# 3M™ Dynatel™ Cable/Pipe/Fault Advanced Locator 2250ME/2273ME Series

## (With 3-watt, 5-watt, or 12-watt Transmitter)

## Operator's Manual

**2250ME Pipe/Cable Locator**
**2250ME-iD Pipe/Cable and Marker Locator**
**2273ME Cable/Pipe/Fault Locator**
**2273ME-iD Cable/Pipe/Fault and Marker Locator**

**3M**

## B. Capturing the GPS Coordinates
## (Capture Mode / Mode 1)

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

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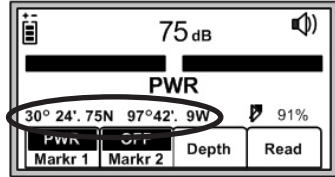


1.  Locate a marker (See *Single Marker Locate*, Section 13D.)

2.  Press *Read* [SK]

The information from the 3M™ iD Marker, as well as the GPS coordinates, will display on the receiver display. This information is saved automatically in the Read Marker History. (*See Reviewing Marker Read/Write History*, Section 17.)

If the marker is a passive marker (rather than iD) the receiver 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.

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

Receivers that have marker locating capability (indicated by 'iD' in the model number) 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.

## D. Path Mapping with GPS

The M-Series cable and pipe locators are compatible with hand-held GPS devices and now have the ability to map the path of underground target facilities. While measuring the depth to the target, the technician can automatically log the coordinates of the path to the GPS device. These logged points contain the Trace template that can have valuable information regarding the facility (owner, utility, size, etc.) and the method used to find the path (frequency, current, and measured depth).

In order to transmit the path information to a GPS device, the GPS has to have the ability to accept information on one of its com ports at 4800 Baud. Using the manual supplied with the GPS device, configure the com port of the GPS to communicate with the receiver.

## 1. Creating Trace Templates

The easiest way to create a Trace template is using the 3M™ Dynatel™ PC Tools software. The 3M Dynatel PC Tools software is available free of charge at www.3M. com/dynatel under the Software section; 2550/2573/2250M/2273M/1420 Locator PC Tools xx.x.x (EXE xx.xMB).

•   Create a TRACE template.

•   Save and download the template to the receiver.

Up to four Trace Templates can be stored on the Receiver.

Each Trace template is limited to 132 user editable characters.

The trace template appears in table format: two columns with six lines.

The first column is limited to 8 characters and the second column is limited to 14 characters. In addition to the 132 character table, the receiver will send a sequence number, the frequency, the measured depth of the conductor, and the current to the GPS.

## 2. Select Com Port Setting

If the GPS device has the ability to send NMEA coordinates on its com port and has the ability to receive information at 4800 baud, set the receiver's com port to GIS.

If the GPS device only has the ability to receive information, set the com port of the receiver to PDA mode.

**Log Prompt = On:** Before the receiver returns to locate mode, a verification screen will pop up on the receiver with the trace template information that will be sent to the GPS device. This information can be modified and confirmed. Press OK to send to GPS device.

**Log Prompt = Off:** When the receiver returns to locate mode, the trace template and locate information will be sent automatically to the GPS device.

## 3. Sending Path Information to GPS Device

1.   Establish communication on GPS device.

2.   Select COM port on receiver.

3.   Locate target utility.

4.   Measure depth to target utility.

    −   If Log prompt is activated, when the Locate/OK [5] button is pressed (or after a five second delay) a screen will appear that displays the path information.

5.   Press *Locate/OK* [5] to send the information to the GPS device, or *Exit* to abort the exchange.

For more information refer to the software release notes at *www.3M.com/dynatel*

# 19. Other Applications

## A. Aerial Faults (Toning)

**Transmitter Setup**
1. Connect the transmitter (based on type of fault) as described in Connection Diagrams in the following section.

