

# INSTRUCTION MANUAL



## TM900 DigAlert Pro Telephone Test Set



**Read and understand** all of the instructions and safety information in this manual before operating or servicing this tool.

Register this product at [www.TempoCom.com](http://www.TempoCom.com)

## Description

The Tempo Communications TM900 DigAlert™ Pro Telephone Test Set is intended to assist with the installation and maintenance of complex telecom systems. A complete butt-in test set, the TM900 adds useful features such as loudspeaker monitor, caller ID, speed dial, intercom, and line voltage/current/frequency meter.

The TM900 not only works in handset mode, but can also be used as a “two-way” hands-free speakerphone. Enclosed in a Nautilus family enclosure which is tough, dust and weathertight.

## Features

- Complete telephone set with ringer and hands-free speakerphone
- Phone-to-phone intercom
- Amplified loudspeaker line monitor
- DigAlert™ digital service protection system
- Tone and pulse dialing
- Large 10-location speed dialing memory
- Multi-memory redial
- DTMF digit detection
- Tone output mode
- Caller ID with name display
- Call waiting caller ID
- Missed call indication
- DSL compatible
- Glow-in-the-dark keypad
- Line voltage and current display
- High voltage detect and lockout
- High current detect and lockout

## Key Specifications

- Bellcore and ETSI caller ID compatible
- User-selectable ANSI, ETSI, or custom telephone performance
- High voltage alert (110 VDC)
- High current alert (125 mA)

## Safety

Safety is essential in the use and maintenance of Tempo tools and equipment. This instruction manual and any markings on the tool provide information for avoiding hazards and unsafe practices related to the use of this tool. Observe all of the safety information provided.

## Purpose of this Manual

This manual is intended to familiarize personnel with the safe operation and maintenance procedures for the TM900 DigAlert™ Pro Telephone Test Set.

Keep this manual available to all personnel. Replacement manuals are available upon request at no charge at [www.TempoCom.com](http://www.TempoCom.com).



**Do not discard this product or throw away!**

For recycling information, go to [www.TempoCom.com](http://www.TempoCom.com).

## Important Safety Information



### SAFETY ALERT SYMBOL

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 or unsafe practices which, if not avoided, **MAY** result in injury or property damage.



#### **⚠ WARNING**

**Read and understand** this material before operating or servicing this equipment. Failure to understand how to safely operate this tool could result in an accident causing serious injury or death.



#### **⚠ WARNING**

Electric shock hazard:  
Contact with live circuits could result in severe injury or death.

#### **⚠ WARNING**


Electric shock hazard:  
Environment: Do not use in wet conditions. Do not connect to network if apparatus is wet.  
This device is rated to IP67.  
Failure to observe this warning could result in severe injury or death.

All specifications are nominal and may change as design improvements occur. Tempo Tools, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

DigAlert is a registered trademark of Tempo Communications, Inc.

**KEEP THIS MANUAL**

## Important Safety Information

	<b>⚠ WARNING</b>
	When in Loudspeaker mode, hold loudspeaker more than 30 cm (1 foot) from your ear. Misuse could result in hearing damage.

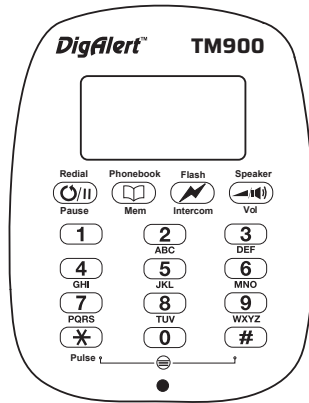
<b>⚠ WARNING</b>
Electric shock hazard: Before opening the case, remove the test leads from the circuit and shut off the unit. Failure to observe this warning could result in severe injury or death.

<b>⚠ CAUTION</b>
<ul style="list-style-type: none"><li>• This unit is to be used by trained personnel only.</li><li>• Do not perform any service or maintenance other than as instructed in this manual.</li></ul> Failure to observe these precautions may result in injury or property damage.

