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3M™ Dynatel™

Cable/Pipe/Fault Locator

2550/2573 Series

Operator's Manual

2550 Pipe/Cable Locator

2550-iD Pipe/Cable and Marker Locator

2573 Cable/Pipe/Fault Locator

2573-iD Cable/Pipe/Fault and Marker Locator

May 2015
78-9000-0192-2 Rev D



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Congratulations! You have just purchased one of the finest, most advanced locating devices available today!

The 3M™ Dynatel™ Pipe/Cable Locators 2550 Series and 3M™ Dynatel™ Cable/Pipe/Fault Locators 2573 Series are designed with all of the functionality of previous Dynatel models plus the availability of 6 active locating frequencies and trace view locating mode, while the iD versions have the enhanced capability to read and write user information into the 3M iD markers. Information such as a pre-programmed identification number, facility data, application type, placement date and other details can all be read, stored and downloaded to your PC for enhanced resource management with this revolutionary equipment. The Dynatel 2550-iD Pipe/Cable Locators and Dynatel 2573-iD Cable/Pipe/Fault Locators will also search for two different types of utility markers simultaneously. When used in conjunction with a hand-held GPS device, the ability to transmit path and marker coordinates multiplies the potential to the mapping industry. This equipment provides a simple system for mapping utility information directly into CAD and GIS systems. The 2550/2573 Series transmitters are 12 watt units. They provide .5 watts, 3 watts and 12 watts of output power. 12 watts is attained by utilizing the Cigarette Lighter Adapter or External Rechargeable Battery.

3M is dedicated to bringing you premium equipment with outstanding reliability, backed by one of the best warranties in the business and outstanding service.



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



1. Safety Information


Please read, understand and follow all safety information contained in these instructions prior to the use of the 3M™ Dynatel™ Pipe/Cable Locators 2500 Series. Retain these instructions for future reference.

Intended Use

The 3M Dynatel Cable/Pipe/Fault 2550/2573 Series Locators are used to identify the placement of underground utility lines. The system must be installed as specified in the 3M™ Dynatel™ Cable/Pipe/Fault Locator 2550/2573 Series Operator's Manual. It has not been evaluated for other uses or locations. If this equipment is used in a manner not specified 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

 WARNING
<p>This WARNING applies to the following 3M Dyna-Couplers;</p> <ul style="list-style-type: none">• 3" (75 mm) - Part number 3001• 4.5" (114 mm) - Part number 4001• 6" (150 mm) - Part number 1196• All accessory kits containing any of the listed Dyna-Couplers - Part numbers 3019, 4519, 1196/C <p>A potential for electrical shock exists when using the Dyna-Coupler on cables energized with electrical power. Use appropriate safety procedures.</p> <p>DO NOT USE ON CABLES CARRYING IN EXCESS OF 600 VOLTS RMS.</p>

⚠ WARNING

This WARNING applies to the use of the Direct Connect Cables and the Transmitter.

To avoid potential shock, or electrically damaging the Transmitter, when setting up the Transmitter to locate using the Direct Connect method, follow these basic steps;

- ALWAYS plug the Direct Connect Cable into the Transmitter *Output Jack* [T-6] BEFORE connecting the leads to the cable/pipe to be located and the ground rod.
 - Connect the red lead to the cable/pipe.
 - Connect the black lead to ground rod.

A POTENTIAL FOR ELECTRICAL SHOCK, AND/OR TRANSMITTER ELECTRICAL DAMAGE, EXISTS WHEN USING THE DIRECT CONNECT CABLE ON CABLES ENERGIZED WITH ELECTRICAL POWER IF THE ABOVE INSTRUCTIONS ARE NOT FOLLOWED. USE APPROPRIATE SAFETY PROCEDURES.

CHECK VOLTAGE BEFORE CONNECTING TRANSMITTER. VOLTAGE HIGHER THAN 240 VOLTS WILL DAMAGE EQUIPMENT. FOLLOW STANDARD PROCEDURES FOR REDUCING THE VOLTAGE.

2. About This Manual

There are two basic models included in the 3M™ Dynatel™ Locator 2500 loctor Series. The 2550 locator is designed for pipe/cable locating. The 2573 loctor is designed for cable/pipe and fault locating. The iD option (read/write capability to 3M™ iD Markers) is available for both models. The 2550/2573 Series transmitters are 12 watt units. They provide .5 watts, 3 watts and 12 watts of output power. 12 watts is attained by utilizing the Cigarette Lighter Adapter or External Rechargeable Battery. This instruction manual will include all features. All instructions are applicable to all products, unless noted.

The 12-watt transmitter offers additional power output levels for improved induction performance and 8 kHz (low frequency) induction for shallow facilities, such as risers. The maximum output power in Direct Connect method is reduced to comply with FCC limits. (FCC limits: 10 watts at 33 kHz and 1 watt at 82 kHz and 200 kHz)

In order to demonstrate all available functions, some illustrations depict the 2573-iD receiver unit. The 2550 receivers and transmitters may vary from the illustrations shown.

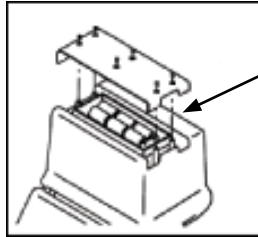
3. Quick Start

A. Transmitter Battery Installation

Loosen the six screws on the battery compartment cover on the bottom of the transmitter. Remove the cover.

Install six 'C' size alkaline cell batteries (LR14) into the compartment as indicated by the polarity symbols (+ and -).

Replace the cover and tighten the screws.



