3M™ Dynatel™

Electronic Marking System (EMS) Marker Locator with iD Read/Write 7420

Operator's Manual

7420 EMS Marker/Tape Locator with iD Read/Write
7420E EMS Marker/Tape Locator with iD Read/Write

July 2015
78-9000-0431-4 Rev F

3M

Contents

Congratulations! You have just purchased one of the high performing Electronic Marker locating devices available today!

The 3M™ Dynatel™ Electronic Marking System (EMS) Marker/Tape Locators 7420/7420E are designed to locate 3M™ EMS Caution Tape 7600 Series, 3M iD Markers, and will read and write unique user information to 3M iD Markers. 3M iD Markers allow information such as a unique serial number (pre-programmed), facility data, application type, placement date and other details to be read, stored and transmitted back to your PC for enhanced resource management with this revolutionary equipment.

Enhancements also include single push button depth and powering bluetooth dongles used for data retrieval and GPS data transmission.

3M is dedicated to delivering premium equipment with outstanding reliability, backed by a strong warranty and outstanding service.

Visit our website at ***http://www.3M.com/dynatel*** for more application notes and product information.

Statement of Conformity

"Hereby, 3M Company declares that this Underground Locating Product is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC."

www.3m.com/market/telecom/access/conformity/

1. Safety Information

Please read, understand and follow all safety information contained in these instructions prior to the use of the 3M™ Dynatel™ Electronic Marking System (EMS) Marker/Tape Locators 7420/7420E. Retain these instructions for future reference.

A. Intended Use

The 3M Dynatel EMS Marker/Tape Locators 7420/7420E are designed and tested for use in locating 3M EMS Caution Tape 7600 Series, 3M EMS Markers and 3M™ iD Markers. 3M caution tape and markers are used to identify buried utilities and structures. If this equipment is used in a manner not specied by 3M, the protections provided by the equipment may be impaired.

Explanation of Signal Word Consequences	
⚠ **Warning:**	Indicates hazardous situation which if not avoided, could result in death or serious injury.
⚠ **Caution:**	Indicates hazardous situation which if not avoided, could result in minor or moderate injury.

Explanation of Product Safety Label Symbols	
	Do not throw away in normal trash.
	Warning: Risk of electric shock
	Consult accompanying documentation in all cases where this symbol is marked on the product.

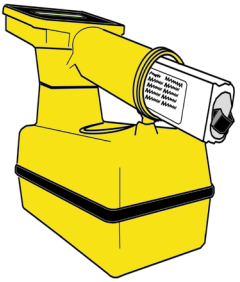
It is unlawful to operate this unit in any country with a configuration setting that is not specific to that country. In order to prevent the user from operating this unit with a configuration setting that is not specific to the country where it is operated, this unit is equipped with configuration software for installing country specific configurations. Please refer to the initial configuration setup sheet.

2. Quick Start

A. Locator Battery

1. Twist cap to open battery compartment.

2. Slide battery into handle ensuring the text is facing left or right of the handle.



B. Charging the Receiver Battery

1. Pull back on the rubber plug cover.

2. Plug the AC charger into a power outlet.

3. Plug the charging cord into the power port.

⚠ WARNING

To reduce the risks associated with fire and explosion when using Lithium Ion batteries:

- Do not short, excessively heat, or dispose of batteries in fire;
- Do not pierce, modify or damage the battery, circuitry or packaging;
- Do not allow the battery to get wet;
- Only use the supplied charger or purchase a new charger from 3M;
- Do not operate batteries outside of -20° to 50° C (-4 ° to 122 °F).
- Only charge batteries in an indoor environment, with a temperature range of 0° to 45°C (32° to 113°F)
- DO NOT DOUSE A BURNING BATTERY! USE A FIRE EXTINGUISHER!

To reduce the risks associated with fire and explosion when using Alkaline batteries:

- Install batteries with proper polarity.
- Use only Alkaline “AA” (LR 6) with the included holder and adapter.
- Do not charge Alkaline batteries.
- Do not use leaking batteries.

⚠ CAUTION

To reduce the risks associated with environmental contamination:

- Dispose of batteries and electronic components in accordance with all federal, state and local regulations.

ATTENTION

Shipping issues regarding batteries:

- In many cases the outside of the packaging must have an appropriate warning label and the package may have weight restrictions;
- Transportation regulations continuously change so please seek the advice of shipping agencies.

The locator batteries are tested for two seconds every time the unit is turned on.

The *Bar Graph* [11] on the display screen will fill to the relative battery level.

The *Battery Icon* [8] on the Locate Screen will continuously indicate the battery level remaining for the locate mode that you are using.

C. Using Alkaline batteries

1. Twist cap to open battery compartment.

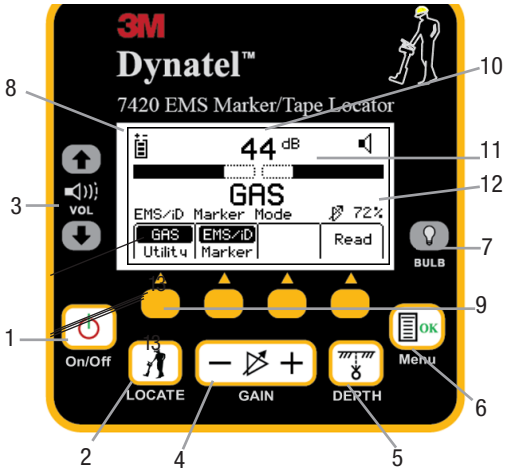
2. Slide Lithium Ion battery pack out of handle.

3. Insert alkaline battery holder, with 8 AA Alkaline batteries, into battery compartment.

D. Service and Accessories

Information regarding service, accessories, or replacement parts can be obtained by contacting 3M at 1-800-200-0265 in the U.S., or by contacting your local 3M Sales Representative outside of the U.S.

E. 3M™ Dynatel™ Electronic Marking System (EMS) Locator 7420 Keypad and Display Definitions



Access panel on bottom side of locator under rubber cover

[1] On/Off (Power): Turns unit on and off.

