TECHNISONIC
Communications

TDFM-136B

OPERATING INSTRUCTIONS

Document No. 08RE399
Rev. A

14 FEB 2013
IMPORTANT INFORMATION

As of January 1st, 2013, the FCC will no longer allow transceivers to be delivered to the US that are capable of Wideband (25kHz) channel spacing in the commercial 2 way mobile / base sections of the VHF and UHF bands. Low band VHF and 700/800 MHz are not affected.

The TDFM-136B transceiver is affected by this new rule and has been modified to restrict Wideband operation on the above bands. When programming the radio from the front panel, if Wideband has been disabled then the Wideband (’w’) Operating Mode will not be available as a selection.

When using the TDP-136 programming software, a warning will be issued if the user attempts to load Wideband channels into a radio that has had Wideband disabled. If the user elects to ignore the warning and load the Wideband channels anyway, the transceiver will automatically set the channels to receive only.
SCOPE of MANUAL

This document provides Operating Instructions for TDFM-136B transceivers with firmware:

Release 1.0.0 This manual does not include transceiver installation instructions. For installation instructions please see Technisonic document: 08RE398.

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-136B, 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:

Technisonic Industries Limited
240 Traders Blvd. E.,
Mississauga, Ontario.
L4Z 1W7
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<th>Description</th>
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<td></td>
</tr>
</tbody>
</table>
# Table of Contents

**SECTION 1** ............................................................................................................................................... 1

  1.1 Controls and Display.......................................................................................................................... 1
  1.1.1 Front Panel Layout and Controls.................................................................................................... 1
  1.1.2 Channel Parameter Display............................................................................................................ 2

  1.2 Transceiver Basic Operation .................................................................................................................. 3
  1.2.1 Selecting the Active Channel – Main or Guard............................................................................... 3
  1.2.2 Selecting a Main Channel Memory .................................................................................................. 4
  1.2.3 Squelch Defeat................................................................................................................................ 4

  1.3 About Commands .................................................................................................................................. 5
  1.3.1 Command Levels .............................................................................................................................. 5
  1.3.2 Command Types .............................................................................................................................. 6
  1.3.3 Command Groups ............................................................................................................................ 6
  1.3.4 Command Reference ......................................................................................................................... 6

**SECTION 2** ............................................................................................................................................... 7

  2.1 Channel Operating Parameters ............................................................................................................. 7
  2.1.1 Memory Parameters .......................................................................................................................... 7

  2.2 Editing Channel Operating Parameters ................................................................................................ 7
  2.2.1 The Frequency Parameter .............................................................................................................. 9
  2.2.2 Operating Modes ............................................................................................................................. 10
  2.2.3 Squelch Modes ............................................................................................................................... 11
  2.2.4 ID Call Operation .......................................................................................................................... 15

  2.3 Scan and Multi-Mode Operation ........................................................................................................... 16
  2.3.1 Scan Operation ............................................................................................................................... 16
  2.3.2 Multi-Mode Operation .................................................................................................................... 17

  2.4 Controlling User Access ....................................................................................................................... 18
  2.4.1 Control Access to Command Levels .............................................................................................. 18
  2.4.2 Set Command Permissions ............................................................................................................. 19
  2.4.3 Control Access to Squelch Modes ................................................................................................... 21
  2.4.4 Control Editing of Memories .......................................................................................................... 21
  2.4.5 Control Display of Frequency Information ..................................................................................... 22

  2.5 Encrypted Operation ............................................................................................................................ 23
  2.5.1 Loading Encryption Keys ................................................................................................................ 23
  2.5.2 Assign KeyTag to Encryption Keys .................................................................................................. 23
  2.5.3 Assign Key by KeyTag to Memory ................................................................................................... 24
  2.5.4 Enable/Disable Encrypted Operation ............................................................................................. 26

**SECTION 3** ............................................................................................................................................... 27

  3.1 Operator Level 1 Commands .................................................................................................................. 28
  3.1.1 Select the Operating Memory for the Main Channel .................................................................... 28
  3.1.2 Increase Display Brightness ........................................................................................................... 28
  3.1.3 Edit Channel Operating Mode ....................................................................................................... 28
  3.1.4 Scroll Backwards through Available Main Memories ..................................................................... 29
  3.1.5 Start/Stop Scan ............................................................................................................................... 29
  3.1.6 Scroll Forwards through Available Main Memories ....................................................................... 30
  3.1.7 Edit Channel Operating Frequency ............................................................................................... 30
  3.1.8 Decrease Display Brightness ........................................................................................................... 31
  3.1.9 Edit Channel Squelch Mode ............................................................................................................ 31
3.1.10 Command Level Up .......................................................... 34
3.1.11 Toggle memory: current/home ........................................... 34
3.1.12 Toggle Talk Around .......................................................... 34
3.1.13 Erase Encryption Keys ...................................................... 34
3.2 Operator Level 2 Commands ................................................... 34
  3.2.1 Create/Edit All Channel Information ................................ 35
  3.2.2 Copy Guard to Main ......................................................... 36
  3.2.3 Lock Keypad ................................................................. 36
  3.2.4 L2-4 not used .............................................................. 36
  3.2.5 Edit Scan List & Enable/Disable Scan .............................. 36
  3.2.6 Edit Memory Text Description ....................................... 37
  3.2.7 Create Shadow Memory .................................................. 38
  3.2.8 Copy Main to Guard ...................................................... 39
  3.2.9 Encryption ON/OFF ....................................................... 39
  3.2.10 Command Level Up ...................................................... 40
  3.2.11 Command Level Down .................................................. 40
  3.2.12 L2–#. Not Used .......................................................... 40
3.3 Operator Level 3 Commands .................................................. 40
  3.3.1 Select Boot Memory for Main Channel ......................... 40
  3.3.2 Assign Key by KeyTag .................................................... 41
  3.3.3 Set Numeric Edit Mode: Decimal or Hexadecimal .......... 42
  3.3.4 Display Firmware Release and Version Information ........ 42
  3.3.5 Edit Scan Parameters ................................................. 43
  3.3.6 Configure PTT Timer .................................................... 44
  3.3.7 Side Tone Audio Level Adjust ....................................... 45
  3.3.8 PC Data Upload/Download ............................................ 45
  3.3.9 Display Channel Squelch Parameters .............................. 46
  3.3.10 Command Level Up ..................................................... 46
  3.3.11 Command Level Down ................................................ 46
  3.3.12 Unused .................................................................. 46
3.4 Maintenance Commands (Level 4) ......................................... 47
  3.4.1 Set Default Record .......................................................... 47
  3.4.2 Set Restricted Level Access Mode ................................. 48
  3.4.3 Set Command Permissions ............................................ 48
  3.4.4 Set Memory Edit .......................................................... 49
  3.4.5 L4-5. not used ............................................................ 50
  3.4.6 L4-6. not used ............................................................ 50
  3.4.7 Set Frequency Display .................................................. 50
  3.4.8 Assign KeyTags to Encryption Keys ............................... 50
  3.4.9 Set Squelch Restrictions .............................................. 52
  3.4.10 Command Level Up ..................................................... 53
  3.4.11 Command Level Down ................................................ 53
  3.4.12 L4-# not used .......................................................... 53
3.5 Supervisor Commands (Level 5) ............................................ 54
  3.5.1 L5-1 not used ............................................................... 54
  3.5.2 L5-2 not used ............................................................... 54
  3.5.3 L5-3 not used ............................................................... 54
  3.5.4 Re-Set Database to Factory Defaults .............................. 54
  3.5.5 Hardware Setup .......................................................... 55
  3.5.6 RF Image Update ........................................................ 58
  3.5.7 Edit Passwords ........................................................... 59
  3.5.8 Run Bootloader ........................................................... 60
3.5.9 Set Unit ID (UID) ................................................................................................. 60
3.5.10 L5-0 not used ................................................................................................. 60
3.5.11 Command Level Down ................................................................................... 61
3.5.12 L5-# not used ............................................................................................... 61

