

**Portable Transceiver System
PTS Model FS2001F-ISO
Preliminary User Manual**

Release 1.0

Software Version 3.8

Preliminary Release for

Software Version 5.0 (Fishery Applications)

Software Version 3.13 (Livestock Applications)

Tuning instructions for AN49XXA located at end of Manual

Includes capability to read SGL Transponders

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TRADEMARKS AND NOTICES

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1. PRODUCT DESCRIPTION

The FS2001F-ISO is a portable, hand held device that is used to read radio and HDX frequency identification (RFID) tags in conformance with ISO 11784 and ISO 11785 standards. This portable transceiver system consists of the transceiver electronics unit and one antenna connected to the unit with a cable.



The FS2001F-ISO Portable Transceiver System (PTS) is a high performance unit specifically designed for portable operation. The unit includes one serial port that may be connected to a computer, for controlling the reader, monitoring the installation, and logging the RF tag numbers.

The PTS main features are the following:

- Compatible with FDX-A, FDX-B, and HDX RF ID tags;
- 2 lines by 16 characters backlight LCD display.
- 5 key keyboard that allows local operation and reader's configuration.
- EIA 232 communication port for connection to a computer for maintenance, menu functions, installation monitoring, and data logging activities.
- Field upgradeable software.
- Data logging memory for up to 6,400 tags.
- Internal battery or external AC/DC power operation.
- Detachable antenna.
- Sturdy shockproof case.
- Water-resistant.

WARNING: When connecting the antenna cable, the end marked transceiver (Ferrite) must be connected to the 2001F. The RS232 cable, if used, must be attached to a grounded connector. Failure to comply may result in the exceeding of FCC limits and undesirable operation of the unit.

Caution: When shipping unit, or when transporting through elevation changes, leave connector caps loose or unscrewed to prevent pressure build-up that can cause damage to the keypad.

The next figure illustrates the Model 2001F-ISO PTS unit with the 7" portable and tabletop antennas. It should be noted that several other specialty antennas are available for other type of applications, such as walk-by panels, walk-through antennas and sticks.

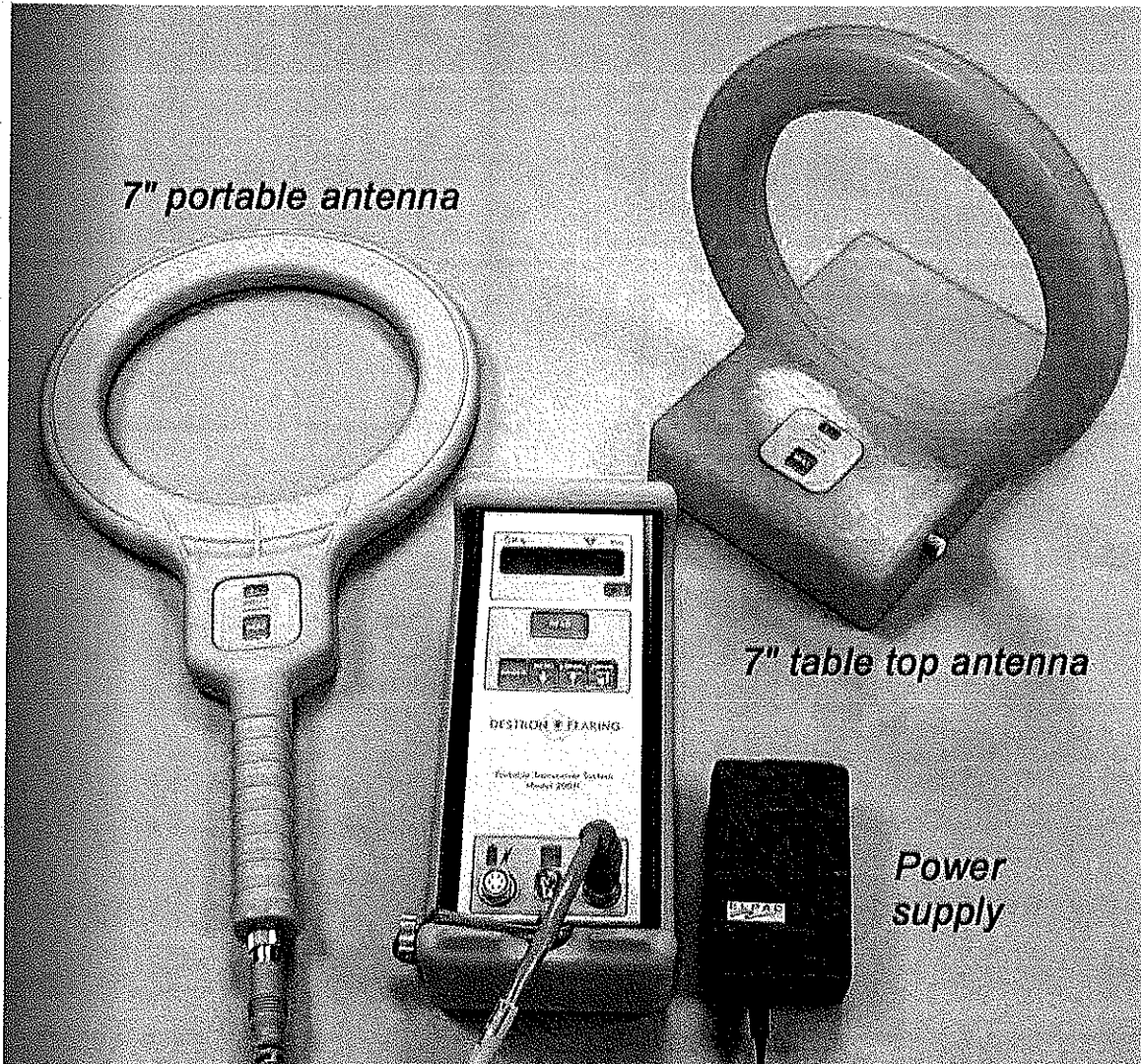


Figure 1 : PTS Model 2001F-ISO reader with 7" portable and tabletop antennas

2. READER OVERVIEW

The PTS main unit is illustrated in the next figure, showing the main components:

- LCD display
- LED indicator
- Context sensitive keyboard
- Audible alarm
- System connectors

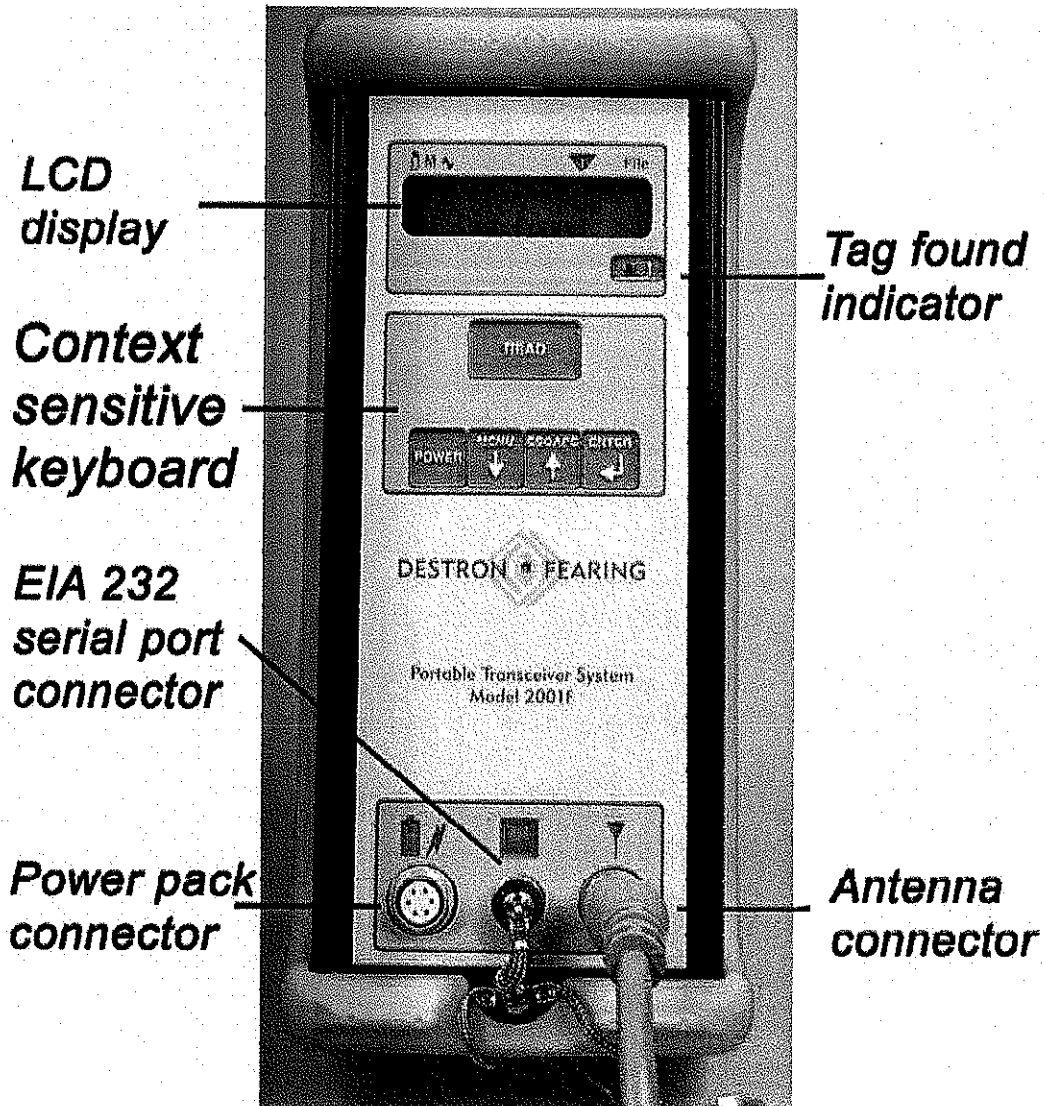


Figure 2 : PTS front panel

2.1. LCD display

The LCD display is a 2 line by 16-character backlit unit that displays TAG IDs and reader's status information. The backlight can be turned on, off or be controlled automatically to save battery energy.

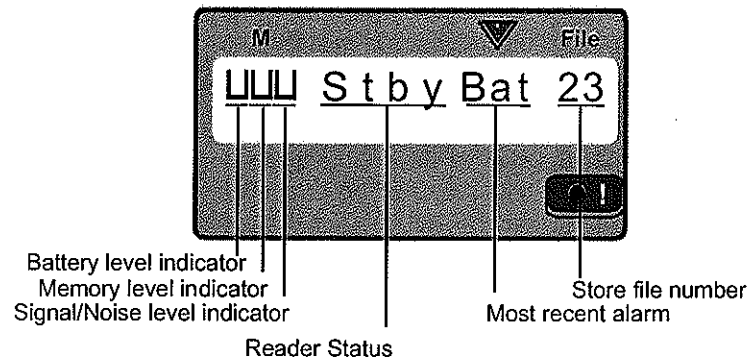



Figure 3 : LCD display with LED indicator

The LED indicators located below the display and on the antenna keyboard indicate the presence of a tag in the antenna field. The LED is turned on each time a tag message is decoded successfully.

2.1.1. Level indicators

On the first line of the LCD, the unit features 3 level indicators that provide information about:

- B** Battery voltage level. It should be noted that when the power is fed from the external power pack, the level indicator is replaced by the  "plug" symbol, indicating the unit power is fed by an external source. The battery percentage is based on a linearization of the battery discharge curve.
- M** Data logging memory use. Up to approximately 6,400 tags (records) can be stored in the data logging memory. The memory is partitioned as variable length "files" (a single file can occupy the entire memory) that are extended as new tag IDs are stored. Up to 32 different files can be created and managed using the file management utilities.
- ⚡** Signal or noise level detected by the reader. When the reader detects an excessive level of noise, an alarm is indicated. The level changes in less than 1 second using an accumulating averaging function.

The level indicators are animated from low to high  , providing a quick overview of the reader status.

2.1.2. Reader status

The next display field is used to display the reader activity and the tag search result. The unit can display:


Ready: The reader is inactive, waiting for a user command from the keyboard or from the computer port. When the automatic shutoff feature is active, the unit will automatically turn off after the delay time setup by the user expires.

Scan: The reader is active and searching for a tag. The unit is finding no tag.

Found: the unit has found a new tag. The tag number found by the unit is different from the previous one found by the unit.

Same: The unit has found a tag but its number is the same as the last one detected by the unit.

