TDFM-136/136A
VHF/FM DIGITAL AIRBORNE TRANSCEIVER

OPERATING INSTRUCTIONS

for

Firmware Release 3.x.x

Til Document: 10RE432
Rev. N/C

APRIL 2011

Technisonic Industries Limited.

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SCOPE of MANUAL

This document provides Operating Instructions for TDFM-136 and TDFM-136A transceivers with firmware: **Release 3.0.0 and higher only**. This document should *not* be consulted for operation of transceivers with earlier firmware versions.

This manual **does not** include transceiver installation instructions. For installation instructions please see the appropriate Technisonic document, shipped with your transceiver.

FCC COMPLIANCE INFORMATION

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

WARNING: For compliance with FCC RF Exposure Requirements, the mobile transmitter antenna installation shall comply with the following conditions:
1. The transmitter antenna gain shall not exceed 3 dBi.
2. The transmitter antenna is required to be located outside of a vehicle and kept at a separation distance of 1.0 meter or more between the transmitter antenna of this device and persons during operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Re-orient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet or circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

WARNING:
Changes or modifications not expressly approved by Technisonic Industries could void the user's authority to operate the equipment.

WARRANTY INFORMATION

The Model TDFM-136(A), VHF/FM Digital Transceiver is under warranty for one year from date of purchase. Failed units caused by defective parts, or workmanship should be returned to:

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SECTION 1

INTRODUCTION

This section provides an overview of the basic transceiver operation, it is broken into three subsections as follows:

- an overview of the controls and display information
- a description of basic use of the transceiver
- an introduction to the transceiver command functions

1.1   Controls and Display

This section provides basic information on the controls and display information provided for the user on the front panel of the transceiver.

1.1.1   Front Panel Layout and Controls

All the user interface controls and display information are available to the user on the front panel of the transceiver, with the exception of the PTT control, which is activated by an external button. The front panel layout of the TDFM-136 is shown in figure 1-1 below.
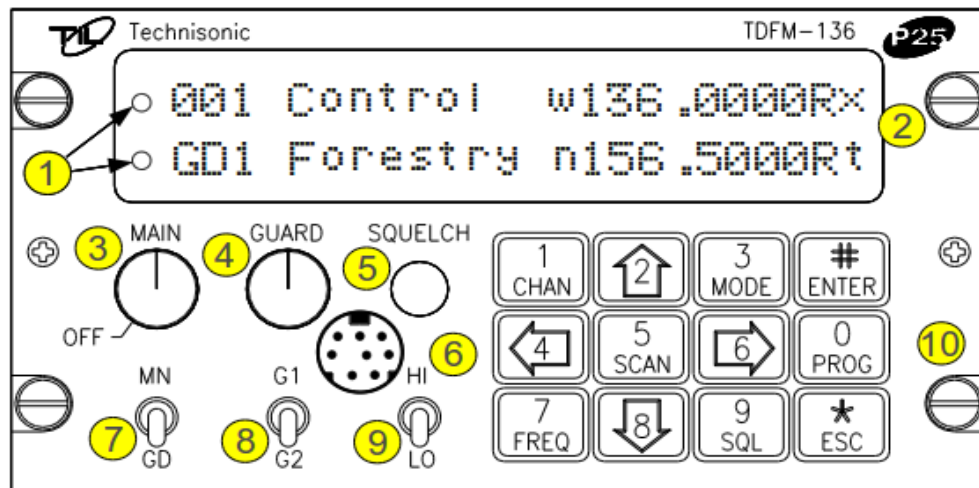
Figure 1-1. The TDFM-136 front panel showing control & display features.

The control and display features are identified as follows:

1. LED channel squelch indicators – light on signal received (top=Main, bottom=Guard).
2. Channel parameter display – two line by 24 character LED display (top=Main, bottom=Guard).
3. Power ON/OFF switch and Main channel volume control (rotary, with switch).
4. Guard channel volume control (rotary).
5. Squelch defeat switch (push button) – Press to open squelch of both Main and Guard channels (in analogue modes of operation).
6. Keyloader port – for use with KVL 3000+ keyloader.
7. Main/Guard switch (toggle) – selects active channel (main or guard), for transmit and edit.
8. Guard 1 or 2 switch (toggle) – selects guard memory (GD1 or GD2), for transmit and edit.
9. Transmit Power switch (toggle) – selects transmit power, high (10W) or low (1W).
10. Keypad (12 push buttons) – control other transceiver features (described below).

1.1.2 Channel Parameter Display

Figure 1-2 below shows the display of the unit, and identifies the individual parameters shown for each of the main and guard channels.
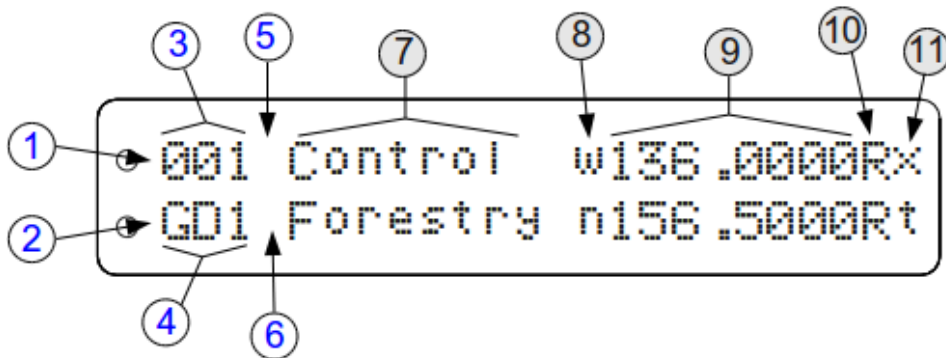
Figure 1-2. The TDFM-136 display – unique parameters highlighted.

The parameters that are specific to one channel or are not channel related are identified in figure 1-2 above. Items 1 – 6 fall into this category, they are described as follows:

1.   Main channel information is displayed on the *top* row of the display.

2.   Guard channel information is displayed on the *bottom* row of the display.

3.   The Main channel can have up to 230 memory positions (001 to 230), the current active memory number for the Main channel is shown in the first three characters of the line.

4.   The Guard channel can have two memories, GD1 and GD2, the currently active Guard memory number is shown in the first three lines of the bottom row.

5.   Memories for the Main channel can be scanned, when in use, scan information is shown at the 4th character position on the top row.

6.   On the bottom row, the 4th character position is used for different purposes: it will indicate the current command level as well as showing the lock icon (⊟) if the keypad access has been locked out.

Figure 1-3 below shows the display of the unit, and identifies those parameters that are common to both main and guard channels.
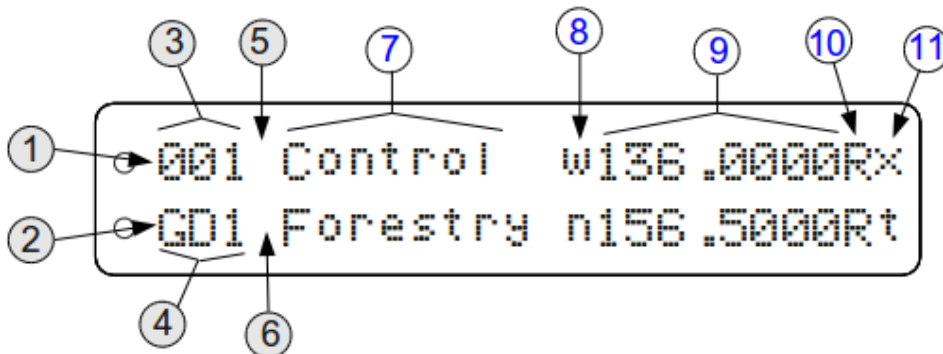
Figure 1-3. The TDFM-136 display - common channel parameters highlighted.

The common parameters are identified as items 7 through 11 and are as follows:

7. Up to eight characters are available for a text description of the memory.

8. One character position is used to indicate the operating mode:

   Analog modes: wide "w"(25kHz.), narrow "n" (12.5kHz.)
   Digital mode: project 25 digital "D" (12.5kHz.).

9. Eight characters are used to indicate the frequency in use.

10. One character indicates either Receive or Transmit as: "R" or "T".

11. The final character indicates the current squelch mode:

   Analog modes: noise squelch "x", CTCSS tones "t", or DCS codes "c"
   Digital modes: monitor "m", NAC only "n", TalkGroup + NAC "g"

1.2   Transceiver Basic Operation

For basic operation of the transceiver the user has the yolk mounted PTT key and memory up/down keys in addition to the controls discussed previously. Basic operation is discussed in this section.

1.2.1   Selecting the Active Channel – Main or Guard

When the user presses 'PTT', the unit will transmit with the parameters of the active channel and memory, that the user has selected. The method of selecting MAIN or GUARD channel is described below.
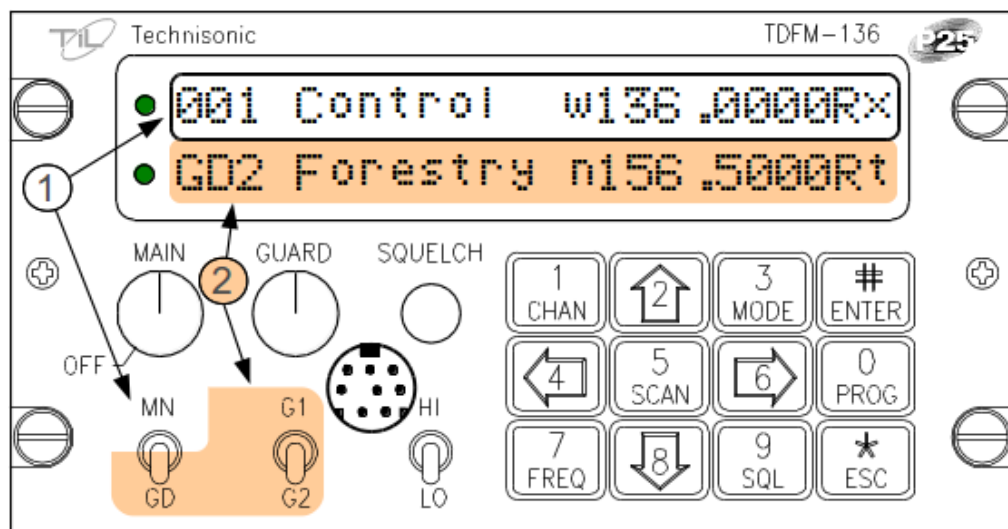
Figure 1-4. The active channel display and control points.

1. When the MN/GD switch is in the MN position then the MAIN channel is active. The MAIN channel data is shown on the top line of the display. The MAIN channel supports 230 memory positions (001 to 230).

2. When the MN/GD switch is in the GD position then the GUARD channel is active. The GUARD channel data is shown on the bottom line of the display. The GUARD channel has two fixed memories: GD1 and GD2, the GUARD memory used is determined by the position of the G1/G2 switch.

1.2.2   Selecting a Main Channel Memory

For the MAIN channel there are 230 possible memory positions to choose from (001 to 230), the method of selecting a memory for the MAIN channel is described below.
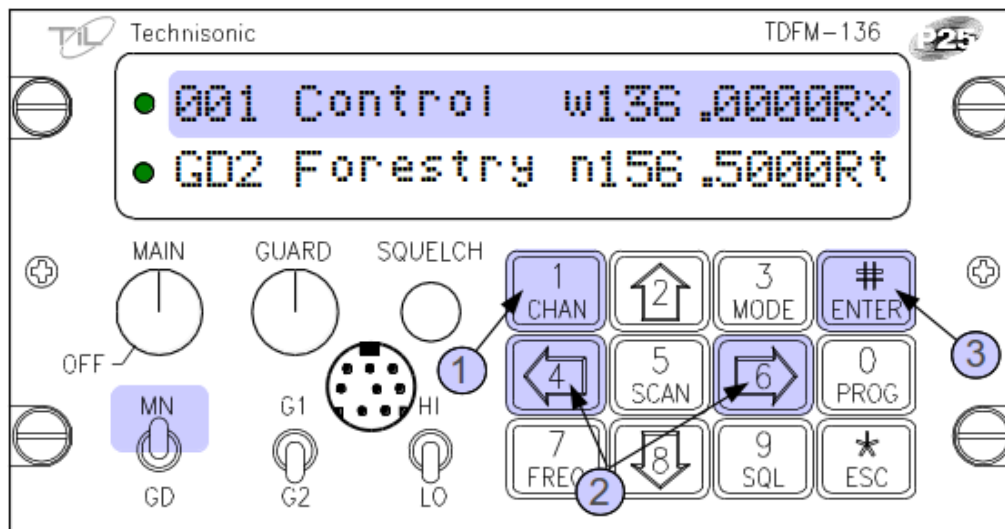
Figure 1-5. Control points for selecting an active memory for the MAIN channel.

There are several ways in which the user can control the active memory for the MAIN channel:

(1) Press 'CHAN' button (1) , and then enter the number of an existing memory (001 to 230), and press 'ENTER' (#). The MAIN channel will **jump** directly to that memory.

Note: See command L2-1 to add more memories, see 1.3 below for more information.

(2) Press and hold either the back arrow (4), or the forward arrow (6) button, and the unit will **scroll** through the existing (already programmed) memories.

Note: the scroll will wrap both up and down (. . . 230 ↔ 001. . .).

(3) Press the 'ENTER' button (#), and the unit's Main channel will **toggle** between the current memory and the designated 'home' memory.

Note: If no 'home' memory has been selected, then the default is memory 001.

Example:

The user has memories 001, 002, 004, 010, 024, 100 and 151 programmed into the transceiver. The MAIN channel is selected, and the active memory is 004. No home memory has been defined, so the default is 001.

If the back arrow is pressed and held, the MAIN display will scroll to memory 002, then to 001, and then to 151, the sequence will continue until the user releases the key.

For the Main channel, if the user presses the "ENTER" button, then the MAIN channel will jump to memory "001", if the Main memory was something other than "001", then pressing "ENTER" again will return to that memory.

1.3   About Commands

The transceiver supports commands to provide more advanced control and configuration features. A command is simply a key press, or series of key presses, that cause the unit to perform a function. This section provides an overview of the command architecture.

1.3.1   Command Levels

In order to accommodate all the commands required to provide the necessary operation, commands have been divided up into levels (abbreviated as 'L1', 'L2' etc). This results in the most common commands needing the fewest key presses to access.

There are five command levels in all, three of which are available to the operator (Operator Commands). For each command level up to 10 commands are available: 1-9, and '#'. Note: for command level 1 (L1) only, the ESC (*) button has an associated function as you cannot go a level down.

The PROG (0), and the ESC (*) key are used to move between the command levels as follows:

| 0 PROG | step up through command levels |
| * ESC | step down through command levels |

When stepping through command levels, the level is shown as a subscript digit in the 4th character position on the lower line of the display, see figure. Note that this display position is left blank for the default level (L1).

```
● 001 Control  w136.0000Rx
● GD1ᴈForestry n156.5000Rt
```
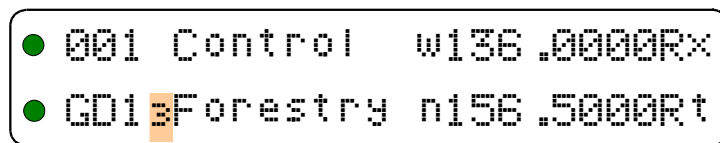
Figure 1-6. The Screen showing 'Level 3" in the Command Level Display Position

The Operator Command levels 2 and 3 (L2 & L3) are 'time limited', if the user gets into one of these command levels and does not enter a command within 5 seconds, the unit automatically returns to command level 1.

Note that after exiting a L2 or L3 command, the timer is reset to 5 seconds, so if you want to return to level 1 immediately, you have to press level down key ('ESC' or '*'). This allows you to perform another command on that level without having to start over from level 1.

In addition to the three command levels available to the operator, the unit can be put into a mode that allows access to maintenance and supervisor commands. These restricted command levels (L4 & L5) are to allow authorized personnel to set operating policy for the radio through use of 'Permissions', and perform other maintenance and configuration functions; these are explained later in the manual.

The restricted command levels (L4 and L5) should NEVER be enabled in flight. Incorrect use could render the unit non-functional! These levels exist for configuration and maintenance use only.

1.3.2   Command Types

There are two basic types of commands: **inherent**, and **interactive**:

Inherent commands
These are simple 'one-touch' commands, they do not need any further input from the user.

Example: the display brightness control commands (up/down arrows, keys 2 & 8)

Interactive commands
These commands require further input from the user, and they must end as follows:

$\boxed{\substack{\# \\ \text{ENTER}}}$ accept the entry and exit

$\boxed{\substack{* \\ \text{ESC}}}$ abandon the entry and exit

Example: the 'Frequency' command requires that the user enter a frequency, before exiting.

1.3.3   Command Groups

The commands can be characterized as belonging to one of three groups:

Operating commands are those which perform a function directly related to the use of the radio.

Edit commands allow the user to Edit the RF channel parameters (frequency, mode etc).

Configuration commands affect how the radio operates, including how other commands work.

1.3.4   Command Reference

Throughout the manual the commands will be referred to by level and number to make it clear what command is being referenced. The short form used is as follows:

Level - abbreviated as 'L' followed by a number, a dash separator, and a command number.

Examples:

The 'edit frequency' command is: level one, command number 7. So the short form is: L1-7. Since under normal circumstances the transceiver is in level 1, to access the command simply press '7'.

Level two, command number 3 is shown as: L2-3. To get to this command you must first go to level 2 (by pressing the '0' key), then enter the command key, '3'.

<div style="background:black;color:white;text-align:center">SECTION 2</div>

<div style="background:black;color:white;text-align:center">TRANSCEIVER OPERATION</div>

This section describes operating the transceiver including using the command functions to perform common tasks.   This section provides more advanced information about operating the transceiver, starting with the basics and moving through the more advanced features.

2.1   Channels, Memories and Operating Parameters

The transceiver supports two (2) channels: Main and Guard. Each of these channels operates using the parameters of the currently selected memory for that channel.

The **Main channel** operates using the parameters of the currently active main memory, and there can be up to 230 memories available (001 to 230) on the Main channel.

