

WinFLEX – Pager Decoding Software for Windows95/98

General Description.....	2
Basic Operation.....	2
Setting up WinFLEX.....	3
Setup.....	4
Interface.....	4
Options.....	4
Font.....	5
Colors.....	5
Filter.....	5
Monitor.....	8
Statistics.....	8
Keep Alive.....	8

General Description

WinFLEX is a Windows application that allows you to decode RF transmissions from a paging system by using a radio scanner and a data slicer circuit. The scanner will need to be modified to tap the discriminator and you will need to build a circuit called a data slicer or, optionally, you can build the 4 Level FSK decoder circuit instead. The data slicer (2 Level FSK circuit) will allow you to decode all three POCSAG speeds (2400, 1200, and 512 baud), Golay (GSC), FLEX 1600bps transmissions and phases A and C of FLEX 6400bps transmissions. The data slicer will not allow you to decode phases B and D of FLEX 6400bps transmissions or ReFLEX transmissions. For these you will need the 4 Level FSK decoder circuit. I would recommend building the data slicer circuit initially and then building the 4 Level FSK decoder circuit later if you need to decode all phases of FLEX 6400bps transmissions or ReFLEX transmissions.

Included in the WinFLEX zip file are schematics for building the data slicer and 4 Level FSK decoder. The ReadMe.txt file also contains a simple ASCII drawing of a data slicer and information about modifying your scanner to tap the discriminator.

Basic Operation

The WinFLEX display is divided into two windowpanes. The upper pane is used to display filter matches (which will be covered later in this document) and the lower pane is used to display messages as they are being decoded from the scanner. The top edge of the lower pane can be repositioned by clicking and dragging that edge with the mouse. Move the cursor near the top edge of the lower pane and the cursor will change to an arrow pointing up and down. When you see this cursor you can click and drag the top of the lower pane. This allows you to see more or less information in each pane. WinFLEX will save the size of the upper and lower windowpanes when you exit the program. This setting will be restored when WinFLEX is started running again. You can make the WinFLEX window larger or smaller by dragging the edges or corners of the WinFLEX window. The size and position of the WinFLEX window will be saved when the program exits. These settings will also be restored when WinFLEX is started running again.

The lower pane cannot be sized smaller than 1 line of text in height. This is to prevent the upper edge of the lower pane from being so close to the bottom of the WinFLEX window that it cannot be easily “grabbed” to resize the lower pane again. The top edge of the lower pane can be moved all the way to the top of the WinFLEX window if desired. This will prevent any filter information from being displayed, but, if you are not using the filters, you may wish to do this to have more messages being displayed in the lower windowpane.

When the windowpanes have more than a “screen full” of information displayed, scroll bars will appear on the right edge of the windowpane. These scroll bars will allow you to scroll back to previously displayed messages. If the button in the scroll bar (the “thumb tab”) is not ALL THE WAY at the bottom of the scroll bar, WinFLEX will NOT display any new information in that pane. This was done so that WinFLEX would not keep scrolling a message out of your view when you have scrolled back to look at it. Any new messages that are received while the display is “scrolled back” will not be lost. They will be stored in the display buffer, but will not be displayed until you scroll the pane all the way back to the bottom. You can use the up or down arrows, the PgUp or PgDn keys and the Home and End keys to scroll the lower pane up or down.

The title bar in WinFLEX will show the current paging format that is being decoded. For FLEX transmissions, the title bar will show the FLEX speed in bits per second and which phases are being used. For POCSAG transmissions, the title bar will show the baud rate (2400, 1200, or 512). For Golay Sequential Code transmissions, the title bar will display “Golay (GSC)”.

The following formats are used to display messages:

POCSAG – The 7-digit capcode will appear within left and right curly braces and will be followed by the function code (from 1 to 4). This will be followed by the numeric or alphanumeric message. An example of a POCSAG message would be:

```
{0473285} 3 This is a test message.
```

FLEX – The 7-digit or 9-digit capcode will appear within square brackets, which will be followed by the FLEX phase, which will be followed by the FLEX format. This will be followed by the numeric, alphanumeric, or binary message. The following FLEX formats are used:

```
SECURE - Used for FLEX secure vector messages.
SH/TONE - Used for short numeric or tone-only messages.
ST NUM - Used for standard numeric messages.
SF NUM - Used for special format numeric messages.
ALPHA - Used for alphanumeric messages.
BINARY - Used for binary format messages.
```

An example of FLEX messages would be:

```
[004863547] A ST NUM 1-800-555-1212
[003495623] C ALPHA Bob, call Sam when you get the sales figures.
[0953465] A SH/TONE 555-9999
```