2.1.3. Alarm indicator

The next 3 character zones designated by the warning indicator  are used to indicate the presence of an alarm. The alarms are:

ANT:	No antenna:	Antenna failure (disconnected or failed)
ANC:	Analog comm:	Analog board communication problem (disconnected or failed)
POW:	Low battery:	Low power level in the internal battery. It should be recharged as soon as possible.
LIT:	Low lithium:	Low voltage level at the memory/real-time clock back-up lithium battery. The back-up lithium battery has an expected shelf life of 5 years, which is reduced when the unit is powered off for a long period of time since current is drawn from it in order to preserve the RAM memory and the real-time clock content. The back-up battery compartment is located on the MPU board. It should be replaced with a CR2016 type lithium battery (Eveready, Toshiba or any other battery manufacturer).
ANF:	Analog fail:	The reader has detected a failure on the analog board. The user should check for the presence of metal around the antenna. If it's not the case, the unit should be returned to the supplier for repair.
MML:	Memory low:	The data logging memory is filled up to 90% of its capacity. Files must be downloaded to the computer or erased from the reader memory. Up to approximately 6,400 tags can be stored in the memory.
MMF:	Memory full:	The data logging memory is full. New tag IDs will not be stored.
OVR:	Overrun:	Environmental noise is detected and the reader is unable to read tags. The antenna should be relocated at a different position using the \blacktriangledown signal level indicator, to find the lowest possible interference level \square .

The alarm messages are sent on the serial port as they occur. A complete alarm list can be displayed on the LCD using the system summary feature available by pressing the Enter key from the main display. Alarms will not be displayed during file downloading.

2.1.4. File number


The last field on the first LCD line displays the file number in which the tags are stored if the Store option is enabled. Up to 32 different files can be created on the reader using the file management utility (file 0 to 31).

2.1.5. Tag number

The second line of the LCD displays the tag ID. When the unit stops scanning without finding a tag, the unit displays "No tag found". The display format of the tag number depends on the option setting and the type of tag. The display format is as following:

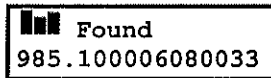
FDX-B tag (hexadecimal format)

Manufacturer ID followed by universal identification code, capital letters:

 Found 3D9.1748D0293F

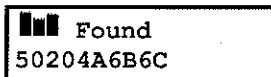
FDX-B tag (decimal format) and HDX tag

Manufacturer ID followed by universal identification code:



FDX-A tag

Universal identification code in hexadecimal format:



2.2. Keyboard

The unit is equipped with a 5-key context sensitive keyboard, which means that the use of the keyboard is adapted to the information being displayed on the LCD (see figure 4).

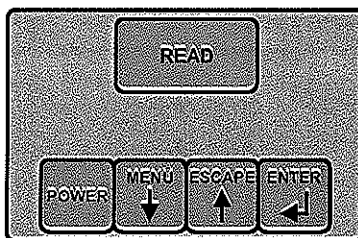


Figure 4 : Keyboard

2.2.1. Power key

The unit is activated/deactivated using the POWER key. When applying power, the unit performs self-diagnostics and either starts scanning for tags ("Continuous" scanning mode active) or waits for a user command ("Continuous" scanning mode inactive). Once active, pressing the POWER key again can turn off the unit. Please refer to the "Power-up sequence" section for more details.

2.2.2. Read key

The READ key is used to activate/deactivate the scanning of tags. In order to configure the reader for a specific application, it is important to understand the following Scan mode options:

Toggle: The *Toggle mode* defines the operating mode of the READ key. When the *Toggle mode* is Off, the READ key has to be pushed and held for the reader to scan for tags (push-to-read operation). This option is normally used for handheld operation. When the *Toggle mode* is On, pushing READ momentarily will start the tag scanning and pushing it again will stop the scanning mode and return it to the *Ready* state. The *Toggle mode* is used for Hands-free operation such as in a fish tagging session using the tabletop antenna.

Continuous: The *Continuous mode* defines the action of the reader if a valid TAG ID is found. When the *Continuous mode* is Off, the reader will stop its scanning and return to the *Ready* state if a valid TAG ID

is found. When the option is *Continuous mode* is On, the reader will not stop scanning if a valid TAG ID is found. This is the normal operating mode for a pipe monitoring installation or hands-free operation.

Unique: The *Unique mode* defines the reaction of the reader when the same tag is detected several times. When the *Unique mode* is Off, the tag will be enunciated as long as it remains in the detection range of the reader. When the *Unique mode* is On, the TAG ID will only be enunciated if it is different from the previous TAG ID detected. Therefore, the TAG ID will only be enunciated once even if it remains in the detection range of the reader. When the Unique mode is in *Delay mode*, the tag will be re-enunciated until the delay is expired. Therefore, the tag will be enunciated immediately when it is first presented in the detection field, and will be re-enunciated at the expiration of the delay when it remains in the detection field.

The Scan options can be configured from the keyboard.

2.2.3. Menu, Escape and Enter keys

The MENU, ESCAPE and ENTER keys are context sensitive navigation keys used to access:

- the reader overview that provides detailed information about the reader operation;
- the file management utilities that allows creation, deletion and downloading files to a computer using the COM port;
- The configuration menu that allows the setup of up to 3 different user profiles.

The key usage is described in the next chapter.

3. SCANNING FOR TAGS

The tag scanning process can be started and stopped in different ways:

- **Manually** using the READ key;
- **Remotely** using the serial port commands;
- **Automatically** by the reader, defined by the configuration set-up.

3.1. Manual scanning

Manual scanning is done from the PTS front-panel keyboard using the READ key.

With the *Toggle mode* Off:

- Push and hold the READ key to scan for tags. Releasing the READ key will set the reader back to the *Ready* mode.

With the *Toggle mode* On:

- In the *Ready* mode, momentarily push the READ key to *Scan* for tags;
- During the tag *Scan*, momentarily push the READ key to return to the *Ready* mode.

3.2. Remote scanning

The RA command can be used to start and stop the scanning from the serial port. Regardless of the *Toggle mode*, RA1 will start the *Scan* mode and RA0 will return the reader to the *Ready* mode. RAZ will shutdown the reader. Please refer to the "Reader Active (RA)" section for more details.

RA command structure

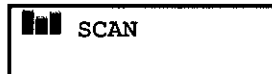
```
RA{1|0|Z}      Reader Active ON|OFF|RESET
```

Example

```
01> RA0.␣  
MESSAGE: Reader is idle  
01> RA1.␣  
MESSAGE: Read mode  
01> RAZ.␣  
MESSAGE: Shutdown!
```

3.3. Automatic scanning

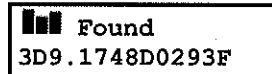
The reader will automatically start the *Scan* mode after a reset or a power-up when the *Continuous Scan* option is selected. The scanning process can then be stopped and resumed using the READ key or the RA serial port command.



3.4. TAG ID detection

When scanning, the following annunciation process occurs upon detection of a valid TAG ID:

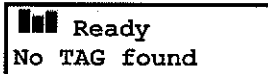
1. The TAG ID is displayed on the second LCD line. If the tag number is different from the preceding tag found, the first line would show "Found". If the number is the same as the preceding tag, the display will show "Same".



Found
3D9.1748D0293F

2. The LED indicators (below the display and on the antenna) are illuminated each time a valid TAG message is detected. Therefore, the LED will continue to flash until the tag is removed from the antenna detection range.
3. The beeper is activated briefly if the "Beeper" option is turned On.
4. The TAG ID message is sent on the COM if on of the "Send to COM port" option is enabled. This option can be turned on or off from the keyboard menu or the serial port.
5. If any of the *Store* options are selected (*All* or *Search*), the TAG ID is stored in the memory file.
6. If the *Continuous mode* is off, return the reader to the *Ready* state, otherwise the unit will continue searching for tags.

If the scanning is interrupted manually or remotely without finding a new TAG ID, the following message will be displayed:



Ready
No TAG found

4. READER STATUS OVERVIEW

The system status overview will allow the user to examine detailed reader status from the display, including:

- Battery level, memory use, tag signal level and antenna current;
- Complete list of alarms existing on the reader;
- Record count in files.

The system status overview consists of 5 different screens and can be accessed from the main display using the ENTER key as in the following figure.

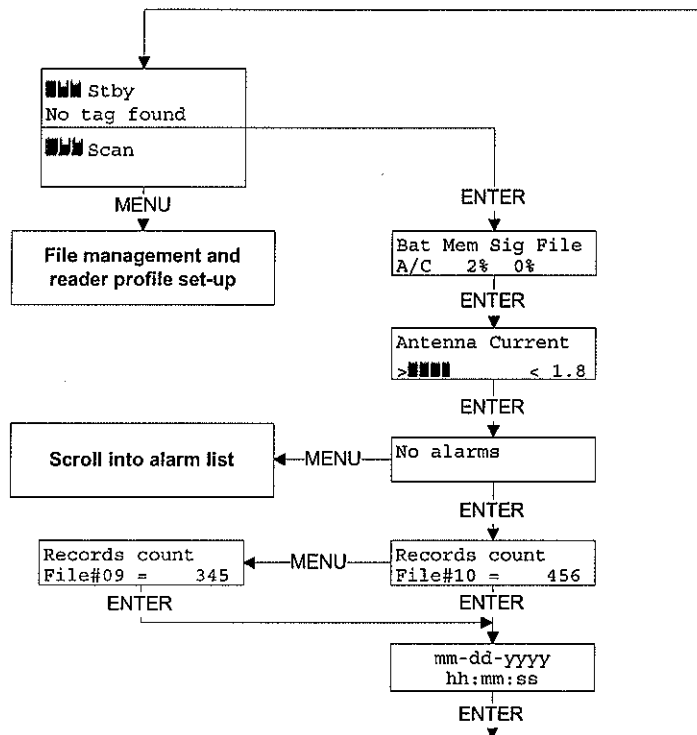


Figure 5: Reader status overview

4.1. Indicators display

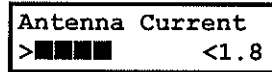
The indicator's display shows the following information:

- Bat** Voltage level (%) of the battery (when operated from internal battery) or from the external supply (when operated from the power pack or from any other external source of supply). It should be noted that the battery voltage is susceptible to temperature changes, and a 5% voltage difference can be seen when the battery is cold or warm.
- Mem** Total data logging memory use (%). The reader can store up to approximately 6,400 tags.
- Sig** Level of signal at the reader input (%). When the reader is in *Ready* mode, the signal level should be 0% since the antenna is not active. However, when the reader is in *Scan* mode, the signal level should reflect the TAG or the noise signal level. For best operation, when operating the reader near a CRT or a TV, the user should use the indicator and move the antenna until the signal level is minimized.
- File** Indicates the current file number in which the TAG IDs are stored. The File field is empty when none of Store options are selected.

Pressing the ENTER key again will show the Antenna Current, or ESCAPE will return to the main display.

4.2. Antenna current

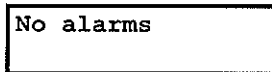
The Antenna Current window shows the current flowing into the antenna. The current is displayed as an horizontal bar graph animated from left to right with the numerical peak-to-peak value on the right. It should be noted that the value is approximate and is mainly used for antenna tuning/diagnostic purpose.



Pressing the ENTER key again will show the Alarm list, or ESCAPE will return to the main display.



4.3. Alarm list

The alarm list allows the user to see a detailed description of the alarms present in the reader. When a new alarm is detected, the reader will beep twice, a detailed alarm message will be sent on the COM port and an abbreviated alarm message will be displayed on the main screen. The detailed alarm message can also be seen on the alarm's list. Under normal conditions, the following message is displayed on the alarm list screen:

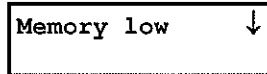


The following alarm messages can be displayed:

Table 1 : Reader alarms

Main display Message	Alarm Message	Description
	No alarms	Normal operating conditions
ANT	No antenna	Antenna failure (disconnected or failed)
POW	Low battery	Low power level in the internal battery (10 to 20 minutes remaining). It should be recharged as soon as possible.
LIT	Low lithium	Low voltage level at the memory/real-time clock back-up lithium battery. The back-up lithium battery has an expected shelf life of 5 years, which is reduced when the unit is powered off for a long period of time since current is drawn from it in order to preserve the RAM memory and the real-time clock content. The back-up battery compartment is located on the MPU board. It should be replaced with a CR2016 type lithium battery (Eveready, Toshiba or any other battery manufacturer).
ANC	Analog comm	The reader is not able to communicate with the analog board. The reader is either overloaded or the analog board has failed.
ANF	Analog fail	The reader has detected a failure in the analog board. It should be returned to the supplier for repair.
MML	Memory low	The data logging memory is filled up to 90% of its capacity. Files must be downloaded to the computer or erased from the reader memory. Up to approximately 6,000 tags can be stored in the memory.
MMF	Memory full	The data logging memory is full. The new tag IDs are not stored any more.
OVR	Over run	Environmental noise is detected and the reader is unable to read tags. The antenna should be relocated at a different position using the  signal level indicator which should be as low as possible  .