Main memory 001 must always exist, and is the only memory programmed from the factory.

Similarly, the **Guard channel** operates using the parameters of the currently active Guard memory. The difference is that the Guard channel supports only two memories: GD1 and GD2, these may be selected via the front panel G1/G2 switch.

Both of these memories (GD1 & GD2) must exist and are programmed from the factory.

The parameters for any factory programmed memory may be changed by the user.

2.1.1   Memory Parameters

Each memory has a variety of parameters that may be edited by the user including:

- frequency – 8 characters
- operating mode – 1 character
- squelch mode and squelch mode value – 1 character displayed
- text description – up to 8 characters
- scan list – 1 character

The ability to edit some of these may be restricted under certain operating conditions.

Example: while scan is available for any Main channel memory, the user may not set *scan* parameters for either Guard channel, or for 'shadow' channels on the Main channel.

2.2   Creating / Editing Memory Operating Parameters

There are two ways to create or edit the memories in the transceiver: from the transceiver front panel, or using the PC programming software. PC programming is discussed in Appendix C.

To create a new memory (Main channel only) or to edit all the parameters of an existing memory (Main or Guard), use command L2-1. This command edits all the parameters of the selected memory, if the memory exists then that data is used, if you are creating a new

memory then default data is used. In either case the individual parameter editors are sequenced so that all the parameters for the memory may be edited. **See section 3.2.1 Create/Edit All for more information.**

The remainder of this section focuses on operation of the individual parameter editors.

All edit commands are interactive commands (they expect input from the user), as such, the line on the display that does not have the parameter to be edited, becomes a prompt line to guide the user as to the valid keys for that edit.

Example: The edit frequency command, figure 2-1 shows the edit frequency screen if the active memory is 001 on Main. Note that a cursor flashes on the second character in the frequency field ①, on the Main display (top row) and that the Guard Display (bottom row) has been changed to a prompt line ② This prompt tells the user what command is running, and what keys are valid.
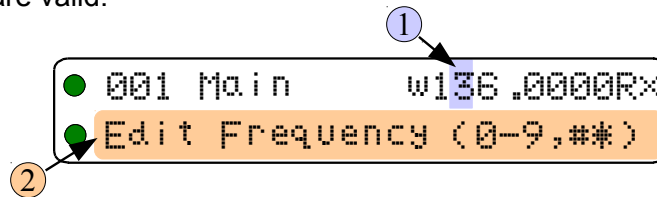
Figure 2-1. The user screen to edit the Main frequency

When the Guard Channel is active, the situation is reversed: the cursor is placed on the second digit in the frequency field on the Guard line, ① and the top line ② becomes the prompt line.
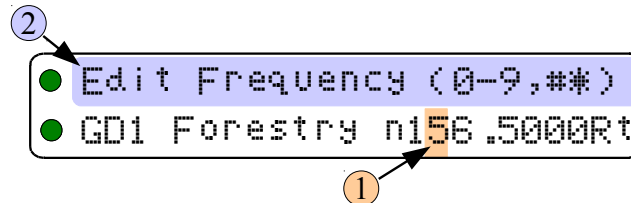
Figure 2-2. The user screen to edit the Guard frequency

Calling Key.
Some editors simply allow the user to select a set value from a list; in these cases, the key used to 'call' the editor will also step *up* through the available choices. This allows the user to make a selection without having to further navigate the keypad.

Simplex and duplex parameters.
Some of the transceiver parameters are simplex only: they are the same for both transmit and receive operation. Other parameters are duplex: these may be (but do not have to be) different for transmit than they are for receive.

Accept and Continue / Accept and Exit ⌗ ENTER

For many edit functions (example Operating Mode), once the user has selected a value, pressing the 'ENTER' key will accept the entry and exit the editor.   However, some edit functions require that the user accept a value before advancing (examples: Create New /Edit All, and Edit Squelch Mode), in these cases pressing the 'ENTER' key will advance to the next point in the editor.

Abandon Edit

In all cases, the ⁎ ESC key will abandon the edit with no changes made.

2.2.1   The Frequency Parameter
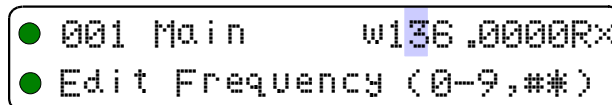
The TDFM-136 supports frequencies in the range 136.0000, to 174.0000 MHz. Frequencies in the analog wide band (25 kHz. channel spacing), the analog narrow band (12.5 kHz. Channel spacing), and the P25 band (Phase 1 – 12.5 kHz. channel spacing) can be entered at any 2.5 kHz step. In addition, frequencies can be entered on the frequencies proposed for P25 Phase 2. Note that this does not mean that the transceiver operates in this mode (6.25 kHz. channel spacing), just that the transceiver can be tuned to those frequencies; the channel spacing will still be either 25 kHz. or 12.5 kHz. See appendix D for the 6.25 kHz frequencies supported.

Frequency is a simplex/duplex parameter, that is, the unit can transmit and receive on the same frequency or it may be configured so that the transmit frequency and receive frequency are different.

Editing Frequencies $\boxed{\begin{array}{c} 7 \\ \text{FREQ} \end{array}}$

The **edit frequency** command is easily accessible, it is command L1-7. To access this command, simply press '7', on the front panel keypad. Notice that the key is also marked "FREQ".

This command allows the user to edit the operating frequency of the selected channel & memory. The frequency will be edited in duplex mode: first Receive, then Transmit. Upon start, the cursor appears at the second character in the Frequency field of the channel to be edited. The edit screen appears as follows:

```
● 001 Main      w136.0000Rx
● Edit Frequency (0-9,#*)
```
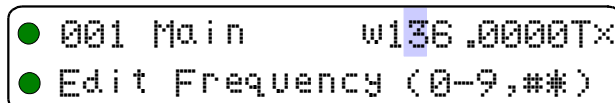
Figure 2-3. The user screen to edit the Main frequency for receive

The user may now enter the desired operating frequency as follows:

$\boxed{\begin{array}{c} 0 \\ \text{PROG} \end{array}}$ **to** $\boxed{\begin{array}{c} 9 \\ \text{SQL} \end{array}}$ decimal mode: enter number, cursor automatically advances

$\boxed{\begin{array}{c} \# \\ \text{ENTER} \end{array}}$ accept the entry and continue

$\boxed{\begin{array}{c} * \\ \text{ESC} \end{array}}$ abandon the entry and exit

The editor will not accept a value outside the limits of 136.0000 MHz. to 174.0000 MHz. In addition frequency supports 2.5 kHz increments, and valid 6.25 kHz channel spacing frequencies in all Operating modes. See appendix D for valid 6.25 kHz frequencies.

Once the receive parameter is entered, the 2nd last character in the display will switch from "R" to "T", the user can now enter the transmit value. Note that the receive value is automatically entered, so to get simplex operation, simply accept this entry.

```
● 001 Main      w136.0000Tx
● Edit Frequency (0-9,#*)
```

Figure 2-4. The user screen to edit the Main frequency for transmit

When complete, accept the entry if it is correct, or escape to exit without saving.

2.2.2   Operating Modes

The operating mode is defined as the RF channel spacing and modulation type used for the selected channel/memory on the transceiver.

The unit supports three operating modes: Analog wide, analog narrow, and P25 digital. In the analog wide mode, the radio is operating on 25kHz. channel spacing, on both analog narrow, and in P25 digital mode, the radio operates with 12.5kHz. channel spacing. In analog modes the transceiver operates using standard frequency modulation, in the P25 mode the unit uses C4FM.

Table 2-1 shows the available Operating Modes, the bandwidth, and the indicating character used.

Table 2-1 Transceiver Operating Modes		
Operating Mode	Bandwidth	Indicator
Analog Wide	25 kHz	'w'
Analog Narrow	12.5 kHz	'n'
P25 Digital	12.5 kHz	'D'

The user can easily switch between modes on any memory for any channel (any Main memory, and both Guard1 and Guard2). Since the squelch modes are not common across analog and digital operating modes, if you change between these modes, the Squelch Mode will be affected (for more on this see 'Squelch Modes' below).

The operating mode is a simplex parameter.

Editing Operating Mode $\boxed{\substack{3\\ \text{MODE}}}$

The **edit operating mode** command is easily accessible, it is command L1-3. To access this command, simply press '3', on the front panel keypad. Notice that the key is also marked "MODE".

This command allows the user to edit the operating mode of the selected channel & memory. Since operating mode is simplex only, the editor is very simple. Upon start, the cursor appears at the operating mode character field of the channel to be edited. The edit screen appears as follows:

```
● 001 Control  w136.0000Rx
● Edit Mode (↑↓3,#*)
```
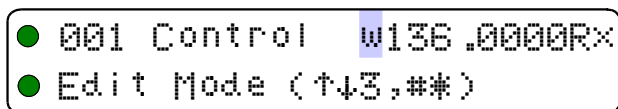
Figure 2-5. The user screen to edit the Main Operating Mode.

You may now edit the Operating Mode as follows:

$\boxed{\substack{2\\ \uparrow}}$ $\boxed{\substack{8\\ \downarrow}}$ $\boxed{\substack{3\\ \text{MODE}}}$ step up/down through available operating modes (w, n, D)

$\boxed{\substack{\#\\ \text{ENTER}}}$ accept the entry and exit

$\boxed{\substack{*\\ \text{ESC}}}$ abandon the entry and exit

2.2.3   Squelch Modes

Squelch mode refers to the method employed to defeat squelch and open the receiver. The transceiver supports a variety of squelch modes for both analog and digital operation, these are shown in table 2-2 below.

Table 2-2. Receive and Transmit Squelch Modes							
Analog				Digital			
Rx		Tx		Rx		Tx	
Noise	x	CTCSS Tones	t	Monitor	mm	TalkGroup + NAC	g
CTCSS Tones	t	DCS Codes	c	NAC Only	n	ID Call	ii
DCS Code	c	Inhibit	-	TalkGroup + NAC	g	Inhibit	-

Non-Selective Squelch
In analog operating modes (w & n), the Noise squelch is non-selective, that is: if a valid signal of enough power is present, the squelch will be defeated and the signal received.
Note: Noise squelch is the only squelch parameter that is global, the value needs only to be set once on any memory and it will apply to all memories on that channel.

For the P25 digital mode (D), the Monitor mode is non-selective: it a P25 digital signal of enough power is present, the squelch will be defeated and the signal received. There is no level setting.
Note: this *does not mean* that encrypted signals will be received and decoded in these modes!

Selective Squelch
The other squelch modes are selective: the transmitting system must be operating in the same squelch mode as the receiving system, and must provide the correct information within that mode.

Scope
Squelch modes are non-orthogonal, that is, they are not the same across differences in Operating Mode or for receive and transmit operation.

Parameters in Memory
For each memory created there is a default value for each of the squelch modes: the memory does have a CTCSS tone, a DCS code, a TalkGroup and a NAC assigned, it is just that these parameters are not used unless the associated squelch mode is chosen.

Since each squelch parameter exists for each memory, and each has a default value, these default values, like all user editable channel parameters, can be set. In addition, Squelch use may be restricted according to: which Squelch Modes may be selected for any Operating Mode, which Squelch Modes may be edited (ie change value), and – in the case of Tones and Codes – which values are available to be selected. See the Maintenance Level (L4) for appropriate commands.

Description
For signals that are on frequency and not encrypted, the Squelch Modes work as follows:

In Analog Modes:

Noise Squelch, 'x' – analog receive only, non-selective. The receiver will open if there is enough RF energy on frequency. This is the default analog squelch mode.

CTCSS Tone, 't' – analog receive and transmit, selective. The receiver will open if the signal received also carries the correct tone. The tones may be the same or different for receive or transmit on any memory.

DCS Code, 'c' - analog receive and transmit, selective. The receiver will open if the signal received also carries the correct code. The codes may be the same or different for receive or transmit on any memory.

In Digital Mode

Monitor Mode 'm' - digital receive only, non-selective. The receiver will open on any valid P25 signal. This is the default digital squelch mode.

Network Access Code (NAC) 'n' – digital receive only, selective. The receiver will open on any P25 compliant digital signal, having the correct NAC.

Talkgroup + NAC 'g' – digital receive and transmit, selective. The receiver will open on any P25 compliant digital signal, having the correct NAC, and the correct TalkGroup. For transmit it indicates that the specified NAC and TalkGroup codes will be transmitted.

ID Call 'i' – digital transmit only, selective. The transmitted signal will carry the ID of a specific transceiver. Only a radio with that ID programmed as it's Unit Identification (UID) will be able to receive the signal. Note that the UID can be set via command L5-9.

In Both Analog and Digital Modes

Transmit Disabled '-' – valid for both analog and digital operating modes, transmit only. This indicates that transmit is disabled for this memory. Pressing PTT will result in a display of "Transit Disabled" on the screen.

Editing Squelch Modes

The **edit squelch mode** command is easily accessible, it is command L1-9. To access this command, simply press '9', on the front panel keypad. Notice that the key is also marked "SQL".

This command allows the user to edit the squelch mode of the selected channel & memory. Since squelch mode is duplex, and the selective squelch options have values that can be edited as well, this editor has more steps than most others. The general flow of the editor is as follows:

1.   Select receive Squelch mode (dependent on operating mode).
2.   If Squelch mode has a value then select the value(s)
3.   If simplex then done, else repeat for transmit.

All Squelch mode edits start the same way, the cursor appears at the Squelch mode character field of the channel to be edited. The edit screen appears as follows:

```
● 001 Control  w136.0000Rx
● Edit Sql Mode (↑↓9,#*)
```
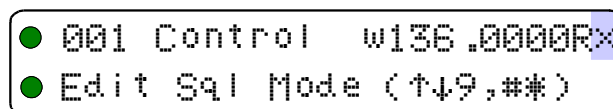
Figure 2-6. The screen to edit the Main Squelch Mode for receive.

You may now edit the Squelch Mode as follows:

| 9 SQL | 2↑ | 8↓ | step up/down through available squelch modes.

| # ENTER | accept the entry and exit

| * ESC | abandon the entry and exit

Remember that the available squelch modes will be constrained by the operating mode as shown in table 2-2 above.

Editing analog squelch modes

For **analog receive noise squelch** the screen to change the value appears as follows:

```
● 001 Control  w136.0000Rx
● Noise Level:          10
```

<u>Figure 2-7. The noise squelch edit screen.</u>

Note that the cursor drops to the bottom row, ready to edit, for noise squelch, the editor operates as follows:

`0 PROG` to `9 SQL`	decimal mode: enter number, cursor automatically advances
`# ENTER`	accept the entry and continue
`* ESC`	abandon the entry and exit

If editing the receive value, when you press "ENTER" to continue, the editor returns to the first screen, but the Transmit/Receive indicator character (second last character on the line) has changed to a "T" to indicate that you are editing for transmit. This allows you to set 'duplex values for the selective squelch (ie transmit may be different than receive). The screen to select a transmit squelch mode appears as follows:

```
● 001 Control  w136.0000Tx
● Edit Sql Mode (↑↓9,#*)
```

<u>Figure 2-8. The screen to edit the Main Squelch Mode for transmit.</u>

The edit keys are the same as for the first screen.

Note that for analog modes "Tx" indicates that no selective squelch will be used, there is no value associated with the "x" choice for transmit.

For **analog CTCSS Tone squelch** the user would have to select 't' in the initial screen (in analog modes only), if so then the editor to change the value would appear as follows:

```
● 001 Control  w136.0000Rt
● CTCSS Tone: (↑↓,#*) 67.0
```

<u>Figure 2-9. The CTCSS Tone squelch edit screen.</u>
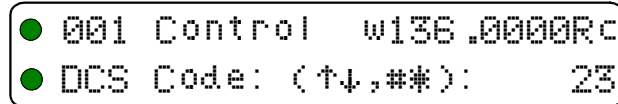
The editor works as follows:

`2` `8`	step up/down through available tone choices
`# ENTER`	accept the entry and continue
`* ESC`	abandon the entry and exit

See Appendix B for the table of CTCSS tones supported.

As with all the squelch editors, when you press "ENTER" to continue (if editing receive), the editor returns to the first screen, but the Transmit/Receive indicator character (second last character on the line) has changed to a "T" to indicate that you are editing for transmit. If you are finishing an edit of the transmit value, then the values are written to memory and the editor exits.

For **analog DCS Code squelch** the user would have to select 'c' in the initial screen (in analog modes only), if so then the editor to change the value would appear as follows:

```
● 001 Control  w136.0000Rc
● DCS Code: (↑↓,#*):    23
```

Figure 2-10. The DCS Code squelch edit screen.

The editor works as follows:
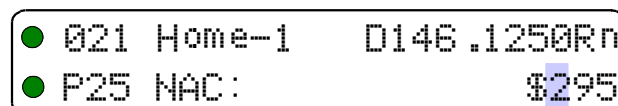
⬆2 ⬇8	step up/down through available code choices
# ENTER	accept the entry and continue
* ESC	abandon the entry and exit

See Appendix B for the table of DCS codes supported.

As with all the squelch editors, when you press "ENTER" to continue (if editing receive), the editor returns to the first screen, but the Transmit/Receive indicator character (second last character on the line) has changed to a "T" to indicate that you are editing for transmit. If you are finishing an edit of the transmit value, then the values are written to memory and the editor exits.

Editing digital squelch modes

For **digital NAC squelch** the user would have to select 'n' in the initial (receive) screen (in digital mode only), if so then the editor to change the value would appear as follows:

```
● 021 Home-1   D146.1250Rn
● P25 NAC:          $295
```

Figure 2-11. The digital NAC squelch edit screen.
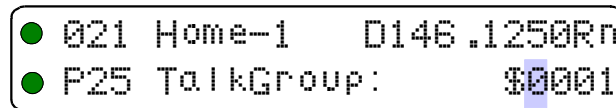
The editor works as follows:

0 PROG to 9 SQL	enter number, cursor automatically advances. $=HEX Mode.
# ENTER	accept the entry and continue
* ESC	abandon the entry and exit

The default edit mode is hexadecimal (HEX), three digits 000 to FFF, the dollar sign "$" is used to indicate a HEX edit. The edit mode can be changed to decimal using command L3-3. In that case the range would be 0000 to 4095.