[2] Locate: Sets the locator to trace mode for locating markers.

[3A] Speaker Volume Icon: Indicates the relative volume level of the locator.

[3] Speaker Volume Control: [2] Adjusts the volume of the locator (off, low, medium, and high).

[4] Gain Adjust: Adjusts the sensitivity of the locator either up or down to maintain a satisfactory signal level.

[5] Depth: Displays the depth of 3M™ EMS/iD Markers or 3M™ EMS Caution Tape.

[6] Menu/OK: Displays setup screen for configuration of the unit, i.e.: clock, language, depth units, and marker data. Also acknowledges setup entries (OK).

[7] Backlight: Toggles the backlight low, high, and off.

[8] Battery Icon: Indicates battery level.

[9] Soft Key Commands: Definitions for each of the four soft key functions.

[SK] Soft Keys: There are four soft keys (yellow keys) on the locator. The function of each key is shown above the key on the display screen. The functions will change, depending on the operation mode of the locator. For instruction purposes in this manual, the display command is followed by [SK] to identify it as a soft key.

[10] Signal Strength: Digital reading of the signal strength that the locator is detecting from the marker.

[11] Bar Graph: Graphical representation of the received signal.

[12] Gain Level: Displays the relative gain level when locating EMS/iD markers.
Threshold Level: Displays the threshold level where audio is cut off when locating EMS caution tape.

[13] Serial Port: RS232 port to connect the locator to a PC via serial cable or USB-to-Serial Adapter cable.

[14] Earphone Jack: Will fit standard 1/8 inch (3.175 mm) mini-jack mono earphone plug (not included).

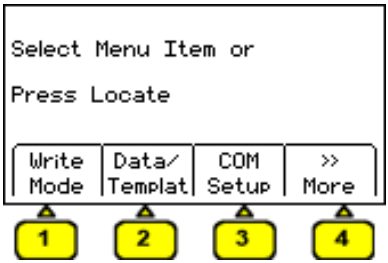
[15] Charging Jack: Port to connect AC charger for charging the Lithium Ion battery pack only.

3. Menu Displays

A. Main Menu

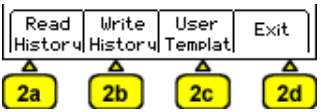
When the Menu [6] button is pressed, the Main Menu display appears.

The function appears on the display above each soft key.



1. **Write Mode:** System used to write information to 3M™ iD Markers

2. **Data/Template:** Displays marker history and template creation/selection displays:



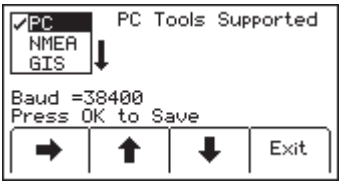
   a. **Read History** – 100 memory locations for Read 3M™ iD Markers.

   b. **Write History** – 100 memory locations for Written iD markers.

   c. **User Templates** – Create and edit iD templates for iD markers (max = 32).

   d. **Exit** – Returns to prior menu.

3. **COM Setup:** Displays second level COM Port setting display to configure RS232 port communication with different devices –



   a. **PC** – Locator will communicate to a computer.

   b. **NMEA** – Port is configured to accept coordinates from GPS device according to NMEA (National Marine Electronics Association).

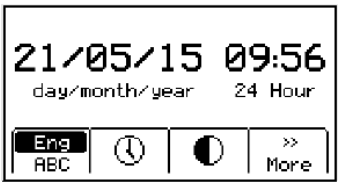
   c. **GIS** – Port is configured to send iD marker information or path information to GPS device and receive coordinates from GPS device according to GIS (Geographic Information System).

   d. **PDA** – Locator will send iD marker and path information in ASCII string.

4. **>>More:** Advances to next menu display.

5. **<<Back:** Returns to previous menu display.

6. **Setup:** Displays second and third level displays for locator configuration.



   a. **Depth Units** – Choose unit of measure; in, ft-in, or cm.

   b. **Clock** – Date and time stamped on marker information and depth readings.

   c. **Language** – Toggles between English and alternate language.

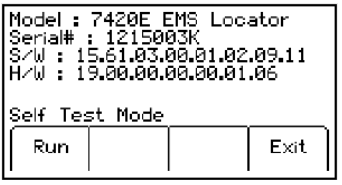
   d. **>>More** - Advances to next menu display.

   e. **<<Back** - Returns to previous display.

   f. **Marker Type** - enable and disable marker utility types.

   g. **Contrast Adjustment** - Choose to increase or decrease contrast.

8. **Self Test:** Displays information about locator unit and performs a self check test.



9. **Help:** Offers the user basic on-screen instructions.

4. Locating 3M™ Electronic Markers and 3M™ iD Markers

A. 3M™ Dynatel™ Electronic Marking System (EMS) Locator-Model Initial Configuration

Attention: All 7420E-Model (Export) iD Locators must run the initial configuration setup found in the 3M Dynatel Locator PC Tools software. The 3M Dynatel PC Tools software is available free of charge at www.3M.com/dynatel under the Software Dynatel™ M-Series Locator PC Tools.

Note: Dynatel locator 7420 Model ship with all marker types enabled (✓). Dynatel locator 7420 model users can skip to Section C.

B. Activating the Marker Locate Feature (7420E-Model Only)

In order to enable the electronic marker location feature of this locator, you must identify the country in which the locator will be used. This initial configuration is required for the 7420E locator models only.

Some countries do not allow all marker operating frequencies. Therefore, the 3M™ 7420E model locators are shipped with all the marker types/frequencies disabled.

ATTENTION

It is unlawful to operate this unit in any country with a configuration setting that is not specific to that country. In order to prevent the user from operating this unit with a configuration setting that is not specific to the country where it is operated, this unit is equipped with configuration software for installing country specific configurations.