SECTION 4 ....................................................................................................................... 63
4.1 Appendix A. Installing the Jumper for Restricted Level Access .................................. 63
4.2 Appendix B. CTCSS Tone and DCS Code Tables ....................................................... 64
4.3 Appendix C. Programming Channel data using TDP and a PC .................................... 65
4.4 Appendix D. 2.5 kHz & 6.25 kHz Valid Frequencies ................................................ 67
4.5 Appendix E. Default Tables ..................................................................................... 68
4.6 Appendix F. Warranty Information ......................................................................... 69
<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1</td>
<td>The TDFM-136 front panel showing control &amp; display features</td>
<td>1</td>
</tr>
<tr>
<td>1-2</td>
<td>The TDFM-136 display – unique parameters highlighted</td>
<td>2</td>
</tr>
<tr>
<td>1-3</td>
<td>The TDFM-136 display - channel parameters highlighted</td>
<td>2</td>
</tr>
<tr>
<td>1-4</td>
<td>The active channel display and control points</td>
<td>3</td>
</tr>
<tr>
<td>1-5</td>
<td>Control points for selecting an active memory for the MAIN channel</td>
<td>4</td>
</tr>
<tr>
<td>1-6</td>
<td>The screen showing ‘Level 3’ in the Command Level Display Position</td>
<td>5</td>
</tr>
<tr>
<td>2-1</td>
<td>The user screen to edit the Main frequency</td>
<td>8</td>
</tr>
<tr>
<td>2-2</td>
<td>The user screen to edit the Guard frequency</td>
<td>8</td>
</tr>
<tr>
<td>2-3</td>
<td>The user screen to edit the Main frequency for receive</td>
<td>9</td>
</tr>
<tr>
<td>2-4</td>
<td>The user screen to edit the Main frequency for transmit</td>
<td>9</td>
</tr>
<tr>
<td>2-5</td>
<td>The user screen to edit the Main Operating Mode</td>
<td>10</td>
</tr>
<tr>
<td>2-6</td>
<td>The screen to edit the Main Squelch Mode for receive</td>
<td>12</td>
</tr>
<tr>
<td>2-7</td>
<td>The noise squelch edit screen</td>
<td>13</td>
</tr>
<tr>
<td>2-8</td>
<td>The screen to edit the Main Squelch Mode for transmit</td>
<td>13</td>
</tr>
<tr>
<td>2-9</td>
<td>The CTCSS Tone squelch edit screen</td>
<td>13</td>
</tr>
<tr>
<td>2-10</td>
<td>The DCS Code squelch edit screen</td>
<td>14</td>
</tr>
<tr>
<td>2-11</td>
<td>The digital NAC squelch edit screen</td>
<td>14</td>
</tr>
<tr>
<td>2-12</td>
<td>The digital TalkGroup squelch edit screen</td>
<td>15</td>
</tr>
<tr>
<td>2-13</td>
<td>The digital ID Call squelch edit screen</td>
<td>15</td>
</tr>
<tr>
<td>2-14</td>
<td>The Set Unit ID edit screen</td>
<td>16</td>
</tr>
<tr>
<td>2-15</td>
<td>Identifying Graphic for Primary Channel with Shadows</td>
<td>18</td>
</tr>
<tr>
<td>2-16</td>
<td>Identifying Graphic for Shadow Channel</td>
<td>18</td>
</tr>
<tr>
<td>2-17</td>
<td>The screen to enter a password for restricted level access</td>
<td>19</td>
</tr>
<tr>
<td>2-18</td>
<td>The screen to set the Maintenance password</td>
<td>19</td>
</tr>
<tr>
<td>2-19</td>
<td>The Screen to Edit the Level 1 Permissions</td>
<td>20</td>
</tr>
<tr>
<td>2-20</td>
<td>The Screen showing Mode Select restrictions for Analog Receive</td>
<td>21</td>
</tr>
<tr>
<td>2-21</td>
<td>The screen for Enabling/Disabling edit of a specific Memory</td>
<td>21</td>
</tr>
<tr>
<td>2-22</td>
<td>The error screen on trying to edit a disabled memory</td>
<td>22</td>
</tr>
<tr>
<td>2-23</td>
<td>The screen for Enabling/Disabling Frequency Display for a specific Memory</td>
<td>22</td>
</tr>
<tr>
<td>2-24</td>
<td>The screen showing memory with frequency display disabled</td>
<td>22</td>
</tr>
<tr>
<td>2-25</td>
<td>The screen to select the SLN to assign the KeyTag to</td>
<td>23</td>
</tr>
<tr>
<td>2-26</td>
<td>The screen to edit the KeyTag</td>
<td>24</td>
</tr>
<tr>
<td>2-27</td>
<td>The screen to assign another KeyTag or exit</td>
<td>24</td>
</tr>
<tr>
<td>2-28</td>
<td>Select the Main memory to assign the key to</td>
<td>25</td>
</tr>
<tr>
<td>2-29</td>
<td>Select the KeyTag to assign to the memory</td>
<td>25</td>
</tr>
<tr>
<td>2-30</td>
<td>Select decrypt on Any Key or Assigned Key</td>
<td>25</td>
</tr>
<tr>
<td>2-31</td>
<td>The screen to assign another key or exit</td>
<td>26</td>
</tr>
<tr>
<td>2-32</td>
<td>The analog memory encryption error screen</td>
<td>26</td>
</tr>
<tr>
<td>2-33</td>
<td>The error screen for no encryption key assigned</td>
<td>26</td>
</tr>
<tr>
<td>2-34</td>
<td>The Encryption Enabled for Main memory screen</td>
<td>26</td>
</tr>
<tr>
<td>3-1</td>
<td>The User Screen to Enter a Memory Number</td>
<td>28</td>
</tr>
<tr>
<td>3-2</td>
<td>The User Screen to Edit the Operating Mode</td>
<td>28</td>
</tr>
<tr>
<td>3-3</td>
<td>Trying to start scan on a Channel with Scan disabled</td>
<td>29</td>
</tr>
<tr>
<td>3-4</td>
<td>Start scan on a Channel with Scan enabled</td>
<td>29</td>
</tr>
<tr>
<td>3-5</td>
<td>The User Screen to Edit the Main frequency</td>
<td>30</td>
</tr>
<tr>
<td>3-6</td>
<td>Editing the Squelch Mode</td>
<td>31</td>
</tr>
<tr>
<td>3-7</td>
<td>Editing the Noise Squelch Value</td>
<td>31</td>
</tr>
<tr>
<td>3-8</td>
<td>Selecting the CTCSS Tone Value</td>
<td>32</td>
</tr>
<tr>
<td>3-9</td>
<td>Selecting the DCS Code Value</td>
<td>32</td>
</tr>
<tr>
<td>3-10</td>
<td>Editing the P25 TalkGroup Value</td>
<td>32</td>
</tr>
</tbody>
</table>

