EasyPal for graphics/pictures
 - <http://www.kc1cs.com/> or
 - <http://www.vk3evl.com/>

Download and Save the installer programs from the suggested sites.

Download and save the latest versions of the following additional files from the SW Raynet Association site.

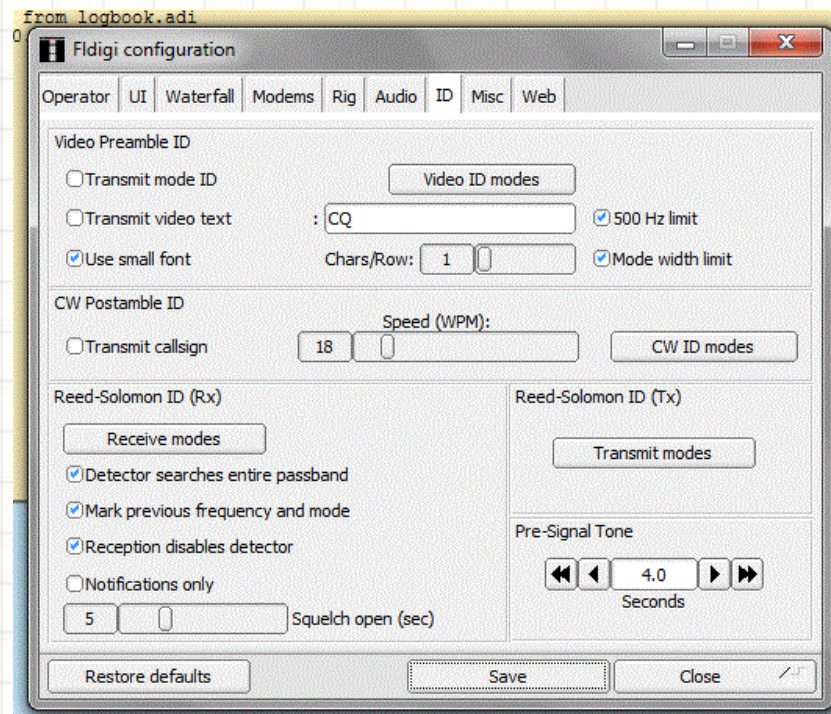
- CHALET form master and ICEmacros.mdf file:
 - <http://www.swraynet.org.uk>

Installing FLDigi

- Fldigi software is an ‘encapsulating environment’ , i.e. a suite of software with over 60 different data modes. However the Fldigi software ranks as one of the most reliable and versatile of the data mode applications.
- Locate the downloaded FLDigi installation file It will look something like

`fldigi-3.21.41_setup.exe`
- *If you have a previous version of Fldigi it is important that this is completely uninstalled, prior to loading a new version using an uninstaller and registry cleaner such as REVO Uninstaller.*
- Run the downloaded program answering “Yes” to all the questions.

Setting up FLDigi ...

- When installation is complete, locate the new Fldigi icon and double click to start the program .
- Fldigi uses a folder of customized information called “fldigi.files” in your ‘Users’ directory. If this is the first time the program has been run, it will ask questions about you and your computer to start creating these customised files. A set of “wizard” screens will request information from you.

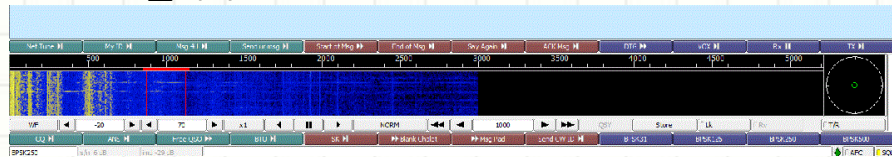


Setting up FLDigi ... the basics part 1

- Under “Operator Information”, enter your Call Sign, Name, QTH and Locator as they are required by the ICEmacros. You can leave the Antenna fields blank unless you plan on doing HF data modes with other hams. Click “SAVE”.
- Under “Audio Drivers” → “Devices”, select “Port Audio”. Remembering the names of the audio devices you noted in the Computer Sound setup, use the drop-menu arrows to select those names for “Capture” (Recording) and “Playback”. Click “SAVE”.
- There is nothing to alter under the other two tabs (Settings and Tx. Level”, so click “Rig”.
- The “Rig” screen has five tabs. Commence with “Hardware PTT”. Click on “Use Separate PTT” Select appropriate COM port for the PTT/FSK/CW port you recorded earlier. Set Use both RTS and DTR. The Initialize button will go red. Click “Initialize” to activate the port. Click “SAVE”
- Click on “SAVE” again.

