DSPWin

DSP-4100 TERMINAL
SOFTWARE
(For Windows 95/98/NT 4.0)

OPERATION

MANUAL

TABLE OF CONTENTS

TABLES

FIGURES

CHAPTER 1

INSTALLATION AND SETUP

This Manual provides information on how to install and use DSPWin, the DSP-4100 Windows 95/98/NT based terminal program.

Minimum system requirements:
        PC-Pentium, 100 MHz
        32 MB RAM
        1 - 3.5" floppy disk drive
        1 - hard disk drive (20MB free min.)
        VGA video card and monitor minimum
        1- Serial I/O port (COM1 to COM4)
        1- DSP4100 or DSP4100/2K

DSPWin has been designed for typical installation on a Windows 95/98/NT 4.0 Operating system. If you are not familiar with standard Windows 95/98/NT 4.0 installations, read each step carefully. This chapter is designed to provide simple instructions on how to install and run DSPWin, but it is not the intent of this manual to provide Windows operating system support.

DSPWin provides access to all of the features and modes of the DSP-4100. Third party terminal and control programs have also been written for the DSP-4100 modem. You should consult their manual for operation. If you choose to run a third party software program, it is recommended that you also install DSPWin or HAL DOS software DSP41.EXE (refer to DSP-4100 Operations Manual Chapter 4) to verify proper hardware setup. If you desire to develop your own terminal software or learn more about CLOVER modes, you may wish to obtain one or more of the following Engineering Documents from HAL:

E2000   CLOVER Glossary of Terms
E2001   HAL DSP Modem Interface
         Command Specifications
E2004   Binary File Transfer Protocol
E2005   DSP4100 Interface Specifications
E2006   CLOVER-II Waveform & Protocol
E2007   CLOVER-2000 Waveform & Protocol
E2009   Optimizing HF Data System Performance
         with CLOVER 2000
E2010   AT Dial Commands

Engineering Documents are available on the HAL website (www.halcomm.com) in the Technical Documents section, and by mail. Please contact HAL's customer service department for more information on obtaining these documents.

1.1 Installing DSPWin Software

Installation Steps:

1. Turn on your PC.
2. Close any programs that may be running.
2. Put your Installation Diskette 1 in Drive A.
3. Click: **Start**

4. Then, click: **Run**

5. The Run Window appears.
   Type: **A:SETUP**
6. Click: **OK**
7. The DSPWin Setup program will now begin.

1.2 The DSPWin Setup Window

Begin installation by clicking: **OK**
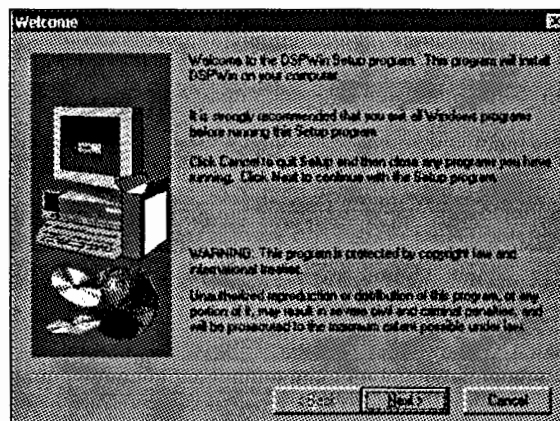
If you have open applications running, click: **Cancel**. Close all open applications and start DSPWin Setup again. You will be prompted as installation files are removed from your system. Click: **Next** to continue.

1.3 Changing DSPWin Directory
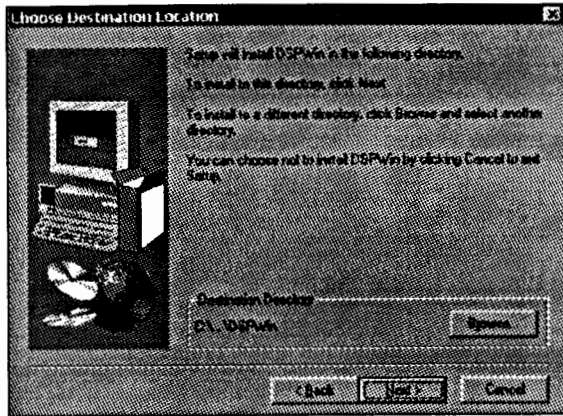
For standard installation, do not change the installation directory. If you wish to install to a different drive or directory click: **Browse.** You will be prompted to enter a new directory and/or drive location. When finished, click: **OK**

1.4 Installing Files
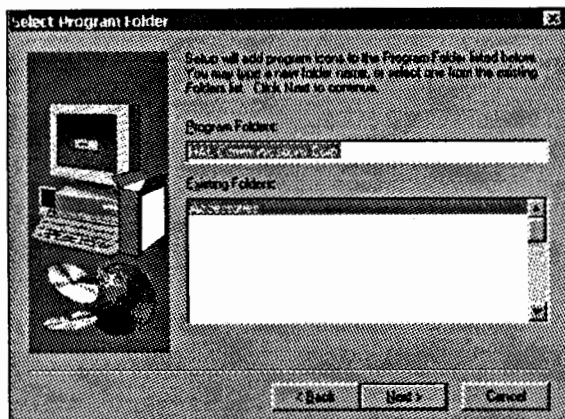
Next, specify the location of the program Icons. Click **Next** to accept the default location or enter a custom name and then Click **Next**.
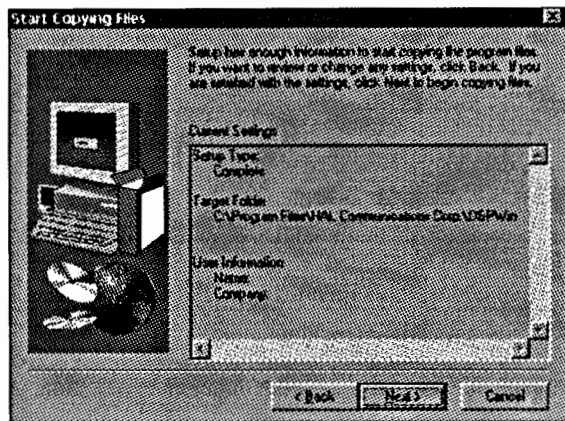
DSPWin Setup will now ask for you to review your previous choices before installing files. Choose **Back** to make any changes and **Next** to continue.
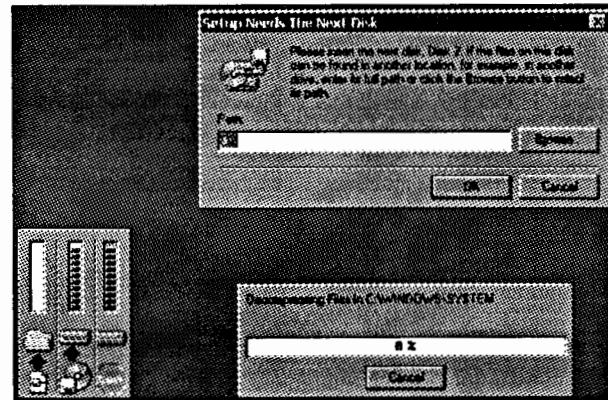
DSPWin Setup will now begin to copy files to your hard drive. You will be prompted to insert Disk 2 in Drive A: then Click: **OK.**

DSPWin Setup is now complete. Click: **OK** to continue.
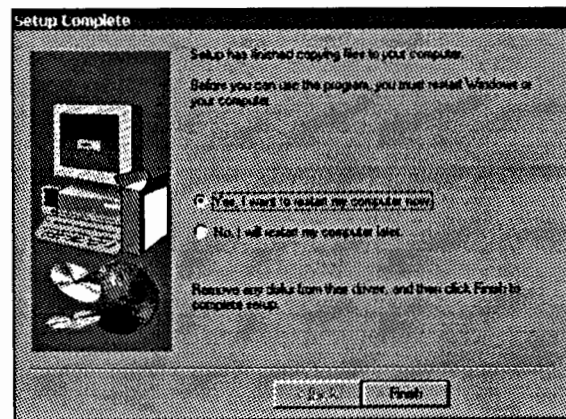
Restart your computer before running DSPWin. To restart your PC Click: **Finish**

CHAPTER 2

RUNNING DSPWIN

2.1 Running DSPWin

Now that you have DSPWin installed correctly it is time to run the software. First, make sure the modem is turned on and verify the COM port setting you are using on your PC. You will be asked for that information shortly.
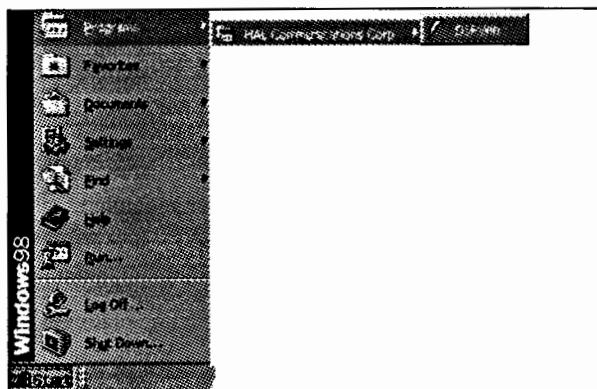
To run DSPWin, find its Start menu icon located in:
Programs\HAL Communications Corp.\DSPWin

Click: **DSPWin**
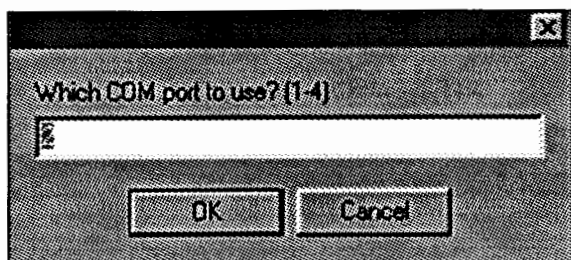
DSPWin will now begin with a window requesting that you provide the correct COM Port setting for the DSP-4100. This Setting will be saved to your configuration file (see section 2.12 Configure Menu) after DSPWin has found the DSP-4100 modem.