**Table of Figures**
Figure 3-11. Editing the P25 NAC Value................................................................. 33
Figure 3-12. Editing the P25 ID Call Value............................................................ 33
Figure 3-13. The Screen to Enter a Scan List or Enable/Disable Scan.................. 37
Figure 3-14. The Screen Showing Scan Enabled for this Memory....................... 37
Figure 3-15. Editing the Text Description............................................................... 37
Figure 3-16. Entering a Primary Memory for the Shadow Channel....................... 38
Figure 3-17. Entering a Shadow Channel Memory Number.................................... 38
Figure 3-18. Edit the Shadow Memory Parameter - Text...................................... 39
Figure 3-19. The Encryption Enabled for Main...................................................... 39
Figure 3-20. Selecting Main Channel Boot Memory............................................. 40
Figure 3-21. Selecting the Memory to Assign the Key to...................................... 41
Figure 3-22. Selecting the KeyTag to Assign to the Memory.............................. 41
Figure 3-23. Selecting the decrypt option: Any Key or Assigned Key.................... 41
Figure 3-24. Screen to Assign another key or exit............................................... 42
Figure 3-25. Selecting Edit mode.......................................................................... 42
Figure 3-26. Showing the Code Release Information.......................................... 42
Figure 2-27. Select the Scan Revert Mode............................................................ 43
Figure 2-28. Set the Scan Reply Timer Value....................................................... 43
Figure 3-29. Set the Scan Monitor Timer Value.................................................... 44
Figure 3-30. Set the Scan Delay Timer Value....................................................... 44
Figure 3-31. Set the PTT Timer Value................................................................ 44
Figure 3-32. Set the Side tone Audio Level............................................................ 45
Figure 3-33. Upload/Download Memory Data to/from the PC.............................. 45
Figure 3-34. Display of the Receive Squelch Parameter Values............................ 46
Figure 3-35. Display of the Transmit Squelch Parameter Values.......................... 46
Figure 3-36. Select the Access Mode from a list.................................................. 48
Figure 3-37. Edit the Level 1 Permissions............................................................... 48
Figure 2-38. Edit the Level 2 Permissions.............................................................. 48
Figure 3-39. Edit the Level 3 Permissions............................................................... 48
Figure 3-40. Enable/Disable edit of a specific Memory........................................ 49
Figure 3-41. The Frequency Display Enable/Disable screen.................................. 51
Figure 3-42. A memory with frequency display disabled...................................... 50
Figure 3-43. Step through available keys by SLN.................................................. 51
Figure 3-44. The screen to edit the KeyTag............................................................ 51
Figure 3-45. The screen to assign another KeyTag or exit..................................... 51
Figure 3-46. The Screen to Set Available Squelch Modes for Analog Receive........ 52
Figure 3-47. The Screen to Restrict Editing of the Noise Squelch Value.................. 53
Figure 3-48. The Screen to Restrict Available CTCSS Tones.............................. 53
Figure 3-49. Restrict Available DCS Codes.......................................................... 53
Figure 3-50. Erase and Re-Program to Factory Defaults..................................... 54
Figure 3-51. Hardware Setup.............................................................................. 55
Figure 3-52. Select Panel Lighting Voltage......................................................... 55
Figure 3-53. Set Display Illumination (backlight off)........................................... 56
Figure 3-54. Set Microphone Input Gain............................................................... 56
Figure 3-55. Set RF Module Output Level............................................................. 57
Figure 3-56. Set RF Module Input Level............................................................... 57
Figure 3-57. Set Audio Record Input Level............................................................ 57
Figure 3-58. Select Diagnostic Message Output................................................... 58
Figure 3-59. Set Antenna Mode.......................................................................... 58
Figure 3-60. RF Image Update............................................................................. 58

Figure 3-61. Edit Maintenance Password............................................................. 59
Figure 3-62. Edit Supervisor Password................................................................. 59
Figure 3-63. The Bootloader Screen.................................................................... 60
Figure 3-64. Set Unit ID Number (screen for Main shown) ................................................................. 60

Figure 4-1. The Screw Positions to remove the Left Hand Side Panel .................................................. 63
Figure 4-2. The Shunt Position to Enable Restricted Level Access ................................................... 63
Figure 4-3. The Communicate with PC Command Screen ................................................................. 65
Figure 4-4. The TDP-136 Radio Programming Software Window ..................................................... 65

Table of Tables

Table 2-1. Transceiver Operating Modes .......................................................................................... 10
Table 2-2. Receive and Transmit Squelch Modes ......................................................................... 11
Table 2-3. Permission Applicability by Command and Level ....................................................... 20
Table 2-4. Squelch Mode Restrictions ......................................................................................... 21

Table 3-1. Command Level Reference ......................................................................................... 27
Table 3-2. Transceiver Operating Modes ..................................................................................... 29
Table 3-3. Receive and Transmit Squelch Modes ........................................................................ 31
Table 3-4. Extra Characters for Text Edit ..................................................................................... 38
Table 3-5. The Channel Template Factory Defaults .................................................................. 47
Table 3-6. Permission Applicability wrt Command Levels ........................................................ 49
Table 3-7. Squelch Modes that can be Restricted ....................................................................... 52

Table 4-1. CTCSS Tones .................................................................................................................. 64
Table 4-2. DCS Codes .................................................................................................................. 64
Table 4-3. Valid Frequency Pattern .......................................................................................... 67
Table 4-4. Memory Template Factory Defaults ........................................................................ 68
Table 4-5. Configuration Parameter Default Values ................................................................ 68
Table 4-6. Scan Parameter Default Values ................................................................................ 68
Table 4-7. Unit Identification (UID) Default Values .................................................................. 68
Table 4-8. Restricted Level Password Default Values ................................................................. 68
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-136B is shown in figure 1-1 below.

![Figure 1-1. The TDFM-136B front panel showing control & display features.](image)

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).
4. “Guard” Multi-function rotary encoder (default: Guard volume, press for Squelch defeat).
5. Data port – for use with KVL 3000+ keyloader or TDP-136 Programming software.
6. Main/Guard switch (toggle) – selects active channel (main or guard), for transmit and edit.
7. Guard 1 or 2 switch (toggle) – selects guard memory (GD1 or GD2), for transmit and edit.
8. Transmit Power switch (toggle) – selects transmit power, high (10W) or low (1W).
9. 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.

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.
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 (if connected) 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. The MAIN channel data is shown on the top line of the display, MAIN supports 230 memory positions (001 to 230). The MAIN channel is made the active channel for transmit and edit by the user placing the MN/GD switch in the MN position. For selecting the active memory for the MAIN channel, see the following section.

2. When the MN/GD switch is in the GD position then the GUARD channel is active. 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.

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

1. Press the 'CHAN' button (1), and then directly enter the three digit memory number.
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.
3. Press the 'ENTER' button (#), and the unit's Main channel will toggle between the current memory and the designated 'home' memory. If no 'home' memory has been selected, then the default is channel 1.

Note on scrolling:
- memory numbers that have not been created will be skipped.
- the scroll will wrap both up and down (. . . 230 ↔ 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.

1.2.3 Squelch Defeat

Squelch may be defeated by pressing the “GUARD” rotary encoder. In analog modes the squelch will simply be opened, in digital modes it will open on any valid P25 (unencrypted) signal.
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 zero (0), and the ESC (*) key are reserved to move between the command levels as follows:

- # step up through command levels
- * 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).

![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 and 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:

- Accept the entry and exit
- 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'.
SECTION 2

TRANSCEIVER OPERATION

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 Channel Operating Parameters

As described in the previous section 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 to the Main channel. Main memory number 001 must always exist, and is the default Main memory when the unit is shipped.

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 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 Editing Channel Operating Parameters

There are two ways to change the operating parameters for the memories used by either the main or guard channel: edit from the transceiver front panel, or edit using the PC programming software. This section will describe the first option; PC programming is discussed in Appendix C.

From the front panel, the user can edit any of the parameters (listed above) for the active channel using the individual parameter edit functions.
In addition to editing the memory parameters individually, the user can create new memories (for the main channel only) or edit all the parameters of an existing memory (for Main or Guard channels). 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 provides the user with information such as what command is running, and what keys are valid.

![Figure 2-1. The user screen to edit the Main frequency](image)

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](image)

**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**
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 (example 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

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:

![Figure 2-3. The user screen to edit the Main frequency for receive](image)

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

- **0** to **9**: decimal mode: enter number, cursor automatically advances
- **#** to **S**: 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 supports 2.5 kHz increments, and valid 6.25 kHz channel spacing frequencies in all Operating modes. See appendix N 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.

