

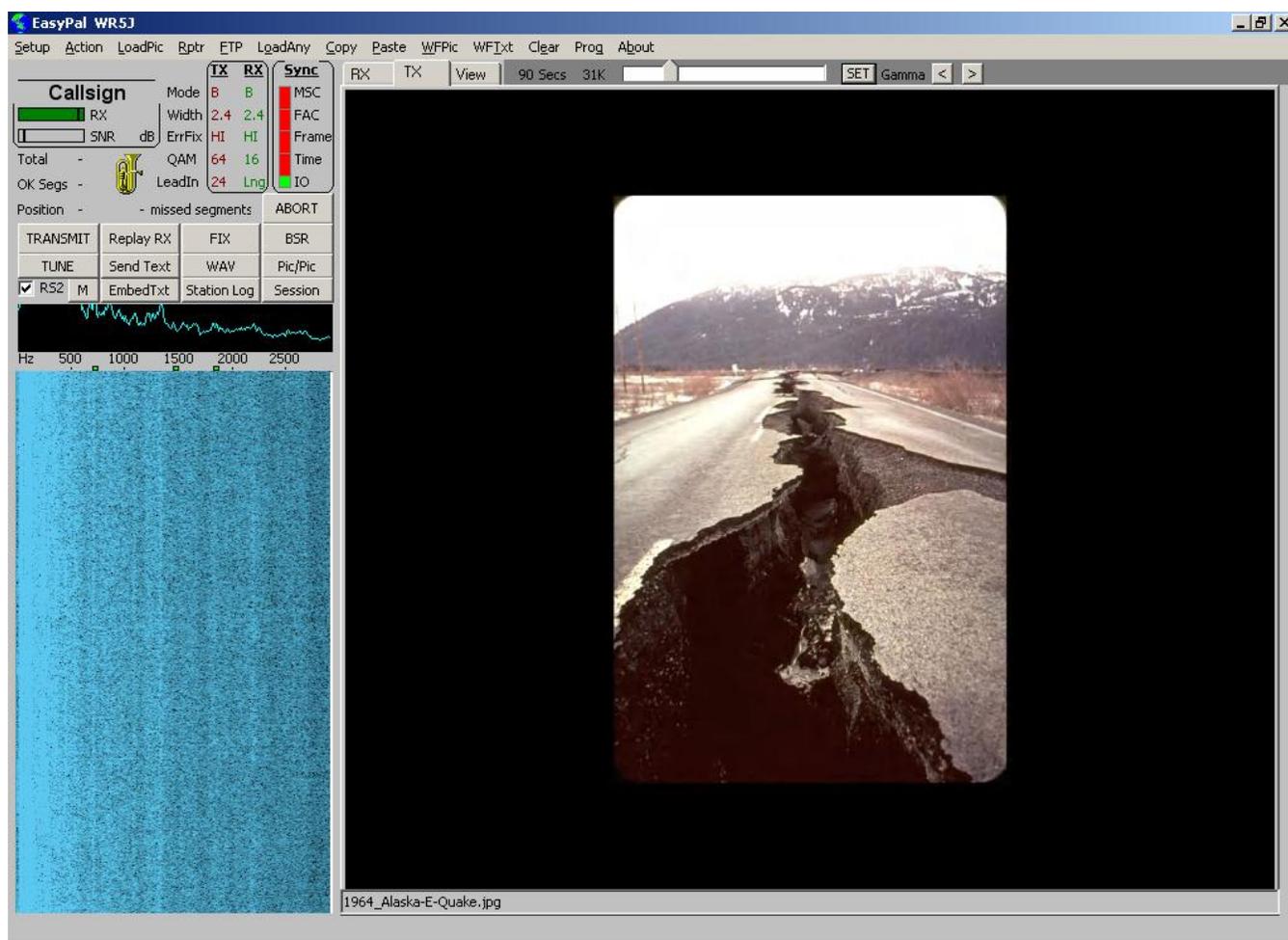
[Blog Post 7 – EasyPAL—Digital Slow Scan Television software using DRM – Digital Radio Mondiale **](#)

** MAHN-DEE-AL (like DEE rhymes with BEE and AL as in Senator Al Franken)

Wednesday July 22, 2009

This is Curt Black, WR5J with the Educational Radio Net Please standby for a Digital SSTV QST

Before the net. Please download tonight's software – EASYPAL and set it up according to the blog and WA-DIGITAL instructions.



As we discussed last week with MMSSTV, Slow Scan TV (SSTV) is a way to get the high-information density of visual images shoe-horned into the audio-bandwidth typically used by the human voice of about 2.5kHz. For full motion NTSC video requires a bandwidth of about 4.5MHz or 9.0MHz if you use both

sidebands as you transmit– so minimally our shoehorn is working with a ratio of about 2000/1. We accomplish this by using more than 1/30th of a second to transmit our images. In this case 30 to 300 seconds is more typical.

Digital Radio Mondiale or DRM means "Digital World Radio." DRM is a fairly new digital radio standard for use by HF broadcasters. The DRM standard uses a bandwidth from 4.5 KHz and up to and beyond 20 KHz using OFDM modulation. It provides FM quality stereo audio over HF as well as the ability to send data. Dream is a software implementation of a DRM receiver.

The HamDream software is a modified form of Dream by Cesco HB9TLK. HamDream uses only 2.5 KHz bandwidth and is the basis for several 2.5 khz DRM programs. WinDRM replaced HamDream software by Cesco and it uses either 2.3 KHz or 2.5 KHz bandwidth. It also has a digital voice mode. HamDRM is a Windows DLL program by Cesco based on his WinDRM program.

EasyPAL is a piece of software by Erik, VK4AES, that uses DRM encoding and allows us to send images. PAL is just the European standard that corresponds to our NTSC video standard. EasyPAL, just like MMSSTV allows us to fit our image into a standard sideband voice bandwidth. However, instead of audio frequencies corresponding to brightness and colors, images are disassembled pixel by pixel and sent as a digital stream that is decoded and reassembled into our image.

This digital format allows us to send considerable additional information including data on our station, the filename, image data, and ultimately, much more than just images. If you look at the menu bar you will see "LOAD ANY" which is the clue that we can send any type of file on your computer. Just like with FLDIGI, with great power comes great responsibility. We have that same training issue we did with FLDIGI of not sending a megabyte when 2 kilobytes will do.

Another amazing thing about this software is that we can request "fills" or retransmission of any blocks not received perfectly (hit that BSR button – BAD SEGMENT REQUEST and a message is formatted that reports to the sending station the specific segments numbers that require retransmission. The sending

station can collect these reports (Visible with the FIX button) and then select them one at a time to retransmit the needed data for a perfectly received transmission at each station.

OR, if you prefer, you may avoid all this re-transmission stuff. You can Reed-Solomon encode everything you send to increase the probability your information will make it through the first time. Just select the encoding appropriate to the band and mode – for tonight’s demo through an FM repeater, I’ve got “very light” encode on. RS Encoding is controlled by the check box next to the RS1 to RS4. Left click to toggle encoding. Right click to change from light encoding to heavy.

If you choose RS4 – your recipient can loose up to 50% of the data and still put your file back together perfectly without any resending.. That is why you may see the picture (or file) appear before the transmission is done. You may have enough data to assemble a perfect picture even though the progress bar is only ½ of the way through the transmission. Tonight I’m using between 16 and 64 simultaneous data streams. Click the QAM button to set the number of data carriers used 4-16-or-64.

Before long you will probably want to upload your received photos to sites on the Web. Just establish a presence on one of the free ham hosts. Try <http://www.qsl.net> or <http://hosting.k2rrt.net/ftphosting.php> . After setting up your space, you need to let the software know in the FTP menu under “Allow Auto Upload of your Received Pictures”. You also need to notify the sites like G0HWC or KC1CS – just send a message to Paul Young, paul@g0hwc.com for his G0HWC site and the other sites will pick up your link from there. The FTP menu item is also where you can update your ONAIR status with the three items, “Let Others See my ONAIR Status”, Add Notes to my ONAIR Status” and “See Who’s ONAIR”. That part doesn’t require anything beyond a web connection when you launch the software.

Getting Started

Pull the software off the Yahoo Group Files Section at <http://groups.yahoo.com/group/wa-digital/files/>

Or go to the source at <http://vk4aes.com/>
or

<http://kc1cs.com/> or <http://www.g4rob.co.uk/easypal.htm>

If you need help, someone on the DIGSSTV newsgroup can probably help you. Be sure to include the version number in any report of a problem. Also keep up to date and use the latest version. <http://groups.yahoo.com/group/digsstv/>

When looking for folks to QSO with, there is our own WA-DIGITAL <http://groups.yahoo.com/group/wa-digital/post>

Also try <http://www.obriensweb.com/sked/> for skeds a little farther afield.

<http://groups.yahoo.com/group/digsstv> is a good resource on frequencies and folks to QSO with.

Here are some suggested SSTV frequencies :

-10 Meters : 28.673 28.677 28.680=calling frequency 28.683 28.686 28.690=K3ASI repeater 28.700=ON4VRB repeater

-15 Meters : 21.334 21.337 21.340=calling frequency 21.343 21.346 Avoid SSTV around 21.350 because there is a Phone DX Net running

-20 Meters : 14.230=calling frequency 14.233 14.236 14.239

Avoid SSTV on 14.227 because there is a Phone DX Net running

80% of all SSTV traffic is done on those frequencies so please don't transmit SSTV pictures BETWEEN those suggested frequencies, it will QRM a lot .