Step 1. Download the 3M Dynatel Locator PC Tools software from www.3M.com/dynatel and install it on your computer. The 3M Dynatel PC Tools software is available free of charge at www.3M.com/dynatel under the Software section; 2550/2573/2250M/2273M/7420 Locator PC Tools xx.x.x (EXE xx.xMB).

Step 2. Close any programs that may be using the COM ports.

Step 3. Start the software program; 3M Dynatel PC Tool kit.

Step 4. Connect the locator to the PC via the provided RS232 serial cable or RS232-to-USB Adapter cable.

Step 5. Power the locator on.

Step 6. From the main screen, select the country in which the unit will be operating. (If the country is not listed, select ‘All other countries’.)

Step 7. A communication window will appear. (Baud rate 38400 / Com Port x; select PC COM Port that is connected to the locator.)

Step 8. Click *OK*.

Step 9. Click *Initial Configuration*.

Step 10. Click *Download*.

Step 11. The prompt line will display: *Download Completed Successfully*, when finished. The marker types legally allowed in the country selected in Step 6 above will be activated at this time.

Step 12. Multiple units may be configured at this point by simply connecting the next locator, powering it on, and clicking *Download*.

Step 13. Click *Exit* when all locators have been updated.

C. Enabling/Disabling Marker Types

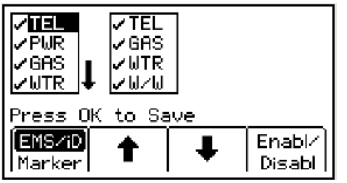
Menu [6] + >>More [SK:4] + Setup [SK:6] + >>More [SK:6d] + Marker Type [SK:6f]

Step 1. Press the up/down arrows [SK] to highlight a utility to enable or disable.

Step 2. Press *Enabl/Disabl* [SK].

- Only the markers that are enabled (✓) will be available in the locate mode.

Step 3. Press *OK* [5] to save settings or *Exit* [SK] to cancel.

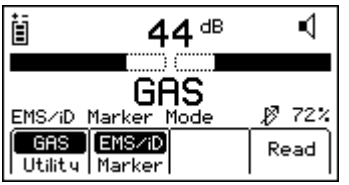


D. Single Marker Locate 3M(TM) Dynatel Electronic Marking System (EMS)/iD Markers)

Step 1. Press *OK* [5]

Step 2. Press *Utility* [SK Toggle] to select desired utility.

Step 3. Marker should have EMS/iD selected.



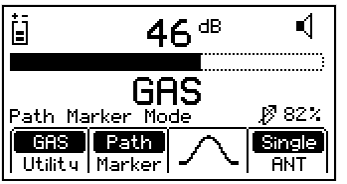
E. Path Marker Locate (3M EMS Caution Tape)

Step 1. Press *OK* [5].

Step 2. Press *Marker* [SK].

Step 3. Press *Utility* [SK Toggle] to select desired utility.

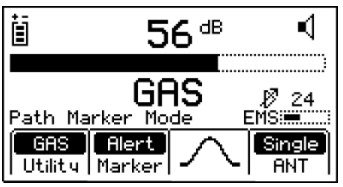
Step 4. Press *Marker* [SK Toggle] to select path.



Note: Only the marker types enabled in the setup menu will be shown. (See 4.C. Enabling/Disabling Marker types). When scanning for markers, the Gain Level [12] should be set high.

F. Alert Mode for Path Markers

While tracing path markers, it is possible to search for point markers with or without iD. The 3M™ Dynatel™ Electronic Marking System (EMS) Marker frequency will be the same as the path marker frequency.



Step 1. Press Menu/OK [6:Toggle to LOCATE MENU screen]

Step 2. Press EMSiD/Path [SK].

Step 3. Press Utility [SK Toggle] to select desired Utility.

Step 4. Press Marker [SK Toggle] to select Alert.

Note: Only the marker types enabled in the setup menu will be shown.

Step 5. Adjust the Gain [4] down until the bar graphs open.
— The bar graph will close, the audio will increase, and the signal strength will be maximum when the receiver detects a marker of the specified utility.
—When an EMS/iD marker detected, select the EMS/iD in Marker [SK Toggle] for the detected utility marker.
— The unit will switch to Single Marker Locate in order to pinpoint the marker.

Step 6. Press Marker [SK Toggle] to return to Alert mode.

Note: Only the marker types enabled in the setup menu will be shown. (See 4.C. Enabling/Disabling Marker types). When scanning for markers, the Gain Level [12] should be set high.

The Path Marker option is used to locate a path marker, such as 3M™ Electronic Marking System (EMS) Caution Tape of choice (TEL, GAS, WTR and WWTR). This mode has three search methods—Peak, Null and a combined Peak/Null response — which can be selected in the locate screen through [SK3].

Peak Mode - On Mode entry, the Peak Mode will give the strongest audio and bar graph response when the receiver is above the path marker.

Null Mode - On Mode entry, the Null Mode will give the strongest audio and bar graph response when the receiver is to the front or back of the marker. Moving the receiver directly over the path marker will produce a quiet response.

Peak/Null Combination - On Mode entry, the combined Peak and Null Modes will respond with the Peak and the Null audio and bar graph response to allow for a larger pattern of signal over the marker.

- The bar graph will increase, the audio will increase, and the signal strength will be maximum when the locator detects a marker of the specified utility.

Single Antenna: Use this antenna arrangement for all normal locates. If there seems to be high noise then try the Dual Antenna to help filter out ambient noise.

Dual Antenna: This mode can help locate when ambient noise is 25 or higher on the signal strength display [10].

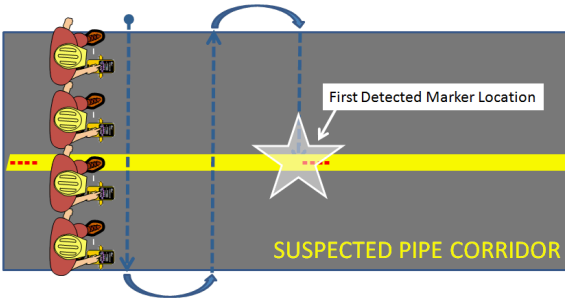
G. Sweeping and Locating the Tape/Pipe

Step 1. Make wide locate sweeps across suspected pipe direction inside the suspected pipe corridor, every 2.5 ft (75 cm) until you detect the first marker.