As a squelch mode by itself, NAC exists for receive only so when you press "ENTER" to continue the editor returns to the first screen, but the Transmit/Receive indicator character (second last character on the line) has changed to a "T" to indicate that you are editing for transmit.

For **digital TalkGroup+NAC squelch** the user would have to select 't' in the initial (receive) screen (in digital mode only), if so then the editor to change the value would appear as follows:

```
● 021 Home-1   D146.1250Rn
● P25 TalkGroup:    $0001
```

Figure 2-12. The digital TalkGroup squelch edit screen.
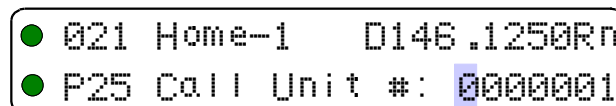
The editor works as follows:

`0 PROG` to `9 SQL`   enter number, cursor automatically advances. $=HEX Mode.

`# ENTER`   accept the entry and continue

`* ESC`   abandon the entry and exit

The default edit mode is hexadecimal (HEX), four digits 0000 to FFFF, the dollar sign "$" is used to indicate a HEX edit. The edit mode can be changed to decimal using command L3-3. In that case the range would be 00000 to 65535.

As a squelch mode TalkGroup includes NAC for both receive and transmit so when you press "ENTER" to continue the editor continues to the NAC editor (shown above). When you exit from NAC, then if you were editing for receive you would return to the first screen, but the Transmit/Receive indicator character (second last character on the line) has changed to a "T" to indicate that you are editing for transmit. If you are finishing an edit of the transmit value, then the values are written to memory and the editor exits.

For **digital ID Call squelch** (available for digital transmit only) the user would have to select 'i' in the transmit screen, if so then the editor to change the value would appear as follows:

```
● 021 Home-1   D146.1250Rn
● P25 Call Unit #: 0000001
```

Figure 2-13. The digital ID Call squelch edit screen.

The editor works as follows:

`0 PROG` to `9 SQL`   Decimal mode: enter number, cursor automatically advances.

`# ENTER`   accept the entry and continue

`* ESC`   abandon the entry and exit

The edit mode is decimal only seven digits 0000001 to 9999999.

As a squelch mode, ID Call exists for transmit only so when you press "ENTER" to continue the values are written to memory and the editor exits.

2.2.4 ID Call Operation

As seen above, the transceiver can be configured, in digital mode, to use ID call as a selective squelch method, in this mode the transmitting unit sets it's TalkGroup to zero (0), and transmits the intended Unit ID number (decimal 0 to 9,999,999), upon seeing the '0' TalkGroup, the receiver ignores everything except the ID number.

Of course the receiver will have to be on the correct frequency and in digital mode.

The TDFM-136 has two distinct RF modules (Main and a dedicated Guard receiver). Unit ID's are set to default ID's of 1 for Main and 2 for Guard. The Unit ID is a user set number, not a factory ID, so if they are to be used, then they need to be set. The command to set the Unit ID is command L5-9, the UID (Main or Guard) to be set is determined by front panel switch positions. The screen to edit these numbers appears as follows:

```
● 5-9 Set Main Unit ID
● Unit ID #:        0000001
```
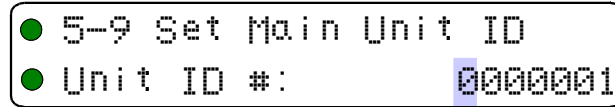
Figure 2-14. The Set Unit ID edit screen.

The editor works as follows:

| 0 PROG | to | 9 SQL | Decimal mode: enter number, cursor automatically advances. |

| # ENTER | | accept the entry and exit |

| * ESC | | abandon the entry and exit |

The edit mode is decimal only seven digits 0000001 to 9999999.

2.3   Scan and Multi-Mode Operation

The transceiver supports two modes of operation where it is able to receive signals on more than the displayed main and guard memories. These modes are: scan and multi-mode operation.

2.3.1   Scan Operation

The radio supports a basic scan mode that operates on the *Main channel only*. The scan function allows users to monitor up to 16 channels at a time. All memories must be a member of one, and only one, scan list; each scan list can hold up to 16 memories. Each memory in a scan list can be enabled for scan or disabled (see command L2-5).

To scan a particular list: the current Main channel memory must belong to that list, and must have it's scan enabled. Under these conditions, when you press the scan button (5), the unit will scan.

Example: There are seven (7) memories assigned to scan list three, these are: 5, 6, 13, 15, 23, 34, and 51. Memories 6 and 15 have scan disabled, the rest have scan enabled. If the user is on channel 6 or 15 and tries to start scan (command L1-5), there will be an error message: "Error: Non-Scanned Chan" and nothing will happen.
If the user is on any other channel in scan list three, then the five scan-enabled channels in list three will be scanned.

You can enable or disable scan for the displayed memory (for Main channel only) by using the command L2-5.

You can affect the scan operational parameters by using command L3-5. This command allows you to affect the following four (4) parameters:

•   Revert Mode
•   Reply Timer
•   Monitor Timer
•   Delay Timer

Revert Mode.   The Revert Mode refers to whether the radio will, when keyed, transmit on the currently *selected* memory channel, or on the last *contacted* memory channel. The radio will only respond on the last contacted channel for a time determined by the Delay timer setting, once the timer times-out, then the unit always transmits on the selected channel.
Default: last contacted

Reply Timer. The scan Reply time is the time that the radio will monitor a channel on which RF was received, *after all activity on the channel has ended (Rx or Tx)*. If there is further receive or transmit activity on the channel, the timer will reset, and start again once the activity has ended. When the timer times-out the unit will resume scan. If set to zero (0), the unit will resume scan immediately upon the end of channel activity.
Range: 0-20s, Default: 3 seconds

Monitor Timer. This is the time that the radio will monitor a channel on which RF was received, before resuming scanning. Once the timer expires, the unit will break and resume scan, if the value is set to zero (0) then the unit will monitor the signal as long as it is received.
Range: 1-90s, Default: 10 seconds

Delay Timer. The Delay time is the time that the radio will remain monitoring a channel after receiving on that channel has ended. If the timer is set to zero, (0), then the unit will resume scanning immediately after receive activity ends. This is the timer that affects the Revert Mode 'Contacted'.
Range: 0-15s, Default: 5 seconds

2.3.2   Multi-Mode Operation

Multi-mode operation allows mixing of analog and digital operating modes on one frequency. In effect, this mode allows one memory position to be set up as though it has multiple sets of parameters associated with it. This manual will refer to this as 'shadow memory' operation: a 'primary' memory can have up to seven 'shadows' for a total of eight sets of operating parameters (1 primary + 7 shadows).

The user invokes this mode by selecting an existing memory to be a 'primary' and assigning at least one 'shadow' memory to it, the command to do this is L2-7. Each 'shadow' takes up one memory position, just like a normal memory.

The shadows have certain restrictions:

- a shadow must have the same frequency as the primary
- a shadow cannot have scan enabled
- a shadow cannot transmit in digital ID call (i) mode
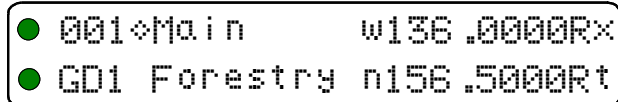
You can mix analog and digital Operating Modes, you can configure different shadows to have different squelch parameters.

Shadow operation is much like scan in *last contacted* mode, once a signal has been received, the user has a set amount of time to key the radio, the unit will transmit with the parameters of the shadow that decoded the signal: in other words you will respond to the person who called you.

When mixing analog noise squelch with analog selective squelches, the noise squelch shadow will delay decode for a short time to allow the selective squelch channels time to decode, if none of the selective squelch channels decode a valid signal, then squelch is broken on the noise squelch channel.

The radio will operate in Mixed Mode when the Main channel has *any* memory in the shadow group selected (ie either Primary or any shadow). The only difference between selections is that if the user keys the radio, other than to respond to a received transmission, then the radio will transmit using the displayed parameters.

Primary memories with shadows are identified with a large diamond in the 4th character position:

```
● 001◇Main      w136.0000Rx
● GD1 Forestry n156.5000Rt
```

Figure 2-15. Identifying Graphic for Primary Channel with Shadows

Shadow memories are identified with a small diamond in the 4th character position:

```
● 011◇Main-1    n136.0000Rt
● GD1 Forestry n156.5000Rt
```

Figure 2-16. Identifying Graphic for Shadow Channel

2.4   Controlling User Access

Whether to restrict operation to correct modes, or to help avoid mis-configuration in the field, it may be advantageous to control user access to certain features. The transceiver supports controlling access to features in different ways, these include:

1. Controlling access to command levels.
2. Controlling access to individual commands via command permissions.
3. Controlling access to squelch modes.
4. Controlling editing of specific memories.
5. Controlling display of frequency information.

2.4.1   Control Access to Command Levels

The most basic access control is provided by the built in restriction of access to Maintenance and Supervisor level commands (L4 and L5 respectively). Maintaining this access security is crucial for any subsequent access control, as those methods are all accessed via commands on the L4 and L5 programming levels. Access to these command levels is gained on one of two ways:

Access via Jumper requires that a hardware jumper (shunt) be placed across two pins inside the transceiver. Obviously the transceiver must be opened on a bench to use this method. See appendix A for side panel removal instructions and jumper placement.
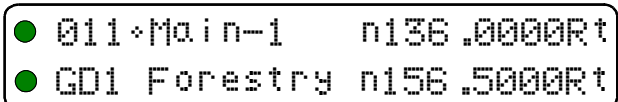
Access via Jumper and Passwords is the default condition. When configured like this the transceiver does not need to be opened to access the restricted command levels. There are two passwords: one for level 4 (Maintenance), and one for level 5 (supervisor).

Passwords are eight characters long and have the full range of characters available for text edit (see L2-6 for character list reference).

When attempting to enter the Maintenance Level (L4) you will be prompted for a password, upon correct entry of the L4 password, you will be granted access to that level
When attempting to enter the Supervisor Level (L5) you will be prompted for a password, upon correct entry of the L5 password, you will be granted access to that level.

If the Supervisor password is entered when attempting to access the Maintenance level, then access to both Maintenance and Supervisor Levels is granted.

The screen to enter a password upon trying to access L4 or L5 looks like:

```
● Enter Password: █
● Edit Text (↑↓↔→3,##)  09
```
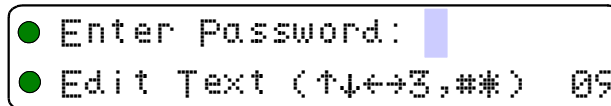
Figure 2-17. The screen to enter a password for restricted level access.

Passwords can use any character supported by the standard TDFM-136 text editor, as such the editing keys are the same:

Key	Description
3 MODE	Step through the available edit groups (A-Z, a-z, 0-9, + extra characters – see table 4.3)
2↑ 8↓	step up/down through the characters in each edit group
4 6	move backward/forward through the available characters
# ENTER	accept the entry and exit
* ESC	abandon the entry and exit

Setting Passwords is done via command L5-7, the command is fixed to edit the Maintenance password followed by the Supervisor password. Passwords must be eight characters.

```
● Edit Maint Pass: █
● Edit Text (↑↓↔→3,##)  09
```
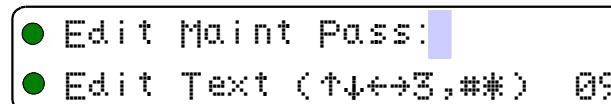
Figure 2-18. The screen to set the Maintenance password.

The editor works the same as for entering the password, except that if you are editing the Maintenance password 'ESC' and 'ENTER' work as follows:

Key	Description
# ENTER	accept the entry and continue to Supervisor
* ESC	abandon the entry and continue to Supervisor

When entering the Supervisor password screen 'ESC' and 'ENTER' work as in other editors:

Key	Description
# ENTER	accept the entry and exit
* ESC	abandon the entry and exit

2.4.2   Set Command Permissions

Command permissions allow those responsible for setting policy to select which commands in the command set will be accessible in the Operator Levels (levels 1, 2, and 3). All the commands in those three levels are affected EXCEPT: 'PROG' (0) and 'ESC' (*).

Table 2-3 below indicates all the available user commands, and shows the permission mode as follows:

●   indicates a command that has a distinct permission

●   indicates a command is available in Guard, but permission is controlled by Main.

X   indicates a command that is NOT available for the channel.

Table 2-3. Permission Applicability by Command and Level										
Cmnd Num	Level 1			Level 2			Level 3		
	Command	M	G	Command	M	G	Command	M	G
1	Select Main Memory	●	●	Create/ProgAll	●	●	Set Main Boot Memory	●	○
2	Display Brighter	●	○	Copy Guard to Main	●	○	Assign Key by KeyTag	●	○
3	Edit Operating Mode	●	●	Lock Keypad	●	○	Set Edit HEX/Decimal	●	○
4	Scroll Memory Down	●	○	not used	X	X	Show Firmware Version	●	○
5	Scan	●	X	Edit Scan List	●	X	Set Scan Parameters	●	○
6	Scroll Memory Up	●	○	Edit Text	●	●	Set PTT Timer	●	○
7	Edit Frequency	●	●	Create Shadow	●	X	Set sidetone level	●	○
8	Display Dimmer	●	○	Copy Main to Guard	●	○	Communicate with PC	●	○
9	Edit Squelch Mode	●	●	Encryption ON/OFF	●	●	Show Squelch	●	●
ENT	Jump to Home Memory	●	X	Set Home Memory	●	○	not used	X	X

The default configuration from the factory has all commands enabled, *except L2-2 and L2-8.*

Permissions are controlled via three screens that allow you to visually enable or disable each command for Main and Guard on a level by level basis.

The Set Permissions screen shows the level being affected (L1, L2, or L3), followed by the command number, and an optional 'g' indicating Guard channel operation for that command (if applicable). The character directly under each number (or 'g') indicates whether or not the command may be accessed. If the command is to be accessible (or enabled), then the character is a is solid round dot, if the command is to be restricted, (or disabled), then the character is an empty dot or donut. The 'Set Permissions' for command level 1 screen appears below:
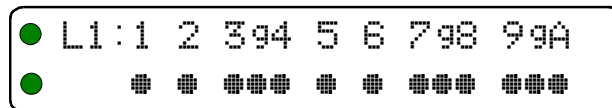

Figure 2-19. The Screen to Edit the Level 1 Permissions

The user may edit the permissions as follows:

0 PROG	Toggle permission (❉ = enabled, ○ = disabled
2 / 8	step up/down through Operator Levels
4 / 6	move backward/forward through the available commands
# ENTER	accept the entry and exit
* ESC	abandon the entry and exit

Note that the cursor will automatically jump to the next valid column, the cursor will wrap. The 'g' indicates a separate Guard option; for the commands that support this, the Main and Guard can be enabled/disabled separately. In addition, some of the commands are either channel agnostic, or specific to the Main channel only and can thus be invoked for Main even when the radio front panel switches are in the Guard position.

For example: with the switches in the Guard position the user can still scroll through the Main memories using the [4] and [6] keys. These types of commands are available in the Guard mode, but the permissions are determined by the Main permission.

2.4.3   Control Access to Squelch Modes

The squelch modes are among the more complicated editing and configuring options; the system supports an access control scheme that allows you to enable access only to modes that your organization or specific mission needs.

Command L4-9 is used to restrict user access to squelch modes, editing, and select options, this can be used to simplify operation and reduces the potential to mis-configure the system. The access restrictions operate according to the following table:

Keys	Mode Select				Edit	Value Select	
	Analog		Digital		Analog	Analog	
← →	Rx	Tx	Rx	Tx	Mode	Tones	Codes
↕ ↑ ↓			NAC		Noise	Enable / Disable individual Tones. See table Appendix C	Enable / Disable individual Codes. See table Appendix C
	Tone	Tone	TalkGroup		Tone		
	Code	Code		ID Call	Code		
		Inhibit		Inhibit			

Table 2-4. Squelch Mode Restrictions

Upon start, the display appears as follows:

```
● Squelch Restrict: Select
● Analog Rx:   Tone        ⊞
```

Figure 2-20. The Screen showing Mode Select restrictions for Analog Receive.

The user may edit the permissions as follows:

`0 PROG`	Toggle permission (⊞ = enabled, ▢ = disabled
`4` `6`	move backward/forward through the restriction screens (← → select column in table)
`2` `8`	step up/down through column entries (↑ ↓ select row in table)
`# ENTER`	accept the entry and exit
`* ESC`	abandon the entry and exit

Note you may only restrict editing of a selected value in analog modes.

2.4.4   Control Editing of Memories

In some cases it may be advantageous to set up a memory, and then ensure that the configuration of that memory cannot be changed by the user. Command 4-4 provides this function. The currently selected channel memory - as determined by the front panel switch positions -may be enabled or disabled for editing. The command screen appears as follows:

```
● 4-4 Set Memory Edit
● Mem: 022 Edit Disable
```
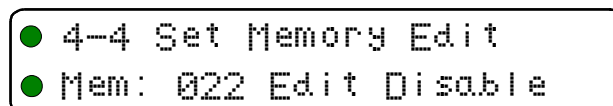
Figure 2-21. The screen for Enabling/Disabling edit of a specific Memory.

The user may change the edit permission for the selected memory as follows:

[2] [8]	toggle enable/disable of selected memory
[# ENTER]	accept the entry and exit
[* ESC]	abandon the entry and exit

Note, once a channel has been disabled for editing, any attempt to call a function that would edit a parameter of the channel would display an error as shown below:

```
● 022 Eesc 1   D155.2500Rm
●       Edit Disabled
```

Figure 2-22. The error screen on trying to edit a disabled memory.

Remember that all the channel functions work as normal, they just cannot be changed.