2.2 MYCALL Setup
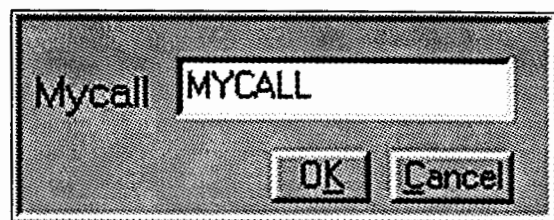
MYCALL is the call sign of the operating station and is required for all modes. This should be setup before proceeding.

1. Press **[Alt]-M**
2. Type the call sign of your station
3. Press **[Enter]**
4. Click: **OK**

2.3 Main Screen

The main screen is composed of eight elements:

DSPWIN OPERATION MANUAL
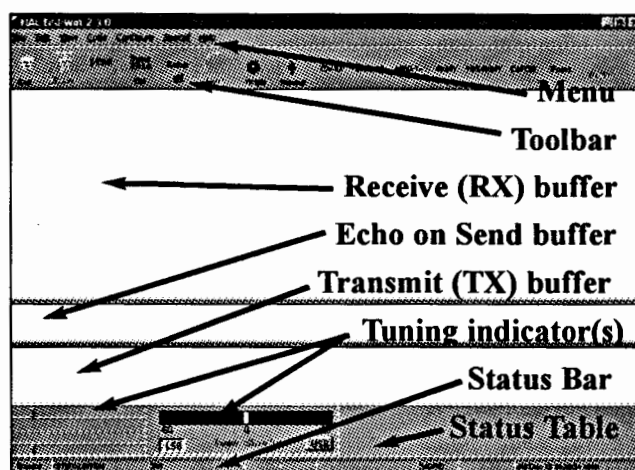
2.4 DSPWin Manual Conventions

The following manual conventions describe the method of entering certain keystrokes.

1. All user-entered keystrokes or mouse clicks are in **BOLD** print.

2. Multi-letter keytop labels are shown in [BRACKETS].

For example: **[ENTER]**, **[F1]**, **[F8]**, **[Ctrl]**, **[Alt]**, **[Shift]**, **[Home]**, **[PgUp]**, etc.

Each **[BRACKETED]** set represents <u>one</u> key to be pressed.

3. Some keys must be held down while pressing a second key. These will be shown with a dash (-) between key presses. The combination of these keystrokes is also known as a hot key.

For example: **[Alt]-C** should be interpreted as:
                 Press and hold the **[Alt]** key
Press and release the **C** key
Release the **[Alt]** key

Table 2.1
Special "Hotkeys" Used by DSPWIN

FUNCTION KEYS

KEY	Fn	Alt-Fn	Ctrl-Fn
F1	...	...	...
F2	Send CALL + ID ...		...
F3	Send CALL	...	Change HISCALL
F4	Send ID	Force CW ID	...
F5	Send HERE IS # ...		...
	Here IS (CLOVER)	...	...
F6	OVER (TOR)	...	...
	NORM/REV(FSK RTTY)		
F7	Normal End	Panic Kill (CLOVER)	...
F8	Listen ON/OFF	Tone Test	...
F9	Connect/Call	Call CQ (CLOVER)	AF Channel (CLOVER)
F10	TX Enable ON/OFF	TX Enable ON/OFF	TX Enable ON/OFF

HOT KEYS

KEY	FUNCTION	KEY	FUNCTION
Alt-A	Date (Military Format)	Alt-P	Print Squelch
Alt-B	Send Time and Date	Alt-Q	Send QBF Message
Alt-F	Files (Save)	Alt-R	Select FSK RTTY Rate
Alt-G	Force Letters	Alt-T	Send Time (Military Format)
Alt-H	Help Pages	Alt-U	Clear RX Buffer
Alt-I	CW ID ON/OFF	Alt-X	Clear TX Buffer
Alt-M	Change MYCALL	Alt-Z	Send Military Time Group
Alt-N	Toggle NORM/REV		

EDIT KEYS

KEY	FUNCTION	KEY	FUNCTION
PgUp	Move up one page	Ctrl-Home	Move to line 1 column 1
PgDN	Move down one page	Ctrl-End	Move to last line in TX buffer
Home	Move to beginning of line	Ins	Toggle Insert and Overstrike
End	Move to end of line		

2.5 Menu Line

Files   Edit   View   Code   Configure   Special

The menu line provides easy access to the features and options of DSPWin. Like many Windows based programs, the hot keys are depicted by the underscore character. For example: [ALT]-F chooses the file menu. Continue to hold [ALT] to choose submenus.

2.5.1 File Menu

Files

Send text file
Send binary file
Stop disk save/send
Save RX to disk
Save statistics to disk

Load Firmware

Print RX Buffer
Print Setup

Exit
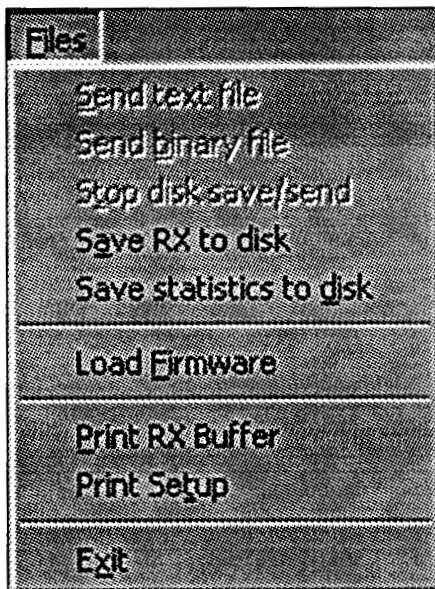
Send text file : Text files may be sent in any mode. The data is sent exactly as it is stored in the disk file, without any modification to the End of Line sequence (EOL). Compression is not used in this mode.

Send Binary file: Use the "Binary" option to send all data files when using CLOVER. All 8 bits are sent in "binary mode" and all data is sent using PK-Ware compression. This mode may be used to send ANY file stored on your computer, including data, image, executable, and text files. This mode is actually a file-transfer mode and results in creation of this file at the other station. If a file of this name already exists at the other station, a duplicate file message is shown on the screen and the file transfer is cancelled. If you wish to transfer this file, rename it at the sending station or remove the previous filename from the receiving station.

Stop disk save/send: The stop send command closes the file immediately and no further information will be saved. Data that is contained in the DSPWin TX buffer will continue to be sent until the buffer is empty. This may be a substantial amount of data when CLOVER is used. If an immediate stop send and stop transmit action is needed, use the "panic kill" [ALT]-[F7].

Save RX to Disk: All received data may be saved to disk as a computer file. Data bytes or characters are saved exactly as received in the disk file, including End Of Line (EOL) sequence and errors that may have been caused by noise, poor typing, etc.

Save Statistics to Disk: Available only when in CLOVER mode. All channel statistics of a CLOVER link are stored in an ASCII data file that is compatible with most spread sheet programs. The file name is created automatically in the following format:

MMDDHHmm.TST (month/day/hours/start minute/.statistic extension)

The three user entry fields at the beginning of each statistics file are:
FREQ   [   ] (6 characters maximum)
NAME   [   ] (16 characters maximum)
OTHER [   ] (16 characters maximum)

The data fields are:
time = HHmmss (hr/min/sec)
rate = Throughput in bytes-per-sec (00-99)
my = MYCALL (8 char max)
snr = Signal-To-Noise Ratio (00-99 dB)
his = HISCALL (8 char max)
frq = Frequency Offset (0-±30Hz)
mod = (BPSM, QPSM, 8PSM, 8P2A, 16P4A)
phs = Phase Dispersion (000-256)
bias = 1 (Robust), 2 (Normal), 3 (Fast)
ecc = Error Corrector (00-100; XX = exceeded)
tpr = Not used

Load Firmware: The **Load Firmware** menu option allows the user to upload new _.S28 and _.LOD files into the DSP-4100 flash memory without any hardware changes. While DSP-4100 modems are shipped with the latest versions of _.S28 and _.LOD, upgrades may be obtained from customer service. Unless directed by customer service, always upload both files to the DSP-4100.