3Kc spacing is really a must for not interfering on nearby stations

The Ten Commandments of Slowscan

by Dave Jones - KB4YZ

1. Use voice before sending SSTV.
2. Wait for voice and SSTV traffic to finish before sending SSTV.
3. Choose an SSTV mode that is proper for the image to be sent, band conditions, and the receive capability of the receiving stations.

4. Announce the SSTV mode used prior to sending.
5. Transmit on frequency as confirmed by calibration of the VFO with WWV.
6. Send straight pictures as confirmed by calibration of the clock timing with WWV.
7. Send quality pictures with call sign on image.
8. Send full frame.
9. Avoid sending a CW ID unless required by regulations.
10. Describe the picture only after it is confirmed that it was properly received.

Clearly, much of this predates EasyPAL and the digital determination of mode and transmission characteristics. You should still voice ID, but the software will figure out what you are sending.

EasyPAL Help Files from <http://www.g4rob.co.uk/easypalhelp/>

EasyPal Setup Menu Help

The SETUP Menu Options

USE WINDOWS OPEN DIALOG For use with the LOAD PIC and LOAD ANY Commands

Select this option if you prefer to use the standard Windows load feature.

It is included for those users who prefer the Windows Standard Dialog over the EasyPal Load Dialog and may be preferred in some Windows versions where users are not fully conversant with how the Windows file system works... Especially Important for Windows 7 Users.

SETUP C/S - SOUND CARD - PTT

CALLSIGN Enter your CALLSIGN here. A Callsign MUST be entered for Transmission to be allowed. Your Callsign is transmitted within the Header information and will be displayed in the Receive Callsign window when your transmission is being received correctly.

SOUND CARD Select the **INPUT** and **OUTPUT** devices for your computer system here.

Remember... **INPUT** relates to the **RECEIVE** signal... **OUTPUT** to **TRANSMIT** signal.

You should set the LEVEL of the signal you **RECEIVE** by adjusting the controls of your PC to Radio Interface (if present) and / or the RECORD / INPUT controls within your PC Soundcard software.

The level of **TRANSMIT** Audio from your PC to Transmitter should likewise be adjusted with the controls of your Radio Interface or PC Soundcard Volume controls. A shortcut to your PC Volume control can frequently be found on your Windows Taskbar.

For those users who have Multiple Soundcards installed in their PC systems it is vitally important that the correct soundcard is selected for any level changes to have an effect on your transmitted or received signals.

The levels selected relating to INPUT will have a direct effect on EasyPal's ability to correctly decode Pictures.

These settings are CRITICAL

Too high or too low a signal level from your Receiver via your Radio Interface to your PC soundcard will result in Total or partial LOSS OF RECEIVE SIGNAL.

EasyPal will correctly receive and decode when ALL RECEIVE INDICATORS SHOW **GREEN**.

Commonly referred to as the **TRAFFIC LIGHTS** the Indicators consist of a vertical stack of Five Indicators titled SYNC to the top left of the RX/TX/VIEW Window.

These Indicators will turn from **OFF** to **RED** to **GREEN** as EasyPal synchronises and Decodes the Received signal.

100% GREEN Indicators throughout the entire Reception process is NOT considered as Fatal within EasyPal.

The level of your soundcard INPUT will have DIRECT effect on these Indicators.

Failure to set the INPUT LEVEL of your soundcard or Interface is the most frequent cause of inability to Receive Pictures. You are encouraged to experiment with these levels until reliable reception / decoding is accomplished.

Loss of SYNC will result in MISSING or BAD SEGMENTS within the Picture being Received.

Depending on the **Transmitted Signal Mode (see Main Screen options)** EasyPal has the ability to cope with missing segments of the Transmitted signal to a greater or lesser extent.

The **BSR** (Bad Segment Request) facility allows reception of only the Missing / Bad received segments. See Main Screen Options for an in-depth description of BSR

USE COMMPORT (PTT rts/dtr) Used to select the method of TRANSMIT - RECEIVE Switching used by EasyPal and your Interface to control your Transceiver.

Select this Option if you use RS232 Type rts/dtr Switching

USE COMMPORT (PTT CAT) Used to select the method of TRANSMIT - RECEIVE Switching used by EasyPal and your Interface to control your Transceiver.

Select this Option if you use CAT type Switching

PICTURE DOWNSIZE OPTIONS (TX ONLY)

HIRES (Downsize if >320 x 256) Picture resolution will resize a large image to fit within 320 x 256 pixels

DEFAULT Picture Resolution Will resize down a large image to fit within 640 x 480 pixels

HIRES (Downsize if >800 x 600) Picture Resolution will resize a large image to fit within 800x600 pixels

HIRES (Downsize if >1064 x 768) Picture Resolution will resize a large image to fit within 1024 x 764 pixels

HIRES (Downsize if > 1280x1024) Picture Resolution will resize a large image to fit within 1280x1024 pixels

HIRES BEST. No Resizing. Slower encode and decode. Longer transmission times. **BEWARE.. VERY LONG TRANSMISSION TIMES CAN RESULT**

These options select the Automatic Resizing Options of a Picture to be TRANSMITTED. Pictures above the selected limits are Downsized to within the limits.

When each option is selected an explanation screen is displayed.

ENCODE OPTIONS

VERY LIGHT ENCODE Selects RS1 type encoding as default. Transmission time will be increased by 13%. At least **89%** of the segments transmitted must be received

LIGHT ENCODE Selects RS2 type encoding as default. Transmission time will be increased by 31%. At least **76%** of the segments transmitted must be received

MEDIUM ENCODE Selects RS3 type encoding as default. Transmission time will be increased by 54%. At least **64%** of the segments transmitted must be received.

HEAVY ENCODE Selects RS4 type encoding as default. Transmission time will be increased by 86%. At least **51%** of the segments transmitted must be received.

Use of Encode may reduce the need for BSR's and FIX'es. No Progressive Receive Option is available in these modes

See also [MAIN SCREEN OPTIONS](#) and [GLOSSARY](#)

DISABLE OPTIONS

DISABLE RX/TX CLICK TO FULL SCREEN When selected the facility to allow a LEFT MOUSE CLICK on a Picture to toggle Full Screen View to be Disabled.

DISABLE RX TEXT MESSAGES When selected Received Test messages are Disabled.

DISABLE TX TEXT MESSAGES When selected Transmitted Text Messages are Disabled.

DISABLE RX SOUND AND TASKBAR ALERTS When selected EasyPal will NOT play an Audio Alert when a Picture is Received.

When selected the EasyPal Icon on the Windows Taskbar will NOT Flash when a Picture is Received.

DISABLE PICTURE TRANSITIONS When selected the transitions between Picture Loading / Displaying are Disabled.

UNATTENDED (NO POPUPS TO HALT PROGRAM) Does exactly what it says. For use in Unattended Mode... popups will not halt program operation allowing unattended receive.

BASIC MODE Runs EasyPal in BASIC MODE. Many Advanced features are disabled or not available on the Menus. Basic and Standard Modes can be switched as required.

BSR MODE AUTOMATIC (Reccomended) Automatic Selction of the Bad Segment Request Mode used. leave this option selected unless you wish to manually change the Mode a BSR uses, in which case select BSR MODE USER SELECT

BSR MODE USER SELECT (Advanced) Refer to Bad Segment Request MODE AUTOMATIC

REPEAT HEADER This default feature automatically repeats the header information of a Transmitted picture.

Leave this option selected unless you are 100% sure the receive station can synch to a signal at the first attempt. Loss of header information will result in total loss of receive picture.

TAG RX FILE WITH CALLSIGN/TIME/MODE When selected the Receive File will have the Callsign of the sending station, Reception time and Mode information added.

PROGRESSIVE RX PICTURE DISPLAY (NOT FOR RS FILES) When selected the Picture being received is progressively displayed.
This feature will not work with RS type transmissions. (see MAIN SCREEN OPTIONS)

W/FALL COLOR This Option allows you to select the Colour of the Waterfall. Select the Colour of your choice from the drop down list.

The NEGATIVE Option is particularly useful when using VOX for PTT control. The Inverted background colour ensures the PTT line is not unkeyed during Blanks in WF Text.

The Negative option.. Black Text on White Background also improved Synch of the Received signal.

CALIBRATE WATERFALL (WWV) Allows you to Calibrate the Waterfall to WWV. Reception of WWV in AM or FM is required.

FULL SCREEN VIEW ALWAYS FULL SCREEN Selection results in Full Screen View.. especially useful for Laptop users.

AUTO RX TO ACTUAL SIZE When selected the Received Picture is automatically resized to it's Actual Size no matter what screen display size is selected on your Monitor / RX setup. Use for Best Quality.

TX MODE = RX MODE When selected the BSR TX mode is set to the RX Mode.

DEFINE ADDITIONAL SAVE DIRECTORY
DEFINE ADDITIONAL IRFANVIEW DIRECTORY When selected additional directories for Save Files and IrfanView can be defined.