Golay Sequential Code (GSC) – The capcode will appear within left and right parenthesis and will be followed by the function code (from 1 to 4). Since there is nothing in the Golay protocol to distinguish numeric messages from alphanumeric messages, if the message is 24 characters long or less, the message will be decoded as both numeric and alphanumeric format. If the message is longer than 24 characters the message will be decoded as alphanumeric. An example of a Golay message would be:

```
(034513) 1 THIS IS A LONG ALPHANUMERIC TEST MESSAGE.
```

If the timestamp option is enabled, timestamps will appear in the following format:

```
----- <date> <time> -----
```

The <date> and <time> information will be formatted based on the way your Windows date and time settings are configured. You can change the date and time format by going to the Windows Control Panel and double clicking on “Regional Settings”. Click on the Time or Date tab and select the appearance that you wish. Note that other Windows programs (like Explorer) will use this date and time setting, so changing it will effect how the date and time appears in other applications as well as in WinFLEX.

Setting up WinFLEX

You will need to have your scanner discriminator tap connected to the input of your data slicer circuit and the output of the data slicer connected to an available COM port on your PC. You will need to set the scanner to the frequency that you wish to monitor. You will need to start the WinFLEX application running. Choose “Setup” from the WinFLEX menu bar and select the “Interface” option to configure WinFLEX for your hardware.

Setup

Interface

The Interface dialog box allows you to choose the COM port that is connected to the data slicer. You can choose from COM1 – COM4 or you can choose a “Custom” COM port. The COM1 through COM4 selections will automatically change the Port I/O Address and the Port IRQ Vector to the standard values found on most PCs. You can determine if the I/O Address and IRQ Vector values match your hardware configuration by looking at the Ports section in the Device Manager tab of the Control Panel->System Properties dialog box. For more details see the ReadMe.txt file that accompanies this document.

In the Interface dialog box you will also need to select whether you are using a 4 Level FSK decoder circuit or not. For the simple 2 Level FSK circuit or, for a Hamcomm type interface, you should NOT have the 4 Level FSK box checked. If you are using the 4 Level FSK decoder circuit, you should check the 4 Level FSK box.

There is also an option in the Interface dialog box that will allow you to invert the data received from your scanner. At first, try decoding messages without the “Invert Data” box checked. If you do not see any messages being decoded in the lower WinFLEX window, you may need to come back to the Interface dialog box and check the “Invert Data” box.

The options in the Interface dialog box will not take effect until you click on the “OK” button. You can cancel any changes made in the Interface dialog box by clicking on the “Cancel” button. The options that you select will be saved to an INI file when you exit the WinFLEX application. These options will automatically be restored when WinFLEX starts running again.

Options

The Options dialog box contains options that can be toggled on or off. The following options are available in the Options dialog box:

Confirm Exit – This option, when checked, will cause a confirmation dialog box to appear when you exit from WinFLEX. This allows you to cancel the exit if you did not really mean to exit the application. If this option is disabled, there will be no confirmation when WinFLEX exits.

Timestamp – This option, when checked, will display a timestamp once per minute between messages as they are decoded. The timestamp will only appear right before a message is displayed and will not appear again until the start of the next minute. If no messages are received for several minutes, the timestamp will not appear again until a message is received.

Show Numeric/Tone – This option, when checked, will display numeric messages and tone-only messages when they are received. If this option is disabled, numeric and tone-only messages will not be displayed.

Enable Filter Beep – This option, when checked, will cause WinFLEX to produce a beep when a filter match occurs. The sound used for the beep is the “Default sound” in the Control Panel->Sounds dialog box. If no sound is specified for the “Default sound”, you will hear a short beep instead. If the Enable Filter Beep option is not checked, WinFLEX will not produce a sound when a filter match occurs.

Decode POCSAG – This option, when checked, will cause WinFLEX to decode POCSAG format transmissions. If you do not wish to monitor POCSAG transmissions, you can leave this option

disabled. Leaving this option enabled, when not needed, will cause WinFLEX to use more CPU time than necessary.

Decode FLEX – This option, when checked, will cause WinFLEX to decode FLEX format transmissions. If you do not wish to monitor FLEX transmissions, you can leave this option disabled. Leaving this option enabled, when not needed, will cause WinFLEX to use more CPU time than necessary.

Decode Golay (GSC) – This option, when checked, will cause WinFLEX to decode Golay Sequential Code (GSC) transmissions. If you do not wish to monitor Golay transmissions, you can leave this option disabled. Leaving this option enabled, when not needed, will cause WinFLEX to use more CPU time than necessary.

