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## **MARKER-MATE™ EML 100 ELECTRONIC MARKER LOCATOR**

**This Instruction Manual Supports Firmware Version 1.0**



*MARKER-MATE™ EML 100 MARKER LOCATOR*

	<p style="text-align: center;"> <b>WARNING</b></p> <p>Read and understand this material before operating or servicing this equipment.</p>
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The Model EML100 is a universal electronic marker locating tool for locating Power, Water, Sanitary, Telephone, Gas, Cable TV, and Non-Potable Electronic markers.

The Model EML100 consists of:

EML100 Electronic Marker Locator

Optional Accessories:

Headset

Carrying Case



This symbol is used to call your attention to hazards or unsafe practices which could result in an injury or property damage. The signal word, defined below, indicates the severity of the hazard. The message after the signal word provides information for preventing or avoiding the hazard.

**DANGER**

Immediate hazards which, if not avoided, **WILL** result in severe injury or death.

**WARNING**

Hazards which, if not avoided, **COULD** result in severe injury or death.

**CAUTION**

Hazards which, if not avoided, **MAY** result in injury.

**WARNING**

- Use this unit for the manufacturer's intended purpose only, as described in this manual. Any other use can impair the protection provided by the unit.
- Use accessories that are appropriate for the application.
- Inspect the accessory before use.

**CAUTION**

- Do not attempt to repair this unit. It contains no user-serviceable parts.
  - Do not expose the unit to extreme temperatures. See Specifications.
- Failure to observe these precautions can result in injury and can damage the instrument.

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Sanitary	Green	172	60773
Telephone	Orange	173	60774
Gas	Yellow	174	60775
Cable TV	Orange/Black	175	60776
Non-Potable	Purple	178	

### Omni Markers

The Tempo Omni Marker provides an improved method to electronically mark and locate underground facilities. Unlike other marking devices that use just a single coil, the Omni Marker contains three orthogonal tuned circuits. When excited by any standard marker locator, these passive circuits produce a uniform, spherical RF field in every direction. Because of their unique patented design, the Omni Marker offers benefits that are superior to any other electronic marking system. (See Figure 31)

Application	Color	Model	UPC
Power	Red	160	60765
Water	Blue	161	60766
Sanitary	Green	162	60767
Telephone	Orange	163	60768
Gas	Yellow	164	60769
Cable TV	Orange/Black	165	60770
Non-Potable	Purple	168	



Fig. 31 - Omni Markers

### Omni Marker & Uni Marker Signals

Omni Markers and Uni Markers each emit a distinct type of signal as shown in Figures 32 and 33. Omni Markers produce a uniform, spherical RF field in every direction, while Uni Markers emit dipole field signals primarily up and down. (See Figures 32 - 33)

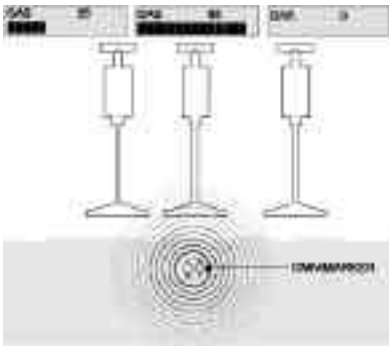


Fig. 32 - Omni Marker Signal

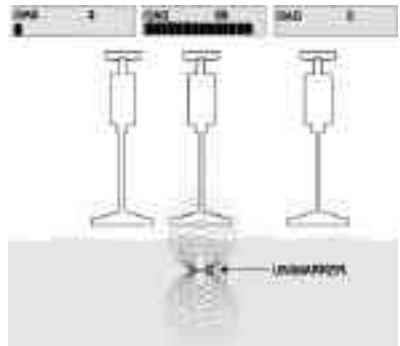


Fig. 33 - Uni Marker Signal

### Headset

Model	UPC
361	60778

# 4. SPECIFICATIONS

## Battery

EML 100 . . . . . (12) 1.5 volt AA  
Battery Life (nominal) . . . . . 20 hrs

## Physical

### Measurements

Length: . . . . . 77.8 cm (30.7")  
Width: . . . . . 19.8 cm (7.8")  
Height: . . . . . 32.5 cm (12.8")  
Weight (with batteries): . . . . . 2.04 Kg (4.5 lbs)

## Operating/Storage Conditions

### Operating Temperature:

Celsius . . . . . -20°C to 50°C  
Fahrenheit . . . . . -4°F to 122°F

### Storage Temperature:

Celsius . . . . . -40°C to 70°C  
Fahrenheit . . . . . -40°F to 158°F

# 5. MAINTENANCE

The only service required for maintaining proper operation is the periodic replacement of the batteries in the transmitter/receiver unit.