LANGUAGE Allows the user to select the default language used within EasyPal from the Drop Down list.

EasyPal Action Menu Help

The ACTION Menu Options

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SEND TEXT Allows you to send a small TEXT file. Text should be typed into the TX screen and will be transmitted when the MAIN SCREEN TRANSMIT Button is clicked. Small text files will be sent several times to allow received stations to sync to your signal.

SESSION LOG Displays details of RX and TX instances since the current session of EasyPal was started. Callsign, RX or TX, Time and Mode details are displayed

STATION LOG Displays the CALLSIGN and details of the sender of each Received Picture since the current EasyPal session was started.. Details may be Edited on Screen and Saved for next session

TUNE When selected a TUNE signal will be transmitted after a few seconds. Used to check the path between TX and RX stations as well as to check your Transmit audio level. Three tones will be transmitted for 7 seconds. These tones will be displayed on the receive station waterfall as three distinct and bold lines directly below the three GREEN tone markers on top of the Waterfall. See **MAIN SCREEN OPTIONS** for more details.

CW ID Sends the selected Callsign in CW with each Transmission.

RX CONSTELLATIONS When ticked a display of the Received signal characteristics in the form of Constellations appears at the bottom of the Waterfall .See **RX CONSTELLATIONS** in the MAIN SCREEN Help

PURGE EXCESS FILES Does exactly what it says ! Purges (clears) files not being used by EasyPal

AUTO-PURGE FILES ON SHUTDOWN When closing EasyPal: If "Auto-Purge files on shutdown" has been checked in the "Action" menu: Files will be purged according to the user purge files settings.

If the Repeater is active Bsr files are purged except the last 10. If not in repeater mode Bsr files are purged except the last 50.

Ocassionally (every few months or so) It is recommended to "Del all BSR" Do this when no further record of BSR's are needed.

This clears the "\corrupt\" directory which can grow very large with unused files.

RESET RX Used to reset the received picture sequence.

USE REPEATER MENU COMMANDS Selects repeater Mode where EasyPal operates as a Repeater. See **REPEATER MENU COMMANDS** at the bottom of this Page.

USE FTP Selects FTP Upload facility . See **FTP MENU COMMANDS** at the bottom of this page.

This function Uploads the received picture to an FTP server for viewing by everyone with WWW access.

An option to block upload of an Image by receiving station exists where you do not want the Image to be uploaded to the WWW.

Undesired Users may be Blocked from Uploading.

ACTIVATE TX WATERFALL When selected this option allows operation of the Waterfall display when transmitting. Full Duplex type soundcards are required with TX loopback to RX. Possible program crashes can result.

USER DETAILS EMBEDDED TEXT When selected one of three preset user details files are embedded into Transmissions.

Any text can be embedded but this option is designed to transmit your details with transmissions. When first selected a small window will be shown where you can add, remove and edit upto three files. You can save and restore any one of these for use with all future transmissions.

Selected Text is embedded when EMBEDTXT button on the **MAIN SCREEN** is clicked.

SET MULTIPLE TX INSTANCES This function allows you to send More than one transmission. A window will appear in which you can enter the number of times a picture / file is to be transmitted.

QUICK SELECT MODE Used to quickly select preset Mode settings. When clicked a window with preset Mode settings will be displayed. Click on the Mode set you wish to use. See **MAIN SCREEN OPTIONS** for more details of Mode selection.

PICTURES/TEXT INSIDE TX PICTURE Allows you to add text or additional pictures to a Picture selected for Transmission.

Click the Merge to TX when ready to update the selected Picture.

LOAD SUPPORT PROGRAMS

LOAD EZCALLS Callsign checker.. Links to QRZ.com with maps etc... Nice !! Written by Dick W3WVG_

LOAD EZLOG

Callsign Logger with maps etc... Nice !!....Written by Dick W3WVG

LOAD SSTVPICS

A very Clean and Easy to Use Picture Viewer.. Integrates Nicely within EasyPal.

Written by Dick W3WVG

LOAD DIGI-SITES

Multiple view of on line FTP DigSstv sites. Written by Dick W3WVG

REASSIGN ABOVE DIRECTORIES

Does exactly what it says ! Allows you to re-assign the directories holding the above programs.

PRINT TEXT NOW

PRINT PICTURE

Does exactly what it says ! Prints Text or Picture on your Windows default printer

TWAIN SELECT

TWAIN AQUIRE

Twain is a common dialog Windows uses to communicate with external devices such as Scanners, Cameras etc

Allows you to select the Twain device to Input a Picture. Twain Aquire directly connects to the selected device.

SEND TO IRFANVIEW

GRAB FROM IRFANVIEW

IrfanView is a Graphics program that can be used to manipulate pictures. These options send a picture to and load a picture from Irfanview. Irfanview must be installed on your PC for these options to work.

REPEATER MENU COMMANDS

The RPTR Menu is only available on the Menu Bar when USE REPEATER is ticked in the Action Menu

Show Last received Repeater Directory

Displays the "Repeater Directory" window. The filenames and file sizes are listed.

Select a file by clicking the filename, then use the "Replay Selected File" or "Delete Selected File" button.

The repeater command will then be sent.

Show Repeater Log

Self explanatory

File is saved to external "\repeater\" (Retick each time)

Allows the sending of a file to be saved to the "Repeater" folder on a remote repeater.

The "USER Info" allows you to enter a callsign for a recipient. Click "OK" to send loaded file to remote repeater.

Either sender or recipient may delete this file from the remote repeater.

Start Webcam

Activates the webcam. All FTP Settings should be unchecked. "Run" should be checked.

Clicking any of the repeater access options from the "Repeater" menu will immediately start transmitting

that command to any active HamPAL or EasyPal repeater on frequency.

Interrogate Repeater

Sends the file "a.r###. Repeater sends out the "reply.wav" file. Default is "REPEATER".

If the "reply.wav" file is not in the correct folder, the repeater will not respond.
A repeater that has been shutdown can still respond

Repeat back Files immediately

Transmits the received file Immediately

Replay Last received Picture

Sends the file "b.r#". Repeater sends out the "replay.wav" file.
Default is "REPLAY". Repeater replays the last received file.

View Repeater Directory

Sends the file "f.r###". Repeater sends out the "dir.wav" file. Default is "DIRECTORY".
Repeater sends an .rs2 encoded file providing a list of files found in the "Repeater" folder.
When this file is received, The "REPEATER DIRECTORY" window will appear.
If you wish to view later, use "Show Last Received Repeater Directory".
After files have been added or deleted from the "Repeater" folder on the remote repeater, the order of filenames will be changed.
For this reason, the "View Repeater Directory" command should be sent again to get the updated listing prior to sending any "Selected File" command.

Repeat Text in repeater Waterfall

You are prompted to enter a text message.
The file "k.r" is sent. The content of this file is the text message.
The Repeater responds with the text message in the Waterfall.

Request HamCam Picture

Sends the file "i.r###". Repeater sends out the "webcam.wav" file.
Default is "WEBCAM". Repeater sends the current webcam picture if available.
Note that the file is standard JPEG: "070710041023-WebCamImage.jpg".

Request Repeater Resend BSR Request

Sends the file "c.r###". Repeater sends out the "filefail.wav" file.
Default is "BSR de RPTR". Repeater sends the BSR.

Send Email

Allows you to email a specific recipient. Opens a dialog where you can enter recipient details and enter email text.
Repeater must be email enabled.

Activate Repeater Beacon

Repeater sends out the "beacon.wav" file. Default is "BEACON".
Not available on distribution versions.

Activate as Base Repeater

Allows Repeater Base to be activated. Warning Dialog results and the option to be an email server is included.
There is a vertical red SQUELCH line in the RX level bar.
The squelch bar must be set ABOVE the RX noise level, but BELOW actual signals.
Tx is only possible when the green RX level bar drops below the squelch bar position.

How to ACTIVATE AS EMAIL SERVER See "email.doc" in the EasyPal folder for full information.

Note Versions Earlier than 12 Mar 2009 Included the following commands

Shutdown all Repeaters

Shutdown all repeaters within range. Sends the file "d.r".
Repeater sends out the "paused.wav" file. Default is "STOPPED".

Restart all Repeaters

Restarts all repeaters within range. Sends the file "e.r".
Repeater sends out the "restart.wav" file. Default is "RESTARTED".

Shutdown Specific Repeater

Shutdown specific repeater of user selected callsign. Sends the file "l.rCALL". (lower case "L")
"CALL" repeater sends out the "paused.wav" file. Default is "STOPPED".

Restart Specific Repeater

Restarts specific repeater of user selected callsign. Sends the file "m.rCALL".
"CALL" repeater sends out the "restart.wav" file. Default is "RESTARTED".

FTP MENU COMMANDS

The FTP Menu is only available on the Menu Bar when USE FTP is ticked in the Action menu

Allow FTP Upload of your Received Pictures

Enter Web address, username, password etc for your web site.

Tag FTP Received Pics Uploads with Callsign, Date, Mode

tags uploaded Pictures

***Let Others see my ONAIR Status**

When checked an ONAIR Symbol is sent to a server database.
The Symbol is removed on shutdown or "Let Others....." is Unchecked.
You do NOT need to specify an FTP directory to use this feature.