6 'C' size (LR14)
Alkaline Batteries

Press and hold *off* [T-1] to manually test the batteries. The display and audio will indicate one of the following levels: (OK w/solid tone = good; LO w/beeping tone = low; "--" w/no tone = replace)

CAUTION

To reduce the risks associated with fire and explosion:

- Do not short, excessively heat, or dispose of batteries in fire.
- Install batteries with proper polarity.
- Use only Alkaline "C" (LR14) sized batteries.
- Do not charge batteries.
- Do not use leaking batteries.

To reduce the risks associated with environmental contamination:

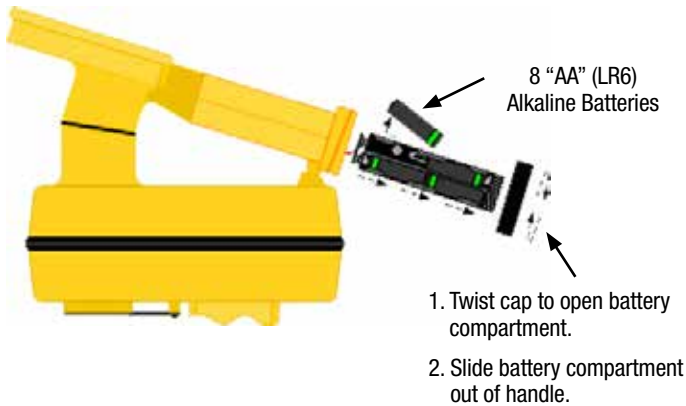
- Dispose of batteries and electronic components in accordance with all regulations.
- Ensure batteries are installed with correct polarity.
- Always remove batteries when storing the units for long periods of time.

B. Receiver Battery Installation

Remove cap from receiver handle.

Install eight 'AA' size alkaline batteries (LR6) into the battery holder as indicated by the polarity symbols (+ and -).

Attach battery holder to the PP3 connector in the receiver handle, and slide holder into the handle. Replace the cap.



CAUTION

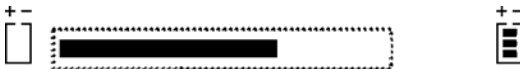
To reduce the risks associated with fire and explosion:

- Do not short, excessively heat, or dispose of batteries in fire.
- Install batteries with proper polarity.
- Use only Alkaline "AA" (LR 6) sized batteries.
- Do not charge batteries.
- Do not use leaking batteries.

To reduce the risks associated with environmental contamination:

- Dispose of batteries and electronic components in accordance with all regulations.
- Ensure batteries are installed with correct polarity.
- Always remove batteries when storing the units for long periods of time.

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



The bar graph on the display will fill to the relative battery level.

The *Battery Icon* [12] (2573); [[11] (2550)] on the Locate Display will continuously indicate the battery level.

C. Cleaning Receiver and Transmitter Units

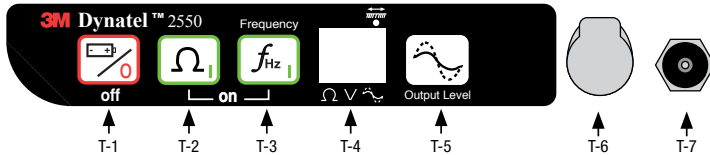
To clean the receiver and transmitter units, wipe with a damp cloth.

D. Service and Accessories

Information regarding service, accessories, or replacement parts can be obtained by contacting 3M at 1-800-426-8688.

This equipment does not require annual calibration or maintenance.

E. 3M™ Dynatel™ Transmitter 2550 Keypad and Connector Definitions



[T-1] **off**: Turns unit off and performs battery test.

[T-2] **on - Ohm-meter**: Turns the unit on and places the unit in Ohm-meter mode. This measures the continuity of the trace conductor/pipe and its far-end ground.

[T-3] **on - Frequency**: Turns the unit on and places the unit in Trace mode.

Select Frequency: Press *Frequency* [T-3] repeatedly to cycle through the transmitter's active frequencies (577 Hz, 1 kHz, 8 kHz, 33 kHz, 82 kHz and 200 kHz). The selected frequency will be displayed [T-4]. 'ALL' indicates that the following active frequencies are transmitting simultaneously: 577 Hz, 8 kHz, 33 kHz and 200 kHz.

[T-4] **Digital Display**:

Indicator Flags: These flags coincide with the operational mode of the transmitter. Starting from bottom left to upper right; Ohm-meter [T-2], Voltage (at start up the transmitter checks for foreign voltage), Output Level [T-5] (no flag = normal output; flag = high output; flashing flag = maximum output) and Trace mode [T-3].

Digital Display: Indicates frequency, relative current, resistance, battery level and voltage (if present on target).

[T-5] **Output Level**: Cycles output power level; normal, high and maximum.

Normal=No Flag; High=Flag; Maximum=Flashing Flag (indicated in Digital Display [T-4])

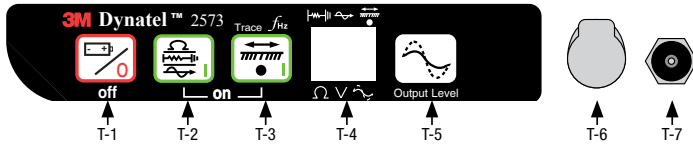
NOTE: An external 12-volt power source is required to obtain Maximum Output level.

NOTE: 12-watt output level varies by frequency. Output is limited to 10 watts at 33 kHz and 1 watt at 82 kHz and 200 kHz using the direct connection method.

[T-6] **Output Jack**: Port for direct connect cables or Dyna-coupler cable.

[T-7] **External Jack**: Port to connect cigarette lighter adapter cable, or rechargeable battery (2200RB). Input voltage level: 9-18 VDC.

F. 3M™ Dynatel™ Transmitter 2573 Keypad and Connector Definitions



[T-1] **off:** Turns unit off and performs battery test.