![Figure 2-4. The user screen to edit the Main frequency for transmit](image)

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>
<thead>
<tr>
<th>Operating Mode</th>
<th>Bandwidth</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog Wide</td>
<td>25 kHz</td>
<td>'w'</td>
</tr>
<tr>
<td>Analog Narrow</td>
<td>12.5 kHz</td>
<td>'n'</td>
</tr>
<tr>
<td>P25 Digital</td>
<td>12.5 kHz</td>
<td>'D'</td>
</tr>
</tbody>
</table>

The user can easily switch between modes on any memory for any channel (ie 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

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:

![Edit Mode Screen]

You may now edit the Operating Mode as follows:

- step up/down through available operating modes (w, n, D)
- accept the entry and exit
- 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>
<thead>
<tr>
<th>Table 2-2. Receive and Transmit Squelch Modes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Analog</strong></td>
</tr>
<tr>
<td>Rx</td>
</tr>
<tr>
<td>Noise</td>
</tr>
<tr>
<td>CTCSS Tones</td>
</tr>
<tr>
<td>DCS Code</td>
</tr>
</tbody>
</table>

**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: if 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 its 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 "Transmit 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:

```
Figure 2-6. The screen to edit the Main Squelch Mode for receive.
```

You may now edit the Squelch Mode as follows:

- step up/down through available squelch modes.
- accept the entry and exit
- 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:

![Figure 2-7. The noise squelch edit screen.](image)

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

- decimal mode: enter number, cursor automatically advances
- accept the entry and continue
- 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 (i.e. transmit may be different than receive). The screen to select a transmit squelch mode appears as follows:

![Figure 2-8. The screen to edit the Main Squelch Mode for transmit.](image)

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:

![Figure 2-9. The CTCSS Tone squelch edit screen.](image)

The editor works as follows:

- step up/down through available tone choices
- accept the entry and continue
- 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:

- step up/down through available code choices
- accept the entry and continue
- 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:

- enter number, cursor automatically advances. $=HEX Mode.
- accept the entry and continue
- 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:

![Figure 2-12. The digital TalkGroup squelch edit screen.](image)

The editor works as follows:

- **0 PROG** to **9 SOL** 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:

![Figure 2-13. The digital ID Call squelch edit screen.](image)

The editor works as follows:

- **0 PROG** to **9 SOL** 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 its 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:

![Set Unit ID edit screen](image)

The editor works as follows:

- 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 memory in scan list three, then the five scan-enabled memories 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:

![Figure 2-15. Identifying Graphic for Primary Memory with Shadows](image)

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

![Figure 2-16. Identifying Graphic for Shadow Channel](image)

### 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:

![Figure 2-17. The screen to enter a password for restricted level access.]

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

- Step through the available edit groups (A-Z, a-z, 0-9, + extra characters – see table 4.3)
- step up/down through the characters in each edit group
- move backward/forward through the available characters
- accept the entry and exit
- 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.

![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:

- accept the entry and continue to Supervisor
- abandon the entry and continue to Supervisor

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

- accept the entry and exit
- 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>
<thead>
<tr>
<th>Cmnd Num</th>
<th>Command</th>
<th>M</th>
<th>G</th>
<th>Command</th>
<th>M</th>
<th>G</th>
<th>Command</th>
<th>M</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Select Main Memory</td>
<td>●</td>
<td>●</td>
<td>Create/Prog All</td>
<td>●</td>
<td>●</td>
<td>Set Main Boot Memory</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>2</td>
<td>Display Brighter</td>
<td>●</td>
<td>●</td>
<td>Copy Guard to Main</td>
<td>●</td>
<td>●</td>
<td>Assign Key by KeyTag</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>3</td>
<td>Edit Operating Mode</td>
<td>●</td>
<td>●</td>
<td>Lock Keypad</td>
<td>●</td>
<td>●</td>
<td>Set Edit HEX/Decimal</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>4</td>
<td>Scroll Memory Down</td>
<td>●</td>
<td>●</td>
<td>not used</td>
<td>X</td>
<td>X</td>
<td>Show Firmware Version</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>5</td>
<td>Scan</td>
<td>●</td>
<td>X</td>
<td>Edit Scan List</td>
<td>X</td>
<td>X</td>
<td>Set Scan Parameters</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>6</td>
<td>Scroll Memory Up</td>
<td>●</td>
<td>●</td>
<td>Edit Text</td>
<td>●</td>
<td>●</td>
<td>Set PTT Timer</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>7</td>
<td>Edit Frequency</td>
<td>●</td>
<td>●</td>
<td>Create Shadow</td>
<td>●</td>
<td>X</td>
<td>Set sidetone level</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>8</td>
<td>Display Dimmer</td>
<td>●</td>
<td>●</td>
<td>Copy Main to Guard</td>
<td>●</td>
<td>●</td>
<td>Communicate with PC</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>9</td>
<td>Edit Squelch Mode</td>
<td>●</td>
<td>●</td>
<td>Encryption ON/OFF</td>
<td>●</td>
<td>●</td>
<td>Show Squelch</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>ENT</td>
<td>Jump to Home Memory</td>
<td>●</td>
<td>X</td>
<td>Set Home Memory</td>
<td>●</td>
<td>●</td>
<td>not used</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

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 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](image)

The user may edit the permissions as follows:

- Toggle permission (● = enabled, ○ = disabled)
- step up/down through Operator Levels
- move backward/forward through the available commands
- accept the entry and exit
- 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:

<table>
<thead>
<tr>
<th>Keys</th>
<th>Mode Select</th>
<th>Edit</th>
<th>Value Select</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Analog</td>
<td>Digital</td>
<td>Analog</td>
</tr>
<tr>
<td>← →</td>
<td>Rx</td>
<td>Tx</td>
<td>Rx</td>
</tr>
<tr>
<td>↑</td>
<td>Tone</td>
<td>Tone</td>
<td>TalkGroup</td>
</tr>
<tr>
<td>↓</td>
<td>Code</td>
<td>Code</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inhibit</td>
<td>Inhibit</td>
<td></td>
</tr>
</tbody>
</table>

Table 2-4. Squelch Mode Restrictions

Upon start, the display appears as follows:

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:

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:

- toggle enable/disable of selected memory
- accept the entry and exit
- 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 Esc 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:

- toggle enable/disable displaying frequency for the selected memory
- accept the entry and exit
- abandon the entry and exit