***Add Comments to the ONAIR Status**

Allows you to enter text comments which follow your Callsign on the ONAIR Server list

***See Who is ONAIR**

When Clicked the Database of ONAIR Stations is Displayed.

*** The success of these commands depends on the internet connection quality
If necessary repeat the commands after the hour glass disappears.**

Do Not allow Listed Calls to Auto-Upload to my Website

Blocks Auto Upload of Pictures from Listed Callsigns.

Do Not allow my TX Pictures to be Uploaded by other Stations

Blocks Other station auto Upload of my Pictures

Detect Remote RX Decode then Stop TX (RS files only)

Shows an options screen with Instructions and where settings can be entered.

This feature allows receive stations to halt your transmission when they have a successful receive.

A fast Internet connection is needed.

If option 2 is selected, a list of users with error free decodes appear.

The TX station may end the TX manually when he is satisfied the user list is sufficient.

WRITE TXT Msgs for FTP upload

Allows you to enter Text Messages to be Uploaded to your web site

PICTURES - View Delete Replace on your Website

Self explanatory... May not work with all systems

MESSAGES - View Delete on your Website

Self explanatory May not work with all systems

FIRST USE or CLEAR ALL PICTURES

Clears all Pictures... recommended for First Time use

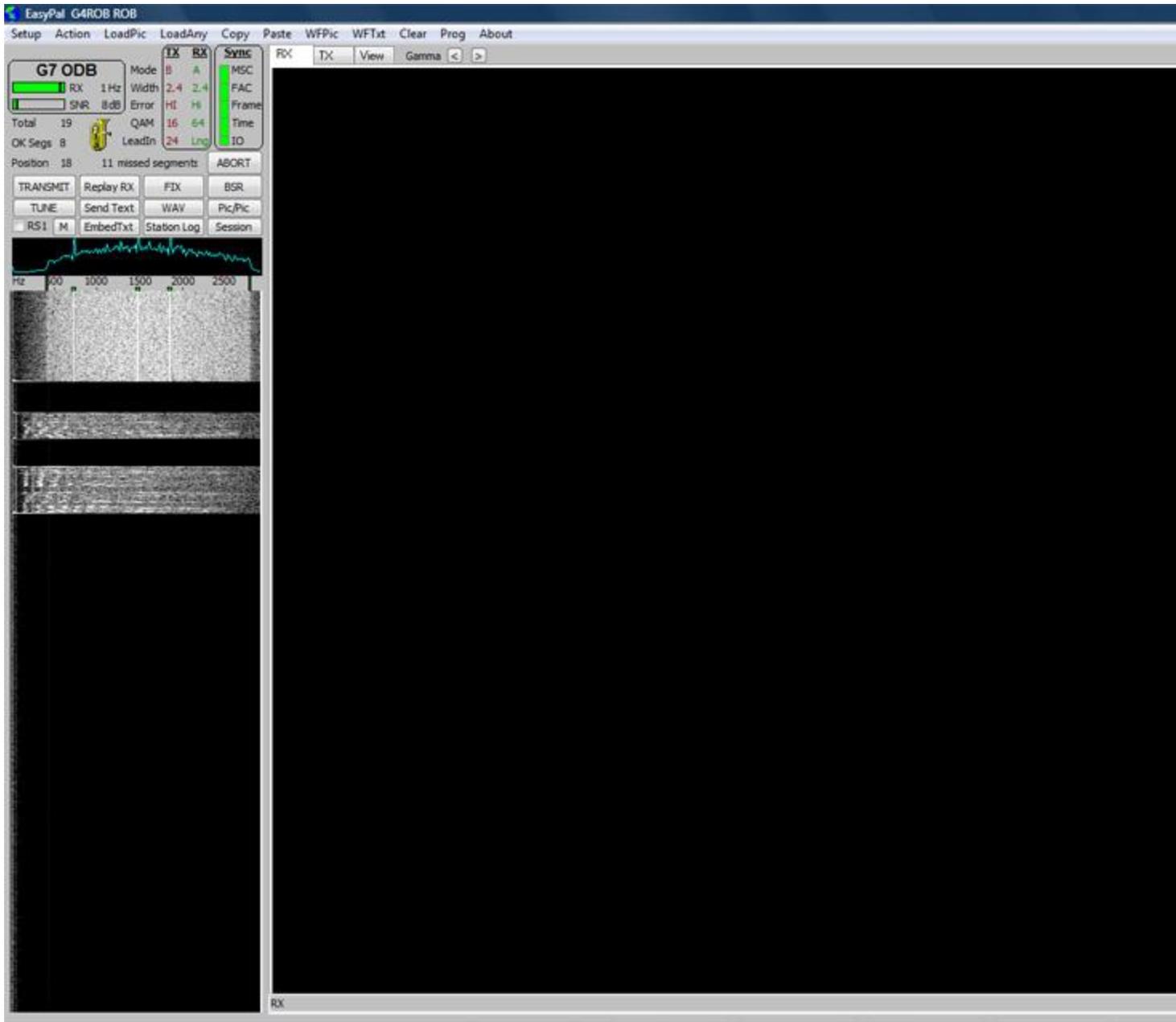
FIRST USE or CLEAR ALL MESSAGES

Clears all Messages.. recommended for First Time use

EasyPal Main Screen Help

MAIN SCREEN OPTIONS AND CONTROLS

The EasyPal Main Screen is the most used screen within the Program. From here you can control all the main functions within EasyPal... switch to TX.. Change Modes.. Load Pictures, View past received and transmitted pictures and much much more.



The **EasyPal Main Screen** with TX Picture window activated.
 TX Mode in this case is B / 2.4 / HI / 16 / 24 shown under TX in **RED**
 RX Mode is A / 2.4 / HI / 64 / Lng shown under RX in **GREEN**

The TX Picture details are shown above the TX Window:
SECS Displays the length of the transmitted signal in Seconds
20K Displays the currently selected picture size in Kbytes
SLIDER + marker Adjusts the amount of jpeg-2000 compression applied to the Picture. Higher compression results in more Picture degradation.
SET Sets the file size after adjustment with the Slider and shows the result on the Picture AFTER

Compression

GAMMA < > Adjusts the GAMMA Correction of the Selected TX File.



This Picture shows an active Receive of a Transmission from G7ODB

*Notice ALL Sync Display indicators are **GREEN***

Total 19 = Total number of segments that make up the Image being transmitted

OK Segs 8 = The number of correctly Received segments so far

Position 18 = Number of Segment currently being Decoded

11 Missing segments = 11 segments remaining for a complete receive.

The THREE peaks within the Receive Passband... BLUE waveform across the audio passband

The Waterfall Display which shows the signal so far received.. a Vertically downward scrolling representation of the Received signal

More Detailed explanation follows:

Main Screen Controls

ABORT Click to **ABORT** a Transmission and switch to Receive

TRANSMIT When Clicked this Button switches to **TRANSMIT**.

Current selected Transmit Picture will be Transmitted using the selected Mode and Options

REPLAY RX Re- Transmits the picture last received. Automatically switches to TX

FIX Sends a FIX in reply to a BSR. See [GLOSSARY](#) for Details

BSR Bad Segment Request. Click this to send a BSR signal. See [GLOSSARY](#)

TUNE Transmits a TUNE signal (See ACTION MENU for more details)

SEND TEXT Sends a TEXT file as entered

WAV Allows selection and Loading of a WAV audio file for Transmission.

Clicking "Set as begin.wav" transmits the selected wav file at the beginning of each transmission.

"set as end.wav" transmits

the selected wav file at the end of each transmission. The "remove" options clear the appropriate selections.

Click "TX Now" to transmit the selected wav file immediately without transmitting an image.

PIC/PIC Allows you to select Multiple Pictures within a Picture for Transmission.

Select an Image for transmission using LoadPic.Click "Pic/Pic". Select another Image to merge with the first. This Image can be resized and moved as required.

Additional Images can be added as required.

An additional small window also appears that allow you to enter and add Text to the Images.

Click "Merge to TX" to complete the montage and process the completed Image for Transmission.

EMBEDTXT Allows Text to be Embedded within a Transmission. See [ACTION MENU USER DETAILS EMBED TEXT](#) for more details.

Box and "RS1" Left click to toggle RS encoding for transmitted files.

Right click the TEXT to toggle the 4 levels of encoding. Shows the current **RS Type**

Encode setting. See [GLOSSARY](#).

M Opens a Small RX Monitor window and closes the Main Screen window.

Very useful if you want to Monitor Received Images while doing other things on your PC. Screen is resizable.

EMBEDTXT Allows Text to be Embedded within a Transmission. See [ACTION MENU USER DETAILS EMBED TEXT](#) for more details.

STATION LOG Displays the CALLSIGN and details of the sender of each Received Picture since the current EasyPal session was started.. Details may be Edited on Screen and Saved for next session

SESSION Displays details of RX and TX instances since the current session of EasyPal was started. Callsign, RX or TX, Time and Mode details are displayed

Upper Screen Display

TX shows the current Mode settings for TX . DRM submode selected for transmit. Right click mode parameter to toggle through settings.

Any changes to the mode are saved for future sessions when the program is closed.