2.4.5   Control Display of Frequency Information

Some agencies may want to restrict access to displayed frequency information for the memories on Main and/or Guard channels. Command 4-7 provides this function. The currently selected channel memory - as determined by the front panel switch positions -may be enabled or disabled for editing. The command screen appears as follows:
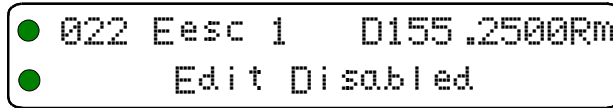
```
● 4-7 Set Freq Display
● Mem: 022 Display Disable
```
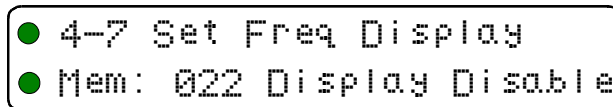
Figure 2-23. The Frequency Display Enable/Disable screen.

The user may change the frequency display for the selected memory as follows:

[2] [8]	toggle enable/disable displaying frequency for the selected memory
[# ENTER]	accept the entry and exit
[* ESC]	abandon the entry and exit

Note, once a channel has had it's frequency display disabled, you cannot edit that frequency, an attempt to do so will cause an error as shown below:

```
● 022 Eesc 1   D———————Rm
●       Edit Disabled
```

Figure 2-24. A memory with frequency display disabled.

Remember that all the channel functions work as normal, it is just that the frequency is not displayed.

2.5   Encrypted Operation

The TDFM-136 supports encrypted operation using both DES OFB and AES encryption keys for P25 communications. The sequence to use encryption is as follows:

1. Load keys using a KVL keyloader.
2. Assign a KeyTag (name) to a key, defined by its SLN.
3. Assign a key, via the KeyTag to a memory.
4. Enable or disable use of encryption in radio operation.

2.5.1   Loading Encryption Keys

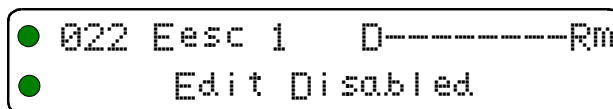In order to use the encryption feature on the transceiver, you must have encryption keys loaded into the unit. The keys must be loaded into the unit using a KVL-3000+ keyloader.   Of course the keys must have been created in the KVL first. Operating instructions for the KVL are beyond the scope of this document, see manufacturer documentation.

Note: The keyloader (KVL) must be connected to the transceiver with the correct cable: ensure you only use a cable designed for use with the TDFM-136.

Once you have a KVL with the correct keys loaded, follow this procedure to load and use them in the transceiver:

1. Connect the KVL to the TDFM-136 via the correct cable.
2. Load the keys following the KVL procedure. The keys will load to the Main or Guard module as determined by the front panel switches.
3. Once you have loaded one module, you must load the same keys in the same order into the other module. This is because the Guard operation is split across the two hardware modules.
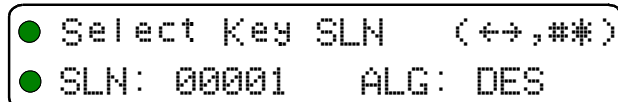
2.5.2   Assign KeyTag to Encryption Keys

Once the keys have been loaded, you need to assign a name (referred to here as a KeyTag) to the key so that they can be manipulated later. Initially, the key will be identified by it's SLN (sometimes called CKR).

Command L4-8 allows you to set the KeyTag for any of the keys loaded into the radio following this sequence:

1. Select the key, by SLN, to assign a KeyTag to.
2. Enter the KeyTag
3. Repeat for other SLN's if desired.

Select Key by SLN. The first screen, shown below, allows you to step through the available keys (by SLN), and shows the encryption algorithm for that key.

```
● Select Key SLN   (←→,#＊)
● SLN: 00001   ALG: DES
```

Figure 2-25. The screen to select the SLN to assign the KeyTag to.

You can now select a key via it's SLN to assign a KeyTag to, using the following keys:

$\boxed{4}$ $\boxed{6}$ move backward/forward through the loaded keys, by SLN

$\boxed{\text{# ENTER}}$ accept the entry and continue

$\boxed{\text{* ESC}}$ abandon the entry and exit

Create KeyTag for Selected Key. The next screen allows you to create a KeyTag for the key selected. The system defaults to naming the KeyTags "Key Tag 01", through "Key Tag 16", this screen allows you to change these names to suit your needs.
The KeyTag is 10 characters and is limited to: Upper & lower case alphabetic, the digits 0-9, a space, and {! " # $ % & ' ( ) * + , - . /} not including the brace brackets.

The screen to edit the KeyTags looks like this:

```
● Edit Key Tag: Key Tag 01
● SLN: 00001 (↑↓←→3,#*) AZ
```

Figure 2-26. The screen to edit the KeyTag.

The keys for the KeyTag text editor operate as follows:

$\boxed{\text{3 MODE}}$ Step through the available edit groups (A-Z, a-z, 0-9, + extra characters – see table 3-4)

$\boxed{2}$ $\boxed{8}$ step up/down through the characters in each edit group

$\boxed{4}$ $\boxed{6}$ move backward/forward through the available characters

$\boxed{\text{# ENTER}}$ accept the entry and continue

$\boxed{\text{* ESC}}$ abandon the entry and continue

Repeat or Exit. The final screen allows you to decide to loop back and repeat the process for another key or to exit the editor entirely:

```
● Edit Key Tag: Key Tag 01
● Another Key? #=ok *=exit
```

Figure 2-27. The screen to assign another KeyTag or exit.

The edit keys are:

$\boxed{\text{# ENTER}}$ accept the entry and continue

$\boxed{\text{* ESC}}$ abandon the entry and exit

2.5.3   Assign Key by KeyTag to Memory
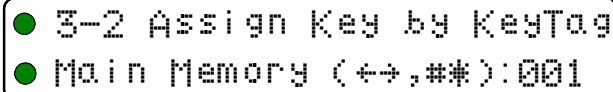
Once the keys have been loaded, and they have been given KeyTags, the user may now assign a key, using KeyTags, to a memory, provided that the memory is in P25 digital mode.
Command L3-2 allows you to assign a key to a memory in the transceiver following this sequence:

1.   Select the memory to assign a Key to.
2.   Assign the key via the KeyTag
3.   Determine decrypt rules (assigned key or any key)
4.   Repeat for other memories if desired.

Select Memory to Assign a Key to. The first screen, shown below, allows you to step through the available memories. Note that only main memories have to be scrolled through, the Guard memories are selectable from the front panel via the MN/GD and G1/G2 toggle switches.

This screen shows selecting a memory for the Main channel:
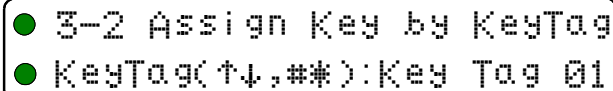
```
● 3-2 Assign Key by KeyTag
● Main Memory (←→,#*):001
```

Figure 2-28. Select the Main memory to assign the key to

The user may select the memory to assign a key to as follows:

⟨4⟩ ⟨6⟩	move backward/forward through the available memories (Main only)
# ENTER	accept the entry and continue
* ESC	abandon the entry and exit

Select Key via KeyTag for Memory. The next screen, shown below, allows you to step through the KeyTags and select one to be assigned to the selected memory.

```
● 3-2 Assign Key by KeyTag
● KeyTag(↑↓,#*):Key Tag 01
```

Figure 2-29. Select the KeyTag to assign to the memory

The user may select the Key, via KeyTag, to assign to the previously selected memory as follows:

⟨2⟩ ⟨8⟩	step up/down through the available KeyTags.
# ENTER	accept the entry and continue
* ESC	abandon the entry and continue

Determine Decrypt Rules. The transceiver is capable of decrypting a received signal using the key that has been assigned to the memory, or by using any key that has been loaded. The next screen allows the user to make this choice.

```
● 3-2 Assign Key by KeyTag
● Set Rx Key: Any Key
```

Figure 2-30. Select decrypt on Any Key or Assigned Key

Now you can make the 'Any Key' or 'Assigned Key' choice as follows:

⟨2⟩ ⟨8⟩	toggle the choice: Any Key or Assigned Key
# ENTER	accept the entry and continue
* ESC	abandon the entry and continue

Repeat or Exit. The final screen allows you to decide to loop back and repeat the process for another memory or to exit the editor entirely:

```
● 3-2 Assign Key by KeyTag
● Assign More? #=ok *=exit
```

Figure 2-31. The screen to assign another key or exit

The edit keys are:

| # ENTER | accept the entry and continue |
| * ESC | abandon the entry and exit |

2.5.4   Enable/Disable Encrypted Operation

Now that keys have been loaded and assigned to various memories in the transceiver, you can enable or disable encrypted operation.

On a Digital memory, that has a key assigned to it, the Encryption may be enabled or disabled using the command L2-9. The command is inherent, there is no edit, either the encryption can be enabled or it cannot. If you try to enable encryption on an analog memory (unsupported), you will see something like:

```
● 101 Idsc      n151.0000Rx
●  No Analog Encryption
```

Figure 2-32. The analog memory encryption error screen

On a Digital memory, that does *not* have a key assigned to it, you will see something like:

```
● 001 Main      D139.1000Rm
●  No SLN Assigned
```

Figure 2-33. The error screen for no encryption key assigned

When correctly configured (a key assigned to a Digital memory), you will see a **'key' icon** in front of the **mode** indicator, similar to:

```
● 022 Encr1    ₺D155.4250Rm
● GD1 Guard1    n154.0000Rt
```

Figure 2-34. The Encryption Enabled for Main memory screen.

SECTION 3

COMMAND REFERENCE

This section provides a summary of the commands supported by the equipment, the Table 3-1 below shows a summary the commands divided into command levels.

Key	Operator Level 1	Operator Level 2	Operator Level 3	Maintenance Level 4	Supervisor Level 5
1 CHAN	Select Main Memory	Program New Memory	Select Boot Memory	Select Default Record	Toggle RF Bias V
2 up	Display – Brighter	Copy Guard to Main	Set Key by KeyTag	Select Access Mode	Scroll Test
3 MODE	Edit Operating Mode	Lock Keypad	Select Edit Mode	Set Cmnd Permissions	n/u
4 back	Scroll Memory Down	n/u	Show Code Rev	Set Memory Edit	Re-Set Data Base
5 SCAN	Scan ON/OFF	Edit Scan	Select Scan Parameters	n/u	n/u
6 fwd	Scroll Memory Up	Edit Description	Select PTT timer	n/u	Transparent Mode
7 FREQ	Edit Frequency	Create Shadow Chan	Select Side tone Audio	Set Freq Display	Edit Passwords
8 down	Display – Dimmer	Copy Main to Guard	PC Communications	Set KeyTag for Keys	Run Boot loader
9 SQL	Edit Squelch Mode	Set Encrypt ON/OFF	Show Squelch Values	Set SQL Permissions	Set Unit ID
0 PROG	Go to next level	Go to next level	Go to next level	Go to next level	n/u
# ENTER	Toggle Home/Current	Select Home Memory	n/u	n/u	n/u
* ESC	Toggle Talk Around	Go to Previous level	Go to Previous level	Go to Previous level	Go to Previous level
2+4+6	Emergency Erase Keys	n/u	n/u	n/u	n/u

Table 3-1. Command Level Reference

NOTE: n/u indicates command keys that are not currently implemented.

Operator Levels:
Level 1 commands are a mix of operating and editing commands.
Level 2 commands are a mix of operating, editing, and configuration commands.
Level 3 commands are configuration commands.

Restricted Levels:
Level 4 allows qualified personnel to configure access permissions for the radio.
Level 5 allows qualified personnel to change core aspects of the transceiver operation including erasing and updating the transceiver code.

NOTE: NEVER fly the radio with restricted levels accessible.

These command levels are for maintaining the transceiver only, they are not required for operation in flight!

3.1   Operator Level 1 Commands

This section lists the commands available to the user in Level 1. The availability of the commands is subject to the restrictions set by the Permissions policy (see section 2.5).

The commands are listed by increasing number.

3.1.1   Select the Operating Memory for the Main Channel

Level 1   Key [1 CHAN]   Scope: Main only

This command allows you to directly select the memory for the MAIN channel operation, the cursor will appear at the first digit in the channel number as shown:

```
● 000
● Enter Number (0-9,#*)
```
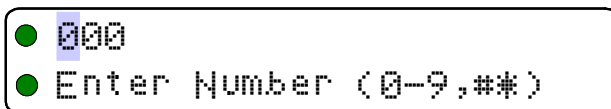
Figure 3-1. The User Screen to Enter a Memory Number

Now, select a number from 001 to 230, the cursor wraps. Valid edit keys are:

[0 PROG] to [9 SQL]   Enter digit, cursor automatically advances and wraps

[# ENTER]   accept the entry and continue

[* ESC]   abandon the entry and exit

Note: If the channel number selected is out of range then the cursor will remain until the user enters a valid number. If there is no information programmed for the channel, the editor will return to the previously displayed channel.

3.1.2   Increase Display Brightness

Level 1   Key [2]   Scope: Main and Guard

Press and hold the up arrow (2) key to increase the brightness of the LED character display, it stops when the key is released or at maximum, whichever occurs first.

3.1.3   Edit Channel Operating Mode

Level 1   Key [3 MODE]   Scope: Main and Guard

This command will edit the Operating Mode of the selected channel. Upon selecting this command the cursor will appear at the MODE position.

```
● 001 Main    D136.0000Rg
● Edit Mode (↑↓3,#*)
```
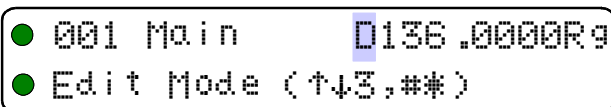
Figure 3-2. The User Screen to Edit the Operating Mode

Edit Keys

Key	Description
2↑ 3 MODE	step up through available operating modes (w, n, D)
8↓	step down through available operating modes (w, n, D)
# ENTER	accept the entry and exit
* ESC	abandon the entry and exit

Table 3-2 Transceiver Operating Modes		
Operating Mode	Bandwidth	Indicator
Analog Wide	25 kHz	'w'
Analog Narrow	12.5 kHz	'n'
P25 Digital	12.5 kHz	'D'

Note: If an Operating Mode is selected that is incompatible with the current Squelch Mode, then the Squelch mode will automatically be changed to one that is acceptable for that Operating Mode (ie >x' for analog, 'm' for Digital Rx and 'g' for Digital Tx).

### 3.1.4   Scroll Backwards through Available Memories

Level 1   Key 4   Scope: Main only

Press and hold the back arrow (4) key to scroll the memories for the Main Channel BACK, or down, through the programmed memories until reaching the lowest memory programmed, it will then wrap around and restart from the top. Once the user releases the button the displayed characteristics will be programmed. The scroll speed will increase as the button is held.

3.1.5   Start/Stop Scan

Level 1   Key 5 SCAN   Scope: Main only

This command allows the user to start and stop Scan operation, the system will scan the channels that are in the same scan list that the currently displayed Main channel is a member of. Note that the channels in the scan list must have scan enabled (see command L2-5) to be scanned. If the scan has not been enabled for the memory, then the following screen appears:

```
● 001₁Main      D136.0000Rg
● Error Non-Scanned Chan
```
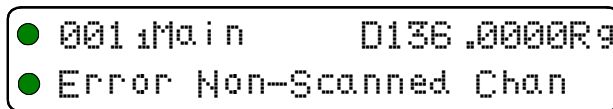
Figure 3-3. Trying to start scan on a Channel with Scan disabled

If the channel has been enabled for scan the user will see the following screen:

```
● 001₁Main      D136.0000Rg
● GD1█Guard1    n154.0000Rt
```
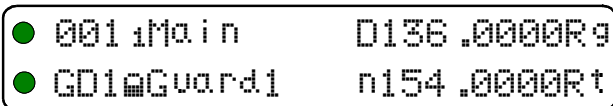
Figure 3-4. Start scan on a Channel with Scan enabled

Once scan has started the scan list digit flashes to indicate that the unit is in SCAN mode. Also note that the key level indicator position has the lock symbol, this indicates that all keypad keys are disabled except for:

Edit Keys

| 5 SCAN | * ESC | Stop scan |

| 2↑ | 8↓ | change display brightness |
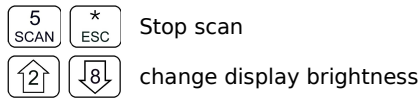
Front panel switch operation is modified as well: operation of **MN/GD** or **G1/G2** *will terminate scan* and restore normal operation of keys and switches. The front panel **Squelch** button is disabled. The **HI/LO** power switch is unaffected.

3.1.6   Scroll Forwards through Available Memories

Level 1   Key 6⟩   Scope: Main only

Press and hold the forward arrow (6) key to scroll the Main Channel FOREWARD, or up, through the programmed memories until reaching the highest memory programmed, it will then wrap around and restart from the bottom. Once the user releases the button the displayed characteristics will be programmed. The scroll speed will increase as the button is held.

3.1.7   Edit Channel Operating Frequency

Level 1   Key 7 FREQ   Scope: Main and Guard

This command allows the user to edit the **Operating Frequency** of the selected channel. The frequency will be edited in duplex mode: first Receive, then Transmit. Once the receive parameter is entered, the 2nd last character in the display will switch from "R" to "T", the user can now enter the transmit value. Note that the receive value is automatically entered, so to get simplex operation, simply accept this entry. The edit screen appears as follows:

```
● 001 Main      w136.0000Rx
● Edit Frequency (0-9,#*)
```
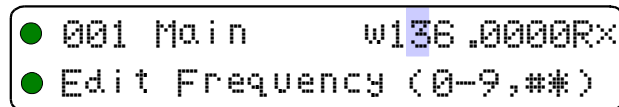
Figure 3-5. The User Screen to Edit the Main frequency

Upon start, the cursor appears at the second character in the Frequency field of the channel to be edited. The user may now enter the desired operating frequency as follows:

Edit Keys
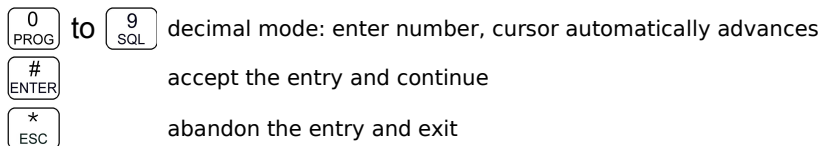
| 0 PROG | to | 9 SQL | decimal mode: enter number, cursor automatically advances |

| # ENTER | accept the entry and continue |

| * ESC | abandon the entry and exit |

The editor will not accept a value outside the limits of 136.0000 MHz. to 174.0000 MHz. In addition frequency selection is limited to 2.5 kHz increments and valid 6.25 kHz frequencies in all Operating modes (see appendix N for valid 6.25kHz frequencies).