2. Press and hold *off* [T-1] to perform a battery test.

3. Press *on: Ohm-meter/Fault Locate/Tone* [T-2] to turn the Transmitter on and to verify the fault.

4. Press *on: Ohm-meter/Fault Locate/Tone* [T-2] twice more to select the Tone mode.

5. The *Digital Display* [T-4] will alternately flash between 577 and 133K.

6. Press *Output Level* [T-5] for high or maximum output power level.

**Receiver Setup**
1. Press *On/Off (Power)* [1] to turn the Receiver on.

2. Press *Locate/OK* [5]

3. Press *Tone/Ext* [SK] to select Tone mode.

4. Press *Freq* [SK Toggle] to select 577Hz.

5. Connect a toning coil to the receiver *External Jack* [14] ([13] on 3M™ Dynatel™ Advanced Locator 2250M Receiver).

6. Move the toning coil along the cable and find a peak signal then press *Gain* [4] down to adjust the receiver gain.

7. Press *Speaker Volume Control (Spkr/Xpand)* [2] to adjust the speaker volume as needed.

8. Follow the cable with the toning coil.

   − When the receiver detects a short, cross, or ground fault (Connection Diagram Figures #1, #2, or #3), the audio and Signal Strength [10] will stop or drop off sharply.

   − When the receiver detects a split (Connection Diagram Figure #4) the audio and Signal Strength [10] will increase significantly.

   − When verifying a split (Connection Diagram Figure #5) the audio and Signal Strength [10] will decrease after the toning coil has passed the split.

**Connection Diagrams**

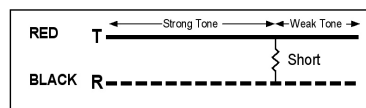**Short:** Red clip to Tip; Black clip to ring.



Figure 1

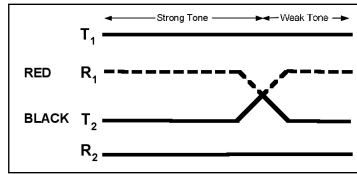**Cross:** Red clip to the crossed conductor of one pair; Black clip to the crossed conductor of the other pair.



Figure 2

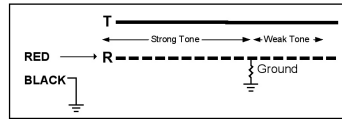**Ground:** Red clip to the faulted conductor; Black clip to ground.



Figure 3

**Split:** Red clip to Tip of Pair 1; Black clip to Ring of Pair 1.
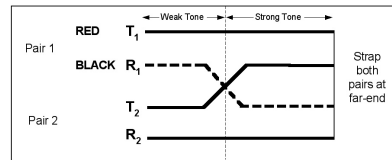


Figure 4

**Verify Split:** Red clip to good conductor of Pair 1; Black clip to split conductor of Pair 2
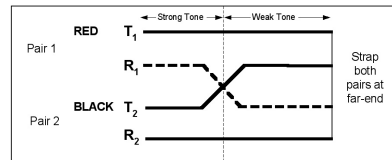


Figure 5

# B. Cable Identification

**Transmitter Setup**

1.   Connect the 3M™ Dyna-Coupler to the Transmitter *Output Jack* [T-6] using the coupler cable.

*Note: Cable Identification requires two Dyna-Couplers: one at the Transmitter and one at the Receiver.*

2.   Clamp the Dyna-Coupler around the cable or both the tip and ring of a pair. Make sure the jaws fully close.

3.   Press and hold *off* [T-1] to perform a battery check.

4.   Press *on: Ohm-meter/Fault Locate/Tone* [T-2] three times to set the transmitter to Tone mode.

- The indicator flag will light in the Digital Display [T-4] under the Tone icon.

5. Press *Output Level* [T-5] for high or maximum output power level.

- The indicator flag will light in the Digital Display [T-4] above the Output Level icon when in high output and flash when in maximum output power level.

- The Digital Display [T-4] will alternately flash between 577 and 133K.