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

```
022 Esc 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-136B.

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:
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](image)

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

The keys for the KeyTag text editor operate as follows:

- Step through the available edit groups (A-Z, a-z, 0-9, + extra characters – see table n.n)
- Step up/down through the characters in each edit group
- Move backward/forward through the available characters
- Accept the entry and continue
- Abandon the entry and exit

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](image)

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

The edit keys are:

- Accept the entry and continue
- 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:

![Figure 2-28. Select the Main memory to assign the key to](image)

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

- move backward/forward through the available memories (Main only)
- accept the entry and continue
- 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.

![Figure 2-29. Select the KeyTag to assign to the memory](image)

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

- step up/down through the available KeyTags.
- accept the entry and continue
- 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.

![Figure 2-30. Select decrypt on Any Key or Assigned Key](image)

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

- toggle the choice: Any Key or Assigned Key
- accept the entry and continue
- 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:

- `#` accept the entry and continue
- `*` 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 something like:

![022 Encr1 lD155.4250Rm]

![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.

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

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 \(1_{\text{CHAN}}\) 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:

![Figure 3-1. The User Screen to Enter a Memory Number](image)

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

- Enter digit, cursor automatically advances and wraps
- Accept the entry and continue
- Abandon the entry and exit

Note: If the memory 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 memory.

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 \(3_{\text{MODE}}\) Scope: Main and Guard

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

![Figure 3-2. The User Screen to Edit the Operating Mode](image)
Edit Keys

- step up through available operating modes (w, n, D)
- step down through available operating modes (w, n, D)
- accept the entry and exit
- abandon the entry and exit

### Table 3-2 Transceiver Operating Modes

<table>
<thead>
<tr>
<th>Operating Mode</th>
<th>Bandwidth</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog Wide</td>
<td>25 kHz</td>
<td>'w'</td>
</tr>
<tr>
<td>Analog Narrow</td>
<td>12.5 kHz</td>
<td>'n'</td>
</tr>
<tr>
<td>P25 Digital</td>
<td>12.5 kHz</td>
<td>'D'</td>
</tr>
</tbody>
</table>

**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 Main Memories

**Level 1**  
**Key**  
**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**  
**Scope:** Main only

This command allows the user to start and stop Scan operation, the system will scan the memories that are in the same scan list that the currently displayed Main channel memory is a member of. Note that the memories 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:

![Scan disabled](image)

**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:

![Scan enabled](image)

**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:
3.1.6 Scroll Forwards through Available Main Memories

Level 1  Key $  Scope: Main only

Press and hold the forward arrow (6) key to scroll the Main Channel FORWARD, 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 $  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:

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

$  decimal mode: enter number, cursor automatically advances

Accept the entry and continue

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 D for valid 6.25kHz frequencies).
### 3.1.8 Decrease Display Brightness

**Level 1**  
**Key** ![Down Arrow]  
**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** ![SQL]  
**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:

![Figure 3-6. Editing the Squelch Mode]

**Edit Keys**  
- step up/down through available squelch modes.  
- accept the entry and exit  
- 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

<table>
<thead>
<tr>
<th></th>
<th>Analog</th>
<th></th>
<th>Digital</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rx</td>
<td>Tx</td>
<td>Rx</td>
<td>Tx</td>
</tr>
<tr>
<td>Noise</td>
<td>x</td>
<td>CTCSS Tones</td>
<td>t</td>
<td>Monitor</td>
</tr>
<tr>
<td>CTCSS Tones</td>
<td>t</td>
<td>DCS Codes</td>
<td>c</td>
<td>NAC Only</td>
</tr>
<tr>
<td>DCS Code</td>
<td>c</td>
<td>Inhibit</td>
<td>--</td>
<td>TalkGroup + NAC</td>
</tr>
</tbody>
</table>

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:

![Figure 3-7. Editing the Noise Squelch Value]
Edit Keys

Decimal mode: enter number, cursor automatically advances

Accept the entry and continue

Abandon the entry and exit

Analog - CTCSS Tone

Scope: receive & transmit, 42 tones (see Appendix B)

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

Step up/down through available CTCSS tones

Accept the entry and: continue if Rx, exit if Tx

Abandon the entry and exit

Edit Analog - DCS Code

Scope: receive & transmit, 83 codes (see Appendix B)

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

Step up/down through available CTCSS tones

Accept the entry and: continue if Rx, exit if Tx

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 prompt line will display the current TalkGroup value, the cursor will be on the first digit:

- 005 Holden D156.5000R9
- P25 TalkGroup: 0001

Figure 3-10. Editing the P25 TalkGroup Value
Edit Keys

- hex edit: move cursor backward/forward through the digits
- hex edit: step up/down through the hex digits (0-9, A-F)
- decimal edit: enter number, cursor automatically advances
- accept the entry and continue to Edit NAC
- 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   D156.5000R9
P25 NAC:   001
```

Figure 3-11. Editing the P25 NAC Value

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

- decimal mode: enter number, cursor automatically advances
- accept the entry and exit
- abandon the entry and exit
3.1.10 Command Level Up

Level 1  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.

3.1.11 Toggle memory: current/home

Level 1  Key # ENTER  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 ESC  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.

3.1.13 Erase Encryption Keys

Level 1  Key ? + 1 + 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 (if any) 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 is given below.
3.2.1 Create/Edit All Channel Information

Level 2 Key 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.

Accept the entry and continue – exit only after all edits completed.

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)

When the Create/Edit All command is selected, 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). In addition valid 6.25kHz. frequencies are supported.

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 Scope: Main only

Copy the currently displayed Guard information UP to the currently selected memory on 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 Scope: Main and Guard

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

Edit Keys

Lock the keypad, display 'locked' until key release.

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

3.2.4 L2-4 not used.

Level 2 Key Scope: Command unused.

3.2.5 Edit Scan List & Enable/Disable Scan

Level 2 Key Scope: Main only

This command allows the user to select which of the SCAN LISTS that the selected memory 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.

![Figure 3-13. The Screen to Enter a Scan List or Enable/Disable Scan](image)

**Edit Keys**
- step up through available scan lists
- step down through available scan lists
- toggle the scan enable / disable (bar = disabled)
- accept the entry and exit
- 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.

![Figure 3-14. The Screen Showing Scan Enabled for this Memory](image)

### 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 current memory on 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.

![Figure 3-15. Editing the Text Description](image)
Edit Keys

- step through the four available edit groups (A-Z, a-z, 0-9, extra characters (see table 3.4)
- step up/down through the characters in each edit group
- move backward/forward through the available characters
- accept the entry and exit
- 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>
<thead>
<tr>
<th>Table 3-4. Extra Characters for Text Edit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>!</td>
</tr>
</tbody>
</table>

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

3.2.7 Create Shadow Memory

Level 2 Key \[ \text{FREQ} \] 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’.

![Figure 3-16. Entering a Primary Memory for the Shadow Channel](image)

Edit Keys

- decimal mode: enter number, cursor automatically advances
- accept the entry and continue
- 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:

![Figure 3-17. Entering a Shadow Channel Memory Number](image)
Enter a number for the shadow memory, do not select a number already in use:

Edit Keys

| 0 (PRG) | 9 (SOL) | decimal mode: enter number, cursor automatically advances |
| # ENTER |        | accept the entry and continue |
|        | * 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:

![Edit Keys](image)

**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 18 Scope: Main and Guard**

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 9 Scope: Main and Guard**

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

![Encryption ON/OFF](image)

**Figure 3-19. The Encryption Enabled for Main.**
3.2.10 Command Level Up

Level 2  Key [PRG]  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 only

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 L2–#. Not Used.

Level 2  Key [#]  Scope: Main only

3.3 Operator Level 3 Commands

The Level 3 commands are configuration commands that 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 Memory for Main 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.

Figure 3-20. Selecting Main Channel Boot Memory

Edit Keys

- step up/down through available boot memory choices
- accept the entry and exit
- abandon the entry and exit
3.3.2 Assign Key by KeyTag

Level 3 Key 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 3-21. Selecting the Memory to Assign the Key to

Edit Keys

- step up/down through available memories (Main only)
- accept the entry and exit
- 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 3-22. Selecting the KeyTag to Assign to the Memory

Edit Keys

- step up/down through available keytags.
- accept the entry and exit
- 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 3-23. Selecting the decrypt option: Any Key or Assigned Key

Edit Keys

- toggle Receive Key Option: Any Key / Selected Key.
- accept the entry and exit
- 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.

Figure 3-24. Screen to Assign another key or exit

3.3.3 Set Numeric Edit Mode: Decimal or Hexadecimal

Level 3 Key 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).

Figure 3-25. Selecting Edit mode

3.3.4 Display Firmware Release and Version Information

Level 3 Key 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:

Figure 3-26. Showing the Code Release Information
3.3.5 Edit Scan Parameters

Level 3 Key * 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:

Figure 2-27. Select the Scan Revert Mode

Edit Keys

<table>
<thead>
<tr>
<th>Key</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>#</td>
<td>accept the entry and exit</td>
</tr>
<tr>
<td>*</td>
<td>abandon the entry and exit</td>
</tr>
</tbody>
</table>

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.

Figure 2-28. Set the Scan Reply Timer Value

Edit Keys

<table>
<thead>
<tr>
<th>Key</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 PROG</td>
<td>to</td>
</tr>
<tr>
<td>#</td>
<td>accept the entry and continue</td>
</tr>
<tr>
<td>*</td>
<td>abandon the entry and exit</td>
</tr>
</tbody>
</table>
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.

Figure 3-29. Set the Scan Monitor Timer Value

Edit Keys
- decimal mode: enter number, cursor automatically advances
- accept the entry and continue
- 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'.

Figure 3-30. Set the Scan Delay Timer Value

Edit Keys
- decimal mode: enter number, cursor automatically advances
- accept the entry and continue
- abandon the entry and exit

3.3.6 Configure PTT Timer

Level 3 Key $ key 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.