3.1.8 Decrease Display Brightness

Level 1   Key ⬇8️⃣   Scope: Main and Guard

Press and hold the down arrow (8) key to decrease the brightness of the LED character display, it stops when the key is released or at minimum, whichever occurs first.

3.1.9 Edit Channel Squelch Mode

Level 1   Key 9️⃣SQL   Scope: Main and Guard

Select the Squelch Mode for the active memory (determined by front panel switch positions), and edit the value if applicable. Note that the scope of the command is subject to restrictions imposed by the Squelch Permissions – see L4-3. Edit Squelch is a duplex command: Receive followed by Transmit. At start the cursor appears at the Squelch Mode indicator position as follows:

```
● 001 Control  w136.0000Rx
● Edit Sql Mode (↑↓9,#*)
```

Figure 3-6. Editing the Squelch Mode

Edit Keys

9️⃣SQL 2️⃣ ⬇8️⃣ step up/down through available squelch modes.
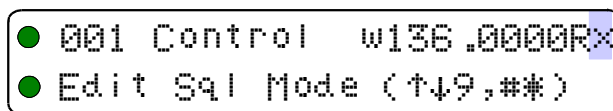
#️⃣ENTER   accept the entry and exit

*️⃣ESC   abandon the entry and exit

The available options are constrained by the operating mode as per table 3-3.

Table 3-3. Receive and Transmit Squelch Modes					
Analog			Digital		
Rx		Tx	Rx		Tx
Noise	✕	CTCSS Tones	Monitor	m	TalkGroup + NAC	g
CTCSS Tones	t	DCS Codes	NAC Only	n	ID Call	i
DCS Code	c	Inhibit	TalkGroup + NAC	g	Inhibit	-

Once the Squelch Mode has been selected, if applicable, the user will be allowed to edit the value of the selected mode (subject to restrictions imposed by the Squelch Permissions – see L4-3).

Analog - Noise Squelch Value

Scope: receive only, range 0-16 ($0-$F)

If Noise (Rx) is chosen, the prompt line will display the current value for noise squelch level and place the cursor on the first digit available for the user to edit:

```
● 001 Control  w136.0000Rx
● Noise Level:       10
```

Figure 3-7. Editing the Noise Squelch Value

Edit Keys

0 PROG	to	9 SQL	decimal mode: enter number, cursor automatically advances

ENTER   accept the entry and continue

* ESC   abandon the entry and exit

Analog - CTCSS Tone

Scope: receive & transmit, 42 tones (see appendix 4.2)

If CTCSS Tones are chosen, the prompt line will display the current value for that tone:

```
● 005 Holden    n156.5000Rt
● CTCSS Tone (↑↓,#*):  67.0
```
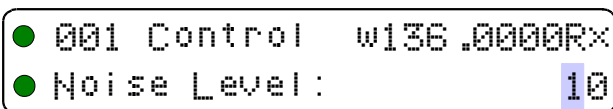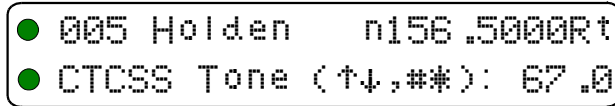
Figure 3-8. Selecting the CTCSS Tone Value

Edit Keys

| 2↑ | 8↓ | step up/down through available CTCSS tones |

ENTER   accept the entry and: continue if Rx, exit if Tx

* ESC   abandon the entry and exit

Edit Analog - DCS Code

Scope: receive & transmit, 83 codes (see appendix 4.2)

If DCS Codes are chosen, the prompt line will display the current value for that code:

```
● 005 Holden    n156.5000Rc
● CTCSS Code (↑↓,#*):    23
```
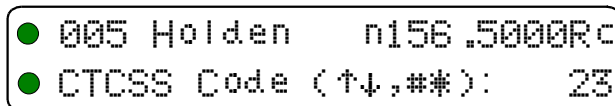
Figure 3-9. Selecting the DCS Code Value

Edit Keys

| 2↑ | 8↓ | step up/down through available CTCSS tones |

ENTER   accept the entry and: continue if Rx, exit if Tx

* ESC   abandon the entry and exit

Edit P25 Digital - Talkgroup Value

Scope: receive and transmit, range 0-65535 ($0000-$FFFF)

If the P25 TalkGroup was chosen the, the prompt line will display the current TalkGroup value, the cursor will be on the first digit:

```
● 005 Holden    D156.5000Rg
● P25 TalkGroup:      0001
```

Figure 3-10. Editing the P25 TalkGroup Value

Edit Keys

◁4 6▷	hex edit: move cursor backward/forward through the digits
2↑ 8↓	hex edit: step up/down through the hex digits (0-9, A-F)
0 PROG to 9 SQL	decimal edit: enter number, cursor automatically advances
# ENTER	accept the entry and continue to Edit NAC
* ESC	abandon the entry and exit

Note: If P25 Talkgroup was chosen, the editor will drop into Edit NAC upon accepting the Talkgroup value.

Edit P25 Digital - NAC Value

Scope: receive and transmit, range 0-4095 ($000-$FFF)

If the P25 NAC was chosen (or after entering the P25 TalkGroup) the prompt line will display the current NAC value, with the cursor on the first digit:
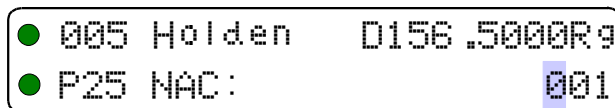
```
● 005 Holden   D156.5000Rg
● P25 NAC:           001
```
Figure 3-11. Editing the P25 NAC Value

Edit Keys

◁4 6▷	hex edit: move cursor backward/forward through the digits
2↑ 8↓	hex edit: step up/down through the hex digits (0-9, A-F)
0 PROG to 9 SQL	decimal mode: enter number, cursor automatically advances
# ENTER	accept the entry and: continue if Rx, exit if Tx
* ESC	abandon the entry and exit

Edit P25 Digital - ID Call Value

Scope: transmit only, range 0-9,999,999

If the P25 ID Call was chosen, the prompt line will display the current ID Call value. This parameter may only be edited in decimal, as follows:
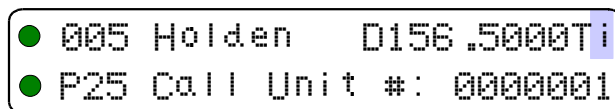
```
● 005 Holden   D156.5000Ti
● P25 Call Unit #: 0000001
```
Figure 3-12. Editing the P25 ID Call Value

This transmit only mode allows the user to try to contact a specific radio by transmitting that radio's user ID. If no radio has that ID then this will fail.

Edit Keys

0 PROG to 9 SQL	decimal mode: enter number, cursor automatically advances
# ENTER	accept the entry and exit
* ESC	abandon the entry and exit

3.1.10   Command Level Up

Level 1   Key $\boxed{\begin{smallmatrix} 0 \\ \text{PROG} \end{smallmatrix}}$ Scope: Main and Guard

This key selects the next HIGHER Command Level, the Command Level is indicated by a subscript digit in the 4th character position on the lower row of the display.

3.1.11   Toggle memory: current/home

Level 1   Key $\boxed{\begin{smallmatrix} \# \\ \text{ENTER} \end{smallmatrix}}$ Scope: Main only

This key toggles the main channel display between whatever memory is currently selected, and the designated 'home' memory. If no memory has been selected as 'home' then the unit defaults to memory '001'.

3.1.12   Toggle Talk Around

Level 1   Key $\boxed{\begin{smallmatrix} * \\ \text{ESC} \end{smallmatrix}}$ Scope: Main and Guard

Talk around is the name given to the function that allows you to temporarily set a duplex memory to use the receive parameters for transmit. Simplex channels are, of course, unaffected as the receive and transmit parameters are already the same. The 'up arrow' character $\text{\textdagger}$ will replace the decimal point in the Frequency field to indicate Talk Around is active for the channel.

3.1.13   Erase Encryption Keys

Level 1   Key $\boxed{2}$ + $\boxed{4}$ + $\boxed{6}$ Scope: Main and Guard

Press all three keys at the same time to bring up a screen that allows you to erase all the encryption keys in the transceiver. This command is irreversible. You must re-load keys with a key-loader in order to restore keys and hence encryption functionality.

3.2   Operator Level 2 Commands

Access the **Operator Level 2 Commands** by pressing the **"PROG"** key from the **Operator Level 1** once. The Menu Level is indicated in the 4th character position on the lower row of the display, this will indicate a subscript **"2"**.

Note: the system is *time limited* in command levels above level 1. The system will *automatically* return to level 1 if a command has not been selected in five (5) seconds.

The Operator Command Level 2 maps the keys to provide a new set of functions for the operator as shown in Table 3-1. Details of command operation are given below.

3.2.1   Create/Edit All Memory Parameters

Level 2   Key $\boxed{\underset{\text{CHAN}}{1}}$ Scope: Main and (Guard)

This command allows the user to create a new memory position (for Main channel only) or to edit all the parameters of an existing memory position (Main or Guard channels).

The editor steps through the channel parameters in sequence from left to right across the screen. The edit functions here match those used to edit an individual parameter; however, in this case selecting the ENTER key accepts the data and *proceeds to the next step*, rather than exiting. Only after the last step does selecting ENTER save the data and exit. The ESC key will abandon the entire edit session at any point without changing an existing channel or creating a new one.

$\boxed{\underset{\text{ENTER}}{\#}}$ accept the entry and continue – exit only after all edits completed.

$\boxed{\underset{\text{ESC}}{*}}$ abandon the entry and exit

If editing a Guard memory (G1 or G2) then proceed to L2-1.3 as the memory for the Guard channel is determined by front panel switches only, and scan is not supported for Guard.

L2-1.1. Entering a Memory Number (refer to L1-1 for details)

Upon selecting this command, the first step is to enter the number of the memory position that you wish to Create or Edit, for Main Channel memories, the valid range is (001 to 230).

Once a number has been entered, the system checks to see if the memory location has already been programmed, if so, then the existing data will be loaded; if the location has NOT been previously programmed then the default template data will be loaded. In each case the user can edit the channel parameters in the same way as shown in the following steps.

L2-1.2. Enter a Scan List & Enabling/Disabling Scan (refer to L2-5 for details)

After entering a MEMORY number the cursor will move to the fourth (4th) position on the top line, the default scan list is shown in subscript. If there is a bar over top of the character, this indicates that scan is disabled for this memory, if there is no bar, then scan has been enabled. The 'PROG' key (key 0) toggles the scan enabled/disabled state.

L2-1.3. Enter a Text Description (refer to L2-6 for details)

After SCAN, the cursor advances to the first position in the eight (8) character text description field, the user may now edit the existing text as desired. The editor allows you to select all upper and lower (A-Z, a-z) case alphabetic characters, the numbers from zero to nine (0-9), and a selection of extra characters including the space.

L2-1.4. Enter an Operating Mode (refer to L1-3 for details)

After TEXT, the cursor advances on the one (1) character Operating Mode (Mode) field, this single character represents the operation of the radio: analog wide, analog narrow, or digital.

L2-1.5. Enter a Frequency (refer to L1-7 for details)

After MODE, the cursor advances to the frequency parameter field, this is a seven (7) digit decimal parameter, though the first digit is always one so the user cannot edit that digit. The frequency

parameter may be edited to any number between 136.0000 and 174.0000 in 2.5 kHz. steps. (ie 150.0025 is valid, 150.0046 is not), or frequencies in the 6.25kHz plan (see appendix D)

This is a duplex parameter, that is, the user has a chance to edit both the receive value followed by the transmit value. Once the receive value has been accepted, pressing 'ENTER' again will accept the same value for transmit. If you wish to have a different value for transmit, then enter it now, otherwise accept the value for simplex.

L2-1.6. Enter the Squelch Parameters (refer to L1-9 for details)

After FREQUENCY, the cursor advances to the Squelch Mode field. A single character field shows the Squelch Mode selected. This is a duplex parameter so a different mode can be chosen for transmit than was chosen for receive. Note that the modes available will be restricted by the Operating Mode (ie the modes available are different for analog and digital operation).

Once the user is finished and selects 'ENTER' then the newly edited channel parameters are selected and displayed for the appropriate channel. This may take a moment as the information is programmed into the appropriate RF module at this time as well.

3.2.2   Copy Guard to Main

Level 2   Key ⌂2⌂   Scope: Main only

Copy the currently displayed Guard information UP to the Main channel. This is irreversible, so be sure you wish to do this. As a safety precaution this command is disabled from the factory. (see Command Permissions L4-2).

3.2.3   Lock Keypad

Level 2   Key 3/MODE   Scope: Main and Guard

This command locks the keypad to prevent accidental change to parameters of the radio unbeknownst to the operator. This will disable all keyboard functions (except keyboard unlock and display luminance).

Edit Keys

3/MODE   Lock the keypad, display 'locked' until key release.

*/ESC   Unlock the keypad (after 2 seconds), display 'unlocked' until key release.

3.2.4   L2-4 not used.

Level 2   Key ◁4◁   Scope: Command unused.

3.2.5   Edit Scan List & Enable/Disable Scan

Level 2   Key 5/SCAN   Scope: Main only

This command allows the user to select which SCAN LIST - if any - that the selected channel is included in. The memory must be a member of one of the fifteen (15) scan lists that are supported. In addition, it allows the user to select whether or not the scan is enabled for the current memory.

The cursor will move to the fourth (4th) position on the top line, the default scan list is shown in

subscript. If there is a bar over top of the character, this indicates that scan is disabled for this memory, if there is no bar, then scan has been enabled.

```
● 001 Main      w136 .0000Rx
● Edit Zone/Scan (↑↓0,#*)
```

Figure 3-13. The Screen to Enter a Scan List or Enable/Disable Scan

Edit Keys

⌷2↑	step up through available scan lists
↓8⌷	step down through available scan lists
0 PROG	toggle the scan enable / disable (bar = disabled)
# ENTER	accept the entry and exit
* ESC	abandon the entry and exit

Note: If a scan list is full, it will NOT appear in the list. This includes the default list, if this happens, the unit will display the next higher available list, this will stop at list 15 and then loop back to list 1.
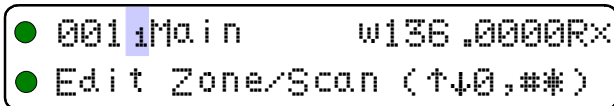
```
● 001 Main      w136 .0000Rx
● Edit Zone/Scan (↑↓0,#*)
```

Figure 3-14. The Screen Showing Scan Enabled for this Memory

3.2.6 Edit Memory Text Description

Level 2   Key ⌷1 CHAN⌷   Scope: Main and Guard

This command allows the user to edit the text description for the selected channel. There are four groups of characters that may be used; upper case (A-Z), lower case (a-z), numbers (0-9), and 16 extra characters (shown in table 3-4 below). The user can change character groups *at any time* and as many times as desired during a description edit session.
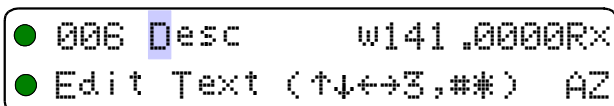
```
● 006 Desc      w141 .0000Rx
● Edit Text (↑↓←→3,#*)  AZ
```

Figure 3-15. Editing the Text Description

Edit Keys

3 MODE	step through the four available edit groups (A-Z, a-z, 0-9, extra characters (see table 3-4)
⌷2↑ ↓8⌷	step up/down through the characters in each edit group
⌷4 6⌷	move backward/forward through the available characters
# ENTER	accept the entry and exit
* ESC	abandon the entry and exit

Note that the up/down arrow keys are *scroll* enabled, that is, if you hold them you will scroll through the character set rather than having to press each time you want to advance.

Table 3-4. Extra Characters for Text Edit															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	!	"	#	$	%	&	'	(	)	*	+	,	—	▪	/

Note: the first character in the table is a blank space.

3.2.7 Create Shadow Memory

Level 2   Key $\boxed{\substack{7 \\ \text{FREQ}}}$ Scope: Main only

This command allows the user to create a shadow of an existing memory on the Main channel. To do so there are two basic steps: select an existing memory as the Primary memory, and then create a shadow memory of the primary.

L2-7.1. Selecting a Primary Memory to Base the Shadow On

First, pick an existing memory to act as the primary, up to seven other memories can be linked to this one as 'shadows'.
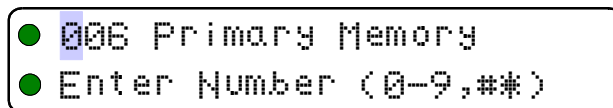
```
● 006 Primary Memory
● Enter Number (0-9,#*)
```

Figure 3-16. Entering a Primary Memory for the Shadow Channel

Edit Keys

$\boxed{\substack{0 \\ \text{PROG}}}$ to $\boxed{\substack{9 \\ \text{SQL}}}$ decimal mode: enter number, cursor automatically advances

$\boxed{\substack{\# \\ \text{ENTER}}}$ accept the entry and continue

$\boxed{\substack{* \\ \text{ESC}}}$ abandon the entry and exit

L2-7.2. Create a Shadow of the Primary Memory

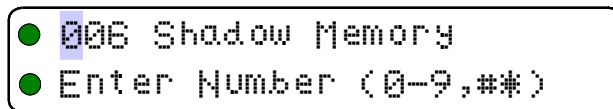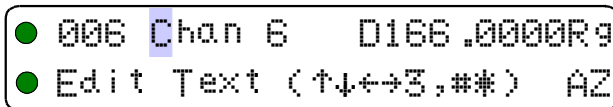To create a shadow memory, start by entering a number for the shadow memory:

```
● 006 Shadow Memory
● Enter Number (0-9,#*)
```

Figure 3-17. Entering a Shadow Channel Memory Number

Enter a number for the shadow memory, do not select a number already in use:

Edit Keys

$\boxed{\substack{0 \\ \text{PROG}}}$ to $\boxed{\substack{9 \\ \text{SQL}}}$ decimal mode: enter number, cursor automatically advances

$\boxed{\substack{\# \\ \text{ENTER}}}$ accept the entry and continue

$\boxed{\substack{* \\ \text{ESC}}}$ abandon the entry and exit

Assume that the user entered '061' as the desired shadow channel number. The radio will now display the data from the chosen Primary channel:

```
● 006 Chan 6    D166 .0000Rg
● Edit Text (↑↓←→3,#*)   AZ
```

Figure 3-18. Edit the Shadow Memory Parameter - Text

The user may now edit those data fields that are valid for a shadow channel. These are:

- Text Description
- Operating Mode
- Squelch Mode and associated value

The editor functions and keys are the same as for any of the independent editor operation, the difference, as with Create New / Program All (L2-1), is that the ENTER key will advance to the next editor until all valid fields have been entered, then the ENTER key accepts and exits.