Step 2. When the first marker is detected, the pipe/tape direction can be determined by rotating the locator and finding the direction of the highest signal strength.

Step 3. Walk straight in the direction of the handle, making smaller left/right sweeps to follow the path.

Step 4. Press depth directly over a marker with maximized orientation, for the estimated depth to the tape.

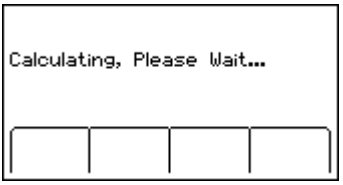


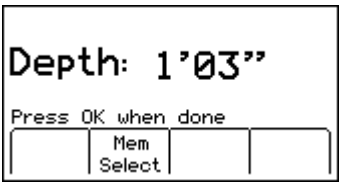
H. Estimating Depth

Step 1. Lower the bottom of the locator to the ground over the targeted marker or caution tape.

Step 2. Press *Depth*

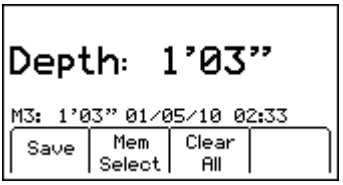
- The locator will calculate the estimated depth to the marker or caution tape. (Calculating, please wait...)





Step 3. To save the depth reading, press *Mem Select* [SK].

- Five depth readings can be saved with the time and date.
- Save [SK] will place each entry in sequential order in memory (M1 - M5) until five readings have been stored. The unit will overwrite saved entries in excess of five, beginning with M1.



Optional: Press *Clear All* [SK] to delete all stored depth information.

Press *Mem Select* [SK] to select a specific memory location to store the depth readings. When the preferred location appears on the screen, press *Save* [SK]. The display and memory location will populate with the current information.

Each memory location can be reviewed by pressing *Mem Select* [SK].

Press *OK [5*] to return to Marker Locate Mode.

5. Creating/Editing Templates for 3M™ iD Markers

In the User Template screen, the operator can create and modify templates for writing to iD markers. Note that the easiest way to create user templates is by using the 3M™ Dynatel™ PC Tool Kit software on a PC and then downloading them to a locator via the RS232 Serial Port [14] on the locator and the provided RS232 cable or RS232-to-USB adapter cable. The 3M™ Dynatel™ PC Tool Kit software is available free of charge

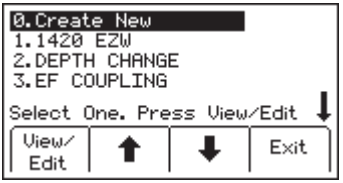
at www.3M.com/dynatel under the Software section; 2550/2573/2250M/2273M/7420 Locator PC Tools xx.x.x (EXE xx.xMB).

A. Creating New Templates

Menu [6] + Data/Templat [SK:2] + User Templat [SK:2c]

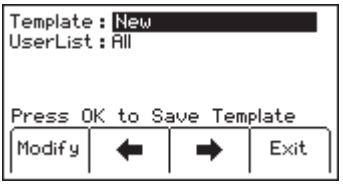
Step 1. Select *Create New* by pressing the up/down arrows [SK].

Step 2. Press *View/Edit* [SK].



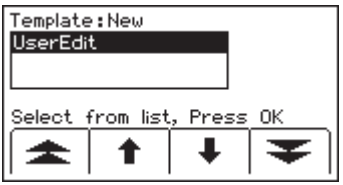
Step 3. Name the template.

Step 4. Press *Modify* [SK] to manually enter the name of the template.

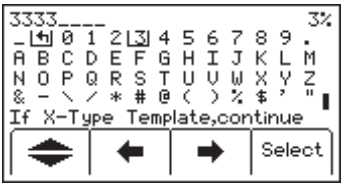


Step 5. Select *UserEdit*.

Step 6. Press *OK* [5].



Note: Older Gen 1 markers have less memory and the operator will see a message asking if you are creating an X-Type template. Only continue adding data if the marker is an X-Type marker.

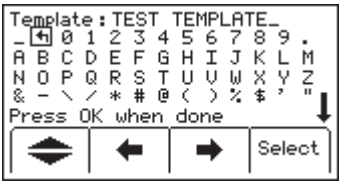


Step 7. Move the boxed cursor by pressing the left/right arrows [SK] or up/down arrow [SK] to move the cursor up or down.

Step 8. Press *Select* [SK] to enter the alphanumeric character.

- Entry will appear at the top of the screen.

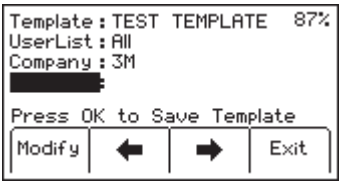
Step 9. Press *OK* [5] when the entries are complete and to save the entries, or press Exit [SK] to cancel entries. Pressing OK [5], or Exit [SK], will return to the template display.



Note: To clear the previous field entry, select the 'back arrow' with the cursor and delete the previous entry.

Step 10. Navigate through the fields by pressing the left/right arrows [SK].

Step 11. Press *Modify* [SK] to populate the highlighted field.

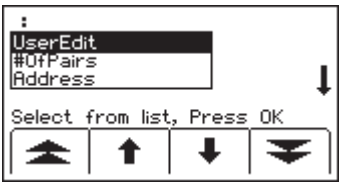


Step 12. When modifying the Labels (left hand side of template information) there are three options for editing that are presented:

a. UserEdit.

b. Choosing one of the common (compressed) terms from the available list of terms.

c. Del Row (delete row).