<b>⚠ CAUTION</b>
Inspect the test set and cord for wear or damage. Replace worn, damaged, or missing components with Tempo replacement parts. A damaged component may fail, resulting in injury or property damage. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

<b>IMPORTANT</b>
Replace weak or discharged batteries as soon as either of these conditions is detected.

# Identification



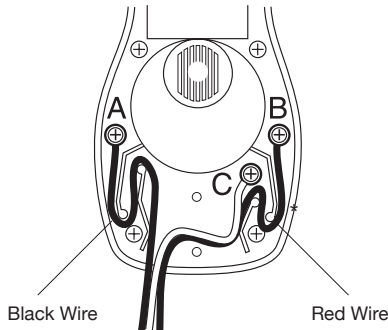
TALK



MONITOR



MUTE



- A. Positive or Tip (Black)
- B. Negative or Ring (Red)

## Setup

### Battery Installation

#### **⚠ WARNING**

Electric shock hazard:

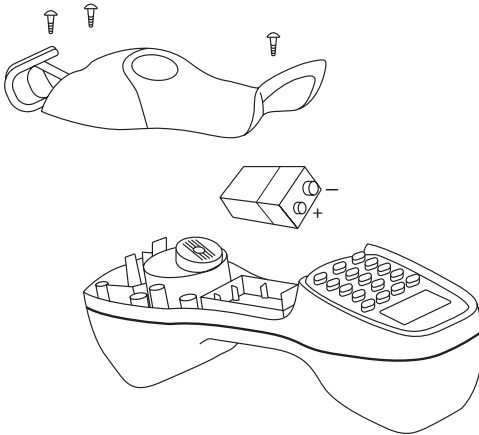
Before opening the case, remove the test leads from the circuit and shut off the unit.

Failure to observe this warning could result in severe injury or death.


The TM900 requires one 9V block battery to be installed for all functions to operate. Tempo recommends alkaline batteries, which are more leak resistant and offer much longer operating life than standard zinc-carbon types.

When a battery is first installed, the unit will default to a Language Setup display (Figure 1). Select a language before using the unit.

To access the battery compartment, loosen the three screws, one at the top and two near the belt clip & remove the battery cover off. Insert the new alkaline battery, check that the polarity is correct before snapping in place. Replace the cover and re-tighten the screws. (Do not overtighten the screw.)



### Low Battery Warning

When the battery voltage becomes low, a warning sound is produced each time the mode switch position changes. In addition, a small battery icon  is displayed in the lower left of the screen. If the battery voltage is allowed to drop below a critical level, the unit will remind you to replace the battery for a few seconds and then return to standby mode.

## Operation

The TM900 test set has six main operating modes: Setup, Talk, Monitor, DTMF Detection, Toner, and Intercom.

### Setup Mode

Power up the unit in **MONITOR**, simultaneously press \* and #. The unit then enters the special features mode. While in this menu, select option **1** to access Setup mode. Now the language and other configurable settings can be set up.

Press the digit corresponding to the desired option to choose it.

To leave this mode, press **0** (back) repeatedly. An invalid entry will result in an error tone.