Default DRM Mode should be Mode B, Width 2.5 khz, Error HI, QAM 16, and LeadIn 24. Interleave is always Long and cannot be changed.

These settings are the best choices for general use on the HF bands.

LeadIn 12 will reduce transmit time by reducing the number of redundant segments. For very short transmissions such as Text messages, LeadIn 12

may be too short a time for all stations to achieve MSC sync before the transmission is finished. In this case, select LeadIn 24.

RX DRM submode received. FAC must be green before the mode can be detected and the callsign decoded. In addition to those mode settings that

may be changed on transmit, the RX will also reveal the interleave setting. Lng for long and Sht for short. The receive mode settings are automatic and do not require the operator to make any changes for receiving any DRM mode.

MODE Mode selected

WIDTH Signal bandwidth selected

ERROR Error Rate Correction selected

QAM QAM rate selected

LEADIN lead In length selected

CALLSIGN Shows the CALLSIGN of the Transmission Station. Note the Validity of the Callsign is not

checked. The Displayed Callsign is simply the Callsign entered by the Transmission station in Setup.

DOUBLE CLICKING a Displayed Callsign links to [EZCALLS](#) and displays the relevant information for the Callsign

RX Display bar showing the Relative strength of the RX signal AUDIO LEVEL

SNR DB The relative Signal to Noise Ratio in DB of the Received Signal

TOTAL The TOTAL Number of Segments in a Transmission

OK SEGS The Number of OK Segments Received

MISSING The Number of MISSING / CORRUPT Segments Received

POSITION The Current Segment Number being received.

The **TUBA GRAPHIC** Plays a few Notes of a Tuba as a Transmission !

SYNC DISPLAY aka TRAFFIC LIGHTS

MSC Master Service Channel in the DRM signal

FAC Fast Access Channel in the DRM signal

FRAME Frame Sync Signal

TIME Timing Sync Signal

I/O Signal present at Soundcard

These Indicators turn from OFF to **RED** to **GREEN** in ASCENDING ORDER. ALL Indicators must be **GREEN** for a Picture to be received correctly (depends on the Mode of the Transmitted Signal)

The Levels of your **RECEIVE SIGNAL** from Receiver via Interface to PC Soundcard have a direct effect on these Indicators.

MSC is the most difficult to lock.. careful adjustment of your Received signal level may be necessary to obtain constant MSC lock.

Lock failure is shown on the **PROGRESS BAR** at the bottom left of the Main Screen as a **RED** Line. Valid Reception is shown in **GREEN**

This Bar only appears when a Valid signal header has been received and the receive signal is being processed by EasyPal.

Depending on the Mode of Transmission **RED** lines in the Progress Bar may result in a FAILURE TO DECODE message after reception completes.

A **BSR** request can be used to ask the Transmission station (or any other station that has the requested information) to re-transmit a **FIX** transmission to Fix (Repair) the Corrupted Receive file.

Beware: The FIX transmission re-transmits the requested Segments of the corrupt file several times. A FIX can take much longer to Transmit than the full Picture.

If you have many errors in the Progress Bar the quickest way may be to Re-Transmit the entire file again.

LOWER WINDOWS

The **First Lower Window displays** an Oscillograph representation of the Receive Signal.

Displayed as a Blue Line the height of which relates to the frequency response of the received signal as it appears on your Soundcard. This display shows in REAL TIME.

The Three Channel tones used by EasyPal should be shown as Three Peaks in the waveform.

For Best Reception the frequency response should be as flat as possible with three distinct peaks corresponding to the three channel tones being transmitted.

The three channel tones should align directly above the Three Green markers on the

Second Lower Window Display... aka the WATERFALL



The Waterfall Display

This Picture shows Valid reception of a **TEST** signal in the WATERFALL WINDOW.

This shows:

- The **Callsign** of the Transmitting Station sending the TEST

- The **Three Channel Lines** transmitted as a TEST Signal as Bold White Lines

- The **Three Peaks** in the Received Waveform... Blue Peaks in the First Window.

- The **Three Channel markers**.. **GREEN** Blocks.. which confirm correct alignment of the transmitted tones.

- The Waterfall screen **SCROLLS** Downward as time progresses.

The Waterfall screen progress can be **PAUSED** by LEFT CLICKING within the Waterfall screen and Restarted by left Clicking again (or clicking RESTART that appears)

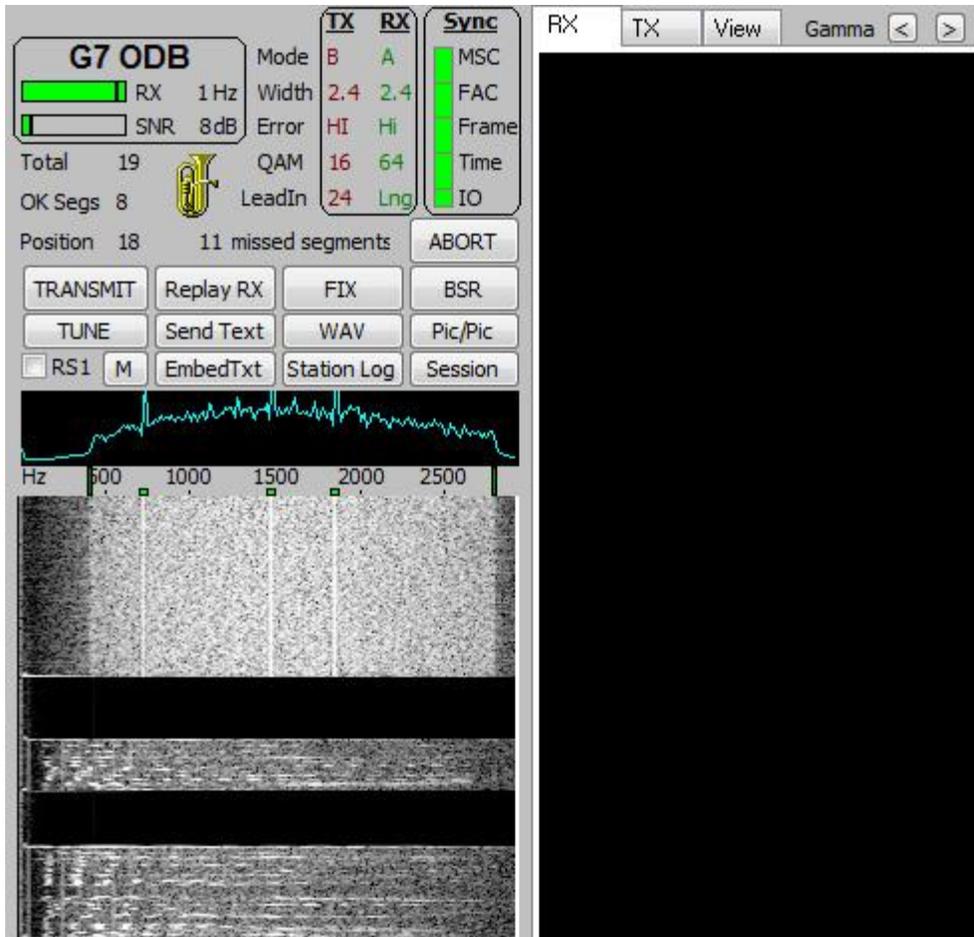
MAIN DISPLAY SCREEN AREA

To the Right of the EasyPal Main screen you will find the **Main Display Area**, where you will find Three TABS which select the:

- RX SCREEN** The Received Picture Screen

- TX Screen** The Picture selected for Transmission

- VIEW Screen** the recent History of RX and TX and other information



A Receive Screen showing:

Progressive Display of the Received File
Part of the RX Screen.. RX file Name below.

The **Waterfall display**

The **Sync Signals...** Traffic Lights

Received signal Info.. Callsign, RX level, SNR, Segments, Modes etc

Receive **Progress Bar** under the waterfall... **RED** lines are Corrupt segments on a **GREEN** Bar (the length of the GREEN Bar shows the size of the picture being received)

To Summarise...

This Screen shows a Picture being sent by G7ODB in Mode A / 2.4 / Hi / 64 / Lng

A total of 19 Segments are being transmitted...

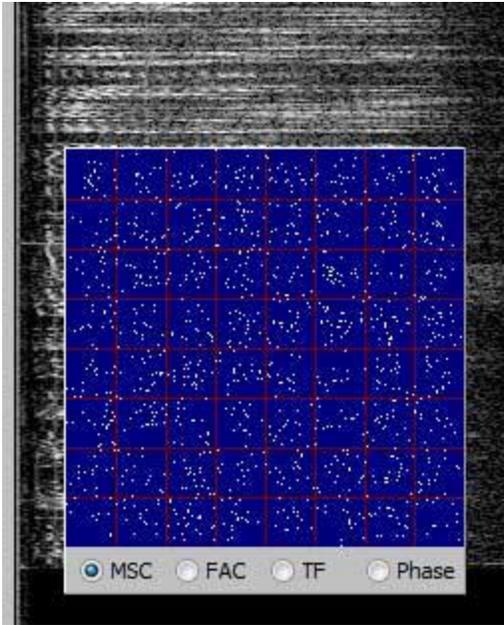
8 OK segments received so far

RX Constellations

EasyPal versions commencing April 2009 have the Receive Constellations display re-located to the Waterfall view when **RX CONSTELLATIONS is ticked in the Action menu.**

The following view shows the RX Constellations Display. This display only appears during a valid receive and disappears when the receive is complete.