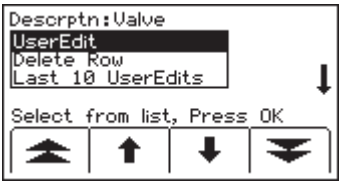
Step 13. When modifying the Descriptions (right hand side of template information) there are four options for editing that are presented:

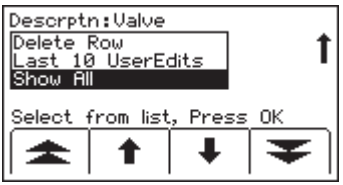
a. UserEdit.

b. Delete Row.

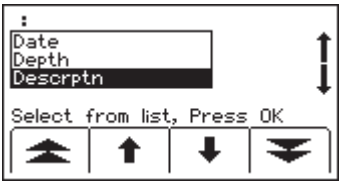
c. Last 10 UserEdits.

d. Show All - lists common compressed terms.

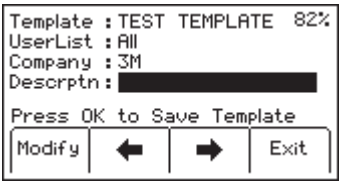




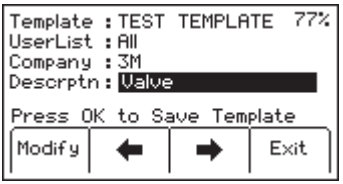
Step 14. Populate as many fields as possible from the drop-down list of common (compressed) terms available to conserve marker memory space, or choose *UserEdit* if a term is not found to meet the user's requirements. Select term by pressing the up/down arrows [SK] and press *OK* [5].



Step 15. Navigate to the next field by pressing the left/right arrow [SK].



Step 16. Press *Modify* [SK] to populate the highlighted field.

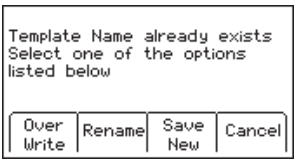


Step 17. Populate additional fields, as needed, using the above procedure steps 15 and 16. Templates are limited to six Label and six Description fields.

Step 18. When the template is complete, save the template by pressing *OK* [5].

B. Editing Templates

The operator can select an existing template and make changes to it in the same manner described in *5.A. Creating New Templates*. The following save screen will appear.



Over Write: Saves all modifications that have been made to the original template.

Rename: Overwrites the old template with the new name and all modifications. Display will return to the template name field. Modify the name of the template and press *OK* [5] to save.

Save New: Creates a new template containing all information. Original template remains unchanged. Display will return to the template name field. Modify the name of the template and press *OK* [5] to save.

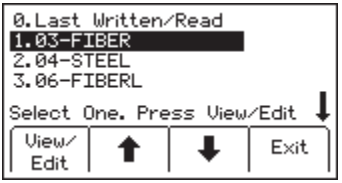
Cancel: Clears all modifications made to any unsaved template.

6. Writing 3M™ iD Markers

The Write Mode enables the user to write information into 3M™ iD Markers. It is also possible to edit the information to be written into an iD Marker.

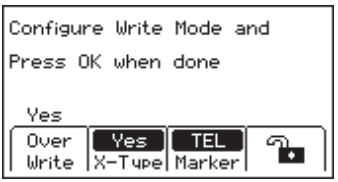
Menu [6] + Write Mode [SK:1]

Step 1. Select a template from the list on the display to be written into the marker by pressing the up/down arrows [SK] to highlight the preferred template. 'Last Written /Read' is the most recent data that was written to/read from a marker by the locator.



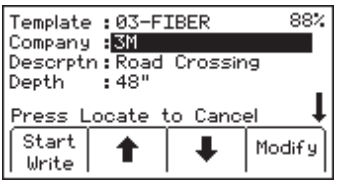
Step 2. Press *View/Edit* [SK].

- Four Write Mode options will be displayed at the bottom of the screen. [SK1] Overwrite: Will overwrite any data existing on an unlocked marker if '*Yes*' is selected and '*No*' will prevent overwrite. [SK2] X-Type: Choose '*Yes*' if writing to a Gen 2 marker and '*No*' if writing to a Gen 1 marker. Gen 2 markers will have an "X" following the serial number that is printed on the attached tag. SK3] Marker: Select type of marker to be written by repeatedly pressing *Marker* [SK Toggle]. [SK4] Lock/Unlocked: Press [SK4] to toggle between locking and unlocking the marker. The default setting is unlocked and note that a locked unit cannot be modified once locked.



Step 3. Press *Menu/OK* [SK].

- The selected template will be displayed. The arrow on the right side of the display indicates there is more information than can be displayed on the screen (scroll down by pressing the down arrow [SK]).



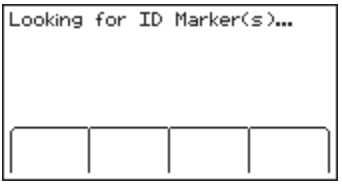
Step 4. Enter user information that will be written to this marker. (See *6.A. Modifying Marker Data to be Written* section.)

Step 5. Verify that all information is correct.

Step 6. Hold the locator directly over the top of the marker. The locator should be within the following maximum writing ranges for each of the different 3M™ iD Marker formats;

- Near Surface iD Marker = 6 in (15 cm) maximum.
- Ball iD Marker = 12 in (30 cm) maximum.
- Full Range iD Marker = 24 in (61 cm) maximum.

Step 7. Press *Start Write* [SK].



Step 8. After writing to the iD Marker is completed,the following screen will be displayed.

The following messages may appear in the writing process.

Message 1. If the overwrite option was set to "No" and there was data present on the target market then the following screen will be displayed.

Message 2. When writing to a passive marker or the wrong frequency then the following will be displayed.

Message 3. This screen indicates that X-Type marker option was incorrectly set to "Yes" or "No". Verify the serial number that is displayed on the marker ends with an “X” to select "Yes" for X-Type, else select "No".

Note: Once the marker data has been locked, the information contained on the marker is PERMANENT. Choosing to permanently lock the marker data is irreversible. Once the data is locked it can not be overwritten. Assure that the data that is being written is correct before proceeding.