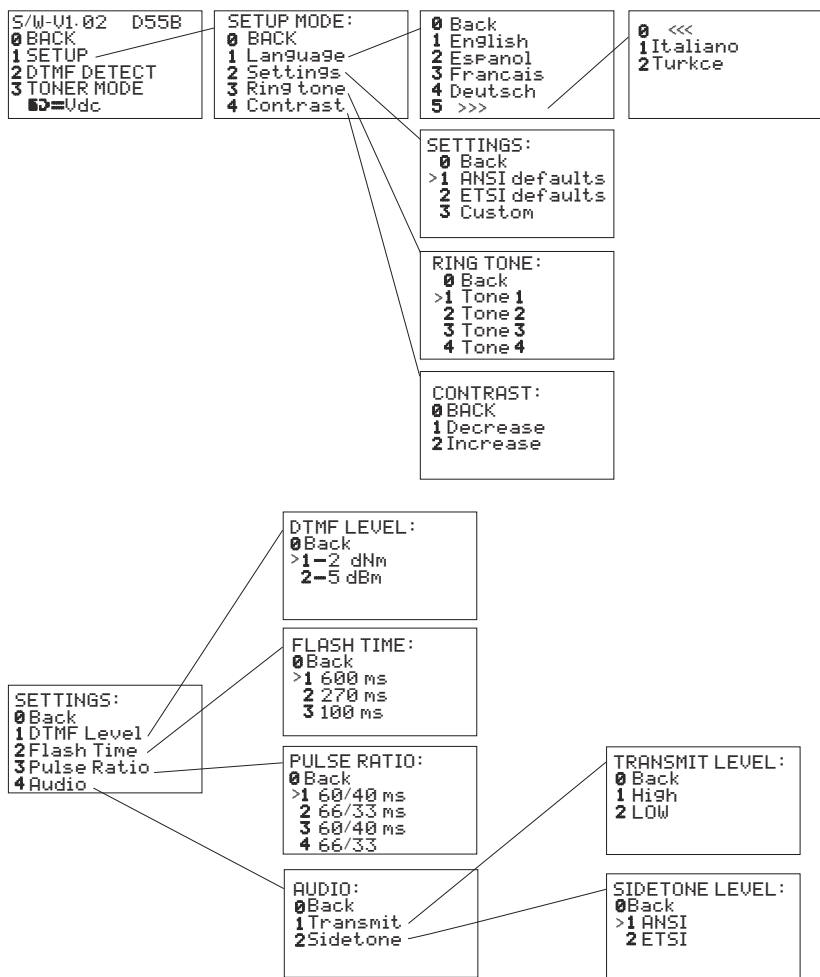


Figure 1.

## Talk Mode

### ⚠ CAUTION

This device is for connection to TNV3 network voltages only. Use this unit only on standard analog Telecom networks.

Press the “TALK” button to enter **TALK** while and connected to a suitable telephone line, the unit will go off-hook. Dialing and speech are now possible.

#### Flash

While off-hook, the Flash key is enabled. This key generates a timed line break, which simulates a hook flash to activate special features of a PBX or central office (Figure 2).

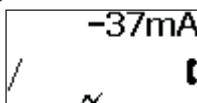



Figure 2.

The flash duration is user-selectable via the Setup mode as 100 ms, 270 ms, or the default of 600 ms. The symbol  is present on the bottom line of the display during Flash operation and for 2 seconds afterward.



#### Off-Line Dialing and Automatic Redial of Last CID Number

Digits entered by hand or received by calling line ID in Monitor mode are dialed automatically upon switching to TALK. Any displayed number can be cleared by pressing and holding **MUTE** for 1 second. Short presses of **MUTE** act as a backspace, allowing errors to be corrected before switching to TALK to dial.

#### Pause

The dual function LNR/Pause key inserts an inter-digit delay of 3 seconds between digits dialed. The pause digit is displayed as “-” (minus sign) on the LCD and is stored in memory. Note that if this were the first key pressed, this would recall and immediately dial LNR (see “Memory Functions”).

#### \* Pulse Dialing Option

To make a call using pulse dialing, press and hold the \* key to select Pulse mode. Then either dial or recall from memory the number to be called. The symbol  is displayed on the bottom line of the display. The dialing mode is changeable from Pulse to Tone while dialing by pushing the \* key. Such mid-call transitions of dialing mode are stored and shown as  in the stored digit sequence, indicating the requested change to Tone mode (Figure 3).

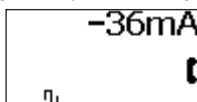


Figure 3.

#### Current Measurement

While the TM900 is off-hook, the line current is displayed along with the polarity.

#### Over Current Protection


When the TM900 is off-hook, it protects against line current over 125 mA by automatically applying a current limit. If the condition is maintained for more than about half a second, the unit goes on-hook, a warning message is displayed, and a warning sound is produced until the unit is disconnected from the line or switched off (Figure 4).






Figure 4.