Note: There are differences in firmware updates for the HAL DSP-4100, HAL DSP-4100/2K, and HAL manufactured OEM modems. Please contact your dealer representative or HAL customer service for the latest firmware revision.

Print RX Buffer: Sends the contents of the RX buffer to the printer. It is advisable to use the Print Setup option if printing to other than the Windows default printer.

Print Setup: Gives optional system printer settings. The user may choose to print to any of the installed printers on the system.

2.5.2 Edit Menu
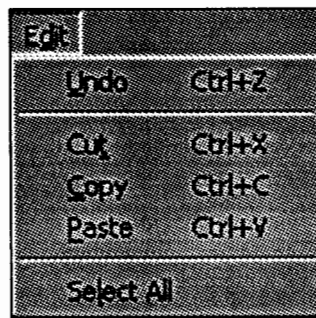
The **Edit** menu allows for basic Windows text editing features. DSPWin allows the user to cut and paste text from the TX or RX buffers onto and from the Windows Clipboard. The standard Windows hot keys are used for operation.

2.5.3 View Menu
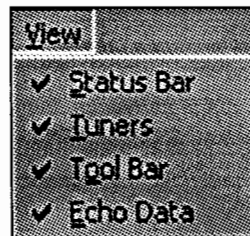
The **View** menu allows for the user to toggle the display of the Status bar, Tuning indicators, Tool bar, and echo window.

2.5.4 Code Menu
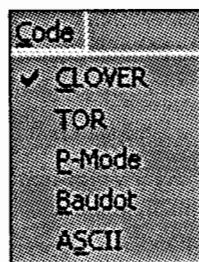
The **Code** menu allows the user to easily switch between the different operating modes of the DSP-4100.

2.5.5 Configure Menu
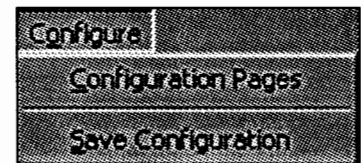
The **Configuration** menu allows the user to open the configuration options and Save the Configuration. This menu is the most complex part of DSPWin setup. Configuration includes all of the options for each of the modes, settings, and messages. To view the options available for each of the modes click the tab associated with that mode. Further explanations for these settings are found in Chapters 3-6 for each of the modes. General and Message configurations are explained in section 2.12. If you choose to make any changes now, be sure to save the configuration by clicking: **Save Configuration**

Save Configuration: This option updates the configuration file containing all of the user-set options. You may choose to save your configuration after setting up the various options in DSPWin. This allows DSPWin to begin with the chosen options in the configuration file.

2.5.6 Special Menu
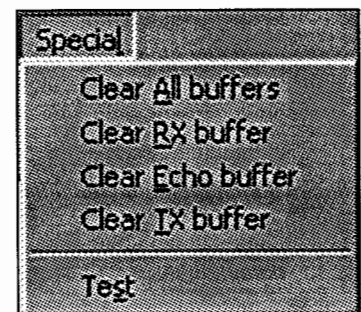
The **Special menu** allows the user to clear any of the three buffers as well as all three buffers at once.

The **Test** option tests the tones available to the current operating mode.

2.6 Toolbar

CLOVER

Link to remote station — Broadcast Mode — Kill Connection NOW — N/A — Send CW ID — Select/Send Message (1-10) — Send HIS de MY — Send QBF

Disconnect from remote station — Listen ON/OFF Toggle — TX Enable ON/OFF Toggle — Send Message #0 — Send de MYCALL — CALL CQ

TOR

Link to remote station — Start FEC — Kill Connection NOW — Norm/Reverse Polarity Toggle — Send Message #0 — Send de MYCALL — N/A — Over

Disconnect from remote station — Listen ON/OFF Toggle — TX Enable ON/OFF Toggle — Send CW ID — Select/Send Message 1-10 — Send HIS de MY — SEND QBF

BAUDOT FSK RTTY

Send HIS de MY — Force Letters — Change Baud Rate — TX Enable ON/OFF Toggle — Send CW ID — Select/Send Message 1-10 — Send HIS de MY — Send QBF

N/A — SYNC ON/OFF Toggle — Panic Kill — Norm/Rev polarity toggle — Send Message #0 — Send de MYCALL — Call CQ

ASCII FSK RTTY

Send HIS de MY — Force Letters — Change Baud Rate — TX Enable ON/OFF Toggle — Send CW ID — Select/Send Message 1-10 — Send HIS de MY — Send QBF

N/A — SYNC ON/OFF Toggle — Panic Kill — Norm/Rev polarity toggle — Send Message #0 — Send de MYCALL — Call CQ

P-MODE

Link to remote station — Start FEC — Kill Connection NOW — N/A — Send Message #0 — Send de MYCALL — N/A — Over

Disconnect from remote station — Listen ON/OFF Toggle — TX Enable ON/OFF Toggle — Send CW ID — Select/Send Message 1-10 — Send HIS de MY — Send QBF

2.7 Receive (RX) Buffer

The upper half of the main screen shows the most recent lines of text received. You may choose to increase the size of the viewing area by hiding the tuning indicator(s) [ALT]-X and or dragging the separator bar between the Receive, Echo, and Transmit Buffers.

2.8 Echo on Transmit (TX) Buffer

The middle screen shows the echo on transmit buffer. This allows the user to view what has been sent by the DSP-4100. The Echo on Transmit buffer may be "hidden" to increase the viewable area by selecting or deselecting Transmit Buffer from View on the main menu bar.

2.9 Transmit (TX) Buffer

The lower area of the screen shows data that is ready to be sent from the transmit (TX) buffer. The user may choose to hide the tuning indicator(s) to increase the viewing area [ALT]-X. Similar to the receive buffer, the buffer may be scrolled by pressing the [up arrow] or [down arrow]. The user may also click in the receive buffer, move the cursor, and highlight text. This allows the ability to cut [Ctrl]-X, copy [Ctrl]-C, paste [Ctrl]-V, and delete [Delete]. Press [ALT]-V to clear the TX buffer.

2.10 Tuning indicators

DSPWin provides software tuning indicators that allow very accurate and rapid tuning of CLOVER, FSK RTTY, TOR, and P-Mode signals. The tuning display may be easily viewed or hidden by pressing [ALT]-X.
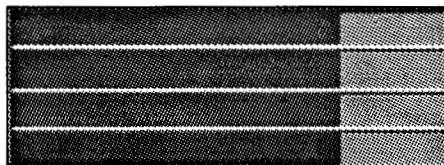
For CLOVER, tune for maximum and equal length for all four tones. In FSK modes (FSK RTTY, TOR, and P-Mode), tune for maximum length of the Mark and Space signal amplitudes shown on the center two bars.
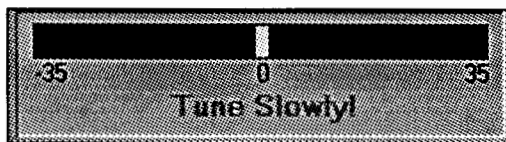
FSK modes also simultaneously show a frequency tuning display to adjust for minimum frequency error. CLOVER also has a similar display labeled Frequency Error.

CLOVER has an additional status table that displays measured signal parameters. This table is shown when either the tune or frequency error tuning displays are being viewed. The data columns show:
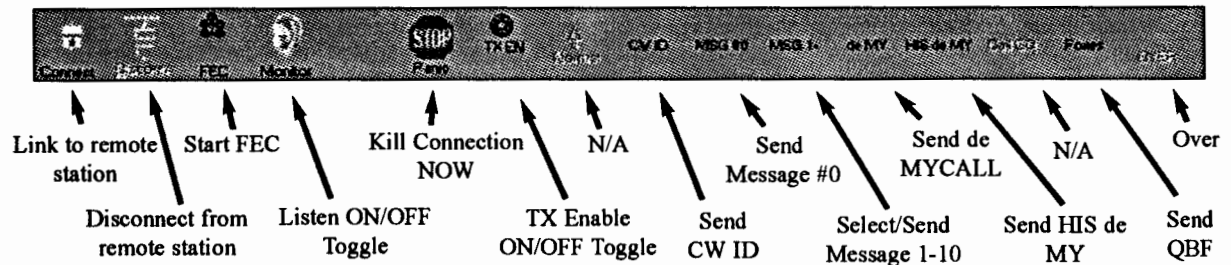
Modulation = Modulation mode (BPSM through 16P4A)
Signal/Noise = Detects signal-to-noise ratio (dB)
Frequency = Tuning error ($\pm$ 1 Hz increments)
PHS = Phase dispersion in log units (low numbers good)
ECC = Error correction capacity used (0 to 100% XX fail)
TPUT = Throughput

Notes:

1. You may not be able to precisely "zero" the Frequency Tuning Bar on the frequency of the sending station. This is not a problem. Some transceivers tune in 10 Hertz steps.

2. If you are the sending station you should avoid tuning at all after a link is made.

3. In CLOVER-II the CW ID is sent using tone "T2". CWID is not available in CLOVER 2000 mode (refer to chapter 3 for differences between CLOVER-II and CLOVER 2000).