Figure 3-31. Set the PTT Timer Value
Edit Keys

- Step up through PTT timer settings
- Step down through PTT timer settings
- accept the entry and exit
- abandon the entry and exit

3.3.7 Side Tone Audio Level Adjust

Level 3 Key \( \fbox{7} \) Scope: Main only

This command allows the user to adjust the level of side tone, the range of adjustment is 0 to 255. The screen shows the currently selected level as shown:

**Figure 3-32. Set the Side tone Audio Level**

Edit Keys
decimal mode: enter number, cursor automatically advances
- accept the entry and continue
- abandon the entry and exit

3.3.8 PC Data Upload/Download

Level 3 Key \( \fbox{8} \) 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 and the TiL TDP-136 Radio Communication Software package. The bottom right hand corner of the display indicates which data port will be used (F=Front serial, R=Rear serial, U=USB). The transceiver will automatically switch to the front serial interface when it detects a TDP cable in the PGM port, or the USB interface when it detects a TDP cable and the USB interface has connected to the PC. 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 when transfer is in progress, and when the transfer is complete (transfer progress can be monitored on the PC display).

**Figure 3-33. Upload/Download Memory Data to/from the PC**

There is one user key function:

- abandon PC communications mode
3.3.9 Display Channel Squelch Parameters

Level 3    Key [9] Scope: Main and Guard

Display the Squelch parameters for the current memory on the selected channel. The data are displayed as follows:

![Figure 3-34. Display of the Receive Squelch Parameter Values](image)

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:

![Figure 3-35. Display of the Transmit Squelch Parameter Values](image)

Edit Keys

-  toggle the squelch parameter display between receive (Rx) and transmit (Tx)
-  exit

3.3.10 Command Level Up

Level 3    Key [0] 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 [*] 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 [#] 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 \text{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>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Scan List</td>
<td>1</td>
</tr>
<tr>
<td>Basic Text Description</td>
<td>&quot;Desc &quot;</td>
</tr>
<tr>
<td>Basic Operating Mode</td>
<td>w</td>
</tr>
<tr>
<td>Receive Rx Frequency</td>
<td>141.0000</td>
</tr>
<tr>
<td>Receive Rx Squelch Mode</td>
<td>x</td>
</tr>
<tr>
<td>Receive Rx Noise Squelch Level</td>
<td>10</td>
</tr>
<tr>
<td>Receive Rx Squelch TalkGroup Value</td>
<td>$0001</td>
</tr>
<tr>
<td>Receive Rx Squelch Tone Value</td>
<td>67.0</td>
</tr>
<tr>
<td>Receive Rx Squelch Code Value</td>
<td>23</td>
</tr>
<tr>
<td>Receive Rx NAC Value</td>
<td>$293</td>
</tr>
<tr>
<td>Transmit Tx Frequency</td>
<td>141.0000</td>
</tr>
<tr>
<td>Transmit Tx Squelch Mode</td>
<td>x</td>
</tr>
<tr>
<td>Transmit Tx Squelch TalkGroup Value</td>
<td>$0001</td>
</tr>
<tr>
<td>Transmit Tx Squelch Tone Value</td>
<td>67.0</td>
</tr>
<tr>
<td>Transmit Tx Squelch Code Value</td>
<td>23</td>
</tr>
<tr>
<td>Transmit Tx NAC Value</td>
<td>$293</td>
</tr>
<tr>
<td>Transmit Tx ID Call Value</td>
<td>00000001</td>
</tr>
</tbody>
</table>
3.4.2 Set Restricted Level Access Mode

Level 4  Key 2  Scope: Main and Guard

Select the method to access the restricted command levels. The choices are 'Jumper only' and 'Jumper & Password'.

Figure 3-36. Select the Access Mode from a list.

3.4.3 Set Command Permissions

Level 4  Key 3  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 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:

Figure 3-37. Edit the Level 1 Permissions

Edit Keys

0 PROG  Toggle permission ( = enabled, = disabled

? 2 8 5 4 6 7 8 9 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0

< ENTER> accept the entry and exit

* ESC  abandon the entry and exit

Figure 2-38. Edit the Level 2 Permissions

Figure 3-39. Edit the Level 3 Permissions
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. 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.

<table>
<thead>
<tr>
<th>Cmnd Num</th>
<th>Command</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Select MN Memory</td>
<td>● ●</td>
<td>● ●</td>
<td>● ●</td>
</tr>
<tr>
<td>2</td>
<td>Brighter</td>
<td>● ●</td>
<td>● ●</td>
<td>● ●</td>
</tr>
<tr>
<td>3</td>
<td>Edit Op Mode</td>
<td>● ●</td>
<td>● ●</td>
<td>● ●</td>
</tr>
<tr>
<td>4</td>
<td>Scroll MN Memory Down</td>
<td>● ●</td>
<td>● ●</td>
<td>● ●</td>
</tr>
<tr>
<td>5</td>
<td>Scan</td>
<td>● ●</td>
<td>● ●</td>
<td>● ●</td>
</tr>
<tr>
<td>6</td>
<td>Scroll MN Memory Up</td>
<td>● ●</td>
<td>● ●</td>
<td>● ●</td>
</tr>
<tr>
<td>7</td>
<td>Edit Frequency</td>
<td>● ●</td>
<td>● ●</td>
<td>● ●</td>
</tr>
<tr>
<td>8</td>
<td>Dimmer</td>
<td>● ●</td>
<td>● ●</td>
<td>● ●</td>
</tr>
<tr>
<td>9</td>
<td>Edit Squelch</td>
<td>● ●</td>
<td>● ●</td>
<td>● ●</td>
</tr>
</tbody>
</table>

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.

Figure 3-40. Enable/Disable 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 Scope: unused

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 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.

Figure 3-41. The Frequency Display Enable/Disable screen.

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

- ![toggle enable/disable displaying frequency for the selected memory](Image)
- ![accept the entry and exit](Image)
- ![abandon the entry and exit](Image)

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:

Figure 3-42. 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 (↔,***)](image)

SLN: 00001  ALG: DES

Figure 3-43. Step through available keys by SLN.

**Edit Keys**
- move backward/forward through the loaded keys, by SLN
- enter
- accept the entry and continue
- * escape
- 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](image)

SLN: 00001 (↑↓←→3,***) AZ

Figure 3-44. The screen to edit the KeyTag.

**Edit Keys**
- 3 mode
- step up/down through the characters in each edit group
- move backward/forward through the available characters
- enter
- accept the entry and continue
- escape
- abandon the entry and continue

**L4-8.3 Repeat or Exit.** When done, you may loop back and repeat the process for another key or to exit the editor entirely:

![Edit Key Tag: Key Tag 01](image)

Another Key? #=ok *=exit

Figure 3-45. The screen to assign another KeyTag or exit.

**Edit Keys**
- enter
- accept the entry and continue
- escape
- abandon the entry and exit
3.4.9 Set Squelch Restrictions

Level 4 Key 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
- move backward/forward through the restriction screens
- step up/down through the parameters for each screen
- Toggle the state of the displayed parameter: enabled / disabled
- accept the entry and exit
- 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>
<thead>
<tr>
<th>Table 3-7 Squelch Modes that can be Restricted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog Rx</td>
</tr>
<tr>
<td>Tone</td>
</tr>
<tr>
<td>Code</td>
</tr>
<tr>
<td>Inhibit</td>
</tr>
</tbody>
</table>

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).

Figure 3-46. 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.
3.4.10 Command Level Up

   Level 4    Key [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 L4-# not used

   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 L5-1 not used

Level 5 Key  
Scope: -

There is no command implemented at this location.

3.5.2 L5-2 not used

Level 5 Key  
Scope: -

There is no command implemented at this location.

3.5.3 L5-3 not used

Level 5 Key  
Scope: 

There is no command implemented at this location.

3.5.4 Re-Set Database to Factory Defaults

Level 5 Key  
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 will lose all information you have loaded!

The Re-Set Database screen looks as follows:

Figure 3-50. 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 Hardware Setup

Level 5 Key $5$ Scope: Main and Guard

This command provides a sub-menu of commands for configuring the Radio hardware.