[T-2] **on: Ohm-meter/Fault Locate/Tone:** Turns the unit on and cycles through the following commands when pressed repeatedly.

Ohm-meter: Measures the continuity of the trace conductor/pipe and its far-end ground. It is also used to measure the fault resistance to earth.

Fault Locate: In this mode, the transmitter sends two alternating locating frequencies (577 Hz and 33 kHz) as well as fault signals 10 and 20 Hz.

Tone: In the tone mode, the transmitter generates 577 Hz and 200 kHz signals.

[T-3] **on: Trace (frequency):** Turns the unit on and places the unit in Trace mode.

Select Frequency: Press *Trace* [T-3] repeatedly to cycle through the transmitter's active frequencies (577 Hz, 1 kHz, 8 kHz, 33 kHz, 82 kHz and 200 kHz). The selected frequency will be displayed [T-4]. 'ALL' indicates that the following active frequencies are transmitting simultaneously: 577 Hz, 8 kHz, 33 kHz and 200 kHz.

[T-4] **Digital Display:**

Indicator Flags: These flags coincide with the operational mode of the transmitter. (From top left to bottom right) Fault Locate mode [T-2], Tone mode [T-2], Trace mode [T-3], Ohm-meter [T-2], Voltage (at start up the transmitter checks for foreign voltage), and the Output Level [T-5] (no flag = normal output; flag = high output; flashing flag = maximum output).

Digital Display: Indicates frequency, relative current, resistance, battery level and voltage (if present on target).

[T-5] **Output Level:** Cycles output power level; normal, high and maximum.

Normal=No Flag; High=Flag; Maximum=Flashing Flag (indicated in Digital Display [T-4])

NOTE: An external 12-volt power source is required to obtain Maximum Output level.

NOTE: 12-watt output level varies by frequency. Output is limited to 10 watts at 33 kHz and 1 watt at 82 kHz and 200 kHz using the direct connection method.

[T-6] **Output Jack:** Port for direct connect cables or 3M Dyna-coupler cable.

[T-7] **External Jack:** Port to connect cigarette lighter adapter cable, or rechargeable battery (2200RB). Input voltage level: 9-18 VDC. (Only on 12-watt transmitters.)

G. Maximum Transmitter Output

An external 12V DC source is required for 12-Watt Output (Max setting) using a 12-watt transmitter. Connecting the rechargeable battery (2200RB) to the *External Jack* [T-7] will provide this external source, or the cigarette lighter adapter cable (included with high-powered units) can be used to connect the DC power from a vehicle's battery source to the transmitter's *External Jack* [T-7].

Press *Output* [T-5] twice for maximum output power mode.

The indicator flag (in [T-4]) will flash when the transmitter is in maximum output mode.

Note: *The external DC source does not charge the internal batteries.*

⚠ WARNING

To reduce the risk associated with hazardous voltage:

- Potential for electric shock exists when handling connection cables while the transmitter is ON. Make all connections prior to powering on the unit. Turn transmitter OFF before handling connection cables.
- Voltage greater than 240 volts will damage equipment and could cause personal injury or death. Make all connections before turning on the transmitter. Follow standard procedures for reducing the voltage.
- Do not change or modify this product in any way.

H. Rechargeable Battery Information

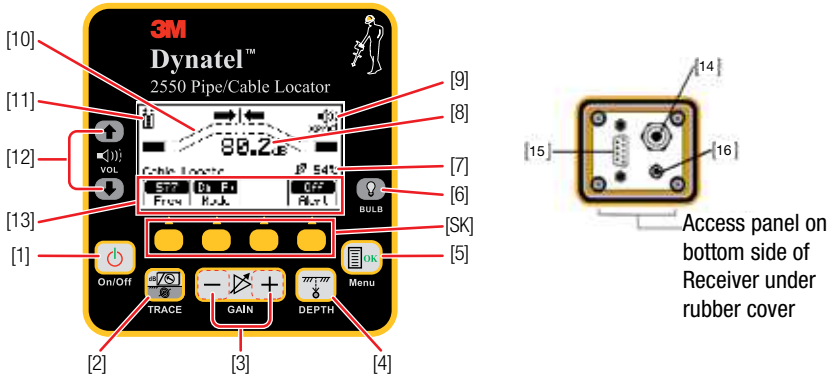
The maintenance-free sealed lead (Pb)-acid 3M™ Dynatel™ Rechargeable Battery 2200RB can be used as an auxiliary battery in 3M™ Dynatel™ 2500 Series 12 Watt Transmitters. It plugs into the *External Jack* [T-7] and provides power for the transmitter. When the rechargeable battery is plugged in, normal output, high output, and maximum output are available. When the rechargeable battery is connected to the transmitter, the alkaline batteries are bypassed.

The rechargeable battery is a lead acid battery rated at 5.4 amp-hours and is equipped with a user replaceable fuse (5A/32V).



Note: *The internal batteries must be at least 5.4 volts. Do not remove the alkaline batteries from the transmitter when using the rechargeable battery. Rechargeable battery, or cigarette lighter adapter cable, is required for maximum output level. Rechargeable battery is shown installed in the well of the transmitter case.*

I. 3M™ Dynatel™ Receiver 2550 Keypad and Display Definitions



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

[2] **TRACE (Locate) MODE:** Toggles between Cable View locate mode and the four other locate modes (cycles through available modes via the Mode soft key when in the Cable/Pipe Locate display).

[3] **GAIN:** Adjusts the sensitivity of the receiver either up (+) or down (-) to maintain a satisfactory signal level.

[4] **DEPTH:** Measures depth of target.