2.11 Status Bar
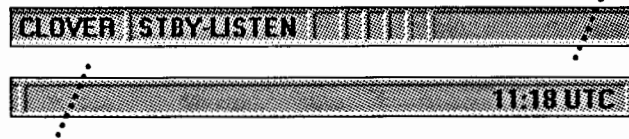
The Status bar provides quick information about the operating mode, status, and time. When in doubt, look here first.

2.12 General Configuration

DSPWin provides quick access to the configuration options. To access these options choose **Configuration** from the **Configure** menu. Examples for the General and Message options are provided below. Descriptions on the options for each mode is described in Chapters 3-6. To apply the changes be sure to click **Save**.

Here is messages may be toggled through by clicking the up/down arrow buttons. Notice that you may also program WRU (Who Are You) from this menu screen. Choose Save when finished.

HisCall and HisCall 476 provide pull down lists by clicking the down arrow. You may view the lists, add to the list, or delete an entry.
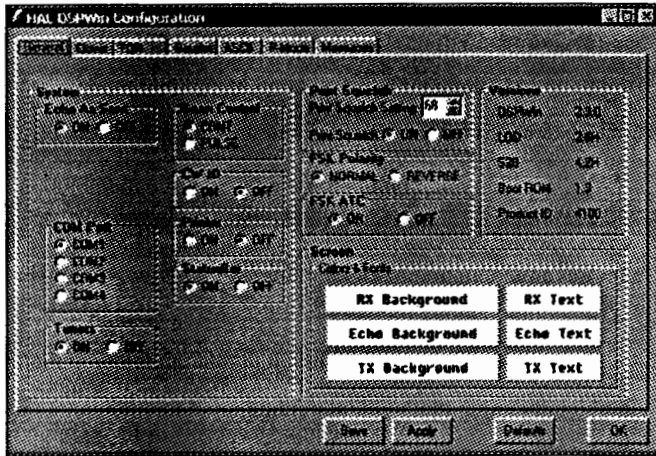
General: These settings allow you to modify General Settings that apply to most modes of operation.

Special Features Include:
Scan Control
Printer Control
Print Squelch Adjustment
Font and Color Options
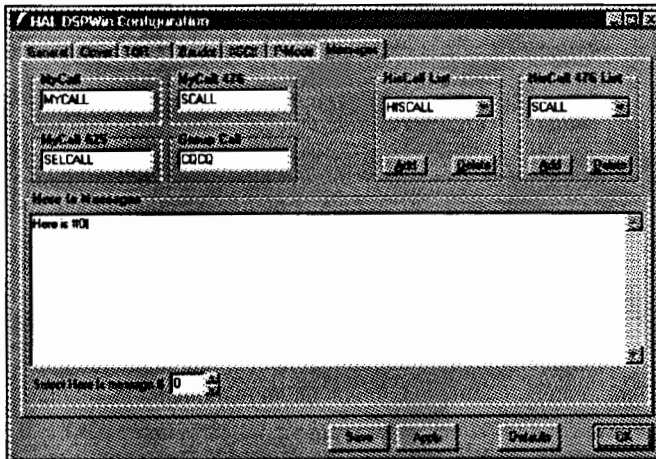
Messages: These settings allow you to program ten Here is messages, MyCall, MyCall 476, MYselcall 625, Group Call, HisCall List, and HisCall 476 List. Be sure to click **Save** to save your changes.

CHAPTER 3

OPERATING CLOVER

This Chapter describes the steps necessary to operate the DSP-4100 in the CLOVER mode. Unless you are already in CLOVER, you need to select the mode CLOVER from the Code menu. Always remember to Save Configuration upon exiting DSPWin if you wish to save your settings.

DSPWin may be used with either the DSP-4100 or DSP-4100/2K modem. The DSP-4100 includes the CLOVER-II waveform and the DSP-4100/2K includes the CLOVER-2000 waveform. The FSK data modes – TOR, P-Mode, Baudot FSK RTTY, and ASCII FSK RTTY – operate the same in both modems. However, there are a few differences in operation between CLOVER-II and CLOVER-2000.

CLOVER-II is the original 500 Hz bandwidth version of CLOVER. It is widely used by amateur radio operators. The center frequency of the four CLOVER-II tones can be set to four values – 750 Hz, 1250 Hz, 1750 Hz, and 2250 Hz. CLOVER-II includes a Morse code CW-ID that can be inserted at any time and sent automatically every 10 minutes. The CW ID is sent by on/off keying of CLOVER-II tone #2. CLOVER-II also has a LISTEN mode that allows a non-linked stations to listen in on an ARQ link between two other CLOVER-II stations. The tone center frequency, CW ID, and LISTEN modes of CLOVER-II can all be accessed via DSPWin.

CLOVER-2000 is the commercial version of CLOVER. The occupied bandwidth is 2000 Hz and the center frequency is always 1500 Hz, providing a passband of 500 to 2500 Hz. CLOVER-2000 does not include CW ID or LISTEN modes. While the DSPWin screens and menus may show options for center frequency, CW ID, and LISTEN, these features do NOT apply when CLOVER-2000 is used.

3.1 Tuning A CLOVER Signal

STEP	ACTION
1	Tune the transceiver until all four bars display equal magnitude. Stop when the bars 'freeze' and the link message or FEC message appears.
2	Center with the Frequency Error Tuning Bar.
3	Make very small adjustments. It will take a moment for the change to be reflected. Repeat this step until you are close to the frequency of the sending station. STOP TUNING.

DSPWin provides software indicators to aid in quick tuning. Use [ALT]-X to toggle tuning displays.

Note that CLOVER data can be updated only once per received data block. Tune slowly and carefully!

Figure 3.1 CLOVER Toolbar Control Options

Link to remote station — Start FEC — Kill Connection NOW — N/A — Send Message #0 — Send de MYCALL — N/A — Send QBF — N/A

Disconnect from remote station — Listen ON/OFF Toggle — TX Enable ON/OFF Toggle — Send CW ID — Select/Send Message 1-10 — Send HIS de MY

CHAPTER 3

OPERATING CLOVER

This Chapter describes the steps necessary to operate the DSP-4100 in the CLOVER mode. Unless you are already in CLOVER, you need to select the mode CLOVER from the Code menu. Always remember to Save Configuration upon exiting DSPWin if you wish to save your settings.
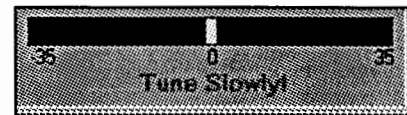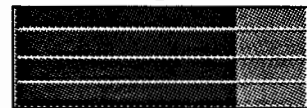
DSPWin may be used with either the DSP-4100 or DSP-4100/2K modem. The DSP-4100 includes the CLOVER-II waveform and the DSP-4100/2K includes the CLOVER-2000 waveform. The FSK data modes – TOR, P-Mode, Baudot FSK RTTY, and ASCII FSK RTTY – operate the same in both modems. However, there are a few differences in operation between CLOVER-II and CLOVER-2000.

CLOVER-II is the original 500 Hz bandwidth version of CLOVER. It is widely used by amateur radio operators. The center frequency of the four CLOVER-II tones can be set to four values – 750 Hz, 1250 Hz, 1750 Hz, and 2250 Hz. CLOVER-II includes a Morse code CW-ID that can be inserted at any time and sent automatically every 10 minutes. The CW ID is sent by on/off keying of CLOVER-II tone #2. CLOVER-II also has a LISTEN mode that allows a non-linked stations to listen in on an ARQ link between two other CLOVER-II stations. The tone center frequency, CW ID, and LISTEN modes of CLOVER-II can all be accessed via DSPWin.

CLOVER-2000 is the commercial version of CLOVER. The occupied bandwidth is 2000 Hz and the center frequency is always 1500 Hz, providing a passband of 500 to 2500 Hz. CLOVER-2000 does not include CW ID or LISTEN modes. While the DSPWin screens and menus may show options for center frequency, CW ID, and LISTEN, these features do NOT apply when CLOVER-2000 is used.

3.1 Tuning A CLOVER Signal

STEP	ACTION
1	Tune the transceiver until all four bars display equal magnitude. Stop when the bars 'freeze' and the link message or FEC message appears.
2	Center with the Frequency Error Tuning Bar.
3	Make very small adjustments. It will take a moment for the change to be reflected. Repeat this step until you are close to the frequency of the sending station. STOP TUNING.

DSPWin provides software indicators to aid in quick tuning. Use [ALT]-X to toggle tuning displays.

Note that CLOVER data can be updated only once per received data block. Tune slowly and carefully!

Figure 3.1 CLOVER Toolbar Control Options

Link to remote station — Start FEC — Kill Connection NOW — N/A — Send Message #0 — Send de MYCALL — N/A — Send QBF — N/A

Disconnect from remote station — Listen ON/OFF Toggle — TX Enable ON/OFF Toggle — Send CW ID — Select/Send Message 1-10 — Send HIS de MY

3.2 RX/TX Status Table

In ARQ mode, CLOVER dynamically adjusts its modulation to match the current propagation conditions. The receiving station measures signal parameters, determines the optimum mode, and sends mode change commands to the transmitting station. The measured parameters and transmit waveforms of the two stations are displayed in the numerical table in the upper right section of both tuning screens.