### SmartMute™

A quick press of the **MUTE** button toggles the microphone off or on. A long press (over 1 second) mutes the microphone while the button is held. The mute symbol  is displayed while the microphone is deactivated.

### Loudspeaker/Volume Key

Press the **Loudspeaker** key at any time in Monitor or Talk modes to turn the speaker on or off. Note that the microphone is automatically muted if you are in Talk or Intercom modes, and  is displayed whenever the speaker is active to remind you that two-way speech is not possible. The speaker remains on for the whole duration of a call, and is kept on while switching to another mode. Automatic power-down turns the speaker off (see “Automatic Power Down” below).

### Volume Control

Long press the Volume/Speaker key and the volume will toggle from high to low or vice versa.

## Monitor Mode

Press the **MONITOR** button, the unit will be on-hook. This mode provides a high impedance connection that enables the user to listen to the line without loading it (Figure 5).

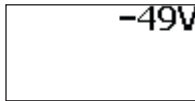


Figure 5.

Monitor mode also constantly monitors and displays the line voltage along with the polarity. With the red lead attached to ring and black to tip, the display shows negative “-” voltage. In the presence of incoming ring, the display provides line status information with caller ID if present, and a ringing alert signal is produced from the loudspeaker.

## DTMF Detection Mode

To enter DTMF Detection mode, press \* and # simultaneously while in Monitor mode, and then select option **2** from the menu.

This mode detects the DTMF tones generated by another unit (for example an alarm autodialler) when it is actively dialing. This mode can also be used to check incoming DTMF caller ID.

## Toner Mode

To enter Toner mode, press \* and # simultaneously while in Monitor mode, and then select option **3** from the menu.

This mode transmits a tracing tone at the line terminals, which is compatible with Tempo’s filter probe key frequencies. Two different speed cadence tones are selectable by selecting **1** or **2** in the Toner menu.

### Over Voltage Warning

The unit is protected against operating in Talk mode when voltages exceed 110 V. A warning tone will be generated and the screen will display the message “Over-voltage!” (Figure 6).

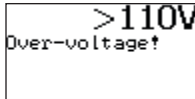


Figure 6.

### Elevated Voltage Warning

If the unit is connected to a voltage between 80 V and 110 V, high-pitched beeps will be produced, warning that this is probably not a normal telephone line (Figure 7). This audible alarm can be disabled by pressing the **MUTE** button. You can also go off-hook by pressing the **TALK** button a second time.

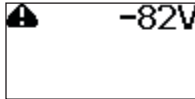


Figure 7.

### Answering Incoming Call




While the TM900 is ringing, press the **TALK** button

*Note: The TM900 will not allow off-hook if ringing is continuous. Check the frequency reported on the screen; if the frequency is approximately 50 Hz to 60 Hz, carefully disconnect from the line.*

### Automatic Power Down

To extend battery life, the TM900 powers down after periods of no user interaction in all modes, except active Talk mode.

- Talk mode with no DC detected: 5 minute timeout
- Talk mode with DC detected: No timeout
- Intercom mode: 60 minute timeout
- Monitor mode: 15 minute timeout

The TM900 can be re-activated following a timeout by pressing monitor  talk  speaker buttons , or connecting to DC (powered line).

### Intercom (Local Battery) Mode

The Intercom mode is a feature that allows two TM900 test sets to communicate without any telephone service available. In this mode only speech signals pass over the telephone pair, and no DC power (talk battery) is available. The SmartIntercom feature only works with other TM900, TM-700 or PE-830 test sets. The intercom feature only works if there is no voltage on the line (Figures 8–10).

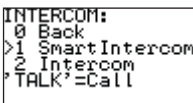


Figure 8.

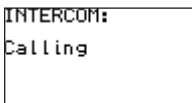


Figure 9.

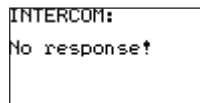


Figure 10.

To activate either Intercom mode, activate **MONITOR** mode and press the **Flash** key. You will be presented with the menu shown in Figure 8; by default SmartIntercom will be selected.