[5] **Menu / OK:** Sets the receiver to trace mode for locating cable or pipe and displays Locate options, 3M iD Marker templates and writing mode options, setup screens for configuration of the unit, i.e.: clock, language, depth units, marker data and frequencies, COM settings and Help files. Also acknowledges setup entries (OK).

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

[6] **BULB:** Toggles the display backlight low, high, and off.

[7] **Gain Level:** Displays relative gain level.

[8] **Signal Strength:** Digital reading of the signal strength that the receiver is detecting from the target.

[9] **Speaker Volume Icon:** Indicates the relative volume level of the receiver. When the third ring is dotted and 'xpnd' appears below the speaker volume icon, the receiver is in "Expander" mode. This mode is used to pinpoint the target cable or pipe.

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

[11] **Battery Icon:** Indicates battery level.

[12] **Speaker Volume Control:** Adjusts the volume of the receiver (off, low, medium, high, and xpnd).

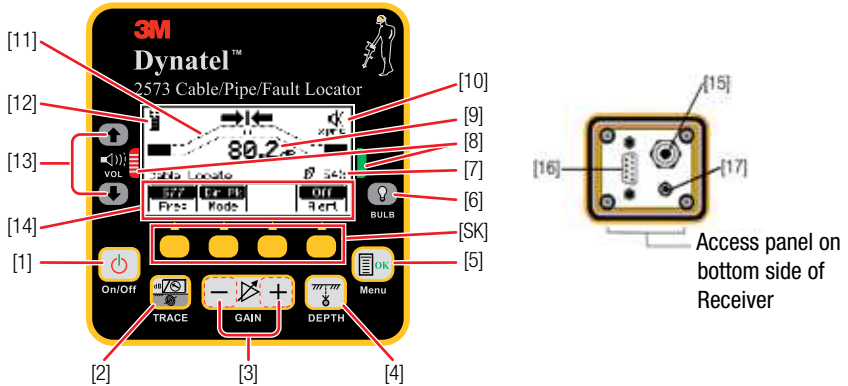
[13] **Soft Key Commands:** Definitions for each of the four soft key functions.

[14] **External Jack:** Port to connect cables from external devices such as the earth contact frame (A-Frame), a second 3M Dyna-Coupler or a toning coil.

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

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

J. 3M™ Dynatel™ Receiver 2573 Keypad and Display Definitions



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

[2] **TRACE (Locate) MODE:** Toggles between Cable View locate mode and the four other locate modes (cycles through available modes via the Mode soft key when in the Cable/Pipe Locate display).

[3] **GAIN:** Adjusts the sensitivity of the receiver either up (+) or down (-) to maintain a satisfactory signal level.

[4] **DEPTH:** Measures depth of target.

[5] **Menu / OK:** Sets the receiver to trace mode for locating cable or pipe and displays Locate options, 3M iD Marker templates and writing mode options, setup screens for configuration of the unit, i.e.: clock, language, depth units, marker data and frequencies, COM settings and Help files. Also acknowledges setup entries (OK).

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

[6] **BULB:** Toggles the display backlight low, high, and off.

[7] **Gain Level:** Displays relative gain level.

[8] **Fault Finding Direction Indicators:** Corresponds to the Earth Contact Frame (A-Frame) probe (leg) colors.

[9] **Signal Strength:** Digital reading of the signal strength that the receiver is detecting from the target.

[10] **Speaker Volume Icon:** Indicates the relative volume level of the receiver. When the third ring is dotted and 'xpnd' appears below the speaker volume icon, the receiver is in "Expander" mode. This mode is used to pinpoint the target cable or pipe.

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

[12] **Battery Icon:** Indicates battery level.

[13] **Speaker Volume Control:** Adjusts the volume of the receiver (off, low, medium, high, and xpnd).

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

[15] **External Jack:** Port to connect cables from external devices such as the earth contact frame (A-Frame), a second 3M™ Dyna-Coupler or a toning coil.

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

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

4. Menu Displays

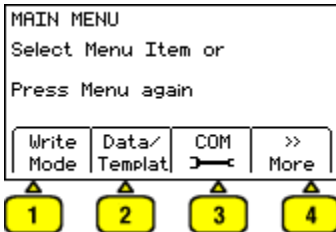
A. Main Menu/Locate Menu

When the *Menu/OK* [5] button is pressed, the display will toggle between the MAIN MENU display and LOCATE MENU display.

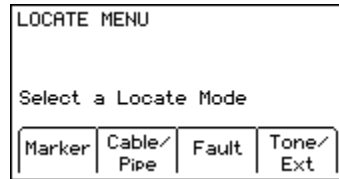
The function appears on the display above each soft key [SK].



MAIN MENU Display



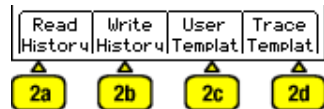
LOCATE MENU Display




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

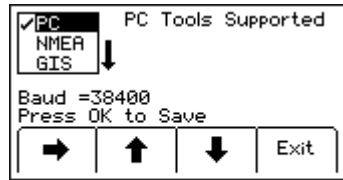
2. **Data/Template:** Displays marker history and template creation/selection displays:

- a. **Read History** – 100 memory locations for Read 3M™ iD Markers
- b. **Write History** – 100 memory locations for written 3M™ iD Markers
- c. **User Templates** – Create and edit iD templates for 3M™ iD Markers (max =32)
- d. **Trace Templates** – Create and edit templates used to identify path (max = 5)



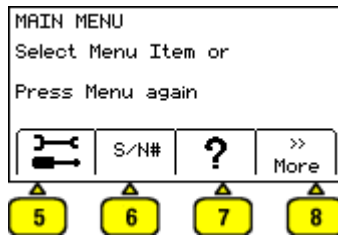
3. **COM** : Displays second level COM Port setting display to configure RS232 port communication with different devices –

- a. **PC** – Receiver will communicate to a computer
- b. **NMEA** – Port is configured to accept coordinates from GPS device
- c. **GIS** – Port is configured to send 3M™ iD Marker information or path information to GPS device and receive coordinates from GPS device
- d. **PDA** – receiver will send 3M™ iD Marker and path information in ASCII string.