The data columns for each station show:

Modulation = Modulation mode (BPSM through 16P4A)
Signal/Noise = Detects signal-to-noise ratio (dB)
Frequency = Tuning error ($\pm$ 1 Hz increments)
PHS = Phase dispersion in log units (low numbers good)
ECC = Error correction capacity used (0 to 100% XX fail)
TPUT = Throughput

This information can be extremely interesting and useful when analyzing propagation conditions. This data may be saved to disk for later analysis (see section 2.5.1).

NOTES:
1. You may not be able to precisely "zero" the Frequency Tuning Bar on the frequency of the sending station. This is not a problem. Some transceivers tune in 10 Hertz steps.

2. If you are the sending station you should avoid tuning at all after a link is made. The receiving station should use this procedure to refine the link frequency.

3. In CLOVER, the CW ID is sent using tone "T2".

3.3 Adaptive ARQ Mode

The CLOVER Adaptive ARQ mode is a two station point-to-point communications mode using fully adaptive waveform control. The following steps show you how to initiate an ARQ LINK:

Note: Click on the **TX EN** button to toggle the transmit buffer ON/OFF.

ARQ LINK: During an ARQ LINK, data is transmitted in two ways. When both stations are "chatting" and the transmitted data from both sides is relatively short, the data is sent as part of each CCB (CLOVER Control Block). When the TX buffer of either station reaches a certain level of fill, CLOVER begins sending the information in a series of data blocks, followed by a CCB. Once the data in the TX buffer is sent, CLOVER returns to the CCB "chat" mode.

Data can be pre-programmed in the ten programmable messages, or as text files on a disk. You can use Load TX Buffer on the Files menu to load a file from disk that does not exceed the 250 line capacity of the buffer. For files larger than the TX buffer, use the Send From Disk option of the Files menu. Files sent that way are transmitted directly, rather than through the TX buffer.

ARQ END Commands: There are two methods of ending a CLOVER ARQ Link

1. Pressing **[F7]** or clicking **DISC** on the toolbar breaks the link in the normal manner after all pending text has been sent. The link does not drop until the other station has confirmed receipt of the disconnect request.

2. Pressing **[Alt]-F7, [Ctrl]-F7,** or clicking **PANIC** produces similar action to **[F7]** except that all pending transmit data is abandoned and a disconnect request is issued immediately. Use this key combination only if you need to get off-the-air very quickly! Use of **PANIC** may force the other station to "retry out".

Initiating an ARQ CQ: To initiate an ARQ CQ call, press **[Alt]-F9.** The DSP-4100 will begin sending the CLOVER CQ sequence, a special version of the CCB ARQ format. The number of CQ calls is set with the "Fail Retries" parameter in the CLOVER configuration file. Other CLOVER stations on your frequency will see a message at the top left of their screen "ARQ CQ from (your call)".

Answering an ARQ CQ: To answer an ARQ CQ call, press **[Ctrl]-F9.** Your station will respond by linking to the calling station and you will see the other station's call at the top of your screen. If a CQ CCB is received, your transceiver is already tuned close enough in frequency to link. Use the Frequency Error Bar to fine tune after the link is established.

If a CCB fails to decode during the connect process, it will cause both stations to return to standby mode, regardless of the retry counters. Once a connection is established it will hold together very tenaciously.

Performance Hints For Keyboard Input: If there are fewer than 256 characters pending, they will be sent using the "slow" CCB "Chat Mode". As soon as you exceed 255 pre-buffered transmit characters, CLOVER will "shift gears" and begin transmitting data in large data blocks using faster modulation forms. Block mode transmission will continue until all pending transmit text has been sent. When all available data has been sent, CLOVER will return to "Chat Mode". If you wish to immediately shift out of "Chat mode" to higher rate modes, preload the transmit buffer with at least 255 characters (about 3 1/2

lines) — a fully-loaded HERE IS message may be used for this purpose.

CLOVER is bi-directional. Both operators may type at the same time and data will be sent in both directions automatically without use of "OVER" commands. This feature works both in "Chat Mode" and in long-block ARQ data mode.

3.4 Broadcast Mode

While ARQ is the prevailing means of communications within CLOVER for passing traffic and general conversation, occasionally there is a need for a "one-station-to-many" broadcast. The Broadcast mode serves to provide just such a service. Any station tuned to the frequency of the Broadcast transmission will be able to monitor it. Errors are corrected at the receiving station, although it is not possible to request repeats. Also, Broadcast is not adaptive so you must make some judgement about current band conditions and select the modulation for your Broadcast transmission. The modulation you select can be changed during transmission.

Modulation modes: 2DPSM, BPSM, QPSM, 8PSM, 8P2A, 16P4A

In general, select the more robust modes with the slower modulation rates for poor band conditions. These are the first few listed above.

ARQ features not available in Broadcast mode are:
1. Repeat of blocks whose errors exceed the Reed-Solomon capacity
2. Adaptive modulation control
3. Chat, 1-way block or 2-way block modes

While all modulation modes may be used for Broadcast transmissions, it must be remembered that very good propagation conditions are required to support the high data rate modes. It is advisable to be "conservative" in the choice of transmission modes, particularly when Broadcast is used to send data to multiple stations. QPSM modulation generally works well under typical daytime conditions and provides throughput of 20 bytes per second (three times the TOR rate). If conditions are poor, use BPSM. 8PSM mode should be reserved for situations in which the propagation path is known to be stable.

CLOVER terminates the Broadcast transmission including your CW ID if it is enabled.

3.5 Listen Mode (CLOVER-II)

Listen mode is a passive monitoring mode available only in CLOVER-II. Listen mode is similar to the Listen mode in TOR and allows monitoring of CLOVER activity that may be occurring.

3.6 Test Mode

The DSP-4100 Test mode provides two different selections of test tones: Single Tone Test and Multi-Tone Test. Test mode is used to set the transmit audio level. Refer to your DSP-4100 Operations Manual any time that you alter the setup of your transceiver to verify that the audio output levels are correctly set. DSPWin provides access to two sets of test tones under the Special menu.

3.7 CLOVER Configuration Menu Parameters

The CLOVER Configuration menu includes options that are used to view and program CLOVER parameters. Most of these parameters may also be set via front screen menus and/or "hot-keys". However, general practice is to setup the power-on default values in the configuration and save the configuration.

FEC Menu: The CLOVER Broadcast mode parameters are:

Modulation:	2DPSM, BPSM, QPSM, 8PSM, 8P2A, 16P4A
Code Effic:	60% (Robust)
Block Size:	51, 85, or 255 bytes (coupled to modulation selection)

ADAPTIVE ARQ Menu: The following ARQ parameters are:

Auto Bias:	Robust (60% RS), Normal (75% RS), Fast (90% RS)
Connect Retry:	Number of connection retries before the link fails (00 - 99)
Fail Retry:	Number of block retry failures before link fails (00 - 99)
Chat Count:	CCB cycles before ARQ changes from CCB to long block mode (0-9)

LISTEN Menu: LISTEN mode may be either turned ON or OFF via the Configuration menu. The action is identical to use of clicking the **MON** button on the toolbar.

To learn more about CLOVER, access the HAL website at www.halcomm.com and read the articles contained in the Technical Documents section.

CHAPTER 4

OPERATING TOR

TOR is an error-correcting communication mode, also known as "AMTOR", "SITOR" or CCIR-476 and CCIR-625. TOR actually has four sub-modes that may be chosen: (1) ARQ ("Mode A"), (2) FEC ("Mode B"), (3) LISTEN ("Mode L"), and (4) STBY (Standby).

TOR ARQ data is sent in pulses and both stations transmit in a time-sequenced order. Each station automatically requests a repeat if an error is detected. In FEC (broadcast), each character is sent twice (with a time separation). LISTEN is a receive-only mode that may be used to listen to ARQ or FEC signals. LISTEN mode cannot correct errors in received ARQ mode signals. STBY mode is the normal "rest" condition of an TOR station when monitoring a frequency. When your SEL-CAL code is received, the modem automatically switches from STBY to ARQ mode and responds. FEC reception is also automatic from STBY mode.

4.1 ARQ Mode

TOR ARQ mode may also be called "Mode A". The letters "ARQ" stand for Automatic Repeat ReQuest (or Query). ARQ is an error-detection mode in which one station sends a group of three characters and the other station may either acknowledge correct reception or request a repeat transmission. This is similar to CLOVER ARQ mode except that TOR cannot correct errors without repeat transmission and the TOR code itself is not completely "infallible" — TOR can print errors. The transmitters of both TOR ARQ stations are pulsed ON and OFF every

450 ms. ARQ mode requires use of transmitters and receivers that can rapidly switch between receive and transmit. Use of radio equipment with TX/RX switching times less than 20 ms is highly recommended.