**Receiver Setup**

1. Press *On/Off (Power)* [1] to power the receiver on.

2. Press *Locate/OK* [5].

3. Press *Tone/Ext* [SK] to select Tone mode.

4. Connect a second coupler to the Receiver's *External Jack* [14] ([13] on 2250M Receiver) using the 3M Earth Contact Frame cable or another coupler cable.

5. Press *Freq* [SK Toggle] to select the highest transmitter frequency (133K).

6. Check the first cable in the group by clamping the coupler around the cable.

7. Press *Gain* [4] down and observe the numerical *Signal Strength* [10].

8. Remember the number and continue by clamping the coupler around the next cable in the group.

- If the Signal Strength [10] is greater than the previous observation, press Gain [4] down.

- If the Signal Strength [10] is less than before, ignore it.

- After checking all the cables in the group, the cable with the highest Signal Strength [10] reading is the target cable.

# 20. Help Mode

The help screen contains basic information about the unit 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.

# 21. 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 Updates section, the software link is titled 3M™ Dynatel™ M-Series Locator PC Tools. To download the software, click on the link and then select 3M Dynatel M-Series Underground Locator PC Tools. Selecting this link will display the latest software downloads as well as any Release Notes related to the current software release.

Once downloaded to your PC, double click the file and an auto-installer will install the C 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 6 to 7 minutes to complete.

The *3M™ Dynatel™ PC Tool Kit* provides the user an excellent interface between the receiver and a PC. This software utility provides the tools by which the user can:

• Upgrade the receiver to the latest software revision

• Program one or multiple receivers to best suit specific user configurations.

• Load an alternate language into the receiver

• Utilize 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 receiver for documentation databases.

Embedded in the desktop software is the most current software for the receiver, 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.

# 22. Self Test Of Receiver

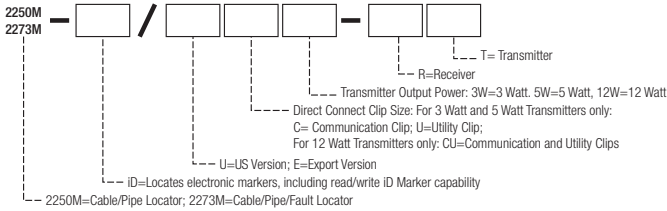This operation performs a self-test on the receiver.

The receiver 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.

# 23. Product Description And Optional Accessories

## A. Product Description



2250M
2273M — ☐ / ☐ ☐ ☐ — ☐ ☐

```
                                              └── T= Transmitter
                                          └── R=Receiver
                              └── Transmitter Output Power: 3W=3 Watt. 5W=5 Watt, 12W=12 Watt
                        └── Direct Connect Clip Size: For 3 Watt and 5 Watt Transmitters only:
                            C= Communication Clip; U=Utility Clip;
                            For 12 Watt Transmitters only: CU=Communication and Utility Clips
                └── U=US Version; E=Export Version
          └── iD=Locates electronic markers, including read/write iD Marker capability
    └── 2250M=Cable/Pipe Locator; 2273M=Cable/Pipe/Fault Locator
```

**Example:** 3M™ Dynatel™ Advanced Locator 2273M-iD/ECU12W-RT

**Description:** 2273M Cable/Pipe/Fault Locator / 3M iD Marker and non-iD Marker capability; Export version; Communication and Utility direct connect cables (clips); 12-Watt Transmitter; Receiver and Transmitter included.