This Display gives Advanced detailed information of the received signal.



Explanation of the RX Constellations Display

Select this view during Reception of an EasyPal signal for an in depth view of the signal being received

MSC Main Service Channel. This is the data channel

The MSC display shows the QAM constellations. (QAM Quadrature Amplitude Modulation. (eg: QAM 64 detects 64 levels of amplitude in each carrier))

Each box shows each data bit received as a dot.

This is displayed in a FIFO buffer. The buffer is averaged over 10 displays.

In the ideal case, the data will be one bright spot in the middle of a box.

This is very rare.

If the data dots drift too far from the centre, an error will occur.

This can be repaired by the DRM error correction and further with the encoded mode.

However too many uncorrected errors will cause data loss.

FAC Fast Access Channel. Sends at a low baudrate (QAM4) of the callsign, decode parameters and sync info.

The FAC box shows the decoding of this channel in the same way as the MSC.

However the FAC channel is always QAM 4, as this info cannot have any errors.

This is sent at the beginning of TX and at the end.

It can also be sent 4 more times during TX if the "Repeat Header (highly recommended always ON)" is checked.

This helps in poor conditions.

There are occasions when sufficient data has been received, but no filename so no decode.

TF Time Frame.

Each vertical line shows an individual carrier and the height is the amplitude of that Carrier.

There are a different number of carriers according to the mode.

In an ideal situation, the top of the carriers should be a straight LEVEL line... all Carriers having the same amplitude.

This is rare as it depends on the TX stations passband and any audio filtering present in the Transmit Path

Receive filters etc also effect this in the same way.

Phase:

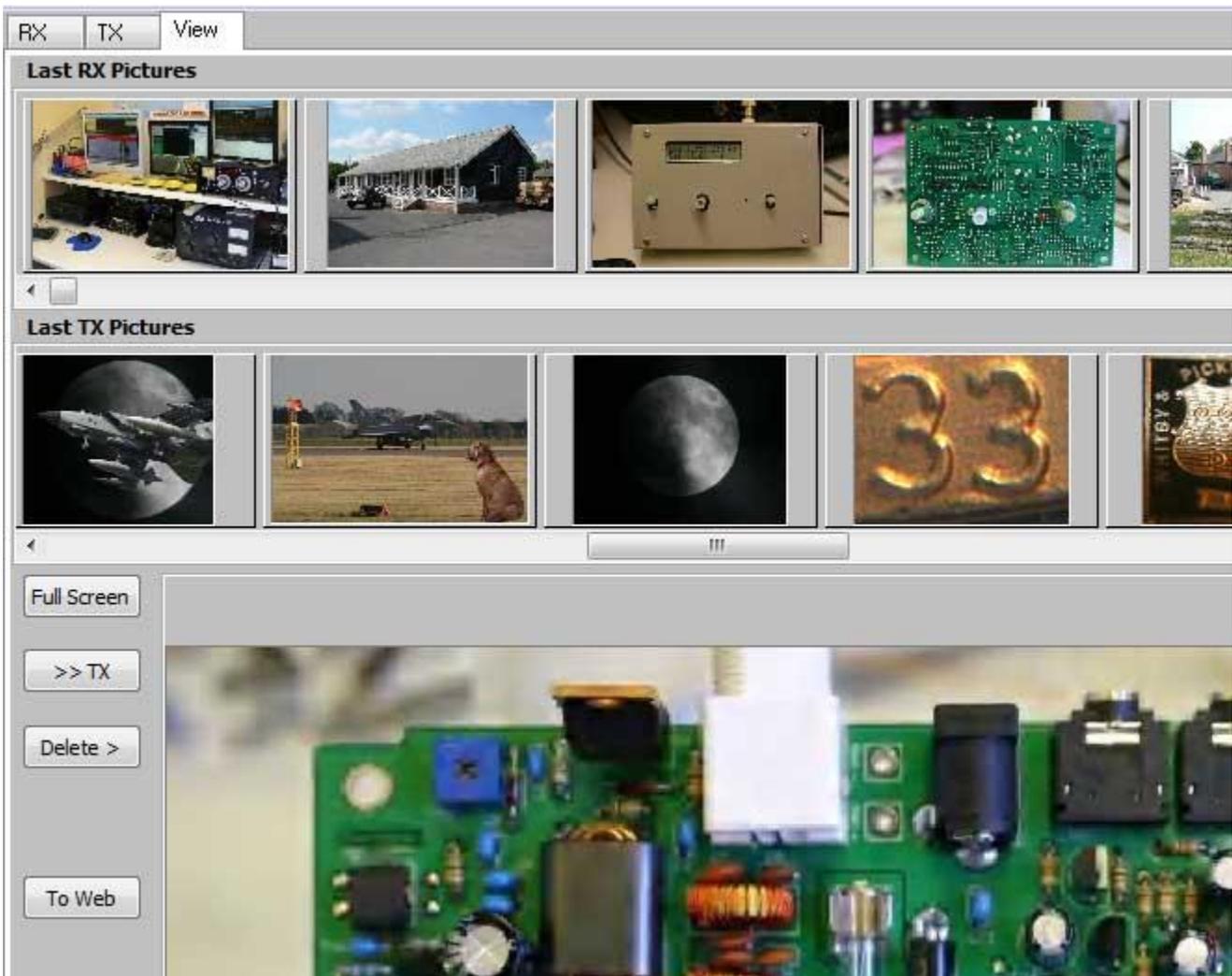
This shows the phase decoding success for each carrier.

There are a different number of carriers according to the mode.

The ideal is again straight line.

When a carrier or carriers lose sync (doppler, multipath etc) the vertical height of the failed carrier will jump higher or lower.

Too many bad syncs causes data loss.



A VIEW Screen

This Picture shows

Recently Received Pictures... Last RX Pictures..... scrollable with the Slider control

Recently Transmitted Pictures... Last TX Pictures... scrollable with the Slider control

The Buttons:

FULL SCREEN Shows the selected Picture in FULL SCREEN

>> **TX** Sends the current selected Picture to the TX screen

DELETE > Deletes the currently selected picture from the relevant EasyPal folder. Use with CARE !

TO WEB Uploads the selected picture to your nominated Web Site via FTP

EasyPal Load Pic and Load Any Help

Please Note that due to differences in the way Windows Operating Systems handle files and folders some operating systems may not allow correct operation of one or the other of these versions.

Users are encouraged to use whichever Version they prefer.

The EasyPal Original LOADPIC Screen
(Use [Windows Open Dialog](#) option is NOT Selected)



Enhanced User Options when using this option to Load a Picture.... they are:

>> TX Send Selected Picture to TX Screen

>> RX Send Selected Picture to RX Screen

PREVIEW Previews Picture

RENAME Renames a Picture

DELETE Deletes a Picture

SORT BY DATE Sorts Pictures by Date !!

FAST THUMBNAIS Increases Load Speed of Thumbnails

+ + + Thumbnail Size

1 2 3 4 etc Favourite Directories. Select the Directory.. RIGHT Click the Button to Save as a Preset Favourite. Left Click to select