To begin the call and ring the far end, press **TALK**.

If you are making a SmartIntercom call, when the distant unit recognizes the call request you will hear a regular ring-back tone from the earpiece. If there is no reply from the distant unit, after a few seconds you will hear an error beep.

Incoming SmartIntercom call alerts will be received in either Off or Monitor mode; you do not need to be in Intercom mode to receive the alerting signal.

The intercom-alerting signal (ring tone) is a fast cadenced, higher pitched ring than normal. If this is heard, then simply press **Talk** to answer the call, automatically placing the TM900 into Intercom mode. A confirmation beep is produced to indicate that the Intercom mode is now active.

To leave Intercom mode, simply move the mode switch from **TALK** to **MONITOR**. A call-completed tone is sent down the line as you do this to alert the other user.

## Memory Functions

Memory and store facilities are available in Talk and Monitor modes. There are 10 memory locations for number storage and a multi-number "last number redial" store. These can be accessed as described below.

### Last Number Redial

When in Monitor mode, the Redial key offers the user the ability to recall any of the last 10 numbers dialed or received by CLID on the unit. The numbers can be accessed by repeatedly pressing the **Redial** key with number information displayed on the LCD. This number will be automatically dialed out when the switch is placed back to the Talk mode (Figure 11).

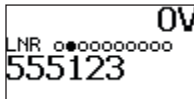


Figure 11.

In Talk mode the Redial key offers the last number dialed (or last CLID) only if no other digits have already been dialed. After dialing any digits, this key becomes the Pause key.

### Saving Speed Dial Number

Enter a number or leave an incoming ID message on the screen. Push the **Phonebook** key **twice** to enter the store mode, and then enter the key number (0-9) to save the number to a memory location (Figures 12-14).

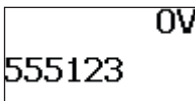


Figure 12.

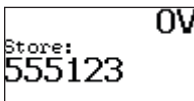


Figure 13.

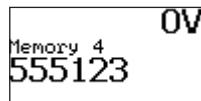


Figure 14.

### Recall Speed Dial Number

Push the **Phonebook** key once followed by the key number (0-9) (Figures 15-17). In addition to direct access by pressing the corresponding number while on-hook in Monitor mode, repeatedly pressing the **Phonebook** key allows you to scroll sequentially through all 10 stored numbers. In all cases the number remains displayed, allowing automatic dialing by simply switching to **TALK**.

**Note: If a location recalled is unused, then no number will be displayed.**

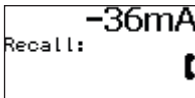


Figure 15.

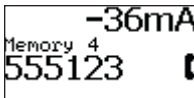


Figure 16.

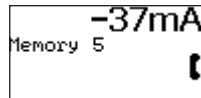


Figure 17.

## Caller ID

CID and CIDCW information will be displayed in Monitor and Talk modes, when available. Error messages are displayed when the CID is detected but not received in full, is corrupted, or is of an incompatible type (Figures 18-19).

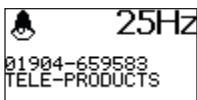


Figure 18.

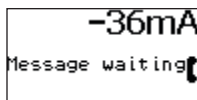


Figure 19.

## Hands-Free (Speaker-phone)

TM900 provides a voice switched speaker-phone function. Whilst in a call press the volume/speaker button and speaker-phone will be activated.

Note that unlike a common speaker-phone, the microphone is muted at the start of the call. Just press MUTE when you want to talk. This avoids problems where using speaker-phone in a noisy environment, such as near a busy road. In such situations the MUTE control helpfully becomes a type of "press to talk" (PTT) button.

If the speaker is activated when the unit is in MONITOR mode then any received audio will be amplified.

To change the volume, press and hold the "Volume/Speaker" button until a beep is heard (low tone for low level, high tone for higher volume).