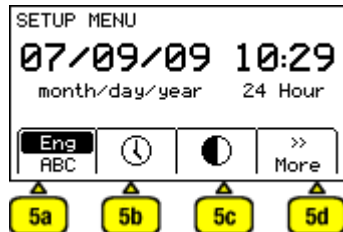
4. **>>More**: Advances to next Main Menu display

MAIN MENU Display 2

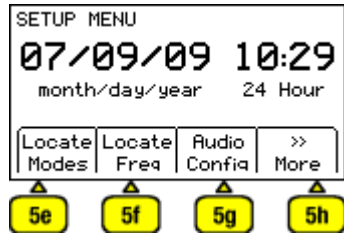



5. **Setup Tools** : Displays second and third level displays for receiver configuration

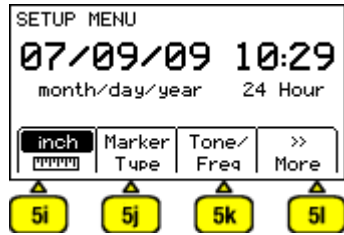
- a. **Language**  – Toggles between English and alternate language
- b. **Clock**  – Date and time stamped on marker information and depth readings.
- c. **Contrast**  – Adjusts contrast of LCD display.
- d. **>>More** - Advances to next menu display



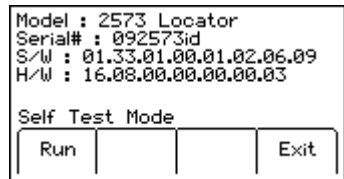
- e. **Locate Modes** – enable or disable locate modes
- f. **Locate Frequencies** – enable and disable receiver frequencies in locate mode
- g. **Audio Configuration** – Select audio response of unit in Directional Peak and Trace View modes
- h. **>>More** - Advances to next menu display




- i. **Depth Units**  – Choose unit of measure; in, ft-in, or cm
- j. **Marker Type** – enable and disable marker utility types
- k. **Tone/Freq** - External Port or Tone Frequencies – enable and disable frequencies that are detectable through the external port of the receiver
- l. **>>More** - Returns to first SETUP MENU display



- 6. **S/N#/Self Test:** Displays information about unit and can perform a self check test





- 7. **Help** : Offers the user on-screen instructions
- 8. **>>More:** Returns to first Main Menu display

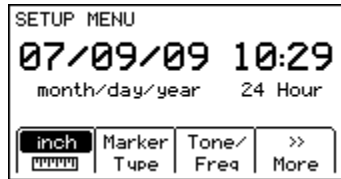
5. Configuring The Receiver

In the setup mode, the units of depth measurement, time, date, and date format can be set. The receiver can be configured to detect only certain frequencies and/or specific utility markers (3M™ Dynatel™ Receivers 2550-iD and 2573-iD only) and activate certain locating modes. User defined frequencies can be programmed, language of the receiver can be selected, and tone frequencies set.

A. Selecting Depth Units



Menu/OK [5:Toggle to MAIN MENU] + >>More [SK:4] +  [SK:5] + >>More [SK:d] + >>More [SK:h] +  [SKToggle:i]

- The soft key command will toggle between inches (in), centimeters (cm), and feet/inches (ft-in).



B. Setting the Receiver Clock

Set the time, date, and date format of the receiver. Depth and Current measurements are time and date stamped, as well as read and write marker information (iD units only).

Menu/OK [5:Toggle to MAIN MENU] + >>More [SK:4] +  [SK:5] +  [SK:b]

- Press the left/right arrow [SK] to highlight the digit of the date or time to change.
- Press the + or - [SK] to increment or decrement.
- When the date format is highlighted, the format will toggle between mm/dd/yy and dd/mm/yy.
- Press *Menu/OK* [5] to save.




C. Selecting a Language

Menu/OK [5:Toggle to MAIN MENU] + >>More [SK:4] +  [SK:5] +  [SKToggle:a]

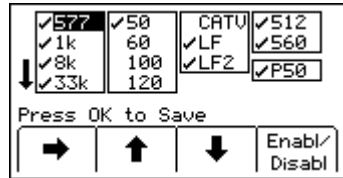
The soft key command will toggle between available languages. Alternate languages can be uploaded to the receiver using the 3M™ Dynatel™ PCTools Software. The 3M™ Dynatel™ PC Tool Kit Software is available free of charge at www.3M.com/dynatel under the Software section; 2550/2573/2250M/2273M/1420 Locator PC Tools xx.x.x (EXE xx.xMB).

D. Enabling/Disabling Locating Frequencies


Menu/OK [5:Toggle to MAIN MENU] + >>More [SK:4] +  [SK:5] + >>More [SK:d] + Locate Freq [SK:f]

The user can select the frequencies that the receiver will detect. All the available frequencies are listed in four groups (Left to Right: Active, Power, Passive, and Auxiliary). The Auxiliary group also contains the User Defined Frequencies. (See 5G. *Creating User Defined Frequencies*.) The box below the Auxiliary group allows the selection of filtering for 50 Hz or 60 Hz passive signals when User Defined frequencies have been chosen for locating.

- Press the right arrow [SK] to move the highlight bar to the section of frequencies to enable, or disable.
- Press the up/down arrows [SK] to highlight the specific frequency.
- Press *Enabl/Disabl* [SK]. (Enable denoted by ✓)
- Repeat steps 2 & 3 to enable/disable other frequencies.
- Press *Menu/OK* [5] to save.