## Battery Replacement

To replace the batteries:

1. Loosen the (8) captive screws on the left side of the unit and remove the battery compartment cover. (See Figure 29)
2. Replace the (12) AA 1.5V batteries. Observe polarity.
3. Replace cover and tighten screws. DO NOT OVERTIGHTEN SCREWS.



Fig. 29 - Battery Cover

## Cleaning

Periodically wipe with a damp cloth and mild detergent; do not use abrasives or solvents.

# 6. COMPATIBLE TEMPO MARKERS

## Uni Markers

The Tempo Uni Marker provides an economical way to electronically mark buried facilities. The Uni Marker is a passive electronic marker that provides a unique electronic frequency when activated by a marker locator and is packaged in a rugged polyethylene case that ensures years of useful life. (See Figure 30)



Fig. 30 - Uni Markers

Application	Color	Model	UPC
Power	Red	170	60771
Water	Blue	171	60772

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# 1. DESCRIPTION

## This Instruction Manual Supports Firmware Version 1.0

The Marker-Mate™ EML100 Electronic Marker Locator is designed to locate seven standard electronic markers including Tempo's Uni Marker and Omni Marker.

### Features

- Five+ foot depth range
- Detects up to seven different marker types
- Scan mode provides simultaneous detection of all marker types
- Rapid switching between scan and single modes
- User-adjustable Detection Threshold
- Digital signal processor accuracy
- Large-character display
- Bar graph, numeric & audible signal strength indicators
- Adjustable speaker volume
- Headphone jack
- Battery level indicator
- Low battery warning
- Adjustable time out feature
- Weather resistant
- Rugged construction

### Electronic Markers

Electronic markers vary in detection range. Markers are color coded as follows:

Power = Red

Water = Blue

Sanitary = Green

Telephone = Orange

Gas = Yellow

Cable TV = Orange/Black

Non-Potable = Purple

See Section 6, Compatible Tempo Markers, for details about Tempo's Uni Marker and Omni Marker.

### Headset

The headset may be used to monitor the received signal in high noise level areas when plugged into the jack provided. The normal speaker is de-activated when a headset is used. Any standard stereo headset with a 3.5mm plug may be used with the EML100.

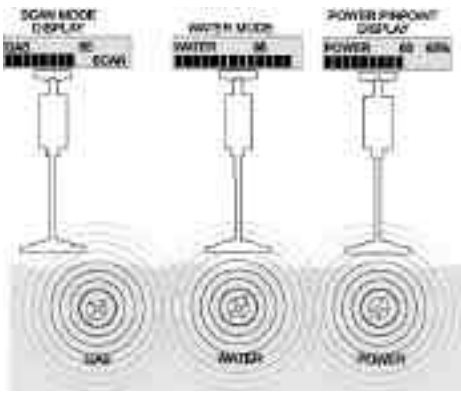


Fig. 27 - Mode Display Samples

## EML 100 Marker Search Pattern

A search pattern should be used when locating markers. All marker locators are dependent on the type of marker, depth of marker, and external noise as to how broad of a footprint that can be detected. The highest probability of locating a marker of unknown type and depth requires a tight search pattern.

Swing the locator in a comfortable 2 to 2½ foot arc; keeping the antenna portion level to the ground. The speed of the swing and walk should be moderate to allow full detection potential. For best results, perform some sort of zigzag pattern as shown below. The edges of the swing should come to the same point in allowing 100% coverage of the area. (See Figure 28)

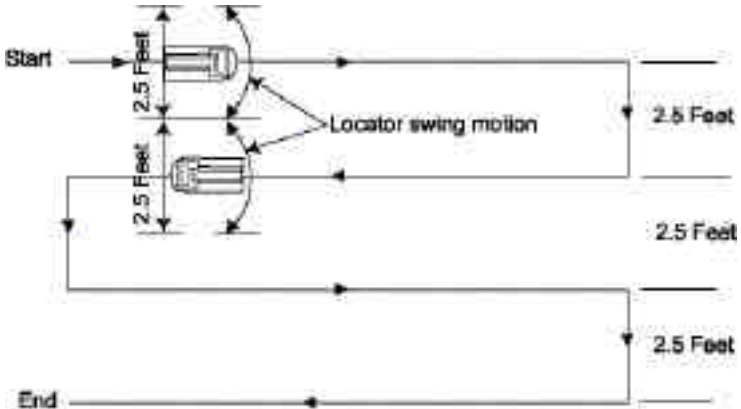


Fig. 28 - Search Pattern

A wider search pattern can be used, but the larger the spacing between passes the greater chance of not locating a marker.