A. Modifying Marker Data to be Written

To alter the information to be written into the marker

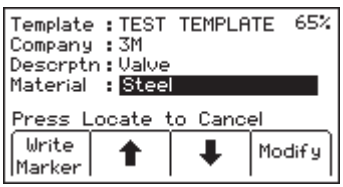
Step 1. Press *Menu [6] + Write Mode [SK]*.

Step 2. Select a template from the list on the display to be written into the marker by pressing the up/down arrows [SK] to highlight the preferred template. ‘Last Written/Read’ is the most recent data that was written to/read from a marker by the locator.

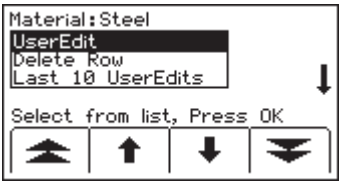
Step 3. Press *View/Edit* [SK].

Step 4. Press the up/down arrows [SK] to highlight the information to change.

Step 5. Press *Modify* [SK]. The percentage displayed in the upper right portion of the display indicates the remaining memory available on the marker.



Step 6. The operator may select *User Edit* in order to 'type' the modification, or *Delete Row* to remove the entire row from the template, or select *Show All* to display a list of common compressed terms.

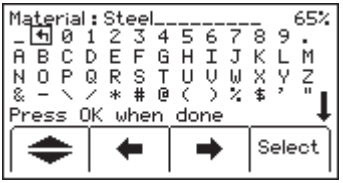


Note: Using a common compressed term requires less memory in the marker.

Step 7. Select an option from the list by pressing the up/down arrows [SK]. Press *OK* [5].

Step 8. If *User Edit* is selected, the following screen will appear.

Step 9. Move the boxed cursor to the 'back arrow' and press *Select* [SK] to delete the entry to be modified.



Step 10. Move the boxed cursor by pressing the left/ right arrows [SK] or the Up/ Down Arrow [SK] to move the cursor to the next row.

Step 11. Press *Select* [SK] to enter the alphanumeric character.

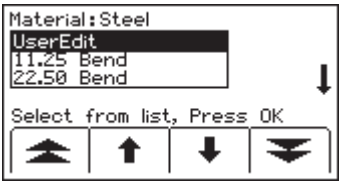
- Entry will appear at the top of the display.

Step 12. Press *OK* [5] when entry is complete.

Step 13. If *Show All* is selected, the following screen will appear.

Step 14. Select a common compressed term from the list by pressing the up/down arrows [SK].

Step 15. Press *OK* [5]. The modification will automatically populate the marker template.



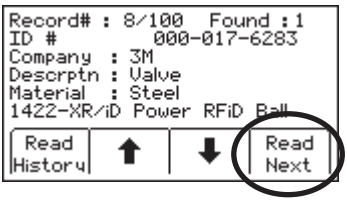
7. Reading 3M™ iD Markers

The operator can retrieve the data from the 3M™ iD Marker by pressing Read [SK] on the Marker Locate screen.

The locator tip should be lowered to the ground to reach maximum read depth.

If more than one iD marker of the same utility is detected, the locator will read the first marker and display the data from the marker.

The fourth yellow command key will be labeled "Read Next". Press this key to extract the data from the other marker.



All the information retrieved from the marker, including the date and time read, is saved into the 'Read History' file of the locator. If a hand-held GPS device is used in conjunction with the locator, coordinates can be saved into the Read History.
(*See 8. Reviewing Marker Read/Write History*)

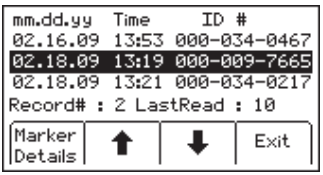
8. Reviewing Marker Read/Write History

A. Read History

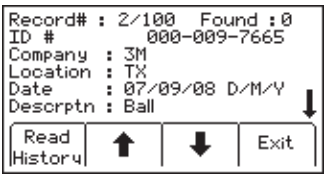
The Read History mode is a historical file of all information that has been read from targeted markers (100 memory locations).

Menu [6] + Data/Templat [SK:2] + Read History [SK:2a]

The Read History screen displays the date and time that each marker was read, and its unique identification number.



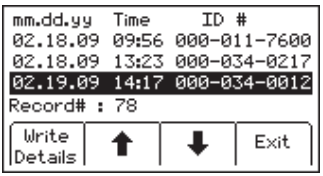
- Select the marker data to be viewed by pressing the up/down arrows [SK].
- Press *Marker Details* [SK] to view all data that was retrieved from the marker.
- Press *Read History* [SK] to return to the list or press *Exit* [SK] to return to Data/Template review display.



B. Write History

Menu [6] + Data Templat [SK:2] + Write History [SK:2b]

- Select the marker data to be viewed by pressing the up/down arrows [SK].
- Press *Write Details* [SK] to view all data that was sent to the marker.
- Press *Write History* [SK] to return to the list of written data.
- Press *Exit* [SK] to return to Data/Template review display.



For additional information concerning writing to 3M™ iD Markers, refer to *www.3M.com/dynatel - Instruction Manual M-Series Locator PC Tools.*

9. GPS Compatibility Operation

A. Activation Key

To activate the GPS compatibility in the locator, an activation key must be entered into the locator. The software version of the locator must be at least version 14 (See *9.B. Serial Number and Software Version* to verify the locator software version). For the locator to transmit information to the GPS for use in GIS mapping applications (see *9.F. Sending iD Marker Data to GPS (Capture-Transmit Mode / Mode 2) section*), the hardware version must be 5.0 or higher. (See *9.B. Serial Number & Software Version Section*.)

The 3M™ Dynatel™ PC Tool Kit software is available free of charge at www.3M.com/dynatel under the Software section; 2550/2573/2250M/2273M/7420 Locator PC Tools xx.x.x (EXE xx.xMB). The GPS activation key can also be obtained from this website free of charge. You will be asked to enter the serial number of the locator and a few other information items in order to receive the GPS activation key.