A down arrow (↓) is displayed in the right upper corner side of the display when more than one alarm exists. The user must then press the MENU key (↓) to see all the existing alarms.



Pressing the ENTER key again will show the file summary, or ESCAPE will return to the main display.

4.4. File summary

The file summary displays:

- The file number in which TAG IDs are stored if any of the *Store* options enabled;
- The number of TAG IDs present in the file.

To view the status of the other files, use the MENU key (↓).

At this point, pressing the ENTER or ESCAPE keys will return to the main display.

A file can store up to approximately 6,400 TAG IDs (limited by the memory size).

5. DATA LOGGING AND FILE MANAGEMENT

The PTS reader has a data logging memory that can store up to approximately 6,400 TAG IDs. Like a computer disk, the data logging memory is partitioned as "files". Up to 32 files can be created (file #0 up to #31), and the file size is limited by the data logging memory capacity.

The file management utilities allow the user to create, erase and download files to a computer. After erasing the entire memory using the Erase All File command, the file #0 is automatically created by the reader as the **Current** file. The entire memory space is then available to that file for data logging as in the following figure.

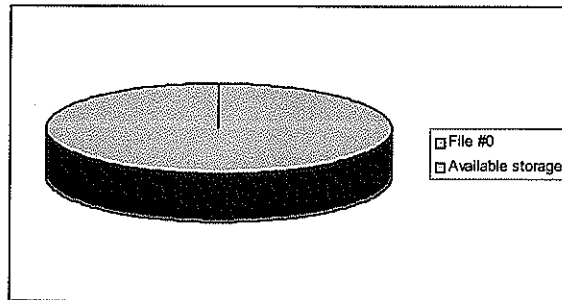


Figure 6 : Empty memory

As TAG IDs are stored in file #0, the file size will increase, the capacity is only limited by the available storage memory. (Figure 7)

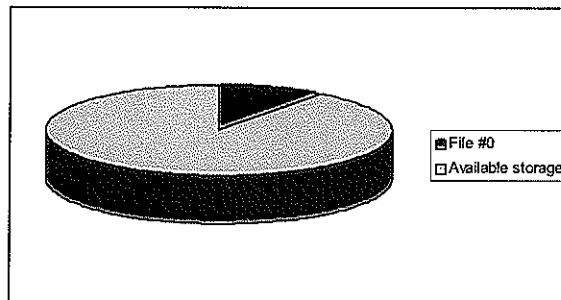


Figure 7 : Filling file #0

By creating a new file, the current file will close, and the remaining memory is now available to the new **Current** file (in this case, file #1). (Figure 8)

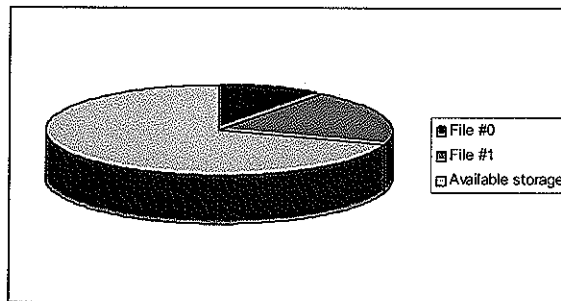


Figure 8 : Filling file #1

It should be noted that each time a file is created, memory space is reserved for the file handling (approximately 54-tag memory location for each file created).

The data logging memory is protected by a lithium back-up battery that prevents accidental data lost when the main battery is low or replaced. This button style back-up battery is located on the MPU board and has an expected life of 5 years (CR2016 made by Eveready, Toshiba or any other battery manufacturer).

5.1. Data logging options

The PTS reader offers the following data storage options:

- Off:** The reader data-logging feature is disabled.
- All:** All the tag IDs found by the reader are stored in the current file number selected by the user.
- Search:** Only the tag IDs not found in the current file selected by the user are stored. This option prevents the multiple storage of the same tag ID in the file.
- ID:** When a tag is found, the ID is compared with the content of the current file selected by the user. When there is a match for the first time, the tag is counted and the match is annunciated with 2 beeps. If the match was already found, the beeper is activated once and the counter is not updated. This mode is useful when the user is looking for specific tags IDs previously stored in memory.

It should be noted that these store options are conditioned by the "Unique mode" option which prevents the processing of a tag when it remains in the antenna field for a long period of time (more than one ID message detected from the same tag processed as a single message). The setting of the different Store options is covered in the next chapter.

When a data storage option is activated, the current file ID is displayed

5.2. Using the file management utilities

The file management utilities can be accessed using the MENU key from the main display as in figure 9.

To access one of the file management utilities, keep the MENU key activated (automatically will scroll, or step through the menu by pressing it several times) until the desired function is displayed and then use the ENTER key to select it. If you go beyond the file management utilities, you can always use the ESCAPE key to start over.

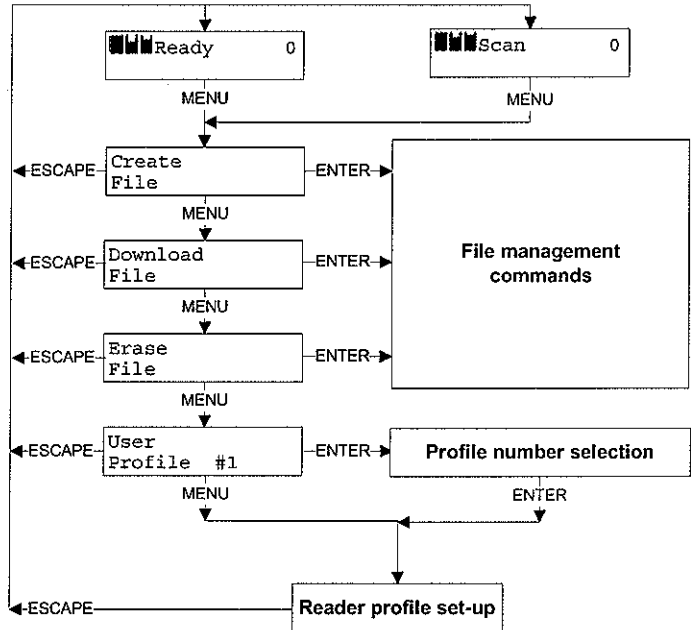


Figure 9 : File management utilities

5.2.1. Create File

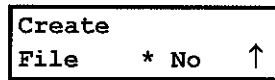
The Create file function allows you to close the current file and create a new one for storage or search functions. It should be noted that the file number 0 is automatically created by the reader when you erase all files, so that it is not necessary to create a file after you erase all of them.

Two parameters are stored in each file:

- The Site ID, which allows to identify a location, a specific test or a group of animals;
- The User ID, which allows to identify the user as required by the application.

Both the Site ID and the User ID are stored in the file for further data analysis or identification. When creating a new file, the reader is inquiring these parameters. These steps can be skipped by pressing the Menu key as illustrated in the following figure.

From the main screen, press the MENU key until "Create File" is displayed, and then use the ENTER key to select the function. The following screen will then be displayed:



The star symbol "*" indicates the current selection (No : you don't want to create a new file). The up arrow "↑" on the right side invites you to press the up arrow key (ESCAPE key) since more options are available. Pressing the up arrow key will show the next selection:



If you want to create a new file, then press the ENTER key. Otherwise the reader shows you to use the down arrow "↓" key (MENU key) to display the next choice (which will be No). Simply then use the ENTER key to avoid the creation of the new file.

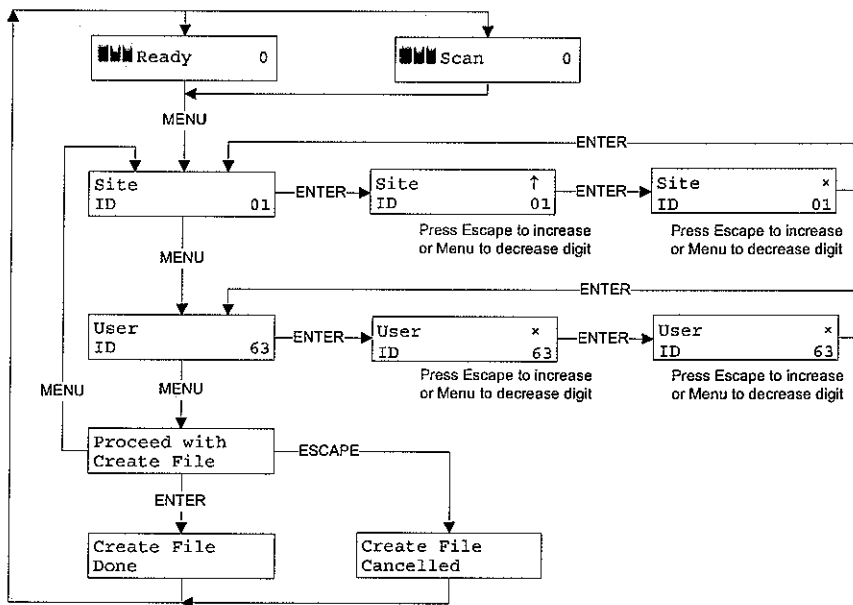


Figure 10 : File management utilities

When the Create File function is selected, the reader is looking for the Site ID, which can refer to a specific location, a site or a group of animals. Pressing enter at this point will allow to change the site ID. Otherwise, pressing the Menu key will skip the entry to next parameter.

Site ID	01
------------	----

At this point, the reader is looking for the User ID, which can refer to a specific User number. Pressing enter at this point will allow to change the User ID. Otherwise, pressing the Menu key will skip the entry to command confirmation.

User ID	63
------------	----

When the User ID is entered or skipped, the reader is waiting for a confirmation:

Proceed with Create File




At this point, pressing:

- ENTER will create the file and return to the main display;
- MENU will allow to reenter the Site ID and User ID;
- ESCAPE keys will cancel the file creation and return to the main display.

5.2.2. Download file

The Download file function allows you to download the current file selection (**Curr.**) or all the files within the reader (**All**) to a computer connected on the COM port. Any individual file may also be downloaded (Ex. **Fd0,fd1,fd2.....fd31**)

In order to download a file, you must prepare the reader and the computer as following:

1. Connect the communication cable between the reader connector identified with the computer symbol  and the computer serial COM port (use a DB9-DB25 adapter if necessary);
2. Make sure that both the computer and the reader are at the same baud rate;
3. Use any standard communication programs such as Terminal  or ProComm .

The format of a file download "**All**" is as following ("**Curr.**" would have only one file). File #1 contains FDX-B tags (decimal format) and the file #2 contains FDX-A tags :

```
Site ID: 23, User ID: 18
File #1
03-07-2000 02:15:33 985.120005011200
03-07-2000 02:15:54 985.120005001129
03-07-2000 02:15:56 985.120005407196
```

```
Site ID: 79, User ID: 18
File #2
03-07-2000 06:39:28 50204A6B6C
03-07-2000 06:39:33 5020504256
Done!
```


Each file content is preceded by the Site ID, the User ID and the file number. When the time tag option is enabled, the date and time of detection of the tag (dd-mm-yyyy, hh:mm:ss) is displayed along with the ID. The "Done!" message indicates that the download command is terminated.

The following example illustrates a file download of a single file containing B tags displayed in hexadecimal format (time tag option disabled):

```
Site ID: 23, User ID: 18
File #1
3D9.1BF0DB2700
3D9.1BF0DAFFA9
3D9.1BF0E131DC
Done!
```

To download a file from the main screen, press the MENU key until the "Download File" menu is displayed and then use the ENTER key to select the function. The following screen will then be displayed:

```
Download
File *No ↑
```

The star symbol "*" indicates the current selection (No: you don't want to download a file). The up arrow "↑" on the right side invites you to press the up arrow key (ESCAPE key) since more options are available. Pressing the up arrow key will show the next selection:

```
Download
File Curr. ↓
```

If you want to download the current selected file, then press the ENTER key. Otherwise the reader shows you by the up/down arrow "↓" key to use either the up arrow "↑" key (ESCAPE key) to download All the files or the down arrow "↓" key (MENU key) to return to the preceding choice (No).

```
Download
File All ↓
```

To make your selection, simply use the ENTER key when it is displayed on the screen. When the Download command is executing, the reader will display the file being downloaded as following:

```
Downloading
File #00...
```

When the operation is terminated (it may take few seconds), the reader returns to the menu choices:

```
Download
File
```

At this point, pressing:

- ENTER will re-enter in the Download File utility;
- MENU will display the next menu item (Erase File);
- ESCAPE keys will return to the main display.