Setting up FLDigi ... the basics part 2

- The Wizard ends and the Fldigi program start running.
- Click on “File” → “Exit”. When asked to save the configuration information, click on “Save”.
- In your “Users” folder there is now a customised “fldigi.files folders containing the information you have entered.
- Start Fldigi again.
- If you have not already done so, download the latest SW Raynet Fldigi macro file ICEmacros_v(x).mdf (~4kb) that contains definitions for each of the F1 to F24 macro keys.
- Move the file to the folder: `“C:\users\%name%\fldigi.files\macros”`.
- In Fldigi, click on “File” → “Macros” → “Open”. Change to the above folder and select “ICEMacros_v(x).mdf”. The new macro bar should now appear



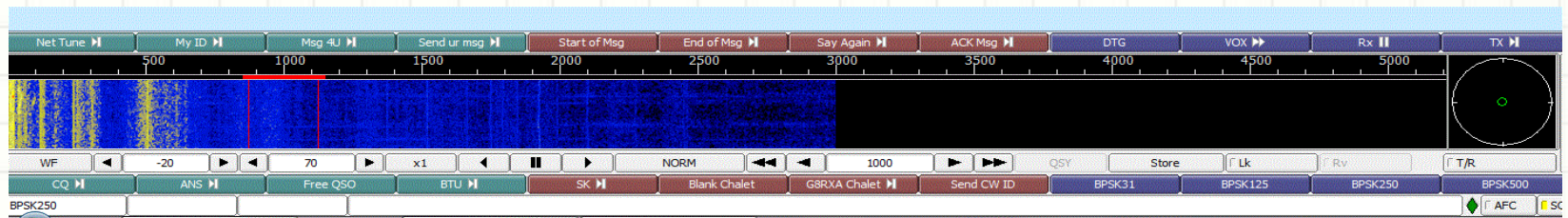
- Click on “Configure” → “User Interface”. Select the “Macros” tab.
- Enable the last two options on the page “Load last used macro file on start-up” and “Display macro file name on start-up”.

Setting up FLDigi ... the new macros

To use all 24 macros select:

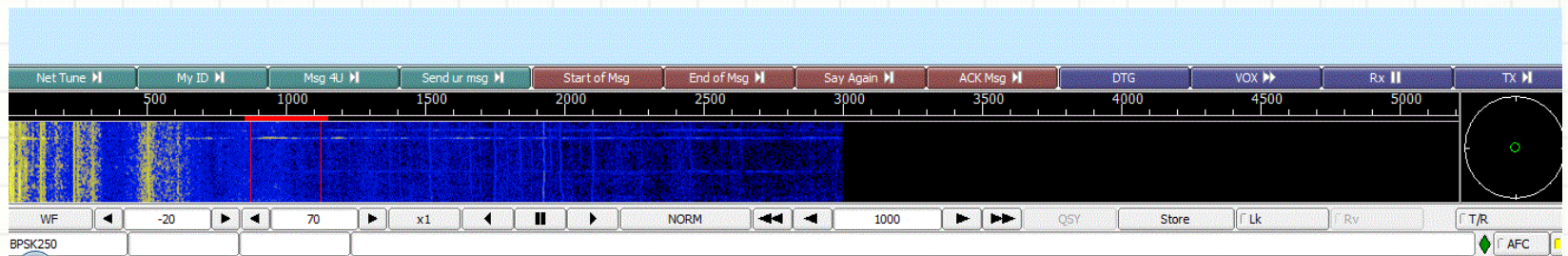
“CONFIG”, “User Interface” or “(UI)”, “Macros”,

“Number and position of macro bars” ->select option 2, 3 or 5 (personal preference)



To just use the Simple Version – 12 macros select:

“Number and position of macro bars” -> One bar above or below waterfall (personal preference)