Note that there are some parameters that cannot be edited:

- Frequency is fixed to that of the Primary channel
- Shadow channels cannot be scanned.
- Shadow channels cannot use the Digital Squelch Mode IDcall (i).
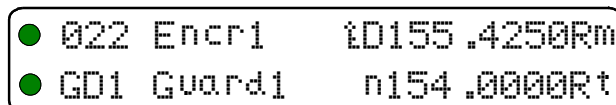
3.2.8   Copy Main to Guard

Level 2   Key ⬇8   Scope: Main and Guard (disabled by default)

Copy the currently displayed Main information DOWN to the selected Guard channel. This is irreversible, so be sure you wish to do this. As a safety precaution this command is disabled from the factory. (see Command Permissions L4-2).

3.2.9   Encryption ON/OFF

Level 2   Key ⁹SQL   Scope: Main and Guard

This command allows the user to turn Encryption ON or OFF providing that the current channel is a digital channel with an encryption key assigned to it. If so, you will see something like:

```
● 022 Encr1    iD155 .4250Rm
● GD1 Guard1    n154 .0000Rt
```

Figure 3-19. The Encryption Enabled for Main.

3.2.10   Command Level Up

Level 2   Key ⁰PROG   Scope: Main and Guard

This key selects the next HIGHER Command Level, the Command Level is indicated by a subscript digit in the 4th character position on the lower row of the display.

3.2.11   Command Level Down

Level 2   Key ⌈ * ESC ⌉   Scope: Main and Guard

This key selects the next LOWER Command Level, the command Level is indicated by a subscript digit in the 4th character position on the lower row of the display.

3.2.12   Set Home Memory.

Level 2   Key ⌈ # ENTER ⌉   Scope: Main only

This command allows you to directly select the home memory for the MAIN channel as shown:
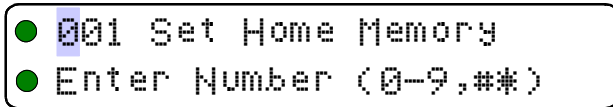
```
● 001 Set Home Memory
● Enter Number (0-9,#*)
```

Figure 3-20. Set the Main channel Home memory

Now, select a number from 001 to 230, the cursor wraps. Valid edit keys are:

⌈ 0 PROG ⌉ to ⌈ 9 SQL ⌉   Enter digit, cursor automatically advances and wraps

⌈ # ENTER ⌉   accept the entry and continue

⌈ * ESC ⌉   abandon the entry and exit

3.3   Operator Level 3 Commands

The Level 3 commands allow the operator to configure many of the default parameters of the radio. In addition, level 3 has the PC upload and download commands.

3.3.1   Select Boot Channel

Level 3   Key ⌈ * ESC ⌉   Scope: Main only

Select which memory that will be used for the Main Channel when the unit is turned on: the *last Selected memory,* the *last Programmed memory or the Home memory*.
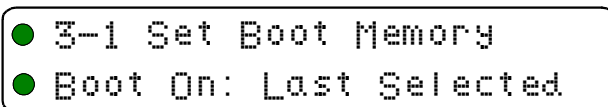
The default is: *last Selected memory.*

```
● 3-1 Set Boot Memory
● Boot On: Last Selected
```
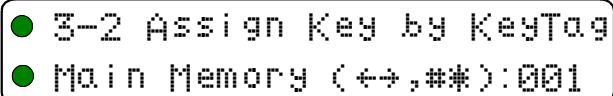
Figure 3-21. Selecting Main Channel Boot Memory

Edit Keys

⌈ 2 ⌉ ⌈ 8 ⌉ ⌈ 1 CHAN ⌉   step up/down through available boot memory choices

⌈ # ENTER ⌉   accept the entry and exit

⌈ * ESC ⌉   abandon the entry and exit

3.3.2   Assign Key by KeyTag

Level 3   Key ⌈2⌉   Scope: Main only

This command allows the user to select a memory, and then assign a key, via the KeyTag, to that memory.

First, step through available memories, and select one to assign a key to.

```
● 3-2 Assign Key by KeyTag
● Main Memory (←→,#*):001
```
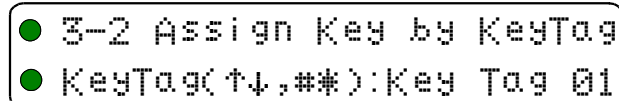Figure 3-22. Selecting the Memory to Assign the Key to

Edit Keys

⌈2⌉ ⌈8⌉   step up/down through available memories (Main only)

⌈# ENTER⌉   accept the entry and exit

⌈* ESC⌉   abandon the entry and exit

Once a memory has been selected, then step through the available KeyTags and pick one to assign to the selected memory.

```
● 3-2 Assign Key by KeyTag
● KeyTag(↑↓,#*):Key Tag 01
```
Figure 3-23. Selecting the KeyTag to Assign to the Memory
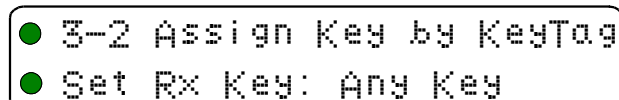
Edit Keys

⌈2⌉ ⌈8⌉   step up/down through available KeyTags.

⌈# ENTER⌉   accept the entry and exit

⌈* ESC⌉   abandon the entry and exit

After assigning the key, set how the decrypt function is applied to receiving on this memory: by only decrypting signals encrypted with the assigned key, or by decrypting if the received signal was encrypted using any key currently loaded into the radio.

```
● 3-2 Assign Key by KeyTag
● Set Rx Key: Any Key
```
Figure 3-24. Selecting the decrypt option: Any Key or Assigned Key

Edit Keys

⌈2⌉ ⌈8⌉   toggle Receive Key Option: Any Key / Selected Key.

⌈# ENTER⌉   accept the entry and exit

⌈* ESC⌉   abandon the entry and exit

Once the above screens have all been passed, then you are given the chance to assign another key, or to exit.

```
● 3-2 Assign Key by KeyTag
● Assign More? #=OK *=exit
```
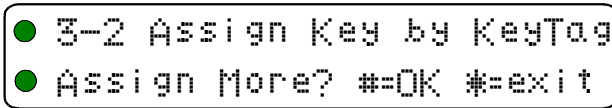
Figure 3-25. Screen to Assign another key or exit

Edit Keys

`#` `ENTER`   assign another

`*` `ESC`   exit

3.3.3   Set Numeric Edit Mode: Decimal or Hexadecimal

Level 3   Key `3 MODE`   Scope: Main only

Select whether to edit the TalkGroup and the NAC numbers as Hexadecimal (Hex) or as Decimal numbers. The other parameters are edited in decimal only. Note that 'HEX' is indicated by a preceding dollar sign (ie $014 is hex 14 or 20 decimal).

```
● 3-3 Set Hex/Decimal Edit
● Edit in: Hex
```
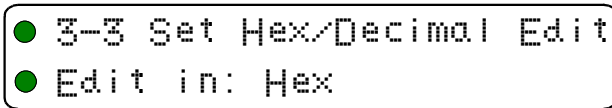
Figure 3-26. Selecting Edit mode

Edit Keys

`2↑` `8↓`   toggle Edit Mode Option: Hex / Decimal Edit.

`# ENTER`   accept the entry and exit

`* ESC`   abandon the entry and exit

3.3.4   Display Firmware Release and Version Information

Level 3   Key `4`   Scope: Main only

Display the current firmware release and version information for the various firmware objects in the transceiver. This information is displayed on the bottom row as follows:

```
● 3-4 Show Code Versions
● Main: 3.0.0/e
```
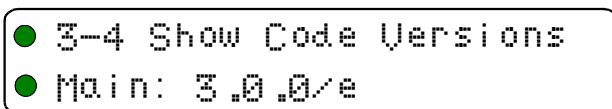
Figure 3-27. Showing the Code Release Information

Edit Keys

`2↑` `8↓` `4`   Step through firmware information: Main, Bootloader, RF Main, and RF Guard.

`* ESC`   exit

3.3.5 Edit Scan Parameters

Level 3   Key ⟦* ESC⟧   Scope: Main only

Edit the parameters that govern the SCAN operation. There are 4 (four) parameters that may be configured: Revert Mode, Reply Timer, Monitor Timer, and Delay Timer. As with the Create/Edit All command (L2-1), this command is sequential, allowing the user to move between parameters using the enter key, at the last parameter, this key accepts all and exits.

L3-5.1. Setting the Revert Mode default: last contacted

The Revert Mode refers to whether the radio will, when keyed, transmit on the *selected* memory channel, or on the last *contacted* memory channel. The radio will only respond on the last contacted channel for a time determined by the Delay timer setting, once the timer times-out, then the unit always transmits on the selected channel. The Revert Mode screen is as follows:

```
● 3-5 Edit Scan Parameters
● Revert Mode: Contacted
```
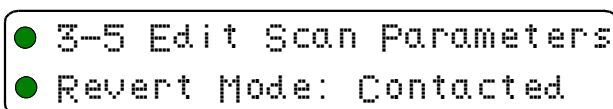
Figure 2-28. Select the Scan Revert Mode

Edit Keys

⟦2⟧ ⟦8⟧	toggle the revert mode
⟦# ENTER⟧	accept the entry and exit
⟦* ESC⟧	abandon the entry and exit

L3-5.2. Setting the Reply Timer Range: 0-20s, Default: 3 seconds

Set the scan Reply time. This is the time that the radio will monitor a channel on which RF was received, after all activity on the channel has ended (Rx or Tx). If there is further receive or transmit activity on the channel, the timer will reset, and start again once the activity has ended. When the timer times-out the unit will resume scan. If set to zero (0), the unit will resume scan immediately when channel activity ends.

```
● 3-5 Edit Scan Parameters
● Reply Timer:          03
```
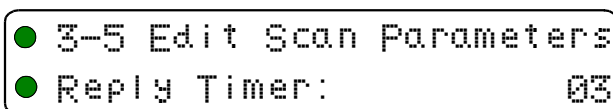
Figure 2-29. Set the Scan Reply Timer Value

Edit Keys

⟦0 PROG⟧ to ⟦9 SQL⟧	decimal mode: enter number, cursor automatically advances
⟦# ENTER⟧	accept the entry and continue
⟦* ESC⟧	abandon the entry and exit

L3-5.3. Setting the Monitor Timer Range: 1-90s, Default: 10 seconds

Next, set the scan Monitor time, this is the time that the radio will monitor a channel on which RF was received, before resuming scanning. Once the timer expires, the unit will break and resume scan, if the value is set to zero (0) then the unit will monitor the signal as long as it is received.

```
● 3-5 Edit Scan Parameters
● Monitor Timer:        10
```

Figure 3-30. Set the Scan Monitor Timer Value

Edit Keys

| 0 PROG | to | 9 SQL | decimal mode: enter number, cursor automatically advances |

| # ENTER | accept the entry and continue |

| * ESC | abandon the entry and exit |

L3-5.4. Setting the Delay Timer Range: 0-15s, Default: 5 seconds

The Delay time is the time that the radio will remain monitoring a channel after receiving on that channel has ended. If the timer is set to zero, (0), then the unit will resume scanning immediately after receive activity ends. This is the timer that affects the Revert Mode 'Contacted'.

```
● 3-5 Edit Scan Parameters
● Delay Timer:          05
```
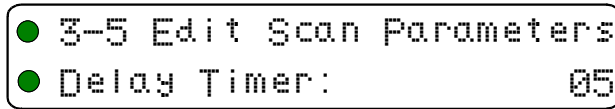
Figure 3-31. Set the Scan Delay Timer Value

Edit Keys

| 0 PROG | to | 9 SQL | decimal mode: enter number, cursor automatically advances |

| # ENTER | accept the entry and continue |

| * ESC | abandon the entry and exit |

3.3.6   Configure PTT Timer

Level 3   Key 6   Scope: Main only

The PTT timer runs whenever the user holds PTT. The PTT timer duration may be set using this command: scroll through the available selections: OFF, 30 seconds, 60 seconds and 90 seconds.

```
● 3-6 Set PTT Timer
● Timer Set: 90 sec
```
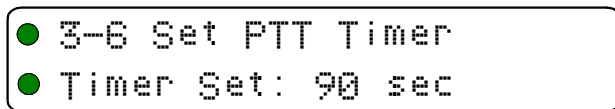
Figure 3-32. Set the PTT Timer Value

Edit Keys

|2↑| |6▷| Step up through PTT timer settings

|8↓| Step down through PTT timer settings

|# ENTER| accept the entry and exit

|* ESC| abandon the entry and exit

3.3.7   Side Tone Audio Level Adjust

Level 3   Key |7 FREQ| Scope: Main only

This command allows the user to adjust the level of side tone, the range of adjustment is 0 to 85, the default level is 35. The screen shows the currently selected level as shown:

```
● 3-7 Set Sidetone Audio
● Audio Level: (0-85):   22
```
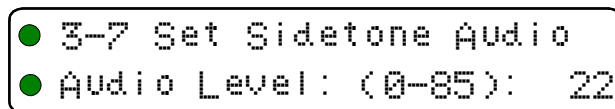
Figure 3-33. Set the Side tone Audio Level

Edit Keys

|0 PROG| to |9 SQL| decimal mode: enter number, cursor automatically advances

|# ENTER| accept the entry and continue

|* ESC| abandon the entry and exit

3.3.8   PC Data Upload/Download

Level 3   Key |8↓| Scope: Main only

This command allows a user to exchange TDFM-136 channel memory files (records) between a PC and the transceiver. The unit must be connected to a PC running Windows 95, 98, NT 4.0, 2000, XP, or Win7 and the TiL TDP-136 Radio Communication Software package. When in this mode, the communication is controlled by the PC software. The transceiver will wait for 25 seconds to receive a valid record before timing out. The radio will indicate which memory is being transferred, and when the transfer is complete.

```
● Communicate with PC
● Ready
```
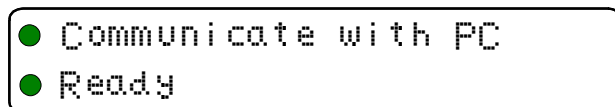
Figure 3-34. Upload/Download Memory Data to/from the PC

If the transceiver has to swap memory space during the download, the activity will be displayed on the front panel and the download will be completed after a SWAP and ERASE cycle is finished.

There is one user key function:

|* ESC| abandon PC communications mode

3.3.9   Display Channel Squelch Parameters

Level 3   Key ⟨9 SQL⟩   Scope: Main and Guard

Display the Squelch parameters for the currently selected channel. The data are displayed as follows:

```
● Rx: Tone Code TalkG NAC
●  A 167.0   23   $0001$293
```

Figure 3-35. Display of the Receive Squelch Parameter Values

When displaying the receive parameters, the noise squelch level appears beneath the "Rx" that starts the line, this space is blank in the transmit parameters display:

```
● Tx: Tone Code TalkG NAC
●    167.0   23   $0001$293
```
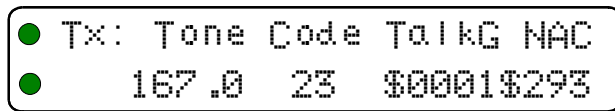
Figure 3-36. Display of the Transmit Squelch Parameter Values

Edit Keys

⟨2↑⟩ ⟨8↓⟩ ⟨9 SQL⟩ toggle the squelch parameter display between receive (Rx) and transmit (Tx)

⟨* ESC⟩   exit

3.3.10   Command Level Up

Level 3   Key ⟨0 PROG⟩   Scope: Main and Guard

This key selects the next HIGHER Command Level, the Command Level is indicated by a subscript digit in the 4th character position on the lower row of the display.

3.3.11   Command Level Down

Level 3   Key ⟨* ESC⟩   Scope: Main and Guard

This key selects the next LOWER Command Level, the command Level is indicated by a subscript digit in the 4th character position on the lower row of the display. See section 2.1 above.

3.3.12   Unused

Level 3   Key ⟨# ENTER⟩   Scope:

3.4   Maintenance Commands (Level 4)

The Maintenance Command Level is a restricted command level; that is, access to these commands is restricted to authorized personnel. This restriction is enforced by requiring either a password or requiring that a shunt be placed on a specific set of jumper pins on the MCU board of the radio.

The Maintenance Commands available allow authorized personnel to set policy for the radio use, by granting or restricting access to system commands and features.

This command level does not preserve the Normal Operating display characteristics, that is: the Main and Guard displays are replaced by suitable command prompt information.

3.4.1   Set Default Record

Level 4   Key ⌊1 CHAN⌋   Scope: Main and Guard

This command allows the user to set up the default record that is used when a user selects Create New/ Edit All (L2-1). This allows you to determine what parameters you wish to have as system defaults. Some of the parameters are subject to restrictions set out in L4-9.

NOTE: If these values are set first, and the restrictions are set after, it is possible for the user to end up using a parameter that you wish to restrict!

The Default Record editor works just like the Create New/ Edit All command (L2-1) except that it takes you through all the possible squelch combinations so that each selection can be edited. Table 3-5 shows the parameters that may be edited, and their default values.