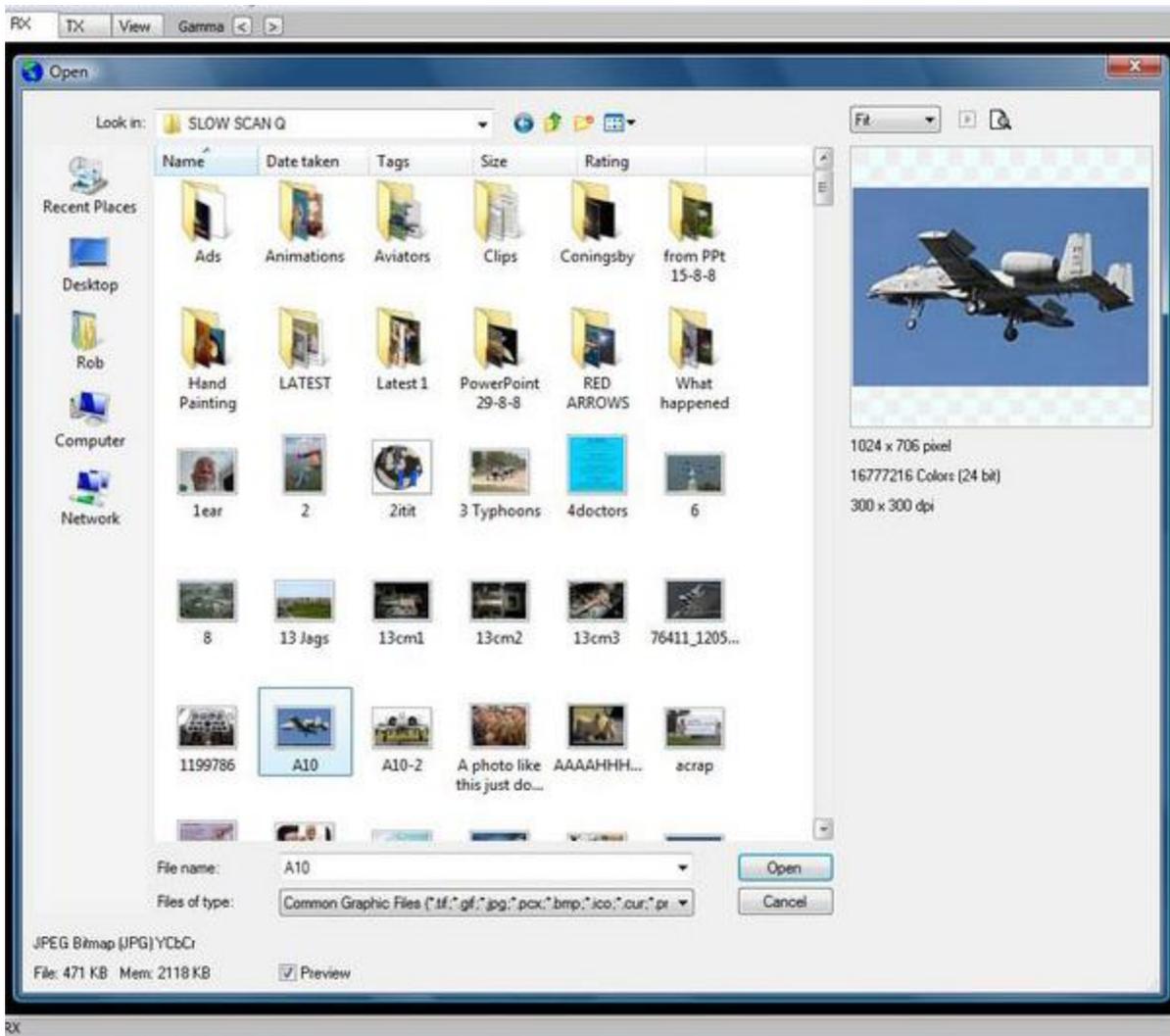
EXIT EXITS the LoadPic screen

USER LIBRARY Shows the Users on your PC system

REFRESH Refreshes the selected folder

NON IMAGES Shows Non Images

The EasyPal LoadPic screen
with [USE WINDOWS OPEN DIALOG](#) Selected



Allows you to Load Pictures using the Standard Windows Dialog. Select this method by Clicking [USE WINDOWS OPEN DIALOG](#) in the [SETUP MENU](#)

Further Information

The Pictures selected will be converted and compressed into a JPEG-2000 format.

They will also be Re-Sized on Transmit depending on the [Re-Size](#) setting in the [Set-Up menu](#)

The Images will be Re-named for Transmission to include the Current Year/Month/Day/Hour/Seconds when the Transmission takes place.

Animated GIF Pictures can also be transmitted... with additional.. sometimes very large Transmission Time Overheads.

(An option to transmit as a fixed or Animated GIF will be offered when the Picture is selected.)

LOAD ANY FUNCTION

Allows you to Load Any type of file for transmission... **not limited to Images.** Very similar Displays to LOAD PIC.

Other EasyPal Commands Help

The COPY Command Standard Image Copy to the Windows Clipboard from the RX or TX Screen

The PASTE Command Standard image paste from clipboard to the RX or TX screen. Paste to the TX screen will compress and convert the image to JPEG-2000 format. The image may be resized based on the setting for HiRES.

The WFPIC Command (Waterfall picture) Transforms the image on screen into a grey scale image that becomes analogue encoded audio to produce a like image in the waterfall.

The WFTEXT Command (Waterfall text) Transforms a user provided text message with the choice of various sizes and fonts into analogue encoded audio to produce the text as an image in the waterfall. To make a waterfall ID click "WFTxt". Type your call into the Waterfall Text window using all caps
You may want to add a space between each character. Select a plain bold font to make it easier to read when displayed in the waterfall.
Select NEGATIVE to invert the Text colours... Black Text on White Background.
The NEGATIVE function helps ensure the transmitter is keyed while using VOX PTT control as well as helping with the Synch of the received signal.
Click Save and use your call as the filename. To send this, click WAV and select the file, then click "Tx Now".

The CLEAR Command Clears the selected RX or TX Screen

The PROG Command Allows you to Program a macro RUN Command that Runs an External program on your PC. Assign the Program to one of the six presets. Very useful where you want to run another program alongside EasyPal

The ABOUT MENU

ABOUT Shows details of the EasyPal version and the "Gang" of Programmers and Helpers who have assisted in the building of EasyPal.

HELP Shows available **WWW Help File Sites.**

UPDATE INFO Shows the Update History of EasyPal along with comments by Erik VK4AES

EasyPal Glossary of Terms Used

BEACON An automated system that sends an Identification signal at preset time intervals

BSR Bad Segment Request. A BSR is sent when an Image is not receive in full. The BSR is received by the station (and all other stations receiving your signals) and a FIX screen is shown allowing the station to select the picture to fix or simply fix the last image sent. Only BAD SEGMENTS will be Resent. Each Bad Segment will be resent several times.

COMMPORT The Serial Port within your PC that Windows uses to communicate with your Interface / Transceiver. Modern USB Interfaces also use the term Commport because a USB device is translated to a COM by Windows, so even if you use a USB Interface you will need to find the COMMPORT address. Use Windows Control Panel / System/Device Manager and look at USB device properties to find the COM Port number associated with your USB Interface. **Also SEE USB**

DRM Digital Radio Mondiale. The basic of Easypal communications. A Worldwide standard for Digital transmissions. More details visit www.drm.org

FAC Fast Access Channel . Vist <http://www.drmradio.co.uk/html/fac.html> for more information

FIX A response to a received BSR. You have the option to FIX an incomplete Image that has been received by another station.

FTP File Transfer Protocol... Used to Communicate over the Internet / WWW. used to Upload Images, files , text etc to your website

HEADER The information preceding the main signal that holds information about the picture and transmitting station. Essential for successful Receive.

INTERFACE The electronic equipment that connects aka "Interfaces" your PC to your Transceiver. Signals to and from your PC and Transceiver travel via your Interface.

MSC Master Service Channel in the DRM signal. Visit <http://www.drmradio.co.uk/html/msc.html> for more information.

QAM Quadrature Amplitude Modulation. Modulation by changing the Amplitude of two Carrier waves.
Visit http://en.wikipedia.org/wiki/Quadrature_amplitude_modulation for more detailed information.

REPEATER A Repeater Re-transmits Received signals. Useful where all stations on frequency cannot hear every other station.

RESOLUTION The resolution of an Image is a statement of the Detail within that Picture. Higher resolutions result in larger image sizes and therefore take longer to transmit but will result in a received Image having greater detail. Loss of Resolution (too much compression) can produce a Pixelated Image (Blocky and fuzzy image).

RS FILES Encoded files using the REED SOLOMON Encode / Decode protocol. Visit http://en.wikipedia.org/wiki/Reed%E2%80%93Solomon_error_correction for more information..

SEGMENT A small part of the Transmitted Image. Many Segments make up the Total Image. Bad Segments can be re-sent faster than a Bad Total Image

SNR Signal to Noise Ratio. The Ratio of Signal to Noise. The Higher the SNR the clearer the received signal data. A Low SNR limits the Receive capability.

THUMBNAIL Miniature view of an Image (and the curved Calcium bit on the end of your Thumb !)

TX and RX On MAIN SCREEN. Shows the current MODE selected for TX and last / current RX Image

USB Universal Serial Bus used by Windows to connect to your Interface. One VERY IMPORTANT point is that a USB COM PORT number can change if the USB device is unplugged or used in a different USB socket on your PC. This is a VERY common cause of communication failure between EasyPal and your Transceiver.

Also see COMMPORT

WATERFALL A representation of the received (or transmitted) signal. Displayed as a Moving Image that scrolls downwards as time progresses. The EasyPal waterfall gives a good idea as to the Transmitted signal quality via the Waterfall Contrast as well as showing the DRM Tones of the transmitted signal.

End of EasyPAL Help Files from

<http://www.g4rob.co.uk/easypalhelp/>

Into THE WEEDS on HOW THE DATA ARE TRANSMITTED:

DRM COFDM

The DRM radio signal consists of data transmitted using COFDM (Coded Orthogonal Frequency Division Multiplex). COFDM is a spectrum efficient digital

modulation scheme employing equally spaced carriers and has become the standard method for digital broadcasting. The number of carriers, carrier modulation and spacing is different for different broadcast systems; as is the way synchronization is achieved.

Digital Audio Broadcasting has 1536 carriers spaced 1 kHz apart.

Digital Terrestrial Television (DTT) in 2K mode has 1705 carriers spaced 4.464 kHz apart, with 1512 carriers carry data and the remainder are pilots.

DRM COFDM Carriers

Individual COFDM carriers are spread across the radio channel but not all of the carriers transmit data. The carrier spacing is equal to the inverse of the symbol duration.

For example Mode A $\frac{1}{(26.66 - 2.66) \text{ mSec}} = 41.66 \text{ Hz}$

Each carrier can be either a data or pilot or reference. The pilot (or gain) carriers are used for channel estimation for use in fading channels. Pilot carriers are broadcast with a known amplitude and phase sequence.