A benefit of using the EML100 in scan mode is that the search path can be done once tightly to insure that all markers are found and identified. Compared to a marker locator only able to detect one marker type at a time, the search pattern would have to be repeated for each marker type.

## Pinpoint Feature

The Pinpoint feature is used to adjust the gain of the EML100 to more closely locate a marker.

### Gain Adjust:

1. To eliminate noise or pinpoint markers reduce gain (press LO gain button).
2. Display indicates gain setting relative to 100%.
3. Continue pressing LO gain to reduce gain.
4. Press HI gain button to restore gain to 100%.

Note: Press LO gain button away from marker peak signal for best pinpoint result.

Note: The Pinpoint feature will work in the normal operation or SCAN modes.

### To activate the Pinpoint feature:

1. Select a marker MODE as described in Unit Set Up above.
2. When a marker has been detected the display will show a reading similar to the "Normal Displays" shown in Figure 26.
3. Without moving the EML 100, press the DOWN arrow key to enter the Pinpoint feature. Press the UP arrow key to return to the normal display.
  - a. The Bar Graph on the display will disappear temporarily and a percentage number will appear in the upper right corner. This percentage indicates the amount of gain remaining.
4. Continue searching the area and the Bar Graph will reappear as the EML 100 is moved closer to the marker.
5. The Pinpoint feature may be used as needed until the exact location of the marker is known.

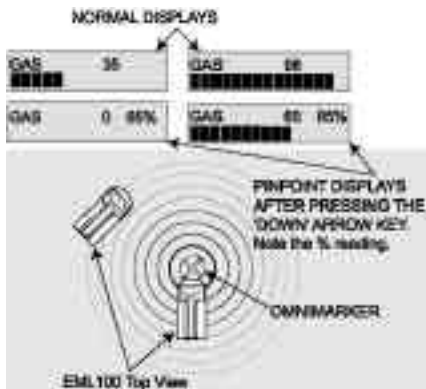


Fig. 26 - Pinpoint Feature

Note: Activating the Pinpoint feature adjusts the gain horizontally and vertically. If a marker is buried too deep, or has marginal signal strength, a reading may not be possible using the Pinpoint feature even if the EML100 is directly over the marker. Reset the gain by pressing the UP arrow key if no markers are being detected.

Figure 27 shows samples of the displays that may be shown in various modes.



## 2. DISPLAY OVERVIEW

**Note:** x's shown in the figures in this manual will be numeric readings on the display.

LCD indicates:

- Mode: SCAN mode (with detected marker type shown), or single marker mode (i.e. Power, Water, etc.) (See Figures 24 & 25)
- Numeric indication and bar graph (See Figure 3)
- Gain Setting (See Figure 23)
- Volume adjustment for speaker response (See Figures 4 - 7)
- Estimated battery life in hours and low battery warning (See Figure 2)
- Time out feature with disable (See Figures 16 - 20)



Fig. 1 - EML 100 Display Panel

### ON/OFF Switch

When the EML100 is turned on, the display will first show the firmware version and then the estimated battery life remaining. (See Figure 2) After the Power-On Sequence, the unit will default to the mode and settings that were used last. For example, if the unit was last used to locate Gas markers with the Volume set on Low, it will return to the same settings. (See Figure 3)



Fig. 2 - Version & Battery



Fig. 3 - Sample Display

### Menu Key

Note: The EML 100 is active as soon as it is turned on and completes the Power-On Sequence. The bottom line of text on the display shows available options when using the MENU Key.

Press the MENU key to cycle through the following 4 sub-menus :

#### Volume Control

Use the Up or Down Arrow keys to select Off, Low, Medium, or High and use the EXITkey to exit the MENU screen. (See Figures 4 - 7)



Fig. 4 - Vol Off



Fig. 5 - Low Vol



Fig. 6 - Medium Vol



Fig. 7 - High Vol

Pressing the MENU Key again will display the MODE Select menu.

## Mode Select

Use the Up or Down Arrow keys to select from the following Modes and use the EXITkey to exit the MENU screen. (See Figures 8 - 15) Note: the Modes are listed in the order they appear on the display and the Down Arrow must be used to change the mode from SCAN, or the UPArrow must be used to change the mode from NON-PTBL.