Table 3-5. The Channel Template Factory Defaults		
Parameter		**Value**
Basic	Scan List	1
	Text Description	"Desc "
	Operating Mode	w
Receive	Rx Frequency	141.0000
	Rx Squelch Mode	x
	Rx Squelch TalkGroup Value	$0001
	Rx Squelch Tone Value	67.0
	Rx Squelch Code Value	23
	Rx NAC Value	$293
Transmit	Tx Frequency	141.0000
	Tx Squelch Mode	x
	Tx Squelch TalkGroup Value	$0001
	Tx Squelch Tone Value	67.0
	Tx Squelch Code Value	23
	Tx NAC Value	$293
	Tx ID Call Value	0000001

3.4.2 Set Restricted Level Access Mode

Level 4   Key ⌈2̂⌉   Scope: Main and Guard

Select the method to access the restricted command levels. The choices are

```
● 4-2 Set Access Mode
● Mode: Jumper/Password
```

Figure 3-37. Select the Access Mode from a list.

3.4.3 Set Command Permissions

Level 4   Key ⌈3 MODE⌉   Scope: Main and Guard

Select which commands in the command set will be accessible in the Operator Levels (levels 1, 2, and 3). All the commands in those three levels are affected EXCEPT: 'PROG' (0) and 'ESC' (*).

The default configuration from the factory has all commands enabled, *except L2-2 and L2-8.*

The Set Permissions screen shows the level being affected (L1, L2, or L3), followed by the command number, and an optional 'g' indicating Guard channel operation for that command (if applicable). The character directly under each number (or associated 'g') indicates whether or not the command may be accessed. If the command is to be accessible (or enabled), the character is a is solid round dot; if the command is to be restricted, (or disabled), the character displayed is an empty dot or donut. The 'Set Permissions' for command level 1 screen appears as below:

```
● 1:1 2 3g4 5 6 7g8 9g*g#
●    ▦ ▦ ▦▦▦ ▦ ▦ ▦▦▦ ▦▦▦○▦
```
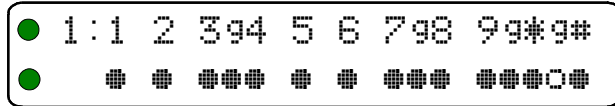
Figure 3-38. Edit the Level 1 Permissions

Edit Keys

⌈0 PROG⌉   Toggle permission (▦ = enabled, ○ = disabled)

⌈2̂⌉ ⌈8̌⌉   step up/down through Operator Levels

⌈4̌⌉ ⌈6̂⌉   move backward/forward through the available commands

⌈# ENTER⌉   accept the entry and exit

⌈* ESC⌉   abandon the entry and exit

```
● 2:1g2 3 4 5 6g7 8 9g   #
●   ▦▦○ ▦ ▦ ▦ ▦ ▦ ○ ▦▦   ▦
```
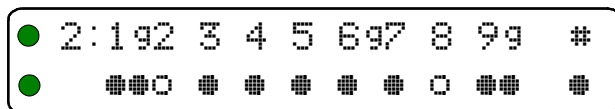
Figure 2-39. Edit the Level 2 Permissions

```
● 3:1 2 3 4 5 6 7 8 9
●   ▦ ▦ ▦ ▦ ▦ ▦ ▦ ▦ ▦
```
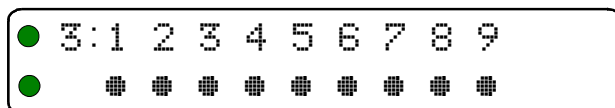
Figure 3-40. Edit the Level 3 Permissions

The cursor will automatically jump to the next valid column and will wrap. The 'g' indicates a separate Guard option, for the commands that support this, the Main and Guard can be enabled/disabled separately. Some of the commands are channel agnostic, or specific to the Main channel only, these can be invoked for Main even when the radio front panel switches are in the Guard position.

For example: with the switches in the Guard position the user can still scroll through the Main memories using the ⟨4⟩ and ⟨6⟩ keys. The table below indicates all the available user commands, and shows the permission mode as follows:

●   shows a command that has a distinct permission

◉   shows a command that is available in Guard, but permission is controlled by Main.

X   shows a command that is NOT available for the channel.

Cmnd Num	Level 1			Level 2			Level 3		
	Command	M	G	Command	M	G	Command	M	G
1	Select MN Memory	●	●	Create/Prog All	●	●	Set Main Boot Memory	●	◉
2	Brighter	●	◉	Copy GD to Main	●	◉	Upload to PC	●	◉
3	Edit Op Mode	●	●	Lock Keypad	●	◉	Set Hex/Decimal	●	◉
4	Scroll MN Memory Down	●	◉	Not Used			Show Version	●	◉
5	Scan	●	X	Edit Scan List	●	X	Edit Scan Params	●	◉
6	Scroll MN Memory Up	●	◉	Edit Text	●	●	Set PTT Timer	●	◉
7	Edit Frequency	●	●	Create Shadow	●	X	Set Sidetone Level	●	◉
8	Dimmer	●	◉	Copy Main to GD	●	◉	Download from PC	●	◉
9	Edit Squelch	●	●	Edit Unit ID	●	●	Show Squelch	●	●
*	Toggle Talk Around	●	●	reserved			reserved		
#	Toggle Home Memory	●	X	Select Home Memory	●	X	Not Used		

Table 3-6. Permission Applicability wrt Command Levels

3.4.4   Set Memory Edit

Level 4   Key ⟨4⟩   Scope: Main and Guard

Individually enable/disable a memory for editing. If disabled then the memory cannot be edited by any operator level command.

```
● 4-4 Set Memory Edit
● Mem: 022 Edit Disable
```
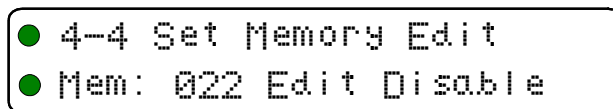
Figure 3-41. The screen for Enabling/Disabling edit of a specific Memory.

Edit Keys

⟨2⟩ ⟨8⟩   toggle enable/disable of selected memory

#/ENTER   accept the entry and exit

*/ESC   abandon the entry and exit

If an attempt is made to edit a disabled memory the error: "Edit Disabled" is displayed on the prompt line.

3.4.5 L4-5. not used

Level 4   Key [5 SCAN]   Scope:

There is no command implemented at this location.

3.4.6 L4-6. not used

Level 4   Key [6]   Scope: unused

There is no command implemented at this location.

3.4.7 Set Frequency Display

Level 4   Key [7 FREQ]   Scope:

Individually enable/disable a memories' frequency display. If disabled, the memory position will not display a frequency. In addition the frequency cannot be edited.

```
● 4-7 Set Freq Display
● Mem: 022 Display Disable
```
Figure 3-42. The Frequency Display Enable/Disable screen.

The user may change the frequency display for the selected memory as follows:

[2] [8]   toggle enable/disable displaying frequency for the selected memory

[# ENTER]   accept the entry and exit

[* ESC]   abandon the entry and exit

Note, once a channel has had it's frequency display disabled, you cannot edit that frequency, an attempt to do so will cause an error as shown below:
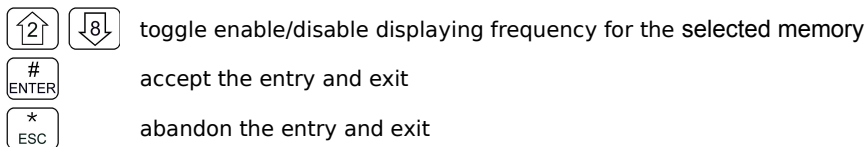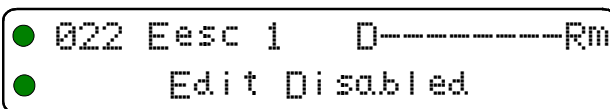
```
● 022 Eesc 1    D------Rm
●         Edit Disabled
```
Figure 3-43. A memory with frequency display disabled.

3.4.8 Assign KeyTags to Encryption Keys

Level 4   Key [8]   Scope: Main and Guard

Assign a KeyTag to the encryption keys loaded into the radio by following this sequence:

1. Select the key, by SLN, to assign a KeyTag to.
2. Enter the KeyTag
3. Repeat for other keys if desired.

L4-8.1 Select Key by SLN. Use this screen to step through the available keys (by SLN). The encryption algorithm for the key is indicated as well.

```
● Select Key SLN   (←→,#*)
● SLN: 00001   ALG: DES
```
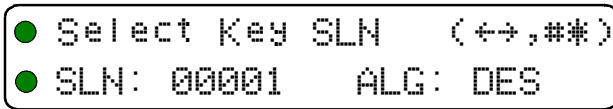
Figure 3-44. Step through available keys by SLN.

Edit Keys

⟨4⟩ ⟨6⟩	move backward/forward through the loaded keys, by SLN
# ENTER	accept the entry and continue
* ESC	abandon the entry and exit
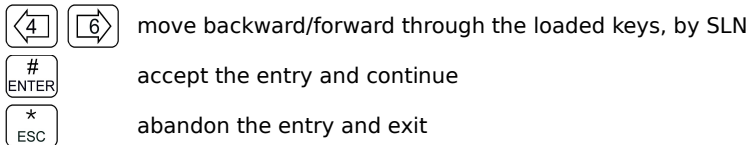
L4-8.2 Edit the KeyTag for the Selected Key. The system automatically creates KeyTags named: "Key Tag 01", through "Key Tag 16". This screen allows you to change these names to suit your needs.
The KeyTag is 10 characters and is limited to: Upper & lower case alphabetic, the digits 0-9, a space, and {! " # $ % & ' ( ) * + , - . /} not including the brace brackets.

```
● Edit Key Tag: Key Tag 01
● SLN: 00001 (↑↓←→3,#*) AZ
```
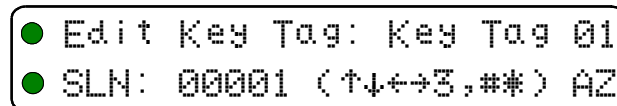
Figure 3-45. The screen to edit the KeyTag.

Edit Keys

3 MODE	Step through the available edit groups (A-Z, a-z, 0-9, + extra characters – see table 3-4)
⟨2⟩ ⟨8⟩	step up/down through the characters in each edit group
⟨4⟩ ⟨6⟩	move backward/forward through the available characters
# ENTER	accept the entry and continue
* ESC	abandon the entry and continue
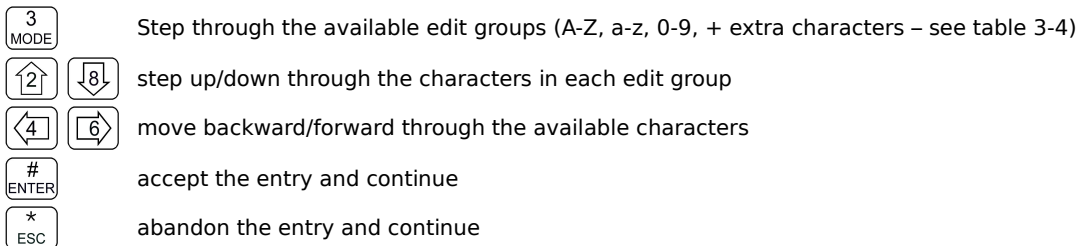
L4-8.3 Repeat or Exit. When done, you may to loop back and repeat the process for another key or to exit the editor entirely:

```
● Edit Key Tag: Key Tag 01
● Another Key? #=ok *=exit
```
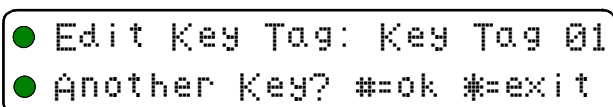
Figure 3-46. The screen to assign another KeyTag or exit.

Edit Keys

# ENTER	accept the entry and continue
* ESC	abandon the entry and exit

3.4.9   Set Squelch Restrictions

Level 4   Key ⌊ 9 SQL ⌋   Scope: Main and Guard

You may restrict user access to the Squelch modes. The restricting hierarchy is as follows:

- squelch mode *select* restrict – limit which squelch modes may be selected.
- squelch mode *edit* restrict – limit which squelch modes the user may edit the value of
- squelch mode *value* restrict - limit the range of values for available in a squelch mode

These features are described in the sections below. The editor operates as follows:

Edit Keys

⌊4⌋ ⌊6⌋   move backward/forward through the restriction screens

⌊2⌋ ⌊8⌋   step up/down through the parameters for each screen

⌊0 PROG⌋   Toggle the state of the displayed parameter: enabled ✳ / disabled ○

⌊# ENTER⌋   accept the entry and exit

⌊* ESC⌋   abandon the entry and exit

L4-9.1. Restricting the Squelch Modes Available to Select

You can restrict the Squelch Modes that the user can select for each of Analog Rx, Analog Tx, Digital Rx, and Digital Tx operation. Note that not all Squelch Modes can be restricted, table 2-8 below shows the available Squelch Mode for each Operating Mode and shows which can be restricted.
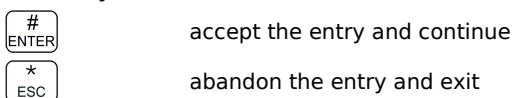
Table 3-7 Squelch Modes that can be Restricted			
Analog Rx	Analog Tx	Digital Rx	Digital Tx
Tone	Tone	NAC	IDcall
Code	Code	Talkgroup	Inhibit
	Inhibit		

The screen shown below is an example of the screens that allow you to restrict which Squelch Modes appear for the user to select when editing Squelch Modes (L1-9, or in L2-1, or L2-7).

```
● Squelch Restrict: Edit
● Value Edit: Noise        ✳
```
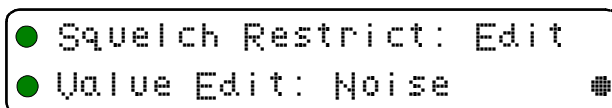
Figure 3-47. The Screen to Set Available Squelch Modes for Analog Receive

Here, the user can restrict the individual Squelch Modes that will appear to the user in the Analog Squelch mode selector for receive, the same can be done for analog transmit.

L4-9.2. Restrict Editing of a Squelch Mode Value

This screen allows you to restrict which Squelch Modes can have their *values* edited by the user, a restriction here will still allow the mode to be selected for use, but the value cannot be changed. **Example:** if Noise mode is disabled here, then the user can *select* Noise (for analog Rx operation), but *cannot change* the Noise Squelch level.

```
● Squelch Restrict: Edit
● Value Edit: Noise        ⬤
```
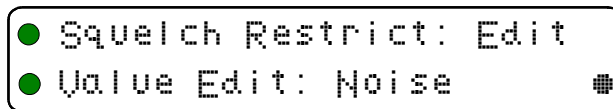
Figure 3-48. The Screen to Restrict Editing of the Noise Squelch Value

L4-9.3. Restricting the CTCSS Tone and DCS Code Values

The list of both CTCSS Tones and DCS Codes that are available to the user in the related Squelch Mode editor can be restricted so that only certain Tones and/or Codes are available to the user during the edit session.

The CTCSS Tone value restrict screen appears as below, here, you can step through the list of all the CTCSS Tones, and restrict individual tone values from appearing to the user in the CTCSS Tone selection list.

```
● Squelch Restrict: Value
● CTCSS Tone:   67.0      ⬤
```
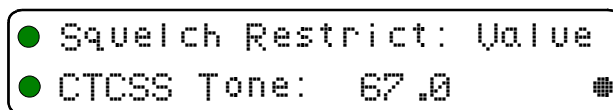
Figure 3-49. The Screen to Restrict Available CTCSS Tones

The DCS Code value restrict screen appears as below, here, you can step through the list of all the DCS Codes, and restrict individual code values from appearing to the user in the DCS Code selection list.

```
● Squelch Restrict: Value
● DCS Code:     23        ⬤
```
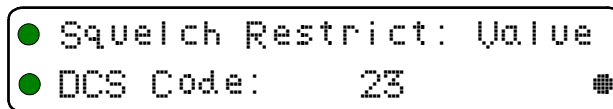
Figure 3-50. Restrict Available DCS Codes

CTCSS Tone or DCS Code entries restricted here will not appear to the user when they are making a selection.

3.4.10   Command Level Up

Level 4   Key `0 PROG`   Scope: Main and Guard

Command level navigation: step up one command level.

3.4.11   Command Level Down

Level 4   Key `* ESC`   Scope: Main and Guard

Command level navigation: step down one command level.

3.4.12   Unused

Level 4   Key `# ENTER`   Scope: Main and Guard

3.5   Supervisor Commands (Level 5)

The supervisor Command Level is available to perform a variety of configuration, testing and tuning functions.

All the functions described in this section are for trained personnel only. If you do not have training on the use of these commands, leave level 5 by pressing the 'ESC' key.

3.5.1   Toggle RF Bias Voltage

Level 5   Key $\boxed{\substack{1\\ \text{CHAN}}}$ Scope: Main and Guard

This command forces the bias voltage onto the RF transistor on the RF amplifier board. This is used for factory testing there is no field use for this command.

```
● 5-1 RF Bias Test
● Bias for (↑↓1,#*):
```
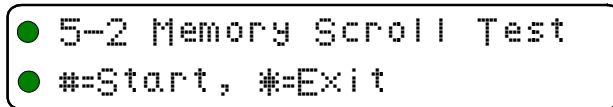
Figure 3-51. RF Bias Test

There is no screen change or indication of mode – factory use only.

3.5.2   Scroll Test

Level 5   Key $\boxed{2}$ Scope: Main only.

This command allows you to test communication between the local MCU and the Main RF module. In this mode the unit will sequentially advances through all the memories on the main channel, and keep a count of successful loops. It will do so until any key is pressed. The start screen looks like:
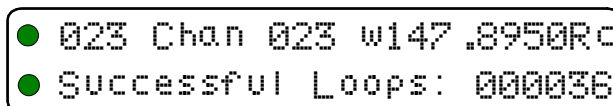
```
● 5-2 Memory Scroll Test
● #=Start, *=Exit
```

Figure 3-52. Main Channel Memory Loop Test - Start Screen

Once started, the screen looks similar to:

```
● 023 Chan 023 w147.8950Rc
● Successful Loops: 000036
```

Figure 3-53. Main Channel Memory Loop Test - Running

When the test is running, pressing any key will stop the loop test and exit.