Upgrade the software of the locator using the desktop software, if necessary, using 3M™ Dynatel™ PC Tool Kit. Enter the GPS activation key on the locator.

B. Serial Number and Software Version

Menu [6] + >>More [SK:4] + S/N# [SK:7]

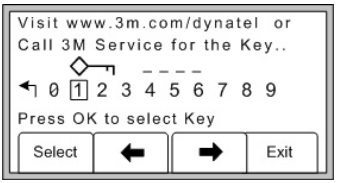
The model number, serial number, software version, and hardware version of the locator are displayed. The Self Test Mode can also be run from this screen by pressing *Run* [SK].

C. Inputting the GPS Activation Key

Menu [6] + COM Setup [SK:3]

Initially, when the *COM* [SK:3] key is pressed, and an attempt is made to enable any selection other than PC, the screen below will appear and you will be prompted to input the activation key that you have obtained from the website. This will have to be performed only one time to enable the GPS interface.

- Move the selector box left or right by pressing the arrow keys [SK].
- Press *Select* [SK] to enter each number.
- Press *OK* [5] to activate.



D. Communicating with the GPS Device

Menu [6] + COM Setup [SK:3]

After the GPS interface has been activated, the *COM Setup* [SK:3] key will toggle through several options to configure the *Serial Port* [14] of the locator (depending on the application, or capabilities of the GPS device). Select from the following options:

NMEA – The Serial Port is configured to receive NMEA signals from a GPS device (4800 Baud Rate). (Capture Mode/Mode 1)

GIS – The Serial Port is configured to send and receive data to a GPS device that has GIS mapping capabilities. (Capture/Transmit Mode/ Mode2)

PC – The Serial Port is configured to communicate with a computer for the Dynatel PC Tool Kit application.

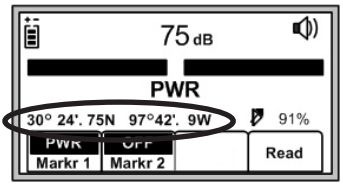
PDA - The Serial Port is configured to only send information if the GPS device only has the ability to receive information.

E. Capturing GPS Coordinates (Capture Mode / Mode 1)

Menu [6] + COM Setup [SK:3] + NMEA

If the GPS device is not configured properly, there is an error communicating with the locator, or the GPS has not acquired enough satellites to pinpoint the location, the locator will display the message “Insert External Device”.

When the locator is communicating with a GPS device, the LAT and LONG coordinates received from the device will appear on the marker locate display.



Step 1. Locate a marker (See *4. D. Single Marker Locate.*)

Step 2. Press *Read* [SK]

The information from the 3M™ iD Marker, as well as the GPS coordinates, will display on the locator display. This information is saved automatically in the Read Marker History. (*See 8.A. Reviewing Marker Read/Write History*.)

If the marker is a passive marker (rather than iD) the locator will display "No iD Marker Found". The GPS coordinates of the attempt to read the non-iD marker are stored in the Read Marker History as serial number # 0000-0000-0000. The marker details will indicate "not an iD marker", but will display the GPS coordinates.

F. Sending 3M™ iD Marker Data to GPS (Capture-Transmit Mode / Mode 2)

Menu [6] + COM Setup [SK:3] + GIS

Locators that have marker locating capability (indicated by 'iD' in the model number or description) can be configured to send 3M™ iD Marker data directly to some GPS devices. When an iD marker is located and read, the information read from the iD marker, with feature and attribute data, is sent to the GPS device and is stamped with latitude, longitude and date/time data. The data acquired during this logging process can be uploaded to GIS mapping software. For more information and detailed instructions pertaining to specific GPS devices, refer to www.3M.com/dynatel for GPS instruction sheet.

10. Help Mode

Menu[6] + >>More [SK:4] + **?** [SK:8]

The help screen contains basic information about the locator and its operation. It is designed to be a quick reference guide.

- Press the double up/down arrows [SK] to navigate between sections.
    - The single up/down arrows [SK] will scroll the display line by line.

11. 3M™ Dynatel™ PC Tool Kit and Locator Software Upgrades

Locator software upgrades are periodically released and can be downloaded, free of charge, at *www.3M.com/dynatel*. Located under the Software section, the software is titled *2550/2573/2250M/2273M/7420 Locator PC Tools xx.x.x (EXE xx.xMB)*. Once downloaded to your PC, double click the file and an auto-installer will install the PC Tool desktop software. Double click the *Dynatel PC Tool Kit* icon on the desktop. Using the provided RS232 cable, or RS232-to-USB adapter cable, connect the Serial Port [14] on the locator to the PC and power the locator on. Click the *Upgrade Software* button in PC Tools to begin upgrade. Do not disconnect or power off the locator while the upgrade is in progress. Wait until the software indicates that the installation was successful. This will take approximately seven minutes to complete.

The *Dynatel PC Tool Kit* provides the user with an excellent interface between the locator and a PC. This software utility provides the tools for:

- Upgrading the locator to the latest software revision
- Programming one or multiple locators to best suit specific user configurations
- Loading an alternate language into the locator
- Using the 3M™ iD Marker utility to:
  - Create templates for writing data to iD markers, or create Trace Templates for GPS path tracing when connected to a GPS device.
  - Download iD marker data that has been written or read by the locator for documentation databases.

Embedded in the desktop software is the most current software for the locator, which affords the user the option of upgrading the unit without returning the unit to the 3M Service and Repair Center.

Please refer to the operating instructions included with the software.

12. Memory Self Test

Menu [6] + >>More [SK:4] + S/N# [SK:7]

This operation performs a self-test on the locator.

The locator will display current information about the unit (model number, serial number, software revision, and hardware revision).

1. Press *Run* [SK] to start the self test.
   - A status bar will appear while the self test is running.
   - Results will appear on the display when the test is complete.
   - Press Exit [SK] to return to the Menu.