The carrier systematically changes function for each symbol/carrier and this frequency/time interleaving of the data makes the signal more robust and improves reception in the presence of fading and interference.

QAM

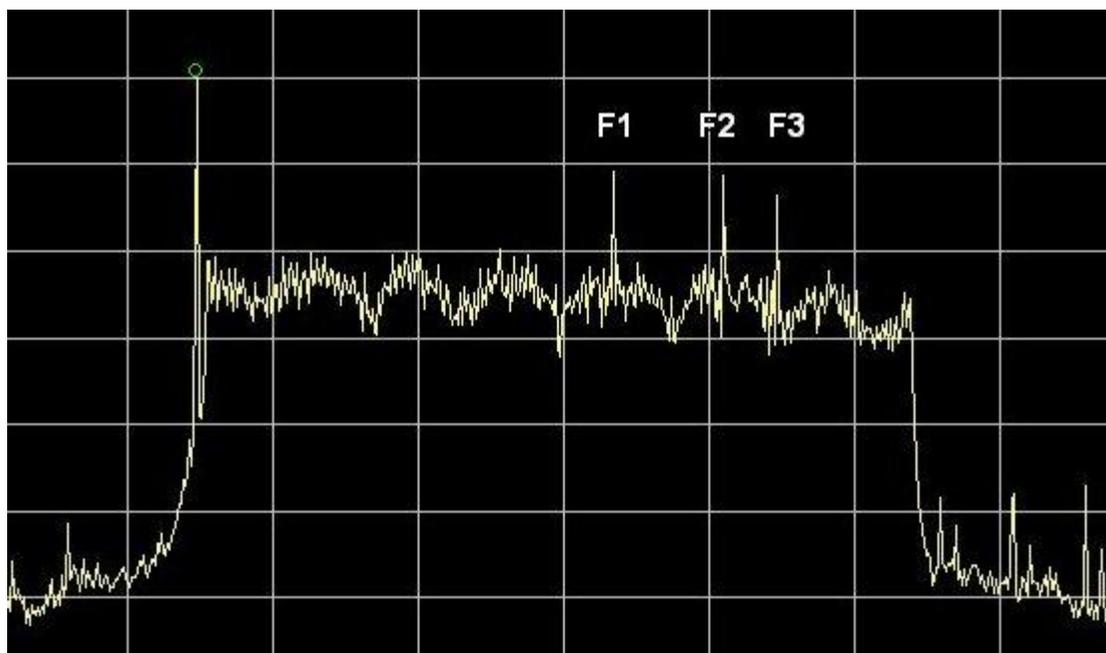
Data to be transmitted is systematically spread across all these carriers and each carrier is modulated using QAM (Quadrature Amplitude Modulation). When viewed in the frequency domain the spectra of these carriers appear overlapped. However thanks to the principle of orthogonality the carriers (once synchronized at the receiver) do not overlap and each individual carrier can be demodulated by software. This considerably increases the density of carriers and consequently increases the data rate available.

QAM is a mixture of fixed amplitude and phase modulation. DRM incorporates error protection so that selective fading, or interference, with the subsequent loss of some carriers does not affect the overall transmitted data.

Each transmission frame contains an FAC block (400 mSec). When more than one service is carried in the multiplex a number of FAC blocks are required to describe all the services.

DRM FAC

Reference Pilots



These three reference pilots (or carriers) are used by the DRM receiver software to help synchronize to the DRM signal. The three FAC reference carriers are transmitted at baseband 750 Hz, 2250 Hz, 3000 Hz (marked as F1, F2, F3).

Unlike all the other DRM carriers, they are dedicated reference carriers whereas all the other carriers constantly switch between either carrying data or used as a pilot (to enable channel estimation).

These FAC reference carriers have their amplitude boosted relative to carriers carrying data by a power gain of 2 so that the DRM software can recognize these FAC reference carriers.

They are transmitted at the same frequency irrespective of the DRM mode being used. FAC reference carriers are used to calculate the initial coarse

frequency offset of the received DRM signal compared to the receiver's local oscillator. This is the first part of the COFDM synchronization process required before the received DRM signal can be properly decoded.

FAC data

The FAC block contains 72 bits of information (64 bits of FAC data plus 8 bit CRC) to allow the DRM software to decode the multiplex. FAC parameters include: spectrum occupancy, interleaver, modulation mode, number of services, language, audio or data, program type.

Whatever the spectrum occupancy or transmission mode the DRM decoder always needs this FAC information first to know how to decode the rest of the DRM signal. Consequently the FAC is always transmitted in the same place with a fixed code rate. Comparing DRM to AM then the FAC would occupy the equivalent location of AM upper sideband.

Each transmission frame contains an FAC block (400 mSec). When more than one service is carried in the multiplex, a number of FAC blocks are required to describe all the services.

base/ enhancement flag	1 bit	0 : base - decodable by all DRM receivers 1 : enhancement – only decodable by enhanced receivers
identity	2 bits	identifies current frame and validates SDC AFS index: 0 : first FAC of super frame and AFS index is valid 1 : second FAC of super frame 2 : third FAC of super frame 3 : first FAC of super frame, AFS index is invalid
spectrum occupancy	4 bits	00 : 4.5kHz 01 : 5.0kHz 02 : 9.0kHz 03 : 10kHz 04 : 18kHz 05 : 20kHz 06 : not defined 15 : not defined
time interleaver depth flag	1 bit	0 : 2 Seconds (long interleaving) 1 : 400 milliSeconds (short interleaving)
MSC modulation mode	2 bits	0 : 64-QAM, no hierarchical 1 : 64-QAM, hierarchical on I 2 : 64-QAM, hierarchical on I&Q 3 : 16-QAM, no hierarchical
SDC mode	1 bit	0 : 16-QAM 1 : 4-QAM
number of audio and data services	4 bits	00 : 4 audio services 01 : 1 data service 02 : 2 data services

		03 : 3 data services 04 : 1 audio service 05 : 1 audio service and 1 data service 06 : 1 audio service and 2 data services 07 : 1 audio service and 3 data services 08 : 2 audio services 09 : 2 audio services and 1 data service 10 : 2 audio services and 2 data services 11 : reserved 12 : 3 audio services 13 : 3 audio services and 1 data service 14 : reserved 15 : 4 data services
re-configuration index	3 bits	indicates the number and timing of a multiplex reconfiguration. Non-zero value indicates the number of transmission super frames before the new configuration will take effect.
rfu	2 bits	reserved for future use and set to zero until defined.
service identifier	24 bits	indicates the unique identifier for this service
short identifier	2 bits	assigned to this service and used as a reference in the SDC
conditional access flag	1 bit	0 : no CA system in use 1 : CA system in use (details provided by SDC data)
language of target audience	4 bits	00 : no language specified 01 : Arabic 02 : Bengali 03 : Mandarin 04 : Dutch 05 : English 06 : French 06 : German 08 : Hindi 09 : Japanese 10 : Javanese 11 : Korean 12 : Portuguese 13 : Russian 14 : Spanish 15 : Other language * further languages indicated by SDC data
audio/data flag	1 bit	0 : audio service 1 : data service
service descriptor	5 bits	if audio/data flag = 0 then the field indicates the programme type: 00 : no programme type 01 : news 02 : current Affairs 03 : information 04 : sport 05 : education 06 : drama 07 : culture 08 : science 09 : varied 10 : pop music

		11 : rock music 12 : easy listening music 13 : light classical 14 : serious classical 15 : other music 16 : weather/meteorology 17 : finance/business 18 : children's programme 19 : social affairs 20 : religion 21 : phone in 22 : travel 23 : leisure 24 : jazz music 25 : country music 26 : national music 27 : oldies music 28 : folk music 29 : documentary 30 : <i>not defined</i> 31 : <i>skip (test transmission)</i>
rfa	7 bits	audio/data flag = 1 (data) then the 5 bit field indicates the application identifier of a data service. value of 0 indicates that the application details are provided by SDC. value of 31 indicates that a DRM receiver should skip this broadcast and not scan, this allows test transmissions to be ignored by DRM receivers.
		reserved for future additions - set to zero until defined

FAC data 64 bits.

Channel Estimation

With QAM modulation an amplitude reading of a particular carrier is meaningless as there may be selective fading on the signal. To determine the correct reading the decoding software looks at the amplitude of the nearest pilot carrier each side of the data carrier.

By interpolation with the known transmitted amplitude (assuming synchronization has already been done) of these pilot carriers an estimate of the channel response is derived which is then used as an offset correction to all the data carrier amplitudes.

This method simplifies DRM decoding as the effects of selective propagation fading can be measured using these pilot carriers and the received amplitude

of the data carriers can be corrected in software. Using channel estimation enables coherent OFDM demodulation.

This is why Mode A can transmit more data than Mode B even though it has less bandwidth (9 kHz compared to 10 kHz). Mode A is used for medium wave and ground wave propagation where the channel fading characteristics are more benign than short wave. Consequently for Mode A more carriers are designated as data carriers rather than pilot carriers than for Mode B.

Also check out the Wikipedia - http://en.wikipedia.org/wiki/Quadrature_amplitude_modulation

If anyone really made it this far, would they mind sending an email to black@nwfirst.com?
Thanks, WR5J