3.5.3   L5-3 Unused

Level 5   Key $\boxed{\substack{3\\ \text{MODE}}}$ Scope:

There is no command implemented at this location.
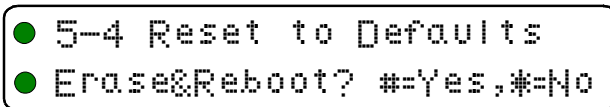
3.5.4   Re-Set Database to Factory Defaults

Level 5   Key ⁴   Scope: Main and Guard

This command allows you to reset the unit to as shipped from factory.

Note: this will erase all your programmed memories – you <u>will</u> lose all information you have loaded!

The Re-Set Database screen looks as follows:

```
● 5-4 Reset to Defaults
● Erase&Reboot? #=Yes,*=No
```

Figure 3-54. Erase and Re-Program to Factory Defaults

Edit Keys

ENTER   accept and erase all data and re-configure the unit

* ESC   abandon without changing

3.5.5   Unused

Level 5   Key ⁵ SCAN   Scope:

There is no command implemented at this location.

3.5.6   Transparent Mode

Level 5   Key ⁶   Scope: Main and Guard

This command allows you to communicate directly with the RF modules.

```
● 5-6 Transparent Mode:
● OFF
```

Figure 3-55. Transparent Mode

The keys used to operate Transparent Mode are:

² ⁶   step up through available choices (main, guard, off)

⁸   step down through available choices

ENTER   exit mode

* ESC   exit mode

3.5.7   Edit Passwords

Level 5   Key 7 FREQ   Scope: Main and Guard

Edit the passwords for access to the restricted command levels. The passwords are edited in sequence: Maintenance (L4) first followed by Supervisor (L5). Each password is eight characters long, and may be any of: Upper & lower case alphabetic, the digits 0-9, a space, and {! " # $ % & ' ( ) * + , - . /} not including the brace brackets.

```
● Edit Maint Pass:
● Edit Text (↑↓↔→3,#✱)   09
```
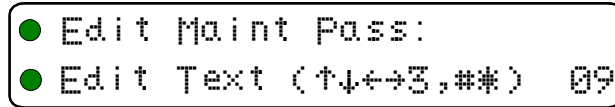
Figure 3-56. Edit Maintenance Password

Edit Keys

3 MODE   Step through the available edit groups (A-Z, a-z, 0-9, + extra characters – see table 3-?)

2 8   step up/down through the characters in each edit group

4 6   move backward/forward through the available characters

ENTER   accept the entry and continue

* ESC   abandon the entry and continue

Once the Maintenance password has been entered you will automatically advance to the screen to edit the Supervisor password.

```
● Edit Super Pass:
● Edit Text (↑↓↔→3,#✱)   09
```
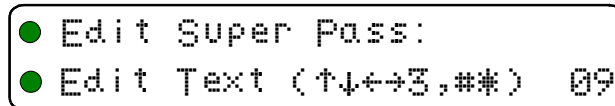
Figure 3-57. Edit Supervisor Password

The editing keys are the same as for the Maintenance password.

3.5.8   Run Bootloader

Level 5   Key 8   Scope: Main and Guard

This command allows you to run the Bootloader in order to load new operating code. Note that the Bootloader is a separate piece of code and does not run under the radio code, so once started, the control is handed to the Bootloader. See Bootloader operating instructions.

Bootloader operation is for trained personnel only.
To use the bootloader you must have the unit attached to a correctly configured PC.
You can erase all information in the radio using the bootloader.
The Bootloader screen will look similar to this:

```
●    TDFM-136 Bootloader
●      Version: 3.0.2
```
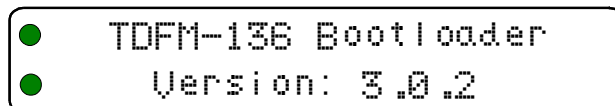
Figure 3-58. The Bootloader Screen

3.5.9   Set Unit ID (UID)

Level 5   Key $\boxed{\substack{9\\ \text{SQL}}}$ Scope: Main and Guard

This command allows you to change the Unit ID number for both the Main and the Guard RF modules depending on the front panel switch position. The UID is a seven digit decimal number in the range 0000001 to 9,999,999. Note that leading zeros must be entered. The edit screen appears as follows:

```
● 5-9 Set Main Unit ID
● Unit ID #:        0000001
```
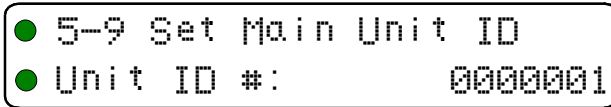
Figure 3-59. Set Unit ID Number (screen for Main shown)

The keys used to edit the UID parameter are:

Edit Keys

$\boxed{\substack{0\\ \text{PROG}}}$ to $\boxed{\substack{9\\ \text{SQL}}}$ decimal mode: enter number, cursor automatically advances

$\boxed{\substack{\#\\ \text{ENTER}}}$ accept the entry and continue

$\boxed{\substack{*\\ \text{ESC}}}$ abandon the entry and exit

3.5.10   L5-0 Unused

Level 5   Key $\boxed{\substack{0\\ \text{PROG}}}$ Scope:

There is no command implemented at this location.

3.5.11   Command Level Down

Level 5   Key $\boxed{\substack{*\\ \text{ESC}}}$ Scope: Main and Guard

Command level navigation: step down one command level.

3.5.12   L5-* Unused

Level 5   Key $\boxed{\substack{\#\\ \text{ENTER}}}$ Scope:

There is no command implemented at this location.

SECTION 4

APPENDICES

The appendices contain information referred to from the main document.

4.1 Appendix A. Installing the Jumper for Restricted Level Access.

To do so refer to figures 4-1 and 4-2, and follow these steps:

1. Ensure that the power to the unit is off.
2. Remove the left hand side cover (10 philips screws)
3. Locate the 6 pin jumper field (approximately half way between the front and rear of the radio).
4. Place a 0.1" shunt on the set of jumper pins closest to the front of the radio.

The user can now select level 4 (maintenance mode).
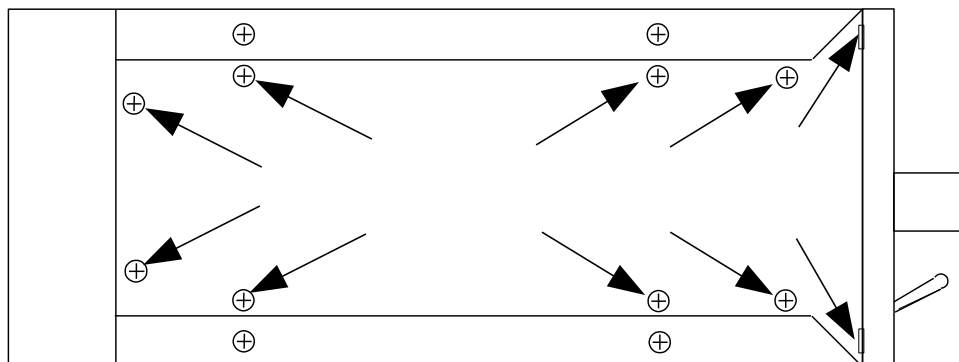
Figure 4-1. The Screw positions to Remove the Left Hand Side Panel

Place shunt on middle Jumper pins pair
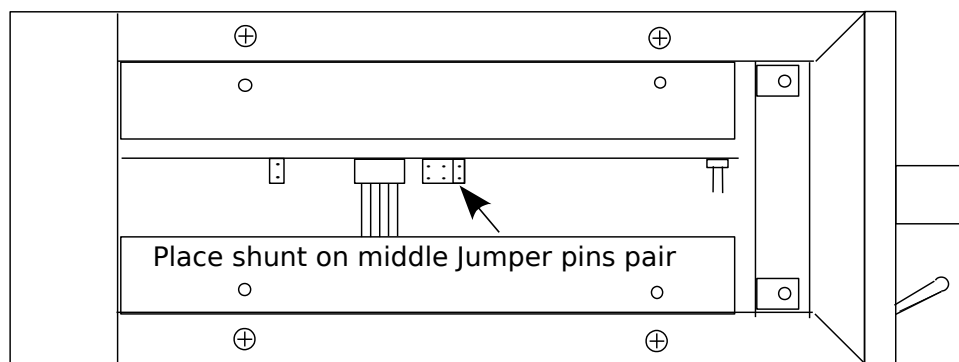
Figure 4-2. The Shunt Position to Enable Level 4 Access

NOTE: Jumper access to this command level MUST BE DISABLED when the radio is used in flight. Restricted commands are NOT required for flight operation.
Use of restricted commands in flight may cause data loss or lock the transceiver.

4.2   Appendix B. CTCSS Tone and DCS Code Tables

The tables below show the CTCSS tones and the DCS codes supported.

Table 4-1
CTCSS Tones (Hz.)
67.0
69.3
71.9
74.4
77.0
79.7
82.5
85.4
88.5
91.5
94.8
97.4
100.0
103.5
107.2
110.9
114.8
118.8
123.0
127.3
131.8
136.5
141.3
146.2
151.4
156.7
162.2
167.9
173.8
179.9
186.2
192.8
203.5
206.5
210.7
218.1
225.7
229.1
233.6
241.8
250.3
254.8

Table 4-2	
DCS Codes	
23	315
25	331
26	343
31	346
32	351
43	364
47	365
51	371
54	411
65	412
71	413
72	423
73	431
74	432
114	445
115	464
116	465
125	466
131	503
132	506
134	516
143	532
152	546
155	565
156	606
162	612
165	624
172	627
174	631
205	632
223	654
226	662
243	664
244	703
245	712
251	723
261	731
263	732
265	734
271	743
306	754
311	

4.3   Appendix C. Programming Channel data using TDP and a PC.

The TDFM-136(A) supports loading memory data from a PC using TDP-136 Radio Programming software. *Do NOT use 'MultiTDP' it does not work with this radio.* For full information see the "TDP-136 PC Software Installation & Operating Instructions", TiL #00RE277.

In brief, you will need:

- A PC running Microsoft Windows (2000, NT, XP, Vista, or Win7), with TDP-136 installed.
- A suitable connecting cable (TiL #003469-1) or a TiL Radio Test Jig (04T139) and serial cable (9 pin).
- 24-30Volt power supply @ 3A.

With the unit powered up and correctly connected to a PC, put the radio into PC Communications Mode (use command L3-8). Once done you will see:
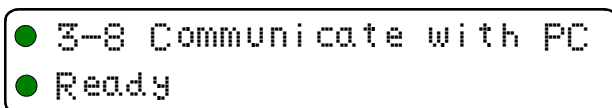
Figure 4-3. The Communicate with PC Command Screen

Start the TDP, you will see a screen similar to:
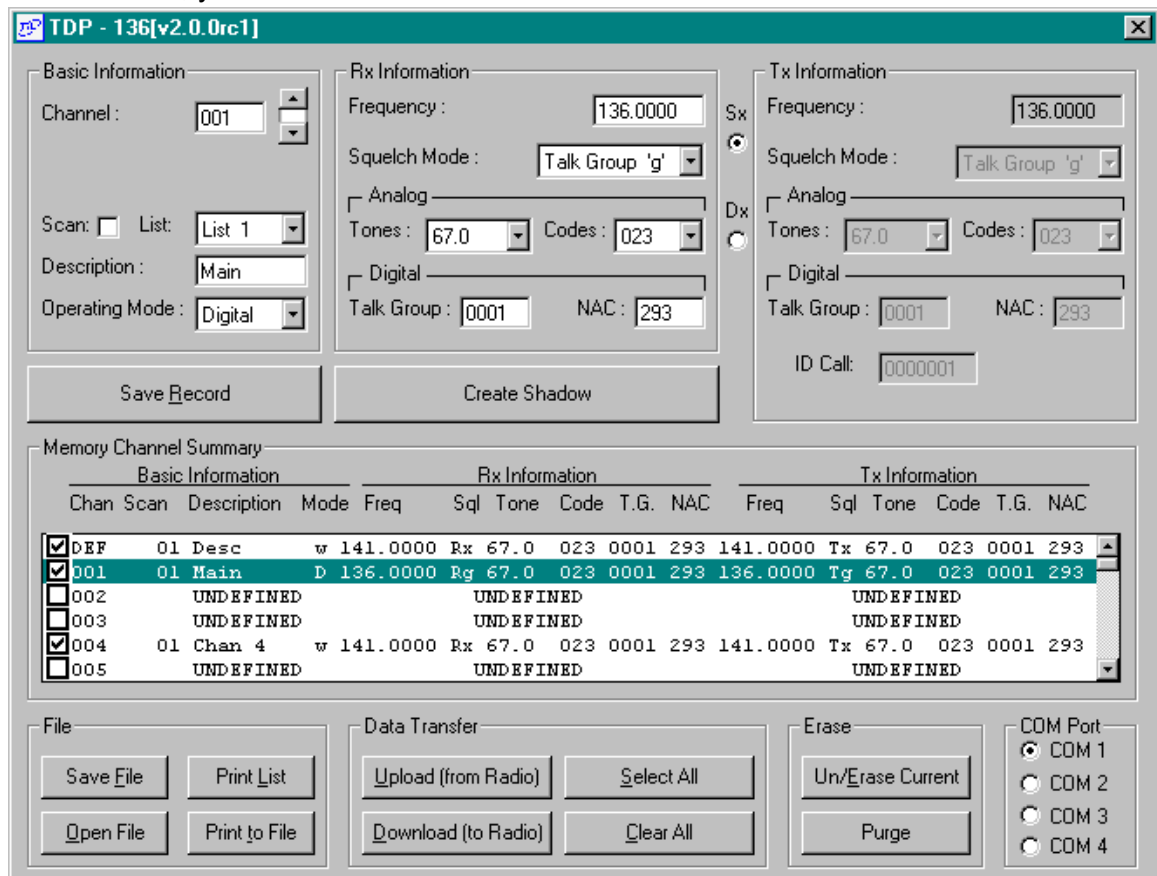
Figure 4-4. The TDP-136 Radio Programming Software Window

Once the transceiver is in PC communications mode, and is correctly attached to a PC running the TDP software, then the control of all functions is via the software running on the PC.

You can get the contents of the transceiver using the "Upload (from Radio)" button.

You can edit a record by clicking on the appropriate line in the memory summary box and then changing the values in the "Basic Information", "Rx Information", and "Tx Information" blocks at the top of the screen. Note that the "Tx" function is un-editable unless you have the duplex "Dx" button selected. Press 'Save Record" when done.

Create a new record by selecting a Memory number using the "Channel" scroll widget, then fill out the appropriate information for Basic, Rx and Tx. Again, press "Save Record" when done.

Once you have modified a file, or created a new one, press "Download (to Radio)", and the records will be transferred to the transceiver.

4.4   Appendix D. 2.5 kHz & 6.25 kHz Valid Frequencies

Table 4-3 shows the frequencies that the transceiver may be tuned to, both 2.5 kHz. steps and 6.25 kHz. steps are supported. Frequencies from 136.0000 to 136.0975 Hz. are shown, the pattern repeats every 100kHz. through the band.

Table 4-3. Valid Frequency Pattern		
2.5 kHz	2.5 and 6.25 kHz	6.25 kHz
136.00000	136.00000	136.00000
136.00250	136.00250	
136.00500	136.00500	
	136.00625	136.00625
136.00750	136.00750	
136.01000	136.01000	
136.01250	136.01250	136.01250
136.01500	136.01500	
136.01750	136.01750	
	136.01875	136.01875
136.02000	136.02000	
136.02250	136.02250	
136.02500	136.02500	136.02500
136.02750	136.02750	
136.03000	136.03000	
	136.03125	136.03125
136.03250	136.03250	
136.03500	136.03500	
136.03750	136.03750	136.03750
136.04000	136.04000	
136.04250	136.04250	
	136.04375	136.04375
136.04500	136.04500	
136.04750	136.04750	
136.05000	136.05000	136.05000
136.05250	136.05250	
136.05500	136.05500	
	136.05625	136.05625
136.05750	136.05750	
136.06000	136.06000	
136.06250	136.06250	136.06250
136.06500	136.06500	
136.06750	136.06750	
	136.06875	136.06875
136.07000	136.07000	
136.07250	136.07250	
136.07500	136.07500	136.07500
136.07750	136.07750	
136.08000	136.08000	
	136.08125	136.08125
136.08250	136.08250	
136.08500	136.08500	
136.08750	136.08750	136.08750
136.09000	136.09000	
136.09250	136.09250	
	136.09375	136.09375
136.09500	136.09500	
136.09750	136.0975	

4.5   Appendix E. Default Tables

This Appendix shows default values for various system parameters.

Table 4-4. The Memory Template Factory Defaults		
Parameter		Value
Basic	Scan List	1
	Text Description	"Desc "
	Operating Mode	w
Receive	Rx Frequency	141.0000
	Rx Squelch Mode	x
	Rx Squelch TalkGroup Value	$0001
	Rx Squelch Tone Value	67.0
	Rx Squelch Code Value	23
	Rx NAC Value	$293
Transmit	Tx Frequency	141.0000
	Tx Squelch Mode	x
	Tx Squelch TalkGroup Value	$0001
	Tx Squelch Tone Value	67.0
	Tx Squelch Code Value	23
	Tx NAC Value	$293
	Tx ID Call Value	0000001

Table 4-5. Configuration Parameters Default Values		
Parameter	Range	Default
Boot Memory	Last used, last programmed, home	Last Used
Home Memory	001 to 230 (must be programmed)	001
Sidetone Volume	00 to 85	63
Noise Squelch Level	00 to 15	10
PTT Timer	30, 60 or 90 seconds	90 seconds
T.G. & NAC Edit Mode	Decimal, Hexadecimal	Hexadecimal

Table 4-6. Scan Parameter Default Values		
Parameter	Range	Default
Revert Mode	Last contacted, currently selected	last contacted
Reply Timer	0 to 20 seconds	3 seconds
Monitor Timer	0 to 90 seconds	10 seconds
Delay Timer	0 to 15 seconds	5 seconds

Table 4-7. Unit Identification (UID) Default Values		
Channel	Range	Default
Main	0000001 - 9999999	0000001
Guard		0000002

Table 4-8. Restricted Level Password Default Values		
Command Level	Each Digit Range (8 digits)	Default
Maintenance	0-9, A-Z, a-z, space, and	00000000
Supervisor	! " # $ % & ' ( ) * + , - . /	10000000