13. Replacement Accessories

Item	Part Number
AC Charger for 7000RB Rechargeable Battery Pack	7000CH
AC Charger for 7000RB Rechargable Battery Pack for ANZ	7000CH-ANZ
Rechargeable Battery Pack for 7000 Series Rcvr	7000RB

14. 3M™ Dynatel™ Electronic Marking System (EMS) Marker/Tape Locator 7420/7420E Product Specifications

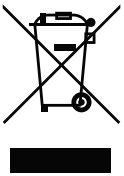
Physical Specifications:		
Locator	Size (H x W x D) IN (CM) 30" x 6.5" x 10.5" (76 x 17 x 27)	Weight (including batteries) 5 lb. (2.25 kg)
Shipping Box	Size (L x W x H) IN (CM) 33" x 17" x 12.5" (84 x 43 x 32)	7 lb. (3.2 kg)
Environmental Specifications:		
Operating environment	Outdoor; Indoor for charging and configuring with a PC	
Operating temperature	-4° F to 122° F (-20° C to 50° C)	
Storage temperature	-4° F to 158° F (-20° C to 70° C)	
Regulatory	7420 (FCC Part 15), 7420E (CE)	
Environmental Standard	IP54	
Maximum altitude	2000 m	
Compatibility:		
3M™ EMS/iD Markers	All 3M markers (telephone, gas, communication, power, water, wastewater and general purpose)	
3M™ EMS Caution Tape and Rope Series 7600	All 3M path marking frequencies (telephone, gas, waste water)	
Range/Depth:		
Maximum Write Range 3M™ iD Markers:	**(Telephone,Gas, Water, Wastewater Communications (CATV), General Purpose)**	
Near-Surface	6 in (15 cm)	
Ball Marker	12 in (30 cm)	
Full-Range	24 in (61 cm)	

7420 Maximum Read Range 3M™ iD Markers (with ID):	**(Telephone, Power, Gas, Water, Wastewater, Communications (CATV), General Purpose)***
Near-Surface	3 ft (0.9 m)
Ball Marker	5 ft (1.5 m)
Full-Range	8 ft (2.4 m)
7420E Maximum Read Range 3M™ iD Markers (with ID):	**(Telephone, Power CE, Water, Gas, Wastewater, Communications (CATV), General Purpose)***
Near-Surface	90 cm (36 in)
Ball Marker	1.5 m (60 in)
Full-Range	2.4 m (96 in)
* Some countries do not allow all marker operating frequencies. Refer to Configuration Section for 7420E (Section 4A). ** Power CE is labeled as PWR2 on the locate screen.	
Maximum Detection Depth Passive Markers (no ID):	
Near-Surface	3 ft (0.9 m)
Ball Marker	6 ft. (1.8 m)
Mid-Range	7 ft. (2.1 m)
Full-Range	9 ft. (2.75 m)
Maximum Detection Depth	
3M EMS Caution Tape 7600 Series	2.5 ft (0,76 m) (Distance from antenna to tape) +/- (10% + 5 cm) or +/- (10% + 2 in)
Depth measurement accuracy	up to specified depth of marker or caution tape (Depth accuracy susceptible to high ambient noise conditions)
3M iD Marker Memory Storage:	
Memory storage with date/time stamp	Read marker records 100
Written marker records	100
User defined iD templates	32
Marker depth memory storage	Five with date/time stamp
Electrical Specifications:	
Power	Rechargeable Li Ion battery pack (7000RB)[1]
Battery life:	8 hours typical[2]
Charging time	2.5 hours typical, with 90~240V AC adapter
Display	Large graphic high-contrast LCD with backlight
Speaker	0.25W
Headphone jack	Standard mini phone jack
Serial port	Standard RS232 serial with DB9 connector (RS232 to USB adapter cable included)

Notes:

1. It's recommended to use the rechargeable battery pack. However, a battery holder and adapter are provided for using 8-AA size Alkaline batteries for backup, which would have reduced battery life.
2. The battery life is specified for the 7000RB rechargeable battery pack at 73°F / 23°C, with 10% usage of the backlight and audio volume at medium level.

This product is in accordance with the requirements of the European directive 99/5/EC.



This is the EU symbol for equipment that is covered under the Waste from Electrical and Electronic Equipment (WEEE) directive per CENELEC Specification 5041. It indicates that certain products should not be discarded in the trash, but rather should be recycled. This applies to all electronic pluggable and battery powered products.

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Important Notice

All statements, technical information and recommendations related to 3M Products are based on information believed to be reliable, but the accuracy or completeness is not guaranteed. Before using the 3M Product, you must evaluate it and determine if it is suitable for your intended application. Because conditions of Product use are outside of our control and vary widely you assume all risks and liability associated with such use. Any Product-related statements not contained in current 3M publications, or any contrary statements contained in your purchase order, shall have no force or effect unless expressly agreed to in writing by an authorized officer of 3M.

Limited Product Warranty

3M Locators (except accessories), will conform to 3M's published specifications and will be free from defects in material and manufacture for a period of twelve (12) months from the date of purchase. Dry cell batteries included in any of 3M's products are warranted only to the extent the battery manufacturer determines such batteries are covered by its warranty. Locating accessories are warranted for ninety (90) days after purchase. 3M's obligations and liability under this warranty are limited to repairing, replacing or refund of the purchase price, at 3M's option, any of 3M's products which, after normal and proper usage, are determined by 3M to be defective. This warranty does not extend to any of 3M's products which have been subjected to misuse, neglect, accident or improper applications, nor shall it extend to products which have been repaired or substantially altered outside 3M's manufacturing or repair facility, nor to any associated instruments, equipment or apparatus. Before utilizing any of 3M's products, BUYER should determine the suitability of the product for BUYER'S intended use. **3M MAKES NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE**. In no case shall 3M be liable for any special, incidental, or consequential damages based upon breach of warranty, breach of contract, negligence, strict liability or any other legal theory. This limitation does not apply to claims for personal injury.

Special Condition: Shipments into authorized distributor/supplier locations will have an additional ninety (90) day warranty period.

3M

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