## Specifications

Telephone Compatibility: TIA/EIA-470-B and ETSI

Storage Temperature: -10 °C to +70 °C (14 °F to 158 °F)

Operating Temperature: 0 °C to +50 °C (32 °F to 122 °F)

Humidity: Up to 90% operating, 95% storage, both with no condensation

CID and CIDCW: Bellcore TR-NWT-000030 (GR30) and SR-TSV-002476

Battery Life: Over 6 months of typical use; only alkaline types recommended; remove batteries if storing unit for long periods

Loop Limits (at 48 V):

Resistance: >5 k $\Omega$

Minimum Current: <10 mA

DC Resistance:

Off-hook: <300  $\Omega$

On-hook: >10 M $\Omega$

Monitor Impedance: >400 k $\Omega$

Pulse Dialing:

Rate: 10 pps or 20 pps

Break: 60% or 66%

Inter-digit Pause: 800 ms (leakage during break >1 M)

DTMF/Tone: -4 dBm / -6 dBm (ANSI); -9 dBm / -11 dBm (ETSI)

FSK Caller Name/Number and Call Waiting:

Bellcore GR-30-CORE, TR-NWT-000030

ETSI FSK types

Displays: Called DN, Caller name

Soft Key Function (on two context-sensitive keys):

Flash/Timed Break Recall: 100 ms, 270 ms, 600 ms

Memory Dialing: 10 memories, 10 LNR

Indicators:

LCD (96 x 48 pixels, 5 lines) displays the following:

Caller ID (name and number) and Call Waiting

Dialed number

Over-voltage conditions

Phone status (monitor, on hook etc.)

Line Voltage: 110 Vdc max

Loop Current: 125 mA max

Ring Frequency: 15–70 Hz

Line Protection:

Over-voltage: 360 Vdc continuous >500 V peak

Current Limited: 125 mA

Lightning: ITU K.17, 20, 21 (1500 V)

Intercom Range: 6 km on typical loops

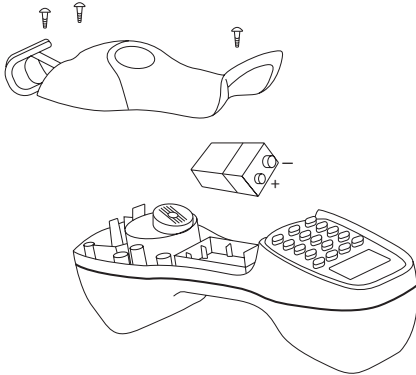
Toner Output: 7 V pk-pk (square wave, on typical lines)

## Changing the Battery or Cord Set

Note: Replace the battery in less than one minute to retain the contents of the memory.

1. Disconnect the unit from the circuit.
2. Press MONITOR to go to off mode.
3. Loosen the three screws and the cover.
4. Replace the battery or cord set, as shown. Observe polarity. (Red/Black, +/-)
5. Replace the cover and tighten the screws.

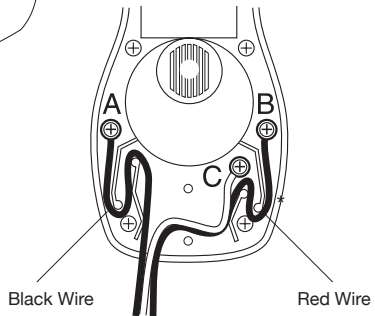
Note: Skipping Steps 1 and 2 may cause the unit to malfunction. If the test set does not restart after changing the battery, disconnect the battery for two minutes. Then proceed with Step 4.



## Maintenance

### Changing Line Cord

1. Disconnect the unit from the circuit.
2. Remove the battery cover as detailed above.
3. Replace the line cord and reconnect.
4. Replace the cover as detailed above.



- A. Positive or Tip (Black)  
 B. Negative or Ring (Red)  
 C. Earth Ground (Green)

## Cleaning

For cleaning it is recommended to only use a cloth dampened with a solution of soap and water.

## Glossary

On-hook / Monitor: The phone line is available for listening only.

Off-hook / Talk: The phone is activated.

Line Current: The amount of current fed from the telephone line when off hook, in milliamperes (mA).

Flash: A momentary line current break used by the butt set to signal the phone system for special function.



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