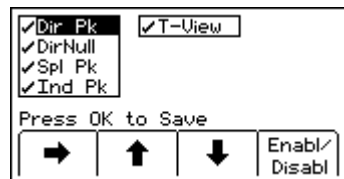
E. Selecting Locate Modes (Antenna Modes)

Menu/OK [5: Toggle to MAIN MENU] + More>> [SK:4] +  [SK:5] + More>> [SK:d] + Locate Modes [SK:e]


The user can select the locate modes (antenna modes) that the receiver utilizes. There are five locate modes that are available; Trace View (T-View), Directional Peak (Dir Pk), Directional Null (DirNull), Special Peak (Spl Pk) and Induction Peak (Ind Pk).

All five modes are activated when shipped. The user can deactivate any of the modes that will not be used.

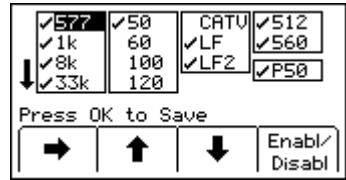
- Press the up/down arrows [SK] to highlight a specific locate mode in the first column.
- Press the right arrow [SK] to move the highlight bar to the second column, or back to the first column.
- Press *Enabl/Disabl* [SK]. (Enable denoted by ✓)
- Repeat steps 2 & 3 to enable/disable other locate modes.
- Press *Menu/OK* [5] to save.




F. Selecting External Jack Frequencies (Tone Frequencies)

Menu/OK [5:Toggle to MAIN MENU] + >>More [SK:4] +  [SK:5] + >>More [SK:d] + >>More [SK:h] + Tone/Freq [SK:k]

A coupler can be plugged into the *External Jack* [15] ([14] on 2550 locator) of the receiver and used to identify 50 Hz or 60 Hz cables. (See 19. *Additional Applications: B: Cable Identification.*) The same procedure as above (Section 5D) is followed for selecting frequencies that can be detected by the *External Jack* [15] ([14] on 2550 locator) found on the bottom of the receiver.

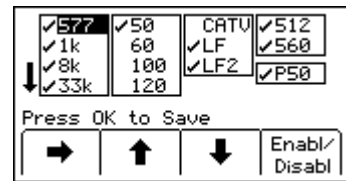


G. Creating User Defined Frequencies

Menu/OK [5:Toggle to MAIN MENU] + >>More [SK:4] +  [SK:5] + >>More [SK:d] + Locate Freq [SK:f]

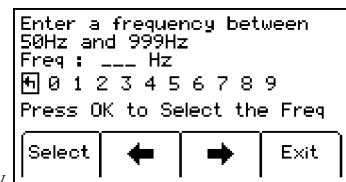
There are four user defined frequencies available on the receiver. (These frequencies must be between 50 Hz and 999 Hz.) These frequencies are found in the column on the far right of the Locate Freq display (Auxiliary frequencies). These frequencies, once programmed, will appear under the *Aux* [SK] frequency list when *Freq* [SK] is selected in the Locate mode.

To program the user defined frequencies press the right arrow [SK] to highlight the Auxiliary group of frequencies. Press the up/down arrows [SK] to highlight the user frequency to program. Press *Enabl/Disabl* [SK].




Press the left/right arrows [SK] to move the square cursor to a digit. Press *Select* [SK] to enter the number in the frequency field.

Press *Menu/OK* [5] to save the programmed frequency, or press *Exit* [SK] to cancel. The frequency will appear in the locate frequency display as U###, where ### represents the programmed frequency.

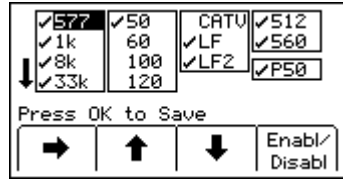


Note: To redefine a previously programmed user frequency, highlight the frequency, press *enabl/disabl*, select the back arrow with the cursor, and press *select* to delete the previous entry.


H. Filtering Power Frequency Interference (User Defined Frequencies Only)

Menu/OK [5:Toggle to MAIN MENU] + >>More [SK:4] +  [SK:5] + >>More [SK:d] + Locate Freq [SK:f]

In order to filter out unwanted power influences while locating with user-defined frequencies, verify the correct frequency is selected for your location (default 60 Hz). Press *Menu/OK* [5] to save.





I. Selecting Locating Audio

Menu/OK [5:Toggle to MAIN MENU] + >>More [SK:4] +  [SK:5] + >>More [SK:d] + Audio Config [SK:g]

The user can choose the audio response of the receiver when using the Directional Peak or Trace View modes for path locating. Highlight the audio selection and press *Menu/OK* [5] to save.

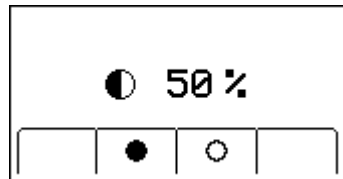


J. Adjusting Display Contrast

Menu/OK [5:Toggle to MAIN MENU] + >>More [SK:4] +  [SK:5] +  [SK:c]

The display contrast can be adjusted higher or lower.

- Press the solid circle [SK] to darken the display.
- Press the open circle [SK] to lighten the display.
- Press *Menu/OK* [5] to save.



6. Locating Buried Cables And Pipes

A. Transmitter Connections

Perform a battery test. Use one of the following three methods to produce a trace signal on the target pipe or cable.

1. Direct Connect Method

⚠ WARNING

This WARNING applies to the use of the Direct Connect Cables and the Transmitter.