5.2.3. Erase file

The Erase File function allows you to erase the current file selection (**Curr.**) or all the files within the reader (**All**). It should be noted that a new file is automatically created after erasing the current one (the new file will have the same number) or all of them (the file number 0 is then automatically created by the reader when you erase **All** files).

From the main screen, press the **MENU** key until the "Erase File" menu is displayed and then use the **ENTER** key to select the function. The following screen will then be displayed:

```
Erase
File   *No  ↑
```

The star symbol "*" indicates the current selection (**No**: you don't want to erase a file). The up arrow "↑" on the right side invites you to press the up arrow key (**ESCAPE** key) since more options are available. Pressing the up arrow key will show the next selection:

```
Erase
File   Curr. ↑
```

If you want to erase the current selected file, then press the **ENTER** key. Otherwise the reader shows you by the up/down arrow "↑" key to use either the up arrow "↑" key (**ESCAPE** key) to erase **All** the files or the down arrow "↓" key (**MENU** key) to return to the preceding choice (**No**).

```
Erase
File   All  ↓
```

To make your selection, simply use the **ENTER** key when it is displayed on the screen. When the Erase command is terminated, the reader returns to the menu choices:

```
Erase
File
```

At this point, pressing:

- **ENTER** will re-enter in the Erase File utility;
- **MENU** will display the next menu item (User Profile);
- **ESCAPE** keys will return to the main display.

6. READER CONFIGURATION

One of the exclusive features of the PTS Reader is its ability to be adapted to several types of operations and applications. The PTS operation can be tailored to the exact customer needs using the configuration setup menu operated from the front panel keyboard/display.

6.1. Profile

Instead of changing individual option settings when using the reader for a specific type of application (i.e. fish tagging session, pipe monitoring, cattle management, hand-held operation, etc.), the user can define up to 3 different sets of parameters called "Profile" and recall a specific set at the time of use. Each of the 3 profiles includes a series of options that define the operation of the reader, such as store control, use of the COM port, etc. The profiles are stored in back-up battery protected RAM memory and therefore these settings are protected during power outage (such as when the internal battery is low and being replaced).

Once the profiles have been set up for specific operations, the user will need to recall the appropriate one at the time of use. Each profile includes the following settings:

Table 2 : Profile settings

Profile item	Available settings	Description
Tag type	HDX (Enable/Disable)	Decode HDX tags
Antenna Power	10 to 100%	Antenna current setting, from 10 to 100%
Store Mode	Off All Search ID	No data logging in memory. TAG IDs are sent to the COM port according to the <i>Send to CommPort</i> and <i>Unique</i> settings. All TAG IDs detected are logged. When <i>Unique</i> is On, only TAG IDs different from the last one are logged. Only TAG IDs not found in the current file are stored. The TAG IDs are matched with the IDs stored in the selected file. Each time there is a match, the reader beeps twice and increment the tag count.
Continuous Mode	Off On	Reader returns to Ready mode when a TAG is detected. Must be turned off for manual Scan. Reader remains in Scan mode when a TAG is detected. Automatic scanning when reader is powered on. Must be turned on for hands-free operation.
Toggle Mode	Off	User must push READ to scan. Releasing READ returns to Ready mode. Must be turned off for manual scanning.
Unique Mode	On Off Delay (1 to 9999 seconds) On	READ used as Push-On/Push-Off. Must be turned on for hands-free operation. All TAG ID messages from the same tag are processed Tag detection based on the <i>Delay setting</i> . A new TAG ID will be detected immediately when placed in the detection field, but will only be re-enunciated after the <i>Delay setting</i> expires when it remains in the field. Only one TAG ID message from a tag is processed. Prevents a successfully scanned TAG from being read twice in a row.
Shutdown Time	0 to 5 minutes Off	Allow the reader to automatically shut down when not active (<i>Ready mode</i>) in order to save battery energy. A 0-minute setting will not cause the reader to shutdown automatically. The reader will not shut off when in <i>Scan mode</i> since it is active. The shutdown timer is rearmed each time a TAG ID is detected or a keypad activity is detected.
Comm Speed	2400, 9600 , 19200, 57600	COM port baud rate setting. The reader must be turned Off and then back On for the new setting to be effective. It should be noted that the 19200 BPS setting is required for the software update using Vbflash.
Send to CommPort	Off Form1 Form2	TAG IDs not sent on the COM port. Only alarm and status messages are sent. TAG IDs sent on the COM port according to the <i>Store Mode</i> setting using standard format. TAG IDs sent on the COM port according to the <i>Store Mode</i> setting using a "no dots" format.
Antenna LED	Off On	The TAG detect LED on the antenna is active. The TAG detect LED on the antenna is inactive, causing no interference with the antenna. Should be turned ON when using the antenna on a pipe.
Backlight	Off On Saving	The LCD backlight is turned off in order to save battery energy. The LCD backlight is always on (requires more battery energy). The LCD backlight is only activated when there is keypad activity or when a TAG is detected.
Beep Sound	Off On	The beeper is not activated when detecting a TAG. The beeper is activated when detecting a new tag or when satisfying to the <i>Store Mode</i> setting.
Click Sound	Off On	No tactile feedback when pressing a key on the keypad. Tactile feedback enabled when pressing a key on the keypad.
Decimal tag (option- not in fisheries model)	Off On	The TAG ID is processed in hexadecimal form (display and CommPort). The TAG ID is processed in decimal form (display and CommPort).
Time Tag (option- not in fisheries model)	Yes No	The TAG ID is saved and/or displayed with time and date of detection. The TAG ID is saved and/or displayed without time and date of detection.

Note: Defaults in Bold

6.2. Profile selection

To select a profile for usage or modification, please refer to the next figure:

1. Press the MENU key until the "Use Profile #n" menu is displayed. If the desired profile number is displayed, use the ESCAPE key to return to the main screen.
2. If a profile number change is required, then use the ENTER key to change the setting.
3. Use the MENU or ESCAPE keys as indicated on the right side of the display to select a different profile number. The current setting is indicated with the "*" symbol preceding the number.
4. When the desired profile number is displayed, use the ENTER key to select it. The reader will then leave the profile *Edit* mode.
5. Use the ESCAPE key to return to the main screen or the MENU key to view or modify one of the profile items.

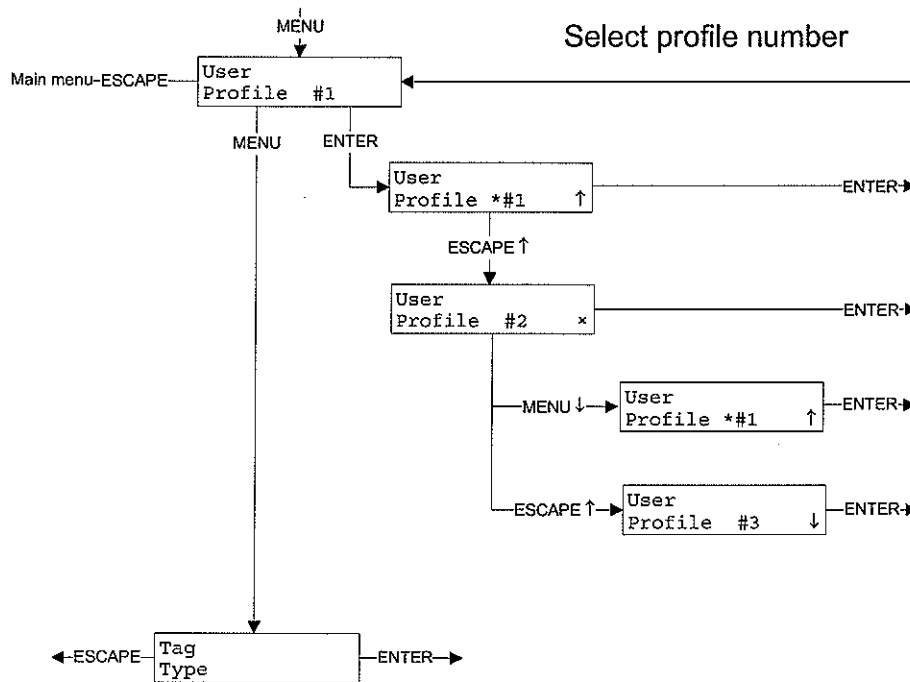


Figure 11 : Selecting a reader profile

6.3. Profile set-up

The reader profile settings may be changed from the keypad. The next figure illustrates the operation of the keys. It can be seen that:

- From the main screen, the MENU key is equivalent to a down arrow (↓) and allows the display of the various menu items without selecting them;
- The ESCAPE key is equivalent to an up arrow (↑), and allows the rapid escape from the current menu item the main screen.
- The ENTER key is equivalent to a computer enter key (↵), and allows the selection of the displayed menu item for modification.

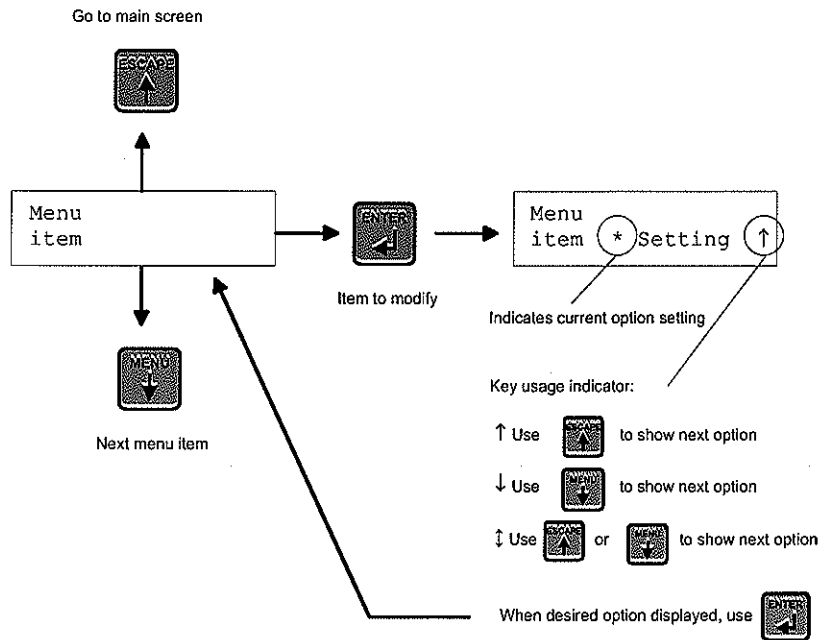


Figure 12 : Key usage

In order to change the content of a profile, use the following procedure illustrated on the following page.

1. Select the profile number as described in the preceding section if necessary.
2. Once done, press and hold the MENU key until the desired profile item is on the screen.
3. Use the ENTER key to enter in *Edit* mode. The reader will then display the current setting of the menu item (indicated by a "*" symbol on the left of the setting) and will show either :
 - an up arrow (↑), indicating that the ESCAPE key must be pushed to view the next available setting;
 - a down arrow (↓), indicating that the MENU key must be pushed to view the next available setting;
 - or an up/down arrow (↕), indicating that both the ESCAPE key and the MENU key can be used to view the next available setting.
4. Once the desired option setting is displayed on the screen, press the ENTER key to activate it and the reader will return to the menu display, leaving the *Edit* mode.

The following figure illustrates the list of profile parameters.