Setting up FLDigi ... the basics part 3

- Click on “Configure” → “Misc” → “Sweet Spot”. Make sure all the values are set to “1000”. This is the default offset of 1 kHz for each data mode.
- Click on “ID” set the “Pre-Signal Tone” to 3 seconds. This sets a 3 second delay to allow any talk-through units or repeaters to latch. Click “Save”
- Click on “Waterfall” → “Display”. Click on “Always show audio frequencies” to enable it.
- Click “Save” and “Close”.
- If you want to change the size of characters displayed by Fldigi, use “Configure” → “Colours and Fonts”. You can use this to increase the size of received text, for example. Click on “Close”.
- Slide the cursor to 1000 Hz on the waterfall and then click on the “Lk” button under the display to hold it at that value*. You can fine tune the value using the adjacent arrow keys. A single arrow changes the value by 1 Hz and the double arrow by 10 Hz. Do not use the AFC (automatic frequency control).
- At the base of the screen ensure the waterfall signal range settings are set to “- 20” dB and to 70 dB for the signal range. You can alter the values with the adjacent arrow keys.
- At the bottom right of the screen is a slider control to adjust squelch (ALC). Slide it to between one third to half way up depending on signal strength received. Too low a setting introduces random characters. Too high a setting you can lose data.
- Select the correct data mode to use. Click on “Op Mode” → “BPSK” → “BPSK250”. Raynet Control may later request this be changed should propagation conditions be un/favourable. To typically BPSK500 or BPSK125 or even down to BPSK31
- Click on “File” → “Exit”.
- Start Fldigi again and ensure a message confirming the loading of the *ICEmacros_v(x).mdf* file has been completed.

EasyPal setup

- EasyPal is a well established Raynet Data program
- It can send almost any form of graphics using the DRM system.
- Locate the downloaded EasyPal installation file It will look something like



EasyPal-10B-MAY-2012-Setup.exe

- *If you have a previous version of EasyPal it is vital that this is completely uninstalled, prior to loading a new version using an uninstaller and registry cleaner such as REVO Uninstaller.*
- Run the downloaded program answering “Yes” to all the questions.

Easypal installation location

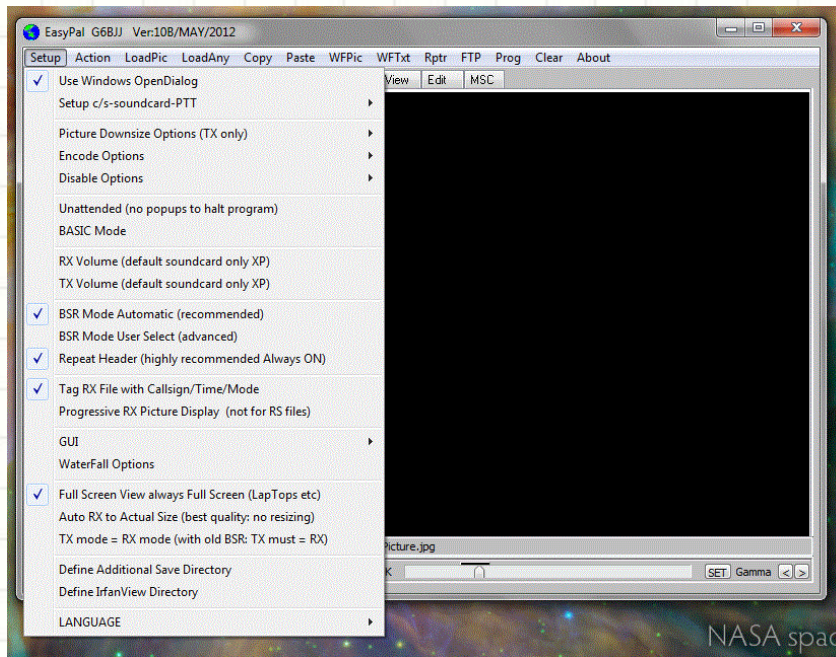
- When you run the EasyPal installer it will attempt to set up the files in your C:\program files\... directory under a new directory called C:\program files\EasyPal
- when the installation wizard offers this location it strongly recommended that it is changed to
 - **C:\Program Files\EasyPalx**
 - some antivirus systems will wrongly report some of the EasyPal files, particularly the file **c32.dll**, with a false positive for a virus. This file actually controls the PTT line.

EasyPal set up options

Open EasyPal

An Initializing screen will appear

Select “Setup” - A drop down box appears.



Select “setup call sign – etc.”

Select callsign and enter your callsign

Select soundcard

Make sure the system has entered your computers soundcard correctly if not enter the correct details and “ASSIGN”

Select PTT

Select use CommPort - rts/dtr



**YOUR SYSTEM SHOULD NOW BE CORRECTLY SETUP
AND READY FOR TESTING AND USE.**

**THERE IS A SEPARATE PRESENTATION AND TRAINING
PACK ON THE USE OF EACH PROGRAM TO FOLLOW.**

Resources

- This project and related resources:

<http://swraynet.org.uk/>

- Additional reading material

<http://www.w1hkj.com/download.html>

<http://www.kc1cs.com/>

<http://www.vk3evl.com/>

SWRA Operations Guides for FLDigi and EasyPal