The ARQ Link:

Start an ARQ LINK by pressing [F9] or use the toolbar LINK button. The ARQ menu will appear. Type a new SEL-CAL code or choose one of the CALL Directory choices.

Once a link has been successfully completed, the two ARQ stations will be synchronized and you may send text to the other station. However, no text will be passed until the link has been completed. Your transmitter should now be pulsing ON and OFF ("chirping").

Once the link has been established, the "Calling" label on the Status Bar will change to "Linked With XXXX". If your receiver speaker is turned ON, you will also hear the other station's short "chirp" response (control signals).

If you do not get a response from the other station, the TIME OUT option controls whether your transmitter continues "chirping forever" (TO = OFF) or the ARQ call automatically "times-out" (TO = 32 or 128). The TIME OUT (TO) option is normally set to "32" but may be changed on Configuration menu. A "quick-kill" or "panic-stop" may be done at any time by clicking PANIC or by pressing [Ctrl]-F7.

Figure 4.1 TOR Toolbar Control Options

| Link to remote station | Start FEC | Kill Connection NOW | Norm/Reverse Polarity Toggle | Send Message #0 | Send de MYCALL | N/A | Over |

Disconnect from remote station   Listen ON/OFF Toggle   TX Enable ON/OFF Toggle   Send CW ID   Select/Send Message 1-10   Send HIS de MY   SEND QBF
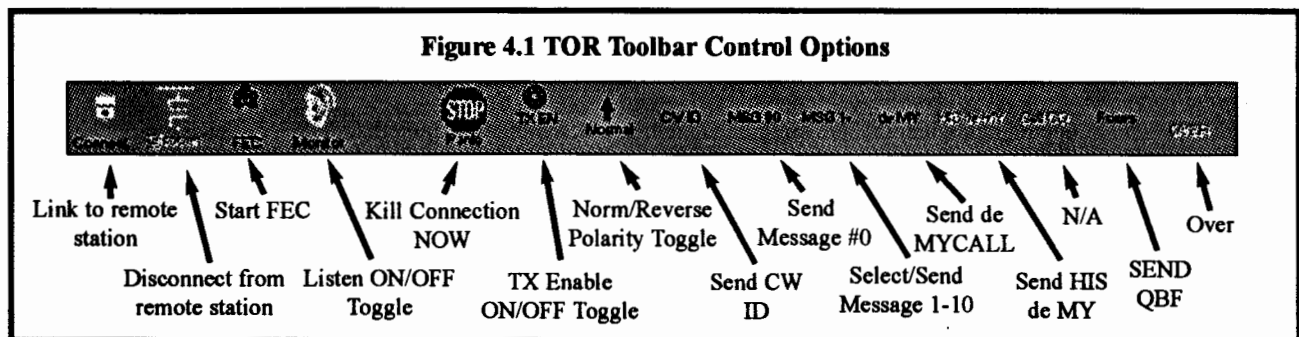
The DSPWin transmit text buffer may be used to pre-type your transmit text. Transmitted characters are "echoed" in the echo as sent window. You can always gauge the progress of the ARQ transmitted output by looking at this window. If your typing is not as fast as the transmitted rate, TOR "idle" characters are automatically inserted (indicated by "IDL" instead of "TFC" on the center status line).

ARQ OVER Commands: If you are the current ISS (Information Sending Station), all you need to do to let the other station talk is click **OVER** on the toolbar. Likewise, he can return sending control to you by doing an over command.

If you are the IRS, the **OVER** button on the toolbar works as a **FORCED OVER** forcing a reverse of the channel. A **FORCED OVER** operates immediately and therefore interrupts whatever the other station is sending. Use it with care!

Even when a **FORCED OVER** is used, any unsent text is preserved in the transmit buffer. This text will be held and sent ahead of any additional preset text when your station is again the ISS.

ARQ END Commands: There are two methods of ending a TOR ARQ Link:

1. Pressing **[F7]** or clicking **DISC** on the toolbar breaks the link in the normal manner after all pending text has been sent. The link does not drop until the other station has confirmed the disconnect request.

2. Pressing **[Alt]-F7, [Ctrl]-F7,** or clicking **PANIC** produces similar action to **[F7]** except that all pending transmit data is abandoned and a disconnect request is issued immediately. Use this key combination only if you need to get off-the-air very quickly!

ARQ WRU Feature: The TOR WRU (Who aRe yoU) feature allows the other station to confirm the identity of your station. Some Email programs use WRU when the first connection is made to the mailbox system. A special character is sent by the mailbox station that causes the DSP-4100 to respond with the ANSWERBACK message (a special type of "HERE IS" message).

The WRU feature may be turned ON or OFF, using the CONFIGURATION and TOR menus. The ANSWER-BACK message is stored in HERE IS 9.

Assuming that WRU is turned ON and an ANSWER-BACK message is programmed, the full operation sequence for WRU is as follows:

1. Station one is ARQ ISS and sends "$" (dollar sign; FIGS-D)

2. The DSP-4100 at station two forces an OVER to become the ISS

3. Station two sends the ANSWERBACK text (HERE IS 9)

4. Station two sends a normal OVER, restoring the original ISS/IRS configuration

ARQ Mode Parameters: Several operating parameters for ARQ mode may be set via the configuration settings. These parameters have the following meaning:

WRU:	Enable or disable WRU mode. Default = OFF
TIME OUT:	Turn time-out ON or OFF. When ON, an ARQ call to another station will cease after 1 minute of unsuccessful calls. Default = ON
TD:	Transmitter turn on delay; the delay from setting the Push-To-Talk (PTT) line to transmit (TX) state and the start of the AFSK tones. Data modulation of the tones starts 5 ms after PTT is set to TX. Default = 10 ms Adj: 5-99 ms
CD:	Control delay between the end of a received block and the start of the first IRS transmission. Adj: 10 - 99 ms. Default = 50ms.
MY 476 SCAL:	Selective call (SEL-CAL) characters for my station in CCIR-476 format.
MY 625 SCAL:	Selective call (SEL-CAL) characters for my station in CCIR-625 format.

4.2 FEC Mode

TOR FEC mode is also called "Mode B" and/or "Collective Broadcast Mode". FEC uses the same 7-bit character code as ARQ mode but sends each character twice, separated by the time it takes to send four other characters (called a "4-character interleave"). If the first received character is in error, the FEC mode receiving equipment examines the second character.

Starting FEC Mode: To start FEC mode, click **FEC** on the toolbar. FEC mode does not require a SEL-CAL code and may be used much like FSK RTTY.

FEC Return to STBY Mode: In some cases, it is desirable for the DSP-4100 to return to TOR-STBY mode rather than to FEC-only receive mode. In this case, insert ZZZZ at the end of the transmitted text. The **[F7]** key may be used to insert the ZZZZ sequence.

FEC may also use the "panic kill" hot-key — **[Ctrl]-F7**. In this case, pressing **[Ctrl]-[F7]** causes an immediate end to an FEC transmission and returns the DSP-4100 to TOR STBY mode (not to FEC). Use **[Ctrl]-F7** with restraint!

4.3 LISTEN Mode

The DSP-4100 includes a receive-only mode to monitor all TOR signals. The LISTEN mode (also called "MONITOR") automatically selects the TOR mode and decodes characters from ARQ or FEC received signals. To start LISTEN mode, click **MON** on the toolbar. When in TOR Listen, the DSP-4100 will also respond to P-Mode link requests.

ARQ END Commands: There are two methods of ending a TOR ARQ Link

1. Pressing **[F7]** or clicking **DISC** on the toolbar breaks the link in the normal manner after all pending text has been sent. The link does not drop until the other station has confirmed the disconnect request.

2. Pressing **[Alt]-F7**, **[Ctrl]-F7,**or clicking **PANIC** on the toolbar produces similar action to **[F7]** except that all pending transmit data is abandoned and a disconnect request is issued immediately. Use this key combination only if you need to get off-the-air very quickly!

CHAPTER 5

OPERATING FSK RTTY

5.1 FSK RTTY Codes

DSPWin includes two FSK RTTY modes, 5-bit Baudot at data rates of 45, 50, 57 or 75 baud and 8-bit ASCII at 75 or 100 baud. Either "U.S. Military Baudot" or "CCITT No.2" Baudot character set may be selected in the configuration settings.

5.2 Starting FSK RTTY

To start FSK RTTY modes choose either Baudot or ASCII FSK RTTY from the Code menu. This will change the screen and toolbar to match the available options of the mode you choose.

5.3 FSK RTTY Data Rates

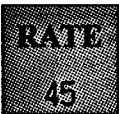The baud and WPM equivalent for each code and speed is shown in Table 5.1

Click: or use Hotkey [ALT]-R

Table 5.1
FSK RTTY Data Rates and Speeds

CODE	BAUD	WPM	COMMENTS
BAUDOT	45	60	"Standard" Baudot Speed
BAUDOT	50	65	"European" Baudot Speed
BAUDOT	57	75	"Weather" Baudot Speed
BAUDOT	75	100	Most Baudot "Mailboxes"
ASCII	75	67	Non-standard Speed
ASCII	110	100	"Standard" ASCII Speed

5.4 Control Options

TX Enable ON/OFF Toggle: This option controls the state of the transmit buffer and the PTT transmit/receive control signal. In disabled state, the transmitter will not be turned ON and text typed into the transmit buffer will be held until this control is set to enabled. Disabled is the normal receive state. This control changes from disabled to enabled each time this option is selected.