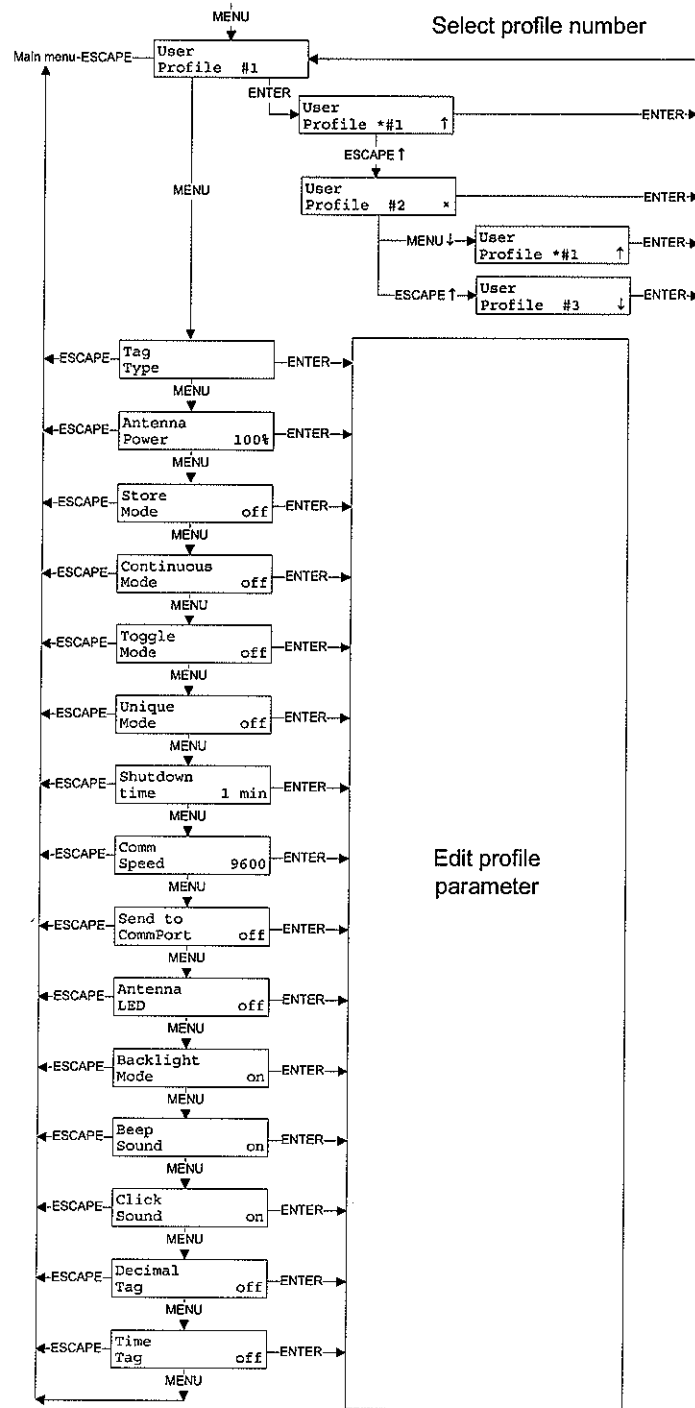


Figure 13 : Profile parameters

6.3.1. TagType

The *Tag type* menu enable the user to turn on or off the detection of each type of tag supported. The best results are achieved when the Tag type menu is used to turn on only the tags that are necessary.

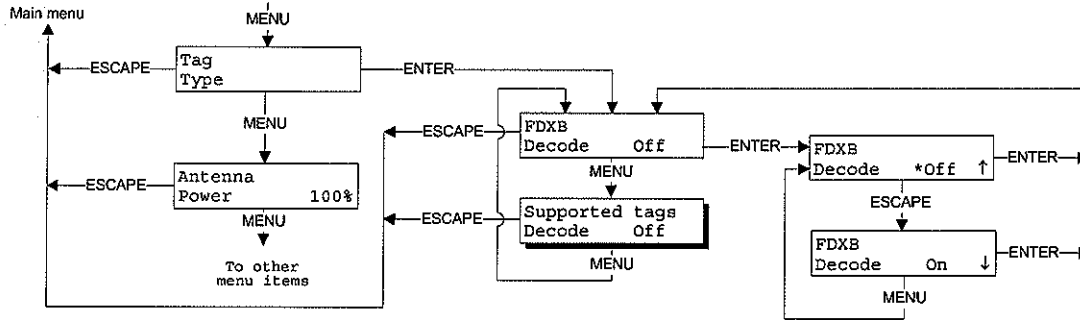


Figure 14 : Turning on or off a tag type

6.3.2. Antenna power

The *Antenna power* setting defines the current level in the antenna. It is adjustable from 10% to 100% of the nominal value. The Antenna power setting affects 2 important characteristics of the reader:

- the power consumption : using high power consumes more battery energy;
- the read range: the higher is the current, the better is the read range, especially for worst tag orientation (tags perpendicular to the antenna loop). However, high current also creates a dead spot (no detection) close to the antenna center since the tag is "saturated" (too much energy radiated in the tag which has then problems sending its message).

The effect of antenna current on the read range is illustrated in the next figure:

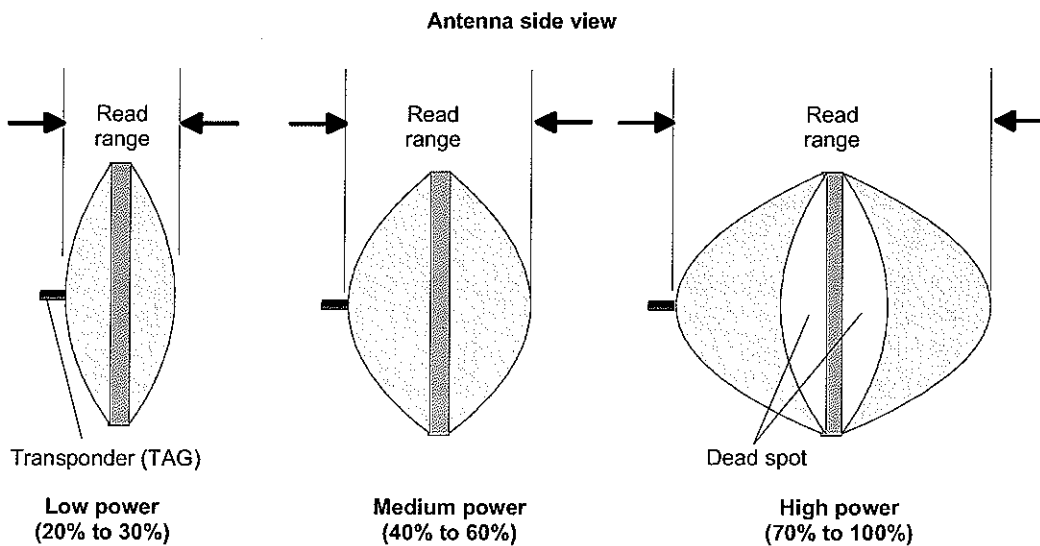


Figure 15 : Effect of the antenna current on the read range

Typically, you should use the following *Antenna power* settings according to the following applications:

- Low power (10 to 30%): Hand-held battery operation (manual scanning), where the prime criterion is battery energy conservation;
- Medium power (40% to 60%): Pipe monitoring (continuous hands-free operation), where the prime criterion is having the best read range without a dead spot in order to have the biggest number of good TAG messages when the fish is swimming through the antenna;
- High power (70% to 100%): Hands-free tabletop operation with external power (fish tagging session), where the prime criterion is the extended read range which will provide fast detection as the transponder approaches the antenna.

6.3.3. Store mode

The PTS reader offers the following data storage options:

- Off:** The reader data-logging feature is disabled. However, when the "Send to CommPort" option is enabled, the TAG IDs are sent to the COM port according to the "Unique mode" setting, allowing the same tag to be sent only once or several times in a row.
- All:** All the tag IDs found by the reader are stored in the **Current** file number selected by the user.
- Search:** Only the tag IDs not found in the **Current** file selected by the user are stored. This option prevents the multiple storage of the same TAG ID in the file. If enabled, the messages on the COM port are sent according to the "Search" setting.

It should be noted that the *Store mode* is affected by the *Unique mode* setting.

6.3.4. Continuous mode

The *Continuous mode* defines the action of the reader if a valid TAG ID is found. When the *Continuous mode* is Off, the reader stops scanning and returns to the *Ready* state if a valid TAG ID is found (manual scanning). When the *Continuous mode* is On, the reader will not stop scanning when a valid TAG ID is found. This is the normal operating mode for Hands-free operation.

6.3.5. Toggle mode

The *Toggle mode* defines the operating mode of the READ key. When the *Toggle mode* is Off, the READ key has to be pushed and held for the reader to scan for tags (push-to-read operation). This option is normally used for hand-held operation.

When the *Toggle mode* is On, pushing READ momentarily will start the tag scanning and pushing it again will stop the scanning mode and return it to the *Ready* state. The *Toggle mode* is used for Hands-free operation such as in a fish tagging session using the tabletop antenna.

6.3.6. Unique mode

The *Unique mode* defines the reaction of the reader when the same tag is detected several times (one read per TAG mode). When the *Unique mode* is Off, the tag will be enunciated as long as it remains in the detection range of the reader.

When the *Unique mode* is On, a TAG ID will only be enunciated if it is different from the previous TAG ID detected. Therefore, the TAG ID will only be enunciated once even if it remains in the detection range of the reader. The *Unique mode* also affects the COM port messages when the *Store mode* is disabled or when the *Store All mode* is selected.

When the *Unique mode* is set at Delay, a TAG ID will only be enunciated if it is different from the previous one. When it remains in the detection field, it will not be enunciated again until the *Delay* is expired. The *Delay* setting can be adjusted from 1 to 9999 seconds.

The *Delay* setting is only applicable when the *Unique Delay mode* is selected. It can be adjusted from 1 to 9999 seconds and prevent a same TAG ID to be detected again before the expiration of the delay. When

editing the delay setting, it must be modified one digit at a time, beginning at the most significant one. To modify the delay setting, first select the Unique mode Delay option.

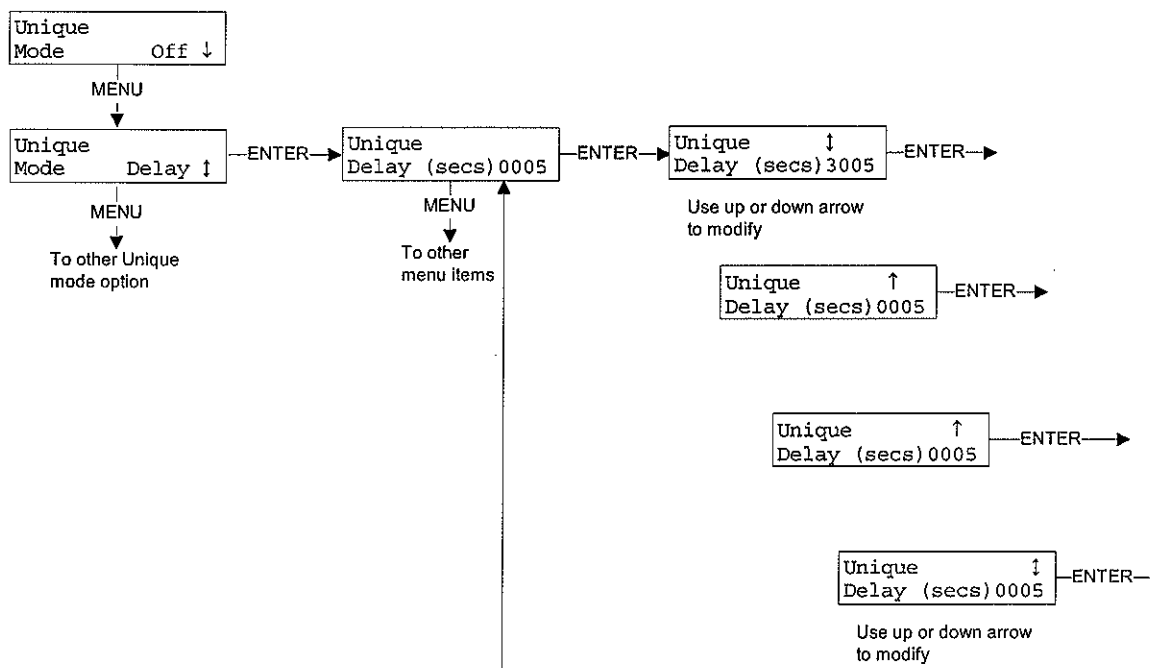


Figure 16 : Unique delay editing

An up/down arrow (↑,↓) will appear over the digit under modification, indicating to use the ESCAPE and the MENU keys to increase/decrease the digit. Once the appropriate value is displayed, use the ENTER key to proceed to the next digit modification until done.

6.3.7. Shutdown time

The Shutdown time allows the reader to automatically shut down when not active (Ready mode) in order to save battery energy. The Off setting will prevent the reader from shutting down automatically. The reader will not shutoff when in Scan mode since it is active. The shutdown timer is rearmed each time a TAG ID is detected or a keypad activity is detected.

6.3.8. Comm speed

The Comm speed setting defines the COM port baud rate setting at 2400, 9600, 19200 or 57600 BPS. After a modification, the reader must be turned Off and then back On for the new setting to be effective. It should be noted that the 19200 BPS setting is required for the software update using Vbflash. The 2400 BPS setting must not be used when the Unique mode is Off, since the data transmission time exceeds the TAG message duration time and can cause a reader communication overload.

6.3.9. Send to CommPort

The CommPort option governs the formatting of the TAG IDs. When the option is FORM1, the TAG ID display and messages on the CommPort are formatted as following:

985.100006080033

When the option is FORM2, the tag ID is displayed without a dot:

985100006080033

Note that this formatting is not irreversible, a tag decoded and stored in FORM1 can be downloaded in FORM2 or vice versa.