Font

The Font dialog box allows you to choose the font you wish to use for the displayed characters. All of the fonts presented in the font dialog box are fixed pitch fonts, which means that all of the characters within each font use the same amount of space horizontally. Fixed pitch fonts are used because WinFLEX will automatically wrap lines longer than 80 characters at the right edge of the window. If variable pitch fonts were used, the right edge would be “jagged” and would not look as good. You can select Italic or Bold font styles and can select the size of the font that you wish to use.

Colors

The Colors dialog box allows you to change the colors used to display information in WinFLEX. You can change the background color by selecting the “Background” button. You can change the capcode color (which is used for capcodes of any format) using the “Capcode” button. You can change the FLEX phase color by using the “FLEX Phase” button. You can change the FLEX format color, which describes the type of FLEX message decoded, by using the “FLEX Format” button. You can change the timestamp color using the “Timestamp” button. You can change the bit errors color using the “Bit Errors” button. You can change the color used to display numeric messages by using the “Numeric” button. You can change the color used to display alphanumeric messages by using the “Alphanumeric” button. You can change the color used to display FLEX binary format messages by using the “FLEX Binary” button. You can change the color used to indicate a filter match by using the “Filter Match” button. You can change the color used for filter labels by using the “Filter Label” button. You can reset all colors to the default settings by using the “Default Colors” button.

There is a sample window in the Colors dialog box that will show you an example of what the display will look like if you select “OK” to exit the Colors dialog box. You can adjust the colors and see what things would look like without making these changes permanent by using this sample window. If you don’t want to save the color changes, you can select “Cancel” to exit the Colors dialog box without changing the current WinFLEX colors.

Filter

Filters allow you to capture messages sent to specific capcodes, or to capture messages that contains specific text. The Filter dialog box in WinFLEX allows you to add, delete or edit filters. You can also log filter matches to a log file which can be view later using any standard ASCII text editor (like Notepad). WinFLEX also gives you the ability to run another application and provide filter fields as arguments to that application. For example, you could run a program that would send the capcode and message from a filter match to your pager. One such program, called TAPP.EXE is included in the WinFLEX zip file.

The Filter dialog box displays any filters that have been previously defined in a scrollable window. To add a new filter, click on the “Add” button in the Filter dialog box. To delete an existing filter, select the filter you wish to delete from the filter list and click on the “Delete” button in the Filter dialog box. WinFLEX will display a confirmation dialog box to make sure that you wish to delete that filter. To edit an existing filter, you can select the filter you wish to edit from the filter list and click on the “Edit” button in the Filter dialog box, or you can simply double click on a filter in the filter list.

When adding a new filter, you will be presented with a dialog box that allows you to choose the filter type, a capcode (if necessary), an optional function code (for POCSAG and Golay filters), an optional filter label, and an optional text string. You can also choose whether this filter will cause the filter command file to be executed when a match for this filter occurs. Here is a description of the fields in the Add/Edit Filter dialog box:

Filter: You can select a Text filter, which will match specific text without regard to the paging format or capcode. You can select a POCSAG Capcode filter, which requires a 7-digit capcode to match against. You can select a FLEX Short Capcode filter, which requires a 7-digit capcode to match against. You can select a FLEX Long Capcode filter, which requires a 9-digit capcode to match against. You can also select a Golay (GSC) Capcode filter, which requires a 6-digit capcode to match against.

Capcode: This field is only available for capcode filter types. The capcode may only contain numeric digits (0-9) or a question mark character (?) which is used as a wildcard that will match any single digit.

Function Code: This field is only available for POCSAG and Golay capcode filter types. The function code can be specified as Any, which will match any function code, or can be specified as function code 1, 2, 3, or 4.

Label: This field is used to help identify the filter when it is displayed in the WinFLEX upper windowpane. The label can be 20 characters long and may contain any text you wish to use to identify that filter. When the filter match is displayed in the upper windowpane, the label will be displayed after the capcode.

Text: This field may contain any text that you wish to match. The Text field is limited to 40 characters. Text entered in this field is NOT case sensitive. For example, if you specify the word “Test” in the Text field, it would match “test”, “TEST”, and “teST”. Note that if you have a capcode filter AND you have text in the Text field, the filter will not match unless there is a message sent to the specified capcode AND that message contains the text in the Text field.

Enable Filter Command File: If this option is checked, and you have enabled the “Filter Command File” in the WinFLEX Filter dialog box, the filter command file will be executed when a match is found for this filter.

When editing an existing filter, you cannot change the filter type. If you have a capcode filter with text specified, you cannot edit it to make it just a text type filter and vice versa. You will have to delete the existing filter and add a new filter if you wish to do this.