The enabled condition actually has two states:

1. If you have pre-typed text into the transmit buffer and the state is changed from disabled to enabled, the transmitter is turned ON and text is sent at the chosen code and data rate. The transmitter will remain "on-the-air" and text will be sent, the PTT line will revert to receive and FSK RTTY can be received.

2. If there is no text in the transmit buffer, the user may choose to actively receive while in the enabled state. However, this state will immediately send when the first character is entered in the transmit buffer. This method is analogous to "Full break in". In actual use, most operators prefer to always set this option to disabled except when it is their turn to transmit. This allows pre-typing your response while receiving the other station ("ASR" mode).

NORM/REV Polarity Toggle: This option controls the polarity of your FSK RTTY signal. It sets the polarity of both the receive and transmit data sections of the DSP-4100. The default settings for FSK RTTY and TOR are shown in Table 5.2.

Table 5.2
Default Settings

Polarity:	NORM (Mark = lower frequency tone)
TONES:	Mark = 2125 Hz; space = 2295 Hz
	Shift = 170 Hz; Center = 2210 Hz
Radio:	LSB mode

Baudot FORCE LTRS Key: In addition to the USOS option, the **LTRS** button forces the receive terminal to LTRS case at any time. This is often the preferred method to actively watching print as it is received. The hotkey **[ALT]-G** may also be used.

SYNC: The Sync option is often called "Sync-IDLE" (or "diddle"). When ON, non-printing characters will be inserted into the transmit data stream if your typing has not been produced a word or character to be transmitted.

In Baudot FSK RTTY, the "LTRS" (letters) character is sent; in ASCII, the "NULL" character is used. Both are "non-printing" characters and may help maintain synchronization of your FSK RTTY signal at the other station.

5.5 Configuration Options

The Configuration page shows options available for both Baudot and ASCII FSK RTTY. The configuration page is another way to to view and set TX EN, NORM/REV polarity, SYNC IDLE, and USOS (only baudot) as well as other user-set options.

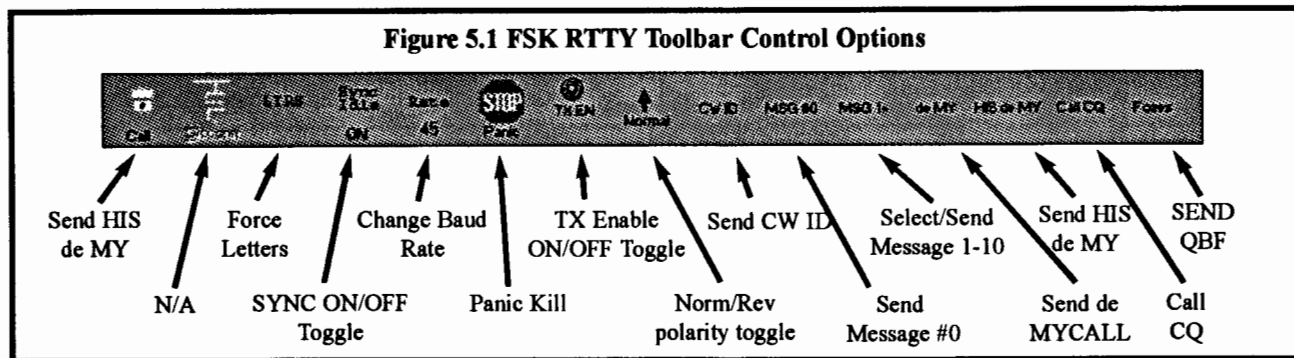**Other FSK RTTY parameters include:**

Baudot USOS (UN-Shift on Space): Baudot code uses its 5-bit code combination twice - once for letters and again for numbers and symbols. A special pair of Baudot characters set the receiving terminal to the correct "case" — Letters (LTRS) or Figures (FIGS). Noise can be interpreted as a FIGS Baudot character, setting the receiver printer

or display to FIGS case by accident and garbles the data received after that point. If enabled, USOS will return the receive display or printer to LTRS case after the reception of a space character. While this is a very useful feature when receiving text, you may wish to turn USOS off when receiving strings of numbers, particularly if the sending station does not send new FIGS characters frequently (a frequent problem in military systems and when receiving weather sequence reports).

EOL: The End of Line (EOL) characters may be set for both Baudot and ASCII modes. The selected EOL sequence can include CR (Carriage Return), LF (Line Feed), and LTRS (Letters — Baudot only). The recommended standard EOL sequences are CR LF LTRS in Baudot and CR LF in ASCII. However, some Baudot operators prefer CR CR LF LTRS. Some computer programs prefer CR only as the ASCII EOL.

CODE No2/US: The DSP-4100 Baudot code may be set to use either the CCITT No. 2 5-unit code or the Military Interoperation Baudot Code. All letters and numbers are the same in both versions of the code. See Table 5.3 below

PTT ON Delay: PTT ON Delay is a programmable delay that is used to compensate for the turn-on time of the transmitter. The number programmed is the delay in milliseconds (ms) between setting the PTT line to ground (transmit state) and the release of data to be transmitted. Use this delay to prevent the garbling of characters during the time that the transmitter relays are switching. The factory default is 20ms; PTT ON may be set between 01 and 99 ms.

Figure 5.1 FSK RTTY Toolbar Control Options

Send HIS de MY | N/A | Force Letters | SYNC ON/OFF Toggle | Change Baud Rate | Panic Kill | TX Enable ON/OFF Toggle | Norm/Rev polarity toggle | Send CW ID | Select/Send Message 1-10 | Send Message #0 | Send HIS de MY | Send de MYCALL | SEND QBF | Call CQ

Table 5.3
Baudot Code Differences

CODE	US Baudot	CCITT No. 2
FIGS-D	$ (dollar sign)	$ (dollar sign, not designated by CITT)
FIGS-H	# (number sign)	# (number sign, not designated by CCITT)
FIGS-J	' (apostrophe)	BELL
FIGS-S	BELL	' (apostrophe)
FIGS-V	; (semi-colon)	= (equal sign)
FIGS-Z	" (quotation)	+ (plus sign)

PTT OFF: PTT OFF is a programmable delay that is used to compensate for the turn-off time of the transmitter. The number programmed is the delay in milliseconds (ms) between sending the last transmit data byte and releasing the PTT line to open (receive state). This delay is often used to prevent TX/RX switching during short pauses when typing text. The factory default value is 20 ms; PTT OFF may be set to a number between 01 and 99 ms.

FSK POLARITY: This option controls the FSK Transmit Output signal.

FSK TONES: The FSK transmit and receive tone frequencies can be set to any frequency between 500 Hz and 3000Hz in 1.0 Hz increments. The frequencies can be specified as either Mark or Space tone frequencies, or the center and shift frequency. Separate sets of Mark/Space frequencies are provided for FSK RTTY/TOR and P-Mode.

5.6 Special FSK RTTY Transmit Keys

Special key combinations are provided to send special FSK RTTY characters:

Table 5.4
Special FSK RTTY Transmit Keys

KEY	CHARACTER	NOTES
[Ctrl]+G	Signal Bell	"Diamond" symbol on screen
<	LTRS	Only Baudot and TOR
>	FIGS	Only Baudot and TOR
[ALT]+Y	12 LTRS	Sequence of 12 LTRS

CHAPTER 6

OPERATING P-MODE

The word "P-Mode" is the HAL designation for a communications protocol that may also be known as "Pactor", a registered trademark of the Spezielle Communications Systeme GmbH (SCS) firm in Hanau, Germany. HAL affirms that, to the best of its knowledge, "P-Mode" is compatible and interoperable with the protocol SCS calls "Pactor" and with the link establishment mode of the protocol SCS calls "Pactor-II".

6.1 Operating P-Mode

P-Mode is the HAL designation for a communications protocol that may also be known as "Pactor", a registered trademark of the Spezielle Communications System GmbH (SCS) firm in Hanau, Germany. P-Mode has four sub-modes that may be chosen: (1) ARQ, (2) FEC (UNPROTO), (3) LISTEN, and (4) STBY (Standby).

6.2 ARQ Mode

ARQ LINK: To Start an ARQ LINK press [F9] or click the LINK button on the toolbar. The Code menu will appear. Type the other station's call sign and Click OK. The P-Mode calling sequence will begin.