The Send to CommPort setting allows the TAG ID messages to be sent to a computer connected to the reader serial port. The TAG IDs are sent on the COM port according to the *Unique Mode* and *Store Mode* settings:

- When the *Unique mode* is On, only the new TAG IDs different from the proceeding ones are sent on the COM port.
- When the *Unique mode* is set to *Delay*, a new TAG ID will be sent on the CommPort upon detection. It can also be sent back at the expiration of the delay if it remains in the detection field.
- When *Unique mode* is Off, all the tag messages are sent on the COM port. It may then cause a communication port overflow, since a new message will be sent at a rate of 33 milli-seconds when a tag remains in the reader detection range.
- When the *Store Search mode* is selected, only the tag IDs not found in the **Current** file selected by the user are sent on the COM port.

It should be noted that the message format is defined according to the Decimal tag option setting.

6.3.10. Antenna LED

The *Antenna LED* setting enables/disables the operation of the detect LED located on the antenna. When this LED is turned on upon the detection of a valid TAG message (*Antenna LED On*), a rapid change of current occurs in the antenna vicinity, therefore creating an electromagnetic interference (EMI) that may disturb the detection of the next TAG message. This disturbance is not important when manually feeding tags in the antenna vicinity since the interference occurs after the tag message is successfully detected. However, when monitoring a pipe, the interference may affect the detection of the next fish if it is grouped with the first one. In these applications, it is therefore important to deactivate the *Antenna LED*, which will prevent the LED to be activated. It should be noted that this setting does not affect the detect LED located under the display.

6.3.11. Backlight mode

The *Backlight mode* governs the operation of the LCD display. The settings are the following:

Off: The LCD backlight is always turned off, offering optimum battery energy consumption.

On: The LCD backlight is always turned on, which requires more energy.

Saving: The LCD backlight is only turned on momentarily upon detection of a TAG or keypad activity, offering a battery energy tradeoff.

6.3.12. Beep sound

The *Beep sound* governs the operation of the beeper. The settings are the following:

Off: The beeper is not activated upon detection of a TAG, offering optimum battery energy consumption.

On: The beeper is activated upon detection of a TAG.

6.3.13. Click sound

The *Click sound* governs the keypad tactile feedback. The settings are the following:

Off: The beeper is not activated upon activation of a key, offering optimum battery energy consumption.

On: The beeper is activated upon activation of a key.

6.3.14. Decimal tag (option)

The *Decimal tag* option governs the processing of the TAG IDs. When the option is turned *On*, the TAG ID display and messages on the CommPort are done in decimal format as following:

985.100006080033

When turned *Off*, the tag ID is displayed in hexadecimal format.

3D9.1748D3AD9F

HDX always displays in decimal.

6.3.15. TimeTag

The *Time tag* option will associate a time stamp to a newly found TAG ID. If *Time tag* is on, the time and date of the detection will be shown before the tag number. Note that the time stamp will only be viewable on the CommPort if a file download is performed or Send to CommPort is on.

The time stamp format is the following:

DD-MM-YYYY HH:MM:SS 985.100006080033

6.4. Typical operation

The examples in the following sections describe typical reader profile settings for different types of operation.

6.4.1. Portable manual scanning with battery operation

This example covers an appropriate setting for a portable manual scanning operated on the internal battery. The prime criterion is energy conservation. The user may want to store this setting in profile #3.

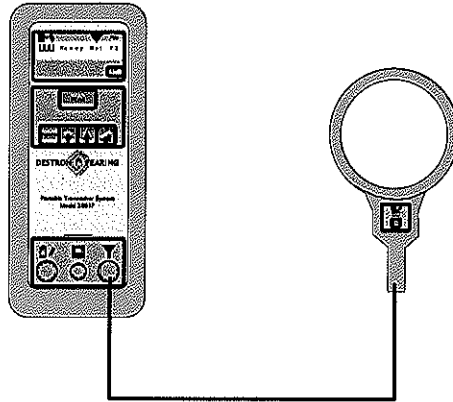


Figure 17 : Portable manual scanning

Table 3 : Profile settings for portable manual scanning with battery operation

Option	Setting	Comment
Antenna power	20%	Save battery energy!
Store Mode	Search	The reader is used as data logger, only searching for new tags.
Continuous	Off	The reader will stop reading if a tag is detected
Toggle	Off	Hand-held push-to-read operation with portable antenna
Unique	On	Doesn't matter since in search mode.
Shutdown time	1 min	We want to save battery energy.
COM speed	19,200 BPS	Irrelevant, since not using the Send to CommPort option.
Send to CommPort	Off	No data logging to a computer. We will use a file download when scanning done.
Quiet operation	Off	We want the LED to come on upon the detection of a TAG.
Backlight	Saving	Tradeoff situation, since we are working at night!
Beep Sound	On	We want a beep when we are detecting a fish.
Click Sound	Off	Save battery energy!
Decimal Tag	On/Off	As preferred.

7. SERIAL PORT OPERATION

The PTS reader can be fully operated and configured using a computer from the COM serial port. This RS-232 COM port can be used for:


- reader configuration (profile selection) and control;
- data file management, including file erase and creation and download to the computer;
- data logging on a computer;
- status and alarm display on a computer;
- Reader software upgrade.



7.1. COM port connections and configuration

The reader is optionally supplied with a 1-meter serial cable terminated on a DB9 female connector that mates most of the PC computer COM port. The pin assignment on the DB9 connector is as in the following table.

Table 4 : COM1 port connections (DB9 connector)

DB9 Pin number	EIA 232 signal name	Description	Reader signal direction	PC Computer connection	
				(25 pin)	(9-pin)
2	RD	Receive Data	Output	3	2
3	TD	Transmit Data	Input	2	3
5	GND	Signal Ground	None	7	5

When not used, the weather protective cap should be installed on the COM port connector identified by the computer symbol .

The serial port is operated with 8 data bits, no parity, 1 stop bit (N81) for ease of operation with most of the communication software packages such as Terminal  or ProComm , etc. The default baud rate for the COM port is 9,600 BPS.

7.2. General command format

The reader commands are made of 2 or more characters followed by Enter (Carriage Return, \$0d, 12d) as in the following example:

RA1.␣

The commands are not case sensitive and are echoed as they are typed. The backspace key can be used to correct an improper command.

Generally, the first two letters designate the command group and the remaining letters/digits designate the command parameters. The supported commands are the following, { } indicating a parameter (1 for On/Set, 0 Off/Reset or a value):

H or ?	Help Command
CP{profile}	Change profile
DS	Display status and profile settings
DT	Display current date and time
FC{SS,UU}	File close and create new{SiteID,UserID}
FE{C A}	File erase {C} current or {A} all files
FD{number A}	File download {number} or {A} all files
KP	Kill parameters
RA{1 0 Z}	Reader Active ON OFF SHUTDOWN
RT{HH:MM:SS}	Reader Set time
RD{DD-MM-YYYY}	Reader Set date
ST{0 1 2}	Send tag codes on COM
SA{0 1}	Send Alarms on COM
TE{1 0}	Test reader efficiency ON OFF Help command

7.3. Reader prompt

After hitting the Enter key on the keyboard, the reader returns a prompt that indicates the profile number currently selected:

```
01>␣
01>
```

7.4. Help (H or ?)

The H or ? command displays the list of commands as follows:

```
01> H␣
CP{profile}      Change profile
DS               Display status and profile settings
DT               Display current date and time
FC{SS,UU}       File close and create new{SiteID,UserID}
FE{C|A}         File erase {C} current or {A} all files
FD{number|A}    File download {number} or {A} all files
KP              Kill parameters
RA{1|0|Z}       Reader Active ON|OFF|SHUTDOWN
RT{HH:MM:SS}    Reader Set time
RD{DD-MM-YYYY}  Reader Set date
ST{0|1|2}       Send tag codes on COM
SA{0|1}         Send Alarms on COM
TE{1|0}         Test reader efficiency ON|OFF
01>
```

It should be noted that the execution of the Help command in series generates a heavy processor load (interrupt processing) and may cause temporary overload when scanning for tags.

7.5. File Create (FC)

The FC command closes the current file and creates a new file for data logging. The reader returns the new current file number that has been created.

```
01>FC␣File #19
01>
```

7.6. File Download (FD)

The FD command will download the specified file number (FDn) or all the files (FDA) to the computer. The following example illustrates the File Download All result when the reader has 2 files (Decimal Tag option is Off):

```
01>FU a.J
File #0
3D9.1748D3AD9F
3D9.1748D3AE8B
3D9.1748D3AF8E
3D9.1748D3AE21

File #1
3D9.1748D3B273
3D9.1748D3AFBD
3D9.1748D3AE66
Done!
01>
```

7.7. File Erase (FE)

The FE command will erase the current file (FEC) or all the files (FEA) in the reader's memory. The reader returns to the current file number that has been created. The following example illustrates the File Erase All command:

```
01>fe a.JFile #0
01>
```


7.8. Display Status (DS)

The DS command displays the reader operating status and the current profile setting as following:

```
01> DS␣
Reader info 03-01-1996 03:37:49
  S/W version:  FS2001ISO 3.8   Active:                On
  Signal level:  0%             Power: AC ON          EXT
Memory:         0%
  Current file number:  -1      Current file tag count:  0
Current profile: #1
  Store mode:         Off       Continuous mode:        On
  Toggle mode:       On        Unique mode:           On
  Unique delay:      1800s     Shutdown time:        Off
  Comm speed:        9600      Comm param:           8N1
  Send tag to comm:  Form1
  Antenna power:     10%
  Antenna led:       On        Backlite:              On
  Beep sound:        On        Click sound:          Off
Alarms
None
```

7.9. Change profile (CP)

The CP command changes the profile selection as follows:

```
01> CP 2␣
02>
```

You should note that the prompt has changed to the new profile number.

7.10. Send TAG on Comm Port (ST)

The ST command is used to enable (ST1) and disable (ST0) the tag message transmission on the COM port. The TAG ID message format is intended for direct ASCII terminal display as following:

```
01>
01>ST1␣
01>3D9.48D3AE26
```

The Manufacturer and ID are sent in the same format as defined on the LCD.

7.11. Reader Active (RA)

The RA command is used to start (RA1) and stop (RA0) the scanning process. It is also used to shutdown the reader remotely as in the following example.

```
01> RA0.␣
MESSAGE: Reader is ready
01> RA1.␣MESSAGE: Reader is scanning
01> RAZ.␣
MESSAGE: Shutdown!
```

7.12. Test reader Efficiency (TE)

The TE command is used to start (TE1) and stop (TE0) the reader efficiency test which allows the estimation of the read range and the percentage of tag message recovery for a given transponder position. When this test is activated and a transponder is presented in the read range, the reader will periodically send the tag recovery hit rate (%) as in the following example. The test is based on a 4 seconds update where approximately 131 tag messages should be read (100% recovery).

```
01> TE1.␣
Hit rate:  N/A
3D9.48D3AE26
Hit rate:  90
Hit rate:  96
Hit rate:  100
TE0.␣
01>
```

7.13. Kill parameters (KP)

The KP command is used to reset the non-volatile memory (files and profile settings) to the factory defaults. The command should be used each time the reader software is updated using the Vbflash Windows application.

```
01> KP.␣
MESSAGE: System shutdown!
```

7.14. Display date and time (DT)

The DT command is used to display the reader's time and date setting.

```
01> DT.␣
19-04-2002 12:08:15
```

7.15. Reader set time (RT)

The RT command is used to set the reader's time.

```
01> RT13:57:00.␣
```

7.16. Reader set date (RD)

The RD command is used to set the reader's date.

```
01> RD19-04-2002.␣
```

7.17. Exception messages

Exception messages are issued by the reader on the serial ports when alarm conditions are detected or when the status of the reader has changed. The messages are in ASCII format. These messages are the following:

Exception message	Description
MESSAGE: Reader is scanning	Reader mode has changed from <i>Ready</i> to <i>Scan</i>
MESSAGE: Reader is ready	Reader mode has changed from <i>Scan</i> to <i>Ready</i>
MESSAGE: System reset!	Reader powered on or reset
MESSAGE: Lithium low	Low voltage level at the memory/real-time clock back-up lithium battery. The back-up lithium battery has an expected shelf life of 5 years, which is reduced when the unit is powered off for a long period of time since current is drawn from it in order to preserve the RAM memory and the real-time clock content. The back-up battery compartment is located on the MPU board. It should be replaced with a CR2016 type lithium battery (Eveready, Toshiba or any other battery manufacturer).
MESSAGE: Analog fail	The reader has detected a failure in the analog board. The user should check for the presence of metal around the antenna. If it's not the case, the unit should be returned to the supplier for repair.
MESSAGE: Analog comm	The reader has detected a failure with the analog board communication. The failure may be caused by temporary reader overflow.
MESSAGE: Memory low	The data logging memory is filled up to 90% of its capacity. Files must be downloaded to the computer or erased from the reader memory. Up to approximately 6,400 tags can be stored in the memory.
MESSAGE: Memory full	The data logging memory is full. The new tag IDs are not stored any more.
MESSAGE: System shutdown!	The reader is turned off.
MESSAGE: Power low	Low power level in the internal battery or at the external supply. It should be recharged as soon as possible.
MESSAGE: No antenna	Antenna failure (disconnected or failed)
MESSAGE: Buffer overrun	Environmental noise is detected and the reader is unable to read tags. The antenna should be relocated at a different position using the \blacktriangledown signal level indicator which should be as low as possible \llcorner .
MESSAGE : Parameters reloaded	Indicates that default values are supplied for parameters. This should happen if the lithium battery is weak. The file system is also emptied at this time.