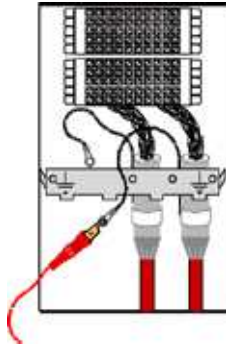
To avoid potential shock, or electrically damaging the Transmitter, when setting up the Transmitter to locate using the Direct Connect method, follow these basic steps;

- ALWAYS plug the Direct Connect Cable into the Transmitter Output Jack [T-6] BEFORE connecting the leads to the cable/pipe to be located and the ground rod.
 - Connect the red lead to the cable/pipe.
 - Connect the black lead to ground rod.

A POTENTIAL FOR ELECTRICAL SHOCK, AND/OR TRANSMITTER ELECTRICAL DAMAGE, EXISTS WHEN USING THE DIRECT CONNECT CABLE ON CABLES ENERGIZED WITH ELECTRICAL POWER IF THE ABOVE INSTRUCTIONS ARE NOT FOLLOWED. USE APPROPRIATE SAFETY PROCEDURES.

CHECK VOLTAGE BEFORE CONNECTING TRANSMITTER. VOLTAGE HIGHER THAN 240 VOLTS WILL DAMAGE EQUIPMENT. FOLLOW STANDARD PROCEDURES FOR REDUCING THE VOLTAGE.

- Plug the direct connect cable into the *Output Jack* [T-6] of the transmitter. Connect the black clip to the ground rod. Place the ground rod in the earth perpendicular to the suspected cable/pipe path. If necessary, extend the black lead with the Ground Extension Cable (#9043 available separately).



- Remove the ground bonding and attach the red clip to the shield of the cable, pipe, or target conductor. (If locating power cables, the red clip can be attached to the transformer cabinet, or the meter box). Metal contact must be made between the red clip and the transformer cabinet or meter box. If painted, some paint will need to be removed/scraped off to allow metal-to-metal contact.
- Turn the transmitter on by pressing *Ohms* [T-2]. The continuity of the circuit will be measured. The results are displayed on the *Digital Display* [T-4] in ohms and as an audible tone.

- If the continuity of the circuit is very good (the reading on the display is less than 3K Ω . and a solid tone from the transmitter is heard) all frequencies can be used to locate. Always use the lowest frequency available (for example, 577 Hz). Lower frequencies are less likely to ‘bleed over’ to other cables in the same area, and are very good for tracing over long distances.
- If the circuit reads more than 3K Ω ., but less than 10K Ω (indicated by a beeping tone from the transmitter) it will be necessary to use a higher frequency than 577 Hz in order to locate the cable/pipe.
- If the circuit reads more than 10K Ω ., it will be necessary to use an RF signal such as 33 kHz, 82 kHz or 200 kHz.
- If there is no tone and the transmitter indicates that there is an open circuit (OL in the display) this could be an indication of a poor ground, or an open-ended cable or pipe. Use one of the higher frequencies available, at high or maximum output power level. If it is an open-ended cable or pipe, the receiver's response will decrease suddenly at the site of the clear or severed end.

Note: In the ohms mode, the transmitter can detect voltage as well as ohms. If a low voltage is detected, the Digital Display [T-4] will alternate between displaying ohms and volts. When displaying ohms, the flag over the Ω symbol will be visible. When displaying volts, the flag over the ‘V’ will be visible. When the voltage magnitude is sufficient to impair the accuracy of the ohms measurement, only voltage will be displayed. If the voltage is AC, a sine wave will be visible on the Digital Display [T-4]. If a high AC voltage is detected, a rapid beeping tone will be heard.

- Press *Trace* [T-3] repeatedly until the desired frequency appears on the display. Note that the number that flashes alternately with the selected frequency is called the relative current. This number can be useful in identifying the target cable/pipe and is discussed more in 8. *Depth and Current Estimate* and 10. *Locating in Directional Peak Mode*.
- Press *Output Level* [T-5] to select high, or maximum, output power level for longer tracing distances or deep pipe/cable.

2. 3M™ Dyna-Coupler Method

⚠ WARNING

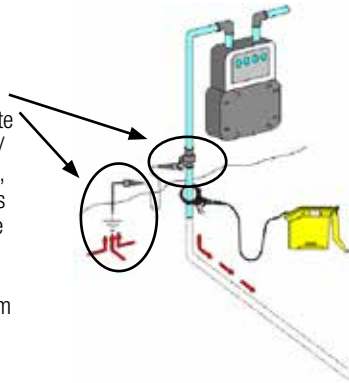
This WARNING applies to the following 3M Dyna-Couplers;

- 3" (75 mm) - Part number 3001
- 4.5" (114 mm) - Part number 4001
- 6" (150 mm) - Part number 1196
- All accessory kits containing any of the listed Dyna-Couplers - Part numbers 3019, 4519, 1196/C

A potential for electrical shock exists when using the Dyna-Coupler on cables energized with electrical power. Use appropriate safety procedures.

DO NOT USE ON CABLES CARRYING IN EXCESS OF 600 VOLTS RMS.

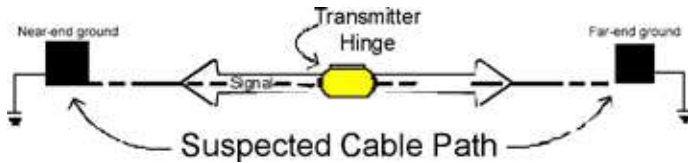
Use a ground extension cable, or wire, and ground rod set-up between a target pipe/cable and a gas meter valve/box, or cable/electrical meter box. This will isolate the locate signal to the target pipe/cable section below the meter/box, between the grounding points. This provides a good return path for the tracing signal. Insulating coupling above a gas meter valve on a pipe will isolate the returning signal from ground and may make locating more difficult.