## B. Standard Configurations - 3M™ Dynatel™ Advanced Locators

| Standard Packages | 2250ME | 2250ME-iD | 2273ME | 2273ME-iD | Part Number |
|---|:-:|:-:|:-:|:-:|---|
| Transmitter | • | • | | | 2250E; 3, 5 or 12 Watt |
| | | | • | • | 2273E; 3, 5 or 12 Watt |
| Receiver w/o Electronic Marker (iD and non-iD) capability | • | | | | 2250M-ER |
| | | | • | | 2273M-ER |
| Receiver w/Electronic Marker (iD and non-iD) capability | | • | | | 2250M-iD/ER |
| | | | | • | 2273M-iD/ER |
| Ground Rod | • | • | • | • | 8006 |
| 3M Dyna-Coupler Kit (3" [76 mm] Dyna-Coupler, Coupler Cable & Pouch) | • | • | • | • | 3019 |
| Direct Connect Cables | • | • | • | • | 2876 (Utility - 10' [3 m]) |
| | | | | | 9012 (Communication - 5' [1.5 m]) |
| 3M Earth Contact Frame | | | • | • | 3014 |
| 3M Earth Contact Frame Cable | | | • | • | 9026 |

## C. Optional 3M™ Dynatel™ Accessories

| Item | Part Number |
|---|---|
| Direct Connect Cables, Small Clip, 1/4" (6.4 mm), Communications version, 10' (3 m) cable length | 2892 |
| Direct Connect Cables, Large Clip, 5/8" (15.8 mm), Utility version, 10' (3 m) cable length | 2876 |
| Direct Connect Cables, Small Clip, 1/4" (6.4 mm) Communications version, 5' (1.5 m) cable length | 9012 |
| Ground Extension Cable | 9043 |
| 3M Dyna-Coupler 3" (75 mm) | 3001 |
| 3M Dyna-Coupler Clamp 4.5" (114 mm) | 4001 |
| 3M Dyna-Coupler 6" (150 mm) w/ pouch | 1196 |
| Locator Coupler Accessory Kit, 3" (75 mm) (includes 3" (75 mm) Dyna-Coupler, Coupler Cable and Coupler Pouch) | 3019 |
| Locator Coupler Accessory Kit, 4.5" 114 mm) (includes 4.5" (114 mm) Dyna-Coupler, Coupler Cable and Coupler Pouch) | 4519 |
| Locator Coupler Accessory Kit, 6" (150 mm) (includes 6" (150 mm) Dyna-Coupler, Coupler Cable and Coupler Pouch) | 1196/C |
| Coupler Cable 12' (3.6 m) | 9011 |
| Rechargeable Battery (12-volt DC) | 2200RB |
| Cigarette Lighter Adapter (12-volt DC) | 457-594-000 |
| Carrying Bag | 2200M |
| 33 kHz Sonde (ADP; Active Duct Probe) | 3229 |
| 3M Earth Contact Frame (A-Frame) | 3014 |
| 3M Earth Contact Frame (A-Frame) Cable | 9026 |

# 24. Receiver Specifications

| Item | Specification |
|---|---|
| Modes | Directional Peak |
| | Directional Null |
| | Special Peak |
| | Induction Peak |
| Frequency Response: | |
|     Active | 577 Hz |
| | 8 kHz |
| | 33 kHz |
| | 133 kHz |
|     Passive | 31.5 kHz (CATV) |
| | 9 – 30 kHz (LF) |
|     Power | 50 Hz, 5th and 9th harmonic of 50 Hz |
| | 60 Hz, 5th and 9th harmonic of 60 Hz |
| | (100 / 120 Hz) rectified power |
|     Auxiliary | 333 Hz |
| | 512 Hz |
| | 560 Hz |
| User Defined Frequencies | Four |
| Display | LCD |
| Gain Control | Manual and Automatic |
| Weight w/batteries | 1.8–2.3 kg (4–5 lbs.) (model dependent) |
| Battery Qty. and size | 8 AA (LR6) |
| Battery Life | 30 hours average |
| Depth Accuracy | $\pm2\% \pm 5$ cm (2 in.) for 0-1.5 m (0–60 in.) |
| | $\pm6\% \pm 5$ cm (2 in.) for 1.5–3.0 m (60–120 in.) |
| | $\pm10\% \pm 5$ cm (2 in.) for 3.0 m–4.5 m (120–180 in.) |
| Depth Range | 0–914 cm (0–360 in.) |
| Marker depth accuracy | $\pm 15\% \pm 5$ cm (2 in.) |
| Maximum Program Range 3M™ iD Markers | |
|     Near-Surface | 15 cm (6 in) |
|     Ball Marker | 30 cm (12 in) |
|     Full-Range | 61 cm (24 in) |
| Read Range 3M iD Markers | |
|     Near-Surface | 60 cm (24 in) |
|     Ball Marker | 1.2 m (48 in) (Telephone, CE Power, Gas, Waste Water, Communication) (CATV), General Purpose |
| | 1.0 m (40 in) (US Power, Water) |
|     Full-Range | 2.0 m (78 in) |