8. SELF TESTS AND DIAGNOSTICS

The PTS unit has integrated self-tests that are used to verify the integrity of the hardware. Two types of tests are performed on the unit:

- power-up diagnostics that are performed each time the unit is turned on;
- periodic self tests that are performed while the unit is active.

The detailed power-up sequence is illustrated in the next figure. When applying power, the LCD is turned on (series of black squares) and the processor performs a "BootLoader" memory verification. The "BootLoader" is a section of program included in the Flash memory (electrically erasable re-programmable memory) that can never be erased and which initialize the reader hardware. If the "BootLoader" program is invalid, the system is halted and need to be returned to the supplier.

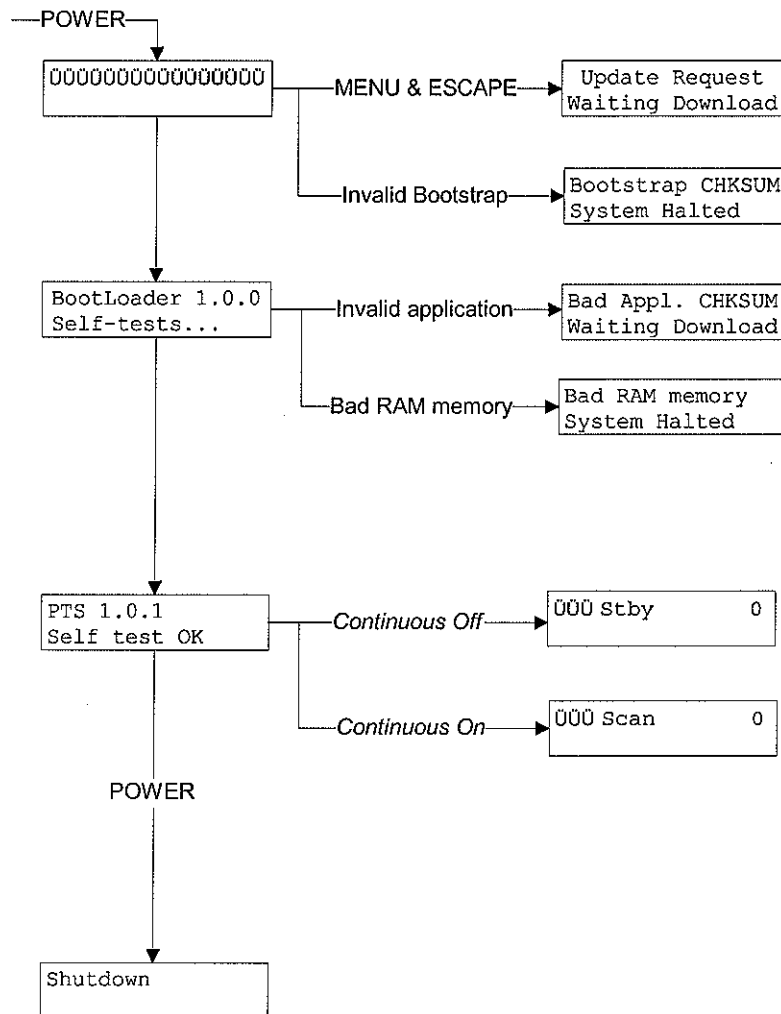


Figure 18 : Power-up sequence

Once this verification is completed, the unit checks if there is a valid application program. The application program governs the operation of the reader and can be updated in the field using the VBFLASH program

running on any PC compatible computer with Microsoft Windows. In order to start the software update process; the user must press both MENU and ESCAPE keys simultaneously immediately after pressing the POWER key. It should be noted that the "BootLoader" and the application program version/revision numbers are displayed during the power-up sequence.

If there is no valid application program, the reader will automatically enter in the software update mode, waiting for a download from VBFLASH. When the Flash memory is verified, the reader proceeds with the RAM memory verification. The system is halted if the RAM memory is defective and should be returned to the supplier.

If no hardware or firmware errors are found, the unit automatically searches for tags ("Continuous" scanning mode On) or waits for a user command ("Continuous" scanning mode Off).

8.1. Main battery replacement

When new, the battery has a charge duration of 6 hours at 100% power. The battery discharge curve is illustrated in the next figure. The reader uses the battery voltage as a reference for the battery level indicator. Since it is relatively flat for most of the time, the battery level indicator is only an approximation of the remaining capacity.

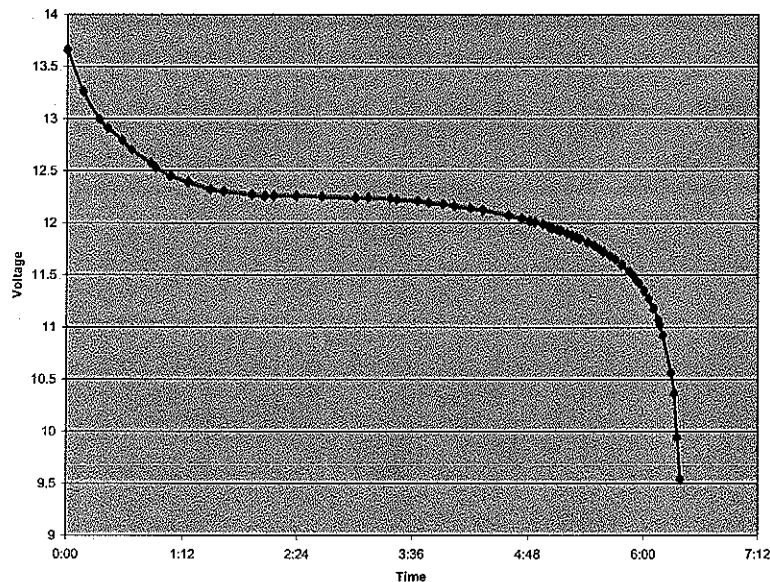


Figure 19 : Battery discharge curve

The main battery can be field-replaced using a Philips screwdriver. In order to replace the battery, use the following procedure:

1. Remove the 4 Philips screws securing the bottom end cap to the unit;
2. Disconnect the black Molex connector on the battery;
3. Slide the battery plate out of the unit;
4. Slide the new battery in the unit;
5. Reconnect the Molex connector;
6. Reinstall the 4 Philips screws, applying equal pressure on each of them, alternating to the furthest screw that was not previously tightened. Do not over tighten!

9. READER SOFTWARE UPDATE

The reader software can be updated from the Vbflash application program running under Microsoft Windows (version 3.1 or newer).

9.1. Vbflash program installation

The Vbflash program can be installed on your computer using the **Setup.exe** program on the installation disk. To install, start Setup from Windows and follow the instructions.

9.2. Vbflash program operation

The Vbflash application program can be started from the following icon:



Figure 20 : Vbflash program icon

When started, the application program appears as following:

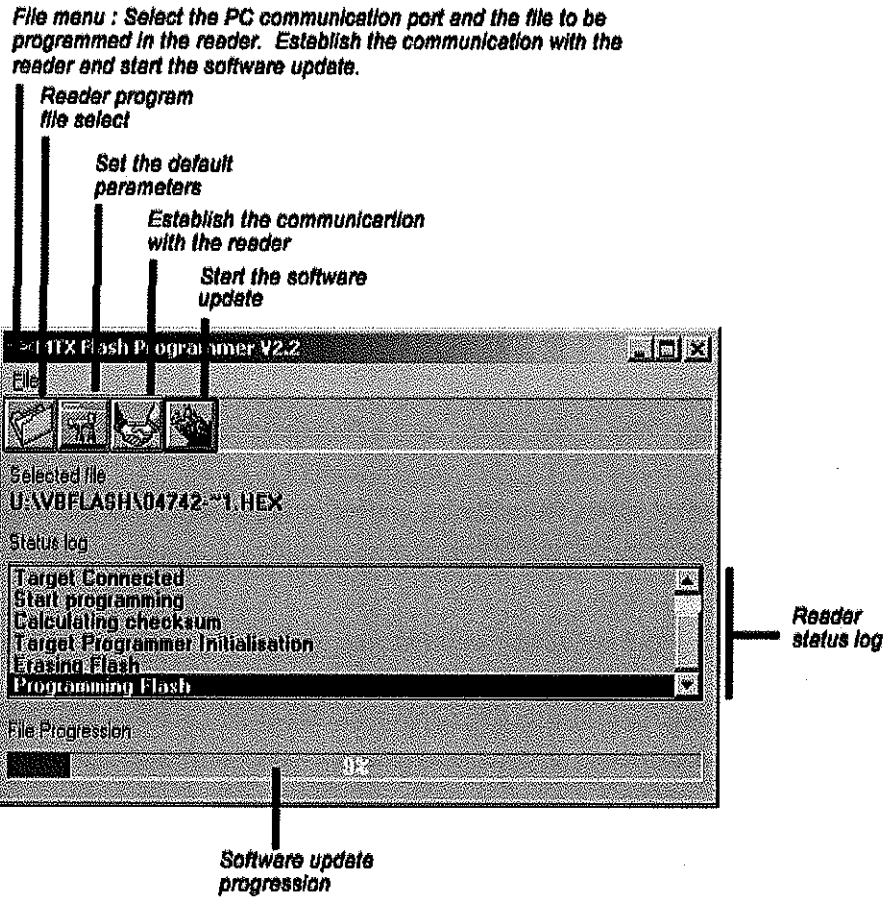


Figure 21 : Vbflash program window

When opened, the File menu is as following:

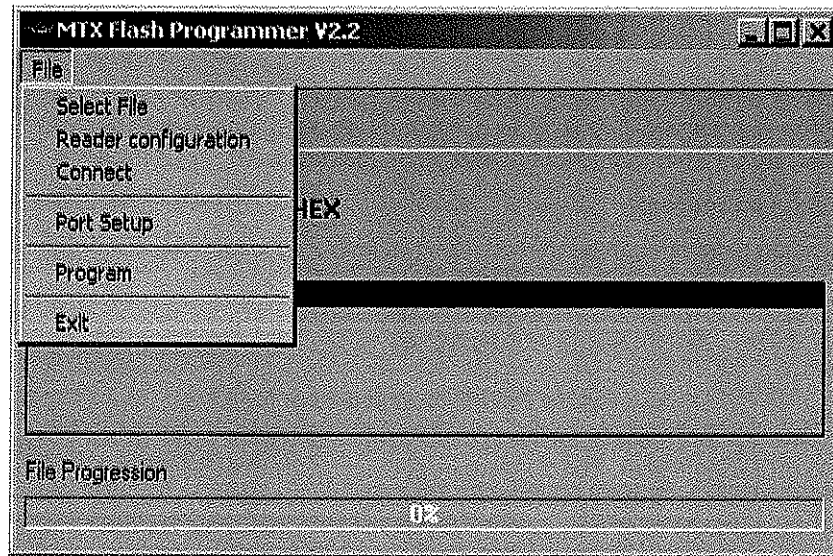


Figure 22 : File menu

The commands are as following:



Connect : Allows the PC to start the communication with the reader.



Select file : Allows the user to select a file to be programmed in the reader (*.hex extension).

Port setup : Allows the user to select the PC communication port to which the reader is connected.



Reader configuration : Allows the user to set the Reader ID and the current alarm threshold



Program : This function starts the software update in the reader from the selected file. This function is equivalent to the push-button.




Exit : Exit the Vbflash application program.



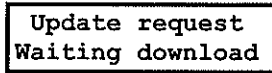
The Reader power must not be turned off when doing a software update!!!