P-Mode Call Signs: Unlike TOR, but like CLOVER, P-Mode does not require a special selective call sequence of letters. Rather, the call sign of each station is used directly. Therefore, no special steps need be taken to program a "SEL-CALL" sequence.
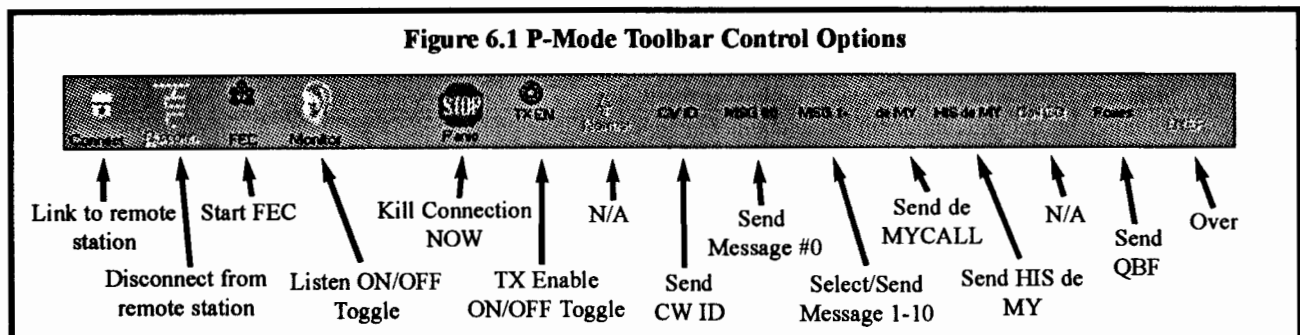
Once the link has been established, the "Calling" label will change to "Linked With XXXX". If you do not get a response from the other station, the MAX ERROR option controls whether your transmitter continues "chirping for-

ever" (MAX ERROR = 255) or the ARQ call automatically "times-out" (MAX ERROR = 30, the minimum). The MAX ERROR option is normally set to "80", but may be changed in CONFIGURATION. You may do a "quick-kill" or "panic-kill" at any time by typing the [Ctrl]-F7 keys.

ARQ OVER Commands: If you are the current ISS (Information Sending Station), all you need to do to let the other station talk is click **OVER** on the toolbar. Likewise, he can return sending control to you by doing an over command.

If you are the IRS, the **OVER** button on the toolbar works as a **FORCED OVER** forcing a reverse of the channel. A **FORCED OVER** operates immediately and therefore interrupts whatever the other station is sending. Use it with care!

Even when a **FORCED OVER** is used, any unsent text is preserved in the transmit buffer. This text will be held and sent ahead of any additional preset text when your station is again the ISS.

Figure 6.1 P-Mode Toolbar Control Options

Link to remote station — Disconnect from remote station — Start FEC — Listen ON/OFF Toggle — Kill Connection NOW — TX Enable ON/OFF Toggle — N/A — Send CW ID — Send Message #0 — Select/Send Message 1-10 — Send de MYCALL — Send HIS de MY — N/A — Send QBF — Over

ARQ P-Mode Parameters: Several operating parameters for ARQ mode may be set in the configuration menu. ARQ mode parameters have the following meaning:

CS DELAY: Delay between the end of a received block and the start of the first IRS control data bit.
Adj: 10-50 Default=30

MAX DOWN: In ARQ mode, the maximum number of flawed data blocks before reducing the data rate from 200 baud to 100 baud.
Adj: 2-30 Default=6

MAX UP: In ARQ mode, the number of error-free blocks before increasing the data rate from 100 baud to 200 baud.
Adj: 2-30 Default=3

MAX TRY: In ARQ mode, the maximum number of attempts to increase the data rate from 100 to 200 baud.
Adj: 0-9 Default=2.

MAX ERROR: In ARQ mode, the maximum number of retries when calling to link or maximum repeats to correct errors during a link.
Adj: 30-255 Default=80

MAX ARQ SUM: In ARQ mode, the maximum number of the memory-counter. Memory-ARQ summation is cleared when MAX ARQ SUM is exceeded.
Adj: 5-60 Default=10

HUFFMAN: In ARQ and UNPROTO/FEC modes, enable or disable Huffman data compression coding.
Default=ON.

6.3 FEC Mode (UNPROTO)

P-Mode UNPROTO (FEC) uses Forward Error Correction. FEC uses the same character code as P-Mode ARQ but sends each character 2 to 5 times, separated in time. If the first received character is in error, the FEC receiving equipment examines the 2nd, 3rd, etc. character.

FEC Data Rates: P-Mode FEC (UNPROTO) transmissions may use either a data rate of 100 or 200 baud. The rate is selected at the beginning of a transmission. Unless the communications path is extremely stable, 100 baud is recommended.

Starting FEC Mode: To start FEC mode, access the COMMAND menu and select FEC. FEC does not require a call sign code.

FEC Send/Receive Control: The FEC code actually sends P-Mode frames without an ACK/NAK response. There is no special startup as with TOR. Once FEC mode is started you must use [F7] to return to receive except as stated below.

FEC Return to STBY Mode: In some cases, it is desirable for the DSP-4100 to return to P-Mode STBY rather than to FEC-only receive. In this case click **DISC** on the toolbar. FEC also includes a "panic kill" hot-key — click **PANIC** on the toolbar or press [Ctrl]-F7. Pressing [Ctrl]-F7 causes an immediate end of the FEC transmission, and returns the DSP-4100 to STBY mode (not to FEC). Use [Ctrl]-F7 with restraint!

FEC Configuration Parameters: Two parameters apply to FEC mode:

FEC REPEATS: The number of times each character to be transmitted is repeated.
Adj: 2-5 Default=2

HUFFMAN: In ARQ and UNPROTO/FEC modes, enable or disable Huffman data compression coding.
Default=ON.

6.4 LISTEN Mode

The DSP-4100 includes a receive-only mode used to monitor P-Mode transmissions. The LISTEN mode (also called "**MONITOR**") will automatically select the mode and decode characters from ARQ or FEC (UNPROTO) received signals. In LISTEN mode, the DSP-4100 responds only to P-Mode link requests. However, the DSP-4100 will also respond to TOR link requests when in P-Mode STBY mode. Toggle the Listen Mode ON/OFF by clicking **MON** on the toolbar.

CHAPTER 7

IN CASE OF DIFFICULTY

7.1 Current Release

Most software related issues are documented and fixed in software revisions. To obtain the current release of DSPWin contact technical support.

Technical Support
HAL Communications Corp.
PO Box 365
Urbana, IL 61801-0365

Phone: 217-367-7373
(8AM - 5PM CST/CDT; Mon. - Fri.)

Fax: 217-367-1701

E-mail: halcomm@halcomm.com

Web: www.halcomm.com

7.2 ReadMe File

The readme.txt file that is included with each release of DSPWin software provides information on solved software issues. If you are having a specific software issue, please check the readme file to see if it has been previously addressed.

7.3 Reinstalling Software

Many operational problems with DSPWin can be solved by simply reinstalling software. If you have problems installing or reinstalling DSPWin, delete all of your DSPWin application files including the preferences file (DSPWin.ini). Do this by using Add/Remove Programs located in the Control Panels Folder.
To be certain that all files were removed, locate your DSPWin programs directory in the C:/Program Files/ HAL Communications Corp/DSPWin directory. Then reinstall DSPWin.

7.4 Reporting Software Issues

While DSPWin has been thoroughly tested it is possible to have unknown software issues. Please report any undocumented or reoccurring software "bugs" to our technical support team. We will attempt to resolve any software issue as expediently as possible. It is important to provide as much detail as possible to the technical support team.

LIMITED WARRANTY

SOFTWARE LICENSE AGREEMENT

This software and documentation is owned by HAL Communications Corporation and is protected by United States copyright laws. Therefore, you must treat the software like any other copyrighted material. One copy of this Software may be made for backup or archival purposes.

All programs and accompanying materials are provided AS IS without any warranty of any kind, either expressed or implied. The complete risk as to the quality and performance is with you. HAL makes no warranty or representation that the functions contained in the Software will meet your requirements, or that the operation of the software will be uninterrupted or error free, or that any software defects are correctable or will be corrected.

HAL Communications Corp. will warrant that the media upon which the software is distributed is free from defects in materials and workmanship for a period of ninety (90) days from the date of purchase. If during this period a defect in the media should occur, return the defective media to HAL Communications Corp. and we will replace the media without charge. A dated copy of the original sales receipt or invoice must be submitted with the diskette as proof of the original purchase. This limited warranty does not apply to any defect that HAL Communications Corp. determines is due to any of the following:

1. Misuse, abuse, neglect, improper installation, or improper operation.

2. Accidental or intentional damage.

Correct installation, use, and maintenance, are essential for the proper performance of this product. The purchaser should carefully read this user manual.

To obtain warranty service contact:

> Customer Service
> HAL Communications Corp.
> PO Box 365
> Urbana, IL 61801-0365
>
> Phone: 217-367-7373
> (8AM - 5PM CST/CDT; Mon. - Fri.)
>
> Fax: 217-367-1701
>
> E-mail: halcomm@halcomm.com
>
> Web: www.halcomm.com

All implied warranties are limited in duration to a period of ninety (90) days from the date of purchase by the original retail purchaser. HAL Communications Corp. disclaims any liability for incidental or consequential damages arising out of the use of or inability to use this product. This warranty gives you specific legal rights, but there may be additional rights.