In the WinFLEX Filter dialog box, you have the option to log filter matches to a log file. If you check the “Enable Output File” option, you must also provide a filename by clicking in the box to the right of the “Enable Output File” option. This will bring up an Open File dialog box which will allow you to select or type in the name of the file you wish to use to store filter matches in. The file used to store filter matches is a standard ASCII text file. The information is stored in the file exactly as it appears on the screen except that any binary characters (characters whose ASCII value is less than 32) are converted to a period character (“.”) when they are written to the filter log file. When WinFLEX opens the filter log file, it will preserve any information already in the file and append any new filter matches to the end of the file. If timestamps are enabled, they will also get written to the filter log file.

If you have the filter output file enabled, you also have the option of flushing the filter output to disk at regular intervals. To do this, check the “Flush Filter Output To Disk” option and select the rate that you wish to use to flush the output to disk. You have the option of flushing the output to disk after every message, at 5-second intervals, at 10-second intervals, at 30-second intervals, or at 60-second intervals. This allows you to force the filter log information to be written to disk so that other programs that might try to access the filter log file while WinFLEX is running will have an up-to-date copy of the filter log. If you do not enable the “Flush Filter Output To Disk” option, the filter log file will only be updated when the Windows operating system flushes the log file to disk. The rate at which this happens will vary depending on how much memory you have and how often filter matches occur. The filter log file will also be flushed to disk when you exit the WinFLEX program. Note that if you enable the “Flush Filter Output To Disk” option and specify that WinFLEX should flush the output after every message, you may get a very heavy amount of disk activity if you have several filter matches occur very closely together. This can lead to performance problems. It is not recommended to flush the output to disk after every message unless your filter matches do not occur very often.

The Filter dialog box has an “Enable Command File” option which allows you to enable an external program that you wish to run when a filter match occurs that has the “Enable Filter Command File” option enabled. The external program, or command file, can be any executable file (.EXE, .COM, or .BAT filename extension). When you check the “Enable Command File” option, you must also specify the command file you wish to run by clicking in the box to the right of the “Enable Command File” option. This will bring up an Open File dialog box that will allow you to choose the command file you wish. To provide arguments to the filter command file, you can use the “Command File Arguments” option. Click in this box and type in the arguments that you wish to pass to the command file when it is executed. These arguments can be any text that you wish and can be the following special character sequences:

%c – Gets expanded to the capcode (or capcode and function code for POCSAG and Golay) that caused the filter match.

%l – Gets expanded to the label that was assigned to the filter that matched (if a label was defined). Note that this is lowercase L, not the digit one.

%m – Gets expanded to the message that was sent when the filter match occurred.

For example, if you create a batch file with the following commands:

```
ECHO LABEL=%1 CAPCODE=%2 AND MESSAGE=%3 >> FILTER.OUT
```

Check the “Enable Command File” option and assign this batch file as the command file. Then place “%l” “%c” “%m” (with the quotes) in the “Command File Arguments” field. If you had a filter that had the “Enable Filter Command File” option checked and the following message was received that matched that filter:

```
{0264573} 3 Test message.
```

The following would appear in the FILTER.OUT file:

```
LABEL="" CAPCODE="{0264573} 3" MESSAGE="Test message."
```

If you wish to use the TAPP.EXE program to send yourself a page when a filter match occurs, you will need to check the “Enable Command File” option, and assign the TAPP.EXE file as the command file. The following “Command File Arguments” could be used if your modem was on COM3 and the TAP/IXO number for your paging company was 1-800-555-1234 and your PIN number was 1234567:

```
COM3 1-800-555-1234 1234567 "%l %c %m"
```

This would send the filter label, capcode, and message text to your pager.

Monitor

The Monitor feature in WinFLEX allows you to monitor the RF channel. You can gather statistics information and set up an “off-the-air” alarm notification.

Statistics

The Statistics dialog box shows you how many messages were received during the last hour and during the current day. The hourly statistics will be reset at the start of each hour and the daily statistics will be reset just after midnight. If you wish to store statistics information to a disk file, you can enable the “Write Statistics To File” option. You will need to click in the box to the right of the “Write Statistics To File” option to specify a filename. When you do this, an Open Statistics File dialog box will appear and you can select an existing statistics file or type in the name of a new statistics file. If you open an existing file, the statistics will be appended to the end of the existing file. When the statistics are written to the disk file, WinFLEX will insert a date and time stamp before the statistics information. Since the statistics are not written until the start of a new hour, the timestamp will actually be for the next hour. For example, if the timestamp reads “03:00:05 PM”, the statistics values are actually for the 02:00:00 PM – 02:59:59 PM hour.

Keep Alive

Not completed yet.