9.3. Reader software update procedure

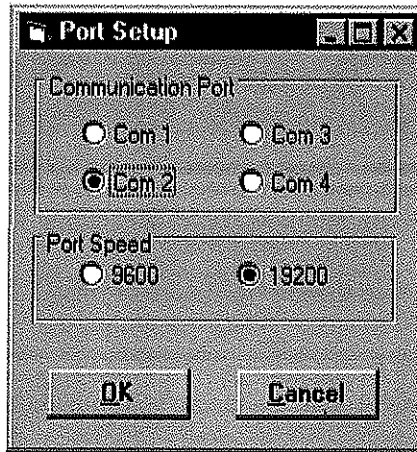
The step-by-step reader software update procedure is the following:

1. Connect the communication cable between the PC communication port and the reader port located identified by the computer symbol . The PC communication port must not be already attached to any application program such as Windows Terminal. Baud rate is not relevant as the reader automatically adjusts to match the computer rate.

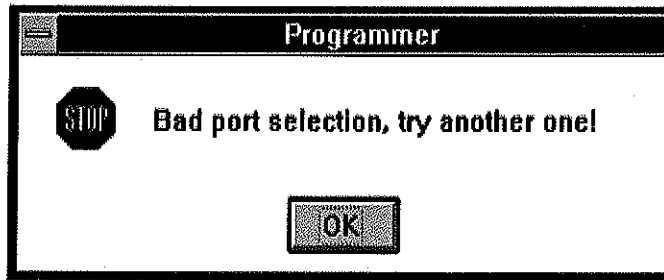
- Turn the reader power off and then back on using the POWER key. When black squares are displayed, the user must push and hold both MENU and ESCAPE keys until the following message is displayed:



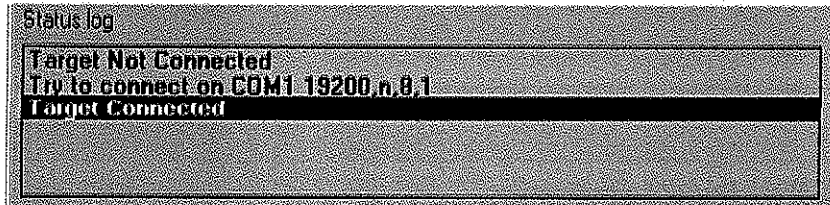
- Start the Vbflash application program.
- From the Vbflash **Port Setup** command, select the PC communication port connected to the reader. By default, COM2 is selected.




If the communication port is used by another application or not available on the computer, the following message will appear on the screen:

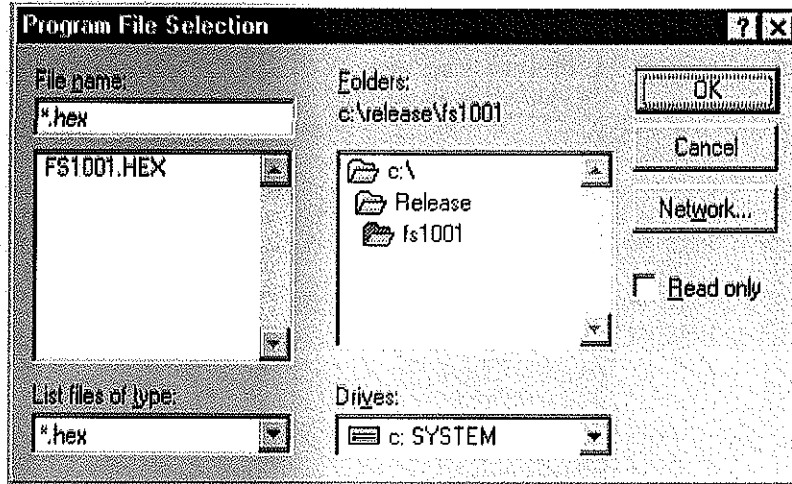


Once connected, the Status will be updated as following:

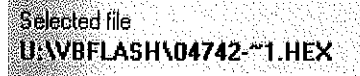



If the computer has problem establishing the communication with the reader, the Status will remain at the line "Try to connect on COMx 19200,n,8,1"

5. Using the  **Select file** command, select the program file to be stored in the reader as following:

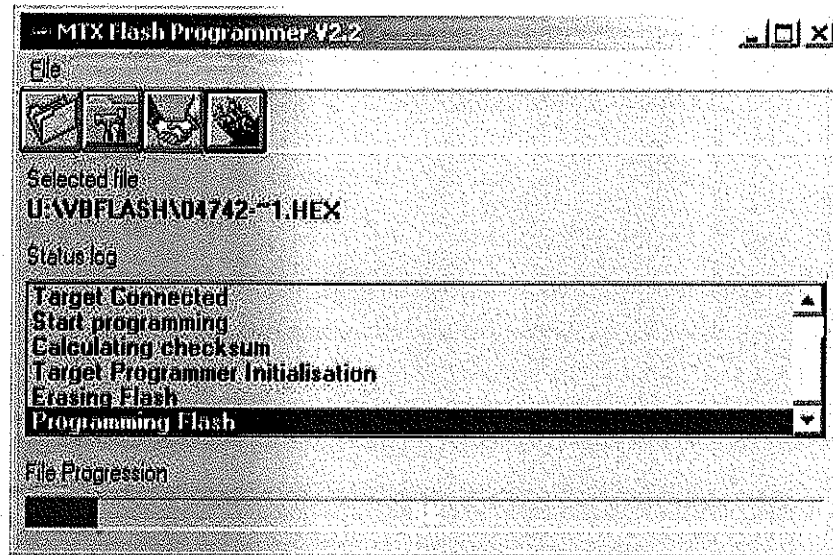


The file must have a **.hex** extension. Once selected, the file name will appear on the Vbflash window as following:



6. Using the  **Program** command, start the reader software update. The Vbflash program will:

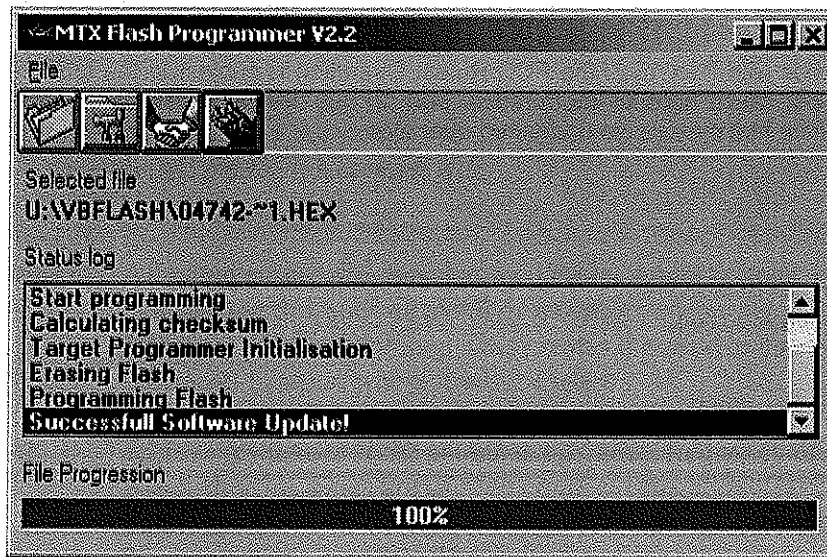
- Calculate the program checksum, erase the flash and start the programming:








- The LCD display will be as following:



- Erase the Flash EPROM program memory:
- The completion of the software update will be indicated as following:



7. The Reader will automatically shutdown after the completion of the software update.
8. Close the Vbflash application using the Exit command ( or ).
9. Using an application such as Terminal  or ProComm  , reset the reader configuration by using the KP command.
10. Set the desired profile parameters from the keypad.

 Always reset the reader configuration by using the KP command after a software update.

10. FCC CERTIFICATION AND USER'S INFORMATION

Declaration of Conformity

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

FCC ID: C5S2001F

Product of USA

For questions regarding this product, contact:

DESTRON-FEARING CORPORATION

490 Villaume Ave.

South Saint Paul, Minnesota 55075

Or call:

1-800-328-0118

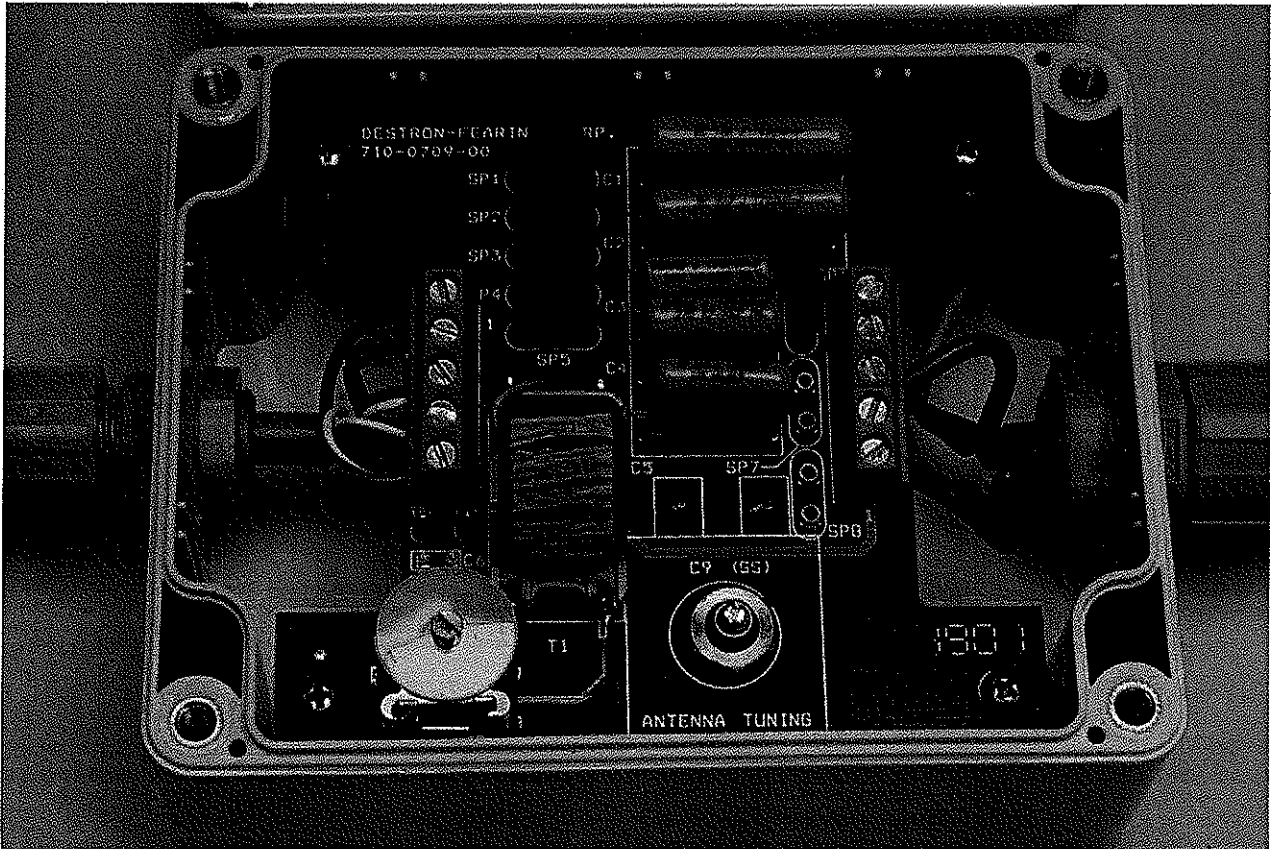
Table 1

Capacitor values:

SP1- C1 10000pf
 SP2- C2 4700pf
 SP3- C3 2200pf
 SP4- C4 2200pf
 SP5- C5 1000pf
 C9 1000pf

SP1	SP2	SP3	SP4	SP5	Total capacitance
X					1000
	X				2200
X	X				3200
	X	X			4400
			X		4700
X	X	X			5400
X			X		5700
	X		X		6900
X	X		X		7900
	X	X	X		9100
				X	10000
X				X	11000
	X			X	12200

Et.



Tuning procedure cont.

As a general rule, if you add more metal to the antenna field you will need to add more capacitance.

The higher value capacitors will have a more dramatic effect on the tuning. Start by adjusting the lower value capacitors first. (see table 1 for capacitor values).

Example: If there is a plug in SP5 but not in SP4, you would remove SP5 and install it in SP4. If you needed still more capacitance you would then install an additional plug in SP5.

After each time you add, remove, or move a plug you will want to try and adjust C9 for the peak value again.

You may use any combination of plugs in SP1 – SP5 to reach the peak voltage. Once you have reached a peak voltage value, put an EID tag in the antenna field and access how well the system reads a tag.

Once the antenna is properly tuned, replace tuning box cover and resume normal operation of system.

Alternative tuning method:

If an oscilloscope is not available tuning may be done by viewing the “antenna current” window on the Fs2001 reader. The actual tuning procedure will not change. The antenna current display will give you a digital current value for the antenna. Once again you will need to adjust the capacitors in the tuning box until you reach a peak value on the display. This method will work but is not as accurate as using an oscilloscope.