Figure 3-51. Hardware Setup

The keys used to operate the Hardware Setup menu are:

- step up through available choices
- step down through available choices
- exit mode
- exit mode

Available choices are:
- Backlight Input
- Radio Mic Input Gain
- RF Module Output Level
- RF Module Input Level
- Audio Record Input Level
- Diagnostic Messages
- Antenna Mode (only available on two-antenna models)

L3.5.1 Setting the Backlight Input

These screens step through and configure the panel lighting voltage, the min/max panel lighting input signal, and the associated brightness of the front panel lighting system.

NOTE: An adjustable backlight voltage must be connected to the Radio when using this command. The software measures and records the backlight input voltage at each step when setting the display illumination.

L3.5.1.1 Select panel lighting voltage

Select the operating voltage for the panel lighting system in the aircraft.

Figure 3-52 Select the Panel lighting voltage

Edit Keys
- Select 28V lighting
- Select 5V lighting
- save the entry and continue
- abandon the entry and exit
L3.5.1.2 Set display illumination

Step through the configuration table and set the default display illumination when the panel lighting voltage is set to off, minimum, 50%, 75%, and maximum. After adjusting the display for each set-point, press ENTER to move on to the next. Note that the lighting voltage set-points are somewhat arbitrary and can be adjusted to obtain an optimum lighting response.

![Set input = Off Dis: 50
Backlight: 0 LED: 50](image)

Figure 3-53. Set display illumination (backlight off)

Edit Keys
- Increase display illumination
- Decrease display illumination
- save the current settings and continue
- abandon all changes and exit

Rotate the Main knob to adjust the keypad illumination. Rotate the Guard knob to adjust the Rx LED illumination.

L3.5.2 Set Radio Microphone Input Gain

Set the microphone input gain.

![Set Mic Input Gain
Mic Gain (0-255): 125](image)

Figure 3-54. Set microphone input gain

Edit Keys
- Increase gain
- Decrease gain
- save the current setting and exit
- abandon changes and exit

Rotating the Main or Guard knob will also adjust the gain.

L3.5.3 Set RF Module Output Level

Set the output volume for each RF module. This setting affects the output from the RF module to the audio circuitry in the 136B. It does not directly affect the volume level out the back of the radio.

![Main Output Volume: 200
Guard Output Volume: 200](image)

Figure 3-55. Set RF Module Output Level
Edit Keys

Adjust Main output volume up/down
Adjust Guard output volume up/down

save the current settings and exit
abandon the entry and exit

Rotate the Main knob to adjust the Main output volume
Rotate the Guard knob to adjust the Guard output volume

L3.5.4 Set RF Module Input Level

Set the microphone input level for each RF module. This setting affects the input to the RF module from the audio circuitry in the 136B.

Main Mic Input: 40
Guard Mic Input: 40

Figure 3-56. Set RF Module Input Level

Edit Keys

Adjust Main mic input up/down
Adjust Guard mic input up/down

save the current settings and exit
abandon the entry and exit

Rotate the Main knob to adjust the Main mic input
Rotate the Guard knob to adjust the Guard mic input

L3.5.5 Set Audio Record Input Level

Set the input level to the audio recorder. This setting affects the input to the audio recorder from the audio circuitry in the 136B.

Set Audio Record Input
Level: 45

Figure 3-57. Set audio record input level

Edit Keys

Increase display illumination
Decrease display illumination

save the current setting and exit
abandon changes and exit
L3.5.6 Select diagnostic message output

Select if the system diagnostic messages are output to one of the serial ports. The choices are Rear serial, Front serial, or Off.

Figure 3-58 Select Diagnostic Message Output

Edit Keys
- Scroll up through available choices
- Scroll down through available choices
- save choice and exit
- abandon change and exit

L3.5.57 Set Antenna Mode

Set the input level to the audio recorder. This setting affects the input to the audio recorder from the audio circuitry in the 136B.

Figure 3-59 Set Antenna mode

Edit Keys
- Select single antenna mode
- Select dual antenna mode
- save the current setting and exit
- abandon changes and exit

3.5.6 RF Image Update

Level 5 Key Scope: Main and Guard

This command allows you to transfer images to the RF modules. The top right hand corner of the display indicates which data port will be used (F=Front serial, R=Rear serial, U=USB). This command is for use by trained personnel to perform software updates on the RF modules.

Figure 3-60 RF Image Update
Edit Keys

- step up through available choices (image type & destination)
- step down through available choices
- Perform selected image transfer then exit
- abandon selection and exit

3.5.7 Edit Passwords

Level 5 Key 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.

Figure 3-61. Edit Maintenance Password

Edit Keys

- Step through the available edit groups (A-Z, a-z, 0-9, + extra characters – see table 3-e)
- step up/down through the characters in each edit group
- move backward/forward through the available characters
- accept the entry and continue
- abandon the entry and continue

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

Figure 3-62. Edit Supervisor Password

The editing keys are the same as for the Maintenance password.
3.5.8 Run Bootloader

Level 5  Key [BL]  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:

```
• series800 MCU Bootloader
• 2.0.3
```

Figure 3-63. The Bootloader Screen

3.5.9 Set Unit ID (UID)

Level 5  Key [SOL]  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 3-64. Set Unit ID Number (screen for Main shown)

The keys used to edit the UID parameter are:

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

3.5.10 L5-0 not used

Level 5  Key [PROG]  Scope:

There is no command implemented at this location.
3.5.11 Command Level Down

Level 5  Key *  Scope: Main and Guard

Command level navigation: step down one command level.

3.5.12 L5-# not used

Level 5  Key #  Scope:

There is no command implemented at this location.
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 2 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

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.
### Appendix B. CTCSS Tone and DCS Code Tables

#### Table 4-1

<table>
<thead>
<tr>
<th>CTCSS Tones (Hz.)</th>
<th></th>
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<tbody>
<tr>
<td>67.0</td>
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<tr>
<td>69.3</td>
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</tr>
<tr>
<td>71.9</td>
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<td>74.4</td>
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#### Table 4-2

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<td>754</td>
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<tr>
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</tbody>
</table>
4.3 Appendix C. Programming Channel data using TDP and a PC.

The TDFM-136B supports loading memory data from a PC using TDP-136 software. Be sure not to use 'MultiTDP' as 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 with the correct TDP installed.
- A suitable connecting cable (TiL #127504) or a TiL Radio Test Jig (04T139) and serial cable (9 pin).
- 24-30Volts 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). You will see a screen similar to below. The bottom right hand corner of the display indicates which data port will be used (F=Front serial, R=Rear serial, U=USB). The transceiver will automatically switch to the front serial interface when it detects a TDP cable in the PGM port, or the USB interface when it detects a TDP cable and the USB interface has connected to the PC.

![Figure 4-3. The Communicate with PC Command Screen](image)

Start the TDP, you will see something like:

![Figure 4-4. The TDP-136 Radio Programming Software Window](image)
The COM port used to communicate with the radio can be selected from the drop-down list, or typed into the selection box.