- Connect the 3M Dyna-Coupler to the transmitter *Output Jack* [T-6] using the coupler cable (9011).
- Clamp the 3M Dyna-Coupler around the cable or pipe, below any bonds, just before it enters the earth. **The jaws of the coupler must fully close.**
- Press *Trace* [T-3] to turn on the transmitter. Press again to select 8 kHz, 33 kHz, 82 kHz or 200 kHz.

Note: When using a 3M Dyna-Coupler, always select high, or maximum, output power level by pressing *Output Level* [T-5] key on the transmitter.

3. Induction Method



If you cannot make a direct connection, or use the 3M™ Dyna-Coupler clamp to apply a locating signal on the target, use the induction method. When nothing is plugged into the *Output Jack* [T-6] of the transmitter the unit will be placed into induction mode when it is turned on. This method uses the internal coil of the transmitter to generate a magnetic field. This is the least preferred method of applying a signal on a target conductor because it can easily be picked up by other non-target conductors in the area. However, it is the preferred method of applying a signal to multiple cables/pipes in the same trench and for the “two-person sweeping” application.

3M Dynatel™ transmitters provide a choice of induction frequencies and output power levels. Higher induction output power levels are needed for detecting deeper depths and longer ranges. The 2500 Series transmitters provide four induction frequencies: 8 kHz, 33 kHz, 82 kHz and 200 kHz and three output power settings up to 12W. The 82 kHz and 200 kHz frequencies are commonly used for deeper cables/pipes and the lower frequencies are used to give longer locate distances. The 8 kHz (low frequency) induction helps in locating shallow facilities, such as risers.

The following sections review Non-sweeping and Sweeping (Area) methods used with the Induction Mode. The Non-Sweeping method is utilized when a specific target requires path tracing. The transmitter remains stationary in-line over the target and the path is traced. The Sweeping method is utilized when a designated area needs to be swept for non-specific targets, for example, all the buried pipes or conductors in the designated area. Several sweeping methods will be reviewed.

A. Non-Sweeping(Passive) Induction Mode Locating

- Position the transmitter over the target facility, with the hinge of the transmitter over and in line with the cable/pipe path. Remove any cables from the *Output Jack* [T-6].
 - Align the Induction Direction arrows on the transmitter with the target conductor.
- Turn on the transmitter, select the frequency and select high output or maximum output power level for best signal-to-noise ratio.
- Trace the signal path with the receiver using the Induction Peak (Ind Pk) mode.

The Induction Peak (Ind Pk) mode of the receiver is a mode in which the upper antenna of the receiver is tuned to minimize distortion from the magnetic field of the transmitter.

Use Induction Peak (Ind Pk) mode when sweeping distance between the transmitter and receiver is 25–60 feet (7.6–20 m). Beyond 60 feet (20 m) you can also use the Special (single) Peak (Spl Pk) or Directional Peak (Dir Pk) modes. Special (single) Peak (Spl Pk) can be used for maximum detection depth and range (needed for deep conductors and metal pipes), but would require increased sweep distance separation between the transmitter and receiver.

Note: If nothing is plugged into the Output Jack [T-6] of the transmitter, the transmitter will automatically turn on the internal antennae, and the last frequency used (8 kHz, 33 kHz, 82 kHz or 200 kHz) will broadcast in induction mode.

The induction frequency can be changed by pressing the Trace [T-3] (Frequency [T-3] on 2550) button on the transmitter. For best results, the receiver should be at least 25 feet (7.6 m) away from the transmitter to begin tracing the target path, have the gain set between 78-84% and have the receiver in Induction Peak (Ind Pk) mode when starting the sweep. Attempting to trace the target close to the transmitter may lead to false indications due to the receiver detecting the large magnetic field radiating from the transmitter.

B. Sweeping (Active) Induction Mode Locating

Sweeping an area with the 3M™ Dynatel™ Locator 2500 Series allows the location of multiple metallic cables and pipes buried in an area without direct connect or coupler access to the cable or pipe. This approach is effective before any excavation takes place. Note that when specific buried objects need to be identified, it's important to use the direct connect or coupler method for applying the signal. This will help limit the applied locate signal to a specific facility that provides more position and depth accuracy along with an effective identification. There are two main types of “no access” or “blind” Induction Sweeps;

Passive Sweeps: These require only the use of the Receiver with passive frequency detection capability. This method uses existing external signal sources, such as 60 Hz/50 Hz for electric power, 15 kHz to approximately 30 kHz for low frequency radio signals, 120 Hz / 100 Hz CPS for impressed current Cathodic Protection signals and the less commonly occurring CATV signal of 31.25 kHz NTSC with CRT TV turned on.

Active Sweeps: These require both the Receiver and Transmitter with Induction capability. This method refers to using a 3M Dynatel transmitter as the signal source through induction, instead of relying on passive frequencies that may exist on the buried conductor or metal pipe. Active Induction allows for detecting buried cables and metal pipes in the absence of passive signals and at deep depths and short sections. 3M Dynatel transmitters provide a choice of induction frequencies and output power levels. Higher induction output power levels are needed for detecting deeper depths and longer ranges. The 2500 Series transmitters provide four induction frequencies: 8 kHz, 33 kHz, 82 kHz and 200 kHz and three output power settings up to 12W. The 82 kHz and 200 kHz frequencies are commonly used for deeper cables/pipes and the lower frequencies are used to give longer locate distances.

C. Passive Sweeps

Select Special (single) Peak (Spl Pk) mode on the receiver and then select the frequency (source; for example, power, LF, etc.) to be traced. Passive sweeps at power frequency will detect buried power cables and conductors carrying 60 Hz/50 Hz power signal in the ground. Other passive sources exist, such as Cathodic Protection, LF and CATV cable (with NTSC TV CRT turned on).