Fig. 8 - Scan Mode



Fig. 9 - Power Mode



Fig. 10 - Water Mode



Fig. 11 - Sanitary Mode



Fig. 12 - Telephone Mode



Fig. 13 - Gas Mode



Fig. 14 - CATV Mode



Fig. 15 - Non-Potable Mode

Pressing the MENU Key again will display the POWER Save menu.

## Power Save Timer

The Power Save Timer may be de-activated, or set in 15-minute increments to automatically turn the unit off.

Use the Up or Down Arrow keys to select 60, 45, 30, 15 minutes, or Off and use the EXITkey to exit the MENU screen. (See Figures 16 - 20)



Fig. 16 - 60 Min Power Save



Fig. 17 - 45 Min Power Save



Fig. 18 - 30 Min Power Save



Fig. 19 - 15 Min Power Save



Fig. 20 - Power Save Off

Pressing the MENU Key again will display the BATTERY menu.

## Battery Hours

This selection displays the estimated Battery Hours remaining. (See Figure 21) Pressing the MENU Key again will return to the Volume Control menu. Press the EXITkey to exit the MENU screen.



Fig. 21 - Remaining Battery Hours

## Gain - HI - LO Keys

### Menu Navigation

The HI - LO (UP/DOWN arrows) are used to navigate through menus while using the MENU Key. (See MENU Key above).

## Pinpoint Feature

The HI - LO (UP/DOWN arrows) are used to toggle the Pinpoint feature ON and OFF. The advanced Pinpoint feature allows the adjustment of the detection threshold, making it possible to narrow the detection area to a precise location. (See Figures 22 & 23) Refer to the Pinpoint Feature in the Operation Section.



Fig. 22 - Sample Gas Display



Fig. 23 - Gas Pinpoint Mode

## Exit Key

### Mode Selection

The EXITKey is used to exit the MENU screen (see MENU Key above).

### Scan / Specific Mode

The EXIT Key may be used to toggle between SCAN and the type of marker being detected. (See Figures 24 & 25)



Fig. 24 - Sample Display



Fig. 25 - Scan Mode

## 3. OPERATION

Note: After the Power-On Sequence the unit will default to the settings last used.

### Normal Operation

To locate a known type of marker (i.e. Gas, Power, Water etc.):

1. Press the ON key and allow the unit to complete the Power On Sequence that shows the Firmware version and estimated battery hours. Replace batteries if necessary. (Refer to Maintenance Section)
2. Press the MENU key.
  - a) Press the UP or DOWN keys to the VOLUME level desired.
3. Press the MENU key again to access the MODE Select menu.
  - a) Use the UP or DOWN arrow keys to select the desired MODE.
4. Press the MENU key again to select the POWER SAVE menu.
  - a) Use the UP or DOWN arrow keys to set an automatic shut off time or to turn the POWER SAVE TIMER off.
5. Press the MENU key again to view the estimated BATTERY HOURS remaining.
6. Press EXIT to begin searching for the selected type of marker.

Note: These settings will be saved and used the next time the unit is turned on.

### Scan Operation

To locate all compatible markers using the SCAN Mode:

1. Perform steps 1 - 6 in Unit Set-Up above.
2. Press EXIT to enter the SCAN Mode and locate all compatible markers.
3. Press the EXIT key repeatedly to toggle between the SCAN mode and a specific marker type mode.

Note: In SCAN mode, the EML100 will display the readings for the strongest signal being received.

## **One-Year Limited Warranty**

Tempo warrants to the original purchaser of these goods for use that these products will be free from defects in workmanship and material for one year, excepting normal wear and abuse.

For all Test Instrument repairs, you must first request a Return Authorization Number by contacting our Customer Service department at +1 940-325-3000 (toll free US / Canada 888-484-4841), ext. 256. This number must be clearly marked on the shipping label. Ship units Freight Prepaid to Tempo, 6100 Columbia Street, Mineral Wells, Texas 76067 USA. Mark all packages: Attention TEST INSTRUMENTREPAIR.

For items not covered under warranty (such as dropped, abused, etc.) repair cost quote available upon request.

Note: Prior to returning any test instrument, please check to make sure batteries are fully charged.

Tempo – Mesa | Formerly Progressive Electronics  
Telephone: +1 815 397-4279  
Toll-free in the US and Canada: 1 800 282-7941  
Facsimile: +1 815 397-1865  
**[www.tempo.textron.com](http://www.tempo.textron.com)**