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 or typing the number into the selection box. 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. Files can also be saved to or retrieved from the local hard drive using the “Save File” or “Open File” buttons.
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>
<thead>
<tr>
<th>2.5 kHz</th>
<th>2.5 and 6.25 kHz</th>
<th>6.25 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>136.0000</td>
<td>136.00000</td>
<td>136.0000</td>
</tr>
<tr>
<td>136.00250</td>
<td>136.00250</td>
<td></td>
</tr>
<tr>
<td>136.00500</td>
<td>136.00500</td>
<td>136.00625</td>
</tr>
<tr>
<td>136.00750</td>
<td>136.00750</td>
<td></td>
</tr>
<tr>
<td>136.01000</td>
<td>136.01000</td>
<td>136.01250</td>
</tr>
<tr>
<td>136.01250</td>
<td>136.01250</td>
<td>136.01500</td>
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<tr>
<td>136.01500</td>
<td>136.01500</td>
<td>136.01750</td>
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<td>136.01750</td>
<td>136.01750</td>
<td>136.01875</td>
</tr>
<tr>
<td>136.02000</td>
<td>136.02000</td>
<td>136.02125</td>
</tr>
<tr>
<td>136.02250</td>
<td>136.02250</td>
<td>136.02500</td>
</tr>
<tr>
<td>136.02500</td>
<td>136.02500</td>
<td>136.02750</td>
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<tr>
<td>136.02750</td>
<td>136.02750</td>
<td>136.03000</td>
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<tr>
<td>136.03000</td>
<td>136.03000</td>
<td>136.03125</td>
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<tr>
<td>136.03250</td>
<td>136.03250</td>
<td>136.03500</td>
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<tr>
<td>136.03500</td>
<td>136.03500</td>
<td>136.03750</td>
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<tr>
<td>136.03750</td>
<td>136.03750</td>
<td>136.04000</td>
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<tr>
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<td>136.04000</td>
<td>136.04250</td>
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<tr>
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<td>136.04250</td>
<td>136.04375</td>
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<tr>
<td>136.04500</td>
<td>136.04500</td>
<td>136.04750</td>
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<tr>
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<td>136.04750</td>
<td>136.05000</td>
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<tr>
<td>136.05000</td>
<td>136.05000</td>
<td>136.05250</td>
</tr>
<tr>
<td>136.05250</td>
<td>136.05250</td>
<td>136.05500</td>
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<tr>
<td>136.05500</td>
<td>136.05500</td>
<td>136.05625</td>
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<tr>
<td>136.05750</td>
<td>136.05750</td>
<td>136.06000</td>
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<td>136.06000</td>
<td>136.06250</td>
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<tr>
<td>136.06250</td>
<td>136.06250</td>
<td>136.06500</td>
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<tr>
<td>136.06500</td>
<td>136.06500</td>
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<td>136.08375</td>
<td>136.08625</td>
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<td>136.08625</td>
<td>136.08875</td>
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<tr>
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<td>136.08875</td>
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<tr>
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<td>136.09125</td>
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<td>136.09875</td>
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<td>136.09875</td>
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<td>136.10125</td>
<td>136.10375</td>
</tr>
<tr>
<td>136.10375</td>
<td>136.10375</td>
<td>136.10625</td>
</tr>
<tr>
<td>136.10625</td>
<td>136.10625</td>
<td>136.10875</td>
</tr>
<tr>
<td>136.10875</td>
<td>136.10875</td>
<td>136.11125</td>
</tr>
</tbody>
</table>
### 4.5 Appendix E. Default Tables

This Appendix shows various system default parameters.

#### Table 4-4. The Memory Template Factory Defaults

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic</strong></td>
<td></td>
</tr>
<tr>
<td>Scan List</td>
<td>1</td>
</tr>
<tr>
<td>Text Description</td>
<td>&quot;Desc &quot;</td>
</tr>
<tr>
<td>Operating Mode</td>
<td>n</td>
</tr>
<tr>
<td>Rx Frequency</td>
<td>141.0000</td>
</tr>
<tr>
<td>Rx Squelch Mode</td>
<td>x</td>
</tr>
<tr>
<td>Rx Noise Squelch Level</td>
<td>10</td>
</tr>
<tr>
<td>Rx Squelch TalkGroup Value</td>
<td>$0001</td>
</tr>
<tr>
<td>Rx Squelch Tone Value</td>
<td>67.0</td>
</tr>
<tr>
<td>Rx Squelch Code Value</td>
<td>23</td>
</tr>
<tr>
<td>Rx NAC Value</td>
<td>$293</td>
</tr>
<tr>
<td>Tx Frequency</td>
<td>141.0000</td>
</tr>
<tr>
<td>Tx Squelch Mode</td>
<td>x</td>
</tr>
<tr>
<td>Tx Squelch TalkGroup Value</td>
<td>$0001</td>
</tr>
<tr>
<td>Tx Squelch Tone Value</td>
<td>67.0</td>
</tr>
<tr>
<td>Tx Squelch Code Value</td>
<td>23</td>
</tr>
<tr>
<td>Tx NAC Value</td>
<td>$293</td>
</tr>
<tr>
<td>Tx ID Call Value</td>
<td>0000001</td>
</tr>
</tbody>
</table>

#### Table 4-5. Configuration Parameters Default Values

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boot Memory</td>
<td>Last selected, Last programmed, Home</td>
<td>Last Selected</td>
</tr>
<tr>
<td>Home Memory</td>
<td>001 to 230 (must be programmed)</td>
<td>001</td>
</tr>
<tr>
<td>Sidetone Volume</td>
<td>0 to 255</td>
<td>90</td>
</tr>
<tr>
<td>PTT Timer</td>
<td>30, 60 or 90 seconds</td>
<td>90 seconds</td>
</tr>
<tr>
<td>T.G. &amp; NAC Edit Mode</td>
<td>Decimal, Hexadecimal</td>
<td>Hexadecimal</td>
</tr>
<tr>
<td>Main &amp; Guard Talkaround</td>
<td>Disabled, Enabled</td>
<td>Disabled</td>
</tr>
</tbody>
</table>

#### Table 4-6. Scan Parameter Default Values

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revert Mode</td>
<td>Last contacted, Currently selected</td>
<td>Last Contacted</td>
</tr>
<tr>
<td>Reply Timer</td>
<td>0 to 20 seconds</td>
<td>3 seconds</td>
</tr>
<tr>
<td>Monitor Timer</td>
<td>0 to 90 seconds</td>
<td>10 seconds</td>
</tr>
<tr>
<td>Delay Timer</td>
<td>0 to 15 seconds</td>
<td>5 seconds</td>
</tr>
</tbody>
</table>

#### Table 4-7. Unit Identification (UID) Default Values

<table>
<thead>
<tr>
<th>Channel</th>
<th>Range</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main</td>
<td>00000001 - 9999999</td>
<td>00000001</td>
</tr>
<tr>
<td>Guard</td>
<td>00000002</td>
<td></td>
</tr>
</tbody>
</table>

#### Table 4-8. Restricted Level Password Default Values

<table>
<thead>
<tr>
<th>Command Level</th>
<th>Each Digit Range (8 digits)</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance</td>
<td>0-9, A-Z, a-z, space, and</td>
<td>00000000</td>
</tr>
<tr>
<td></td>
<td>!&quot;#$%&amp;'()+-./</td>
<td>10000000</td>
</tr>
</tbody>
</table>

Technisonic Industries Ltd
4.6 Appendix F. Warranty Information

Technisonic Industries Limited
240 Traders Blvd., Mississauga, ON Canada L4Z 1W7
Tel: (905) 890-2113 Fax: (905) 890-5338

IMPORTANT
WARRANTY

All communication equipment manufactured by Technisonic Industries Limited is warranted to be free of defects in Material or Workmanship under normal use for a period of one year from Date of Purchase by the end user.

Warranty will only apply to equipment installed by a factory approved and/or authorized facility in accordance with Technisonic published installation instructions. Equipment falling under the following is not covered by warranty:
• equipment that has been repaired or altered in any way as to affect performance,
• equipment that has been subject to improper installation,
• equipment that has been used for purposes other than intended,
• equipment that has been involved in any accident, fire, flood, immersion or subject to any other abuse.

Expressly excluded from this warranty are changes or charges relating to the removal and re-installation of equipment from the aircraft. Technisonic will repair or replace (at Technisonic's discretion) any defective transceiver (or part thereof) found to be faulty during the Warranty Period.

Faulty equipment must be returned to Technisonic (or its authorized Warranty Depot) with transportation charges prepaid. Repaired (or replacement) equipment will be returned to the customer with collect freight charges. If the failure of a transceiver occurs within the first 30 days of service, Technisonic will return the repaired or replacement equipment prepaid.

Technisonic reserves the right to make changes in design, or additions to, or improvements in its products without obligation to install such additions and improvements in equipment previously manufactured. This Warranty is in lieu of any and all other warranties express or implied, including any warranty of merchantability or fitness, and of all other obligations or liabilities on the part of Technisonic.

This Warranty shall not be transferable or assignable to any other persons, firms or corporations.

For warranty registration please complete the on-line
Warranty Registration Form found at www.til.ca.