| Item | Specification |
|---|---|
| Detection Depth 3M™ Non-iD (Passive) Markers | |
|     Near Surface | 60 cm (24 in) |
|     Ball Marker | 1.5 m (60 in) |
|     Mid-Range | 1.8 m (72 in) |
|     Full-Range | 2.4 m (96 in) |

# 25. Transmitter Specifications

| Item | Specification |
|---|---|
| Trace Mode | 577 Hz<br>8 kHz<br>33 kHz<br>133 kHz |
| Fault Mode (2273M models only) | 10/20 Hz -Fault signal<br>577 Hz / 33 kHz -Trace signal<br>*Note: The fault locating limit is 2.0M$\Omega$, although the transmitter's ohmmeter mode can display a fault resistance up to 10M$\Omega$.* |
| Tone Mode | 577 Hz and 133 kHz @ 8 Hz |
| Induction Mode | 8 kHz (only available on 12 Watt Transmitter)<br>33 kHz<br>133 kHz |
| Output Power | 3 Watt Transmitter Model<br>Normal Setting: 0.5 Watt<br>High Setting: 3 Watts<br><br>5 Watt Transmitter Model<br>Normal Setting: 0.5 Watt<br>High Setting: 3 Watts<br>Maximum Setting: 5 Watts (with external DC power source)<br><br>12 Watt Transmitter Model<br>Normal Setting: 0.5 Watt<br>High Setting: 3 Watts<br>Maximum Setting: 12 Watts (with external DC power source) |
| Output Voltage (Maximum) | 70 Vrms |
| Output Protection | 240 Vrms |
| Weight w/batteries | with alkaline batteries only: 2.4 kg (5.2 lbs)<br>with rechargeable battery (3M Dynatel™ Sealed Gel-Cell Battery 2200RB) and alkaline batteries (5W and 12W Transmitters only): 4.2 kg (9.2 lbs) |

| Item | Specification |
|---|---|
| Battery Qty. and size | For Normal and High Output Power: 6 "C" size alkaline (LR14) |
| | For Maximum Output Power: Rechargeable Battery (3M™Dynatel™ Sealed Gel-Cell Battery 2200RB), 12V-6AH, Sealed Maintenance-Free Lead (Pb)-Acid Battery |
| | (See safety information below.) |
| Battery Life | Normal Output Power level: 50 hours typical |
| | High Output Power Level: 10 hours typical |
| | Typical transmitter specified battery life (listed above) is increased by 40% when using the 2200RB Rechargeable Battery (12 volt). Using the 2200RB bypasses the alkaline batteries. |
| | Maximum Output Power Level: 4 hours typical (Maximum Output Power Level is achieved using 2200RB Rechargeable Battery.) |

# 26. Environmental and Regulatory Specifications

| Item | Specification |
|---|---|
| Standard | IP54 |
| Regulatory | CE |
| Operating Temperature | -20°C to 50°C (-4°F to 122°F) |
| Storage Temperature | -20°C to 70°C (-4°F to 158° F) |

# 27. Rechargeable Battery Information

UN2800 classification as "Batteries, wet, Non-Spillable, and electric storage" as a result of passing the Vibration and Pressure Differential Test described in DOT [49 CFR 173.159(d) and IATA/ICAO [Special Provision A67].