

# MCT-302

Supervised PowerCode Magnetic Contact Transmitter



Installation Instructions

## 1. INTRODUCTION

The MCT-302 is a fully supervised, PowerCode magnetic contact transmitter for electronic security applications. It features a built-in reed switch (that operates as a normally closed input if a magnet is placed near it) and an auxiliary hard-wired input, programmable as either N.C. or E.O.L., for use with additional security sensors such as pushbuttons, detectors, door contacts etc.

Although they trigger the same RF module into transmission, the reed switch and the auxiliary input behave as separate transmitters. The reed switch has an individual 24-bit PowerCode ID that identifies it to the target receiver, and so does the auxiliary input. These IDs are randomly selected in the factory from over 16 million possible code combinations and retained in the unit's non-volatile memory. Compatible receivers can "learn" specific IDs and respond only to them.

If the built-in reed switch contacts open or an external loop connected to the auxiliary input is disturbed, a digital message is transmitted. The message includes the disturbed input's PowerCode ID, followed by various status and message-type markers (see Appendix A). Alarm information and other data are thus forwarded to the receiver.

Since messages transmitted by the MCT-302 might collide with transmissions from other PowerCode transmitters, a "smart" anti-collision transmission sequence is used (see Appendix A).

A periodic supervision message, distinguished by a particular marker, is transmitted automatically from the reed switch input

and the auxiliary input once every 60 minutes. The receiver is thus informed, at regular intervals, of each input's active participation in the system.

The MCT-302 is protected by a tamper switch, activated when the cover is removed. Once the tamper switch contacts open, a message will be transmitted with the "tamper alert" marker ON.

An indicator LED lights during transmission whenever alarm or tamper events are reported. The LED does not light while a supervision message is being transmitted.

Operating power is obtained from an on-board 3.6V Lithium Thionyl Chloride battery. A weak battery will cause a "low battery" marker to be added to any message transmitted (Para. 1.2).

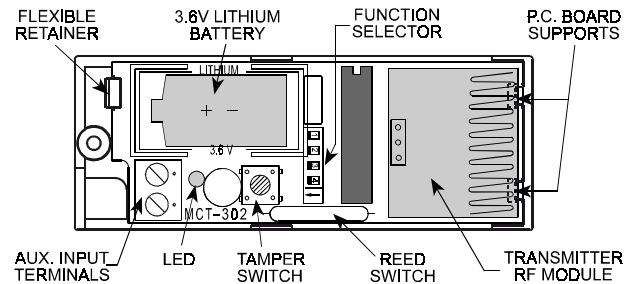


Figure 1. MCT-302 with cover removed

## 2. SPECIFICATIONS

**Frequency (MHz):** 315, 404, 418, 433.92 or other frequencies according to local requirements.

**Transmitter's ID Code:** 24-bit digital word, over 16 million combinations, pulse width modulation.

**Overall Message Length:** 36 bits

**Alarm Inputs:** 2, one internal and one external, with a separate 24-bit transmitter ID each.

**Auxiliary Input Circuit Type:** N.C. / E.O.L., selected with on-board DIP switch

**E.O.L. Resistor Required:** 47 kΩ

**Message Repetition:** Repetitive transmission (once every 3 minutes) or one-shot, as selected with on-board DIP switch.

**Supervision Method:** Automatic reporting at 1-hour intervals from each input.

**Response to Tamper Event:** Tamper report every 3 minutes (until the tamper switch is restored).

**Power Source:** 3.6 V Lithium Thionyl Chloride (LiSOCl<sub>2</sub>) battery, size 1/2 AA, Tadiran TL-5902.

**Nominal Battery Capacity:** 1.2 Ah

**Current Drain:** 5 μA standby, 8 mA in operation (including LED)

**Battery Life (with LED on):**

@ 10 transmissions per day: Over 10 years

@ 50 transmissions per day: About 6 years

**Battery Supervision:** Automatic transmission of battery condition data as part of any status report.

**Operating Temperature:** 0°C to 49°C (32°F to 120°F).

**Dimensions:** 81 x 22 x 23.5 mm (3-3/16 x 7/8 x 15/16 in.).

**Weight : MCT-302 (excluding battery):** 34 g (1.2 oz)

**Magnet:** 13 g (0.45 oz)

**Standards:** Meets FCC Part 15, ETS 300-220 and MPT1349

This device complies with Part 15 of the FCC Rules and RSS-210 of Industry and Science Canada. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The 418 & 433.92 MHz models of this device comply with the European Council Directive EMC 89/336/EEC & 92/31/EEC, and bear the CE mark and certification.

## 3. INSTALLATION

### 3.1 Mounting

It is highly recommended to attach the transmitter to the fixed frame and the magnet to the movable part (door or window), as shown in Figure 2. Make sure that the magnet is located not more than 6 mm (0.25 in) from the transmitter's marked side.

- Remove the case closure screw (Fig. 3).
- Remove the unit's cover as shown in Figure 4.
- Flex out the circuit board retainer (Fig. 1 and 5) and detach the circuit board from the base.
- Hold the base against the mounting surface and mark the drilling points through the mounting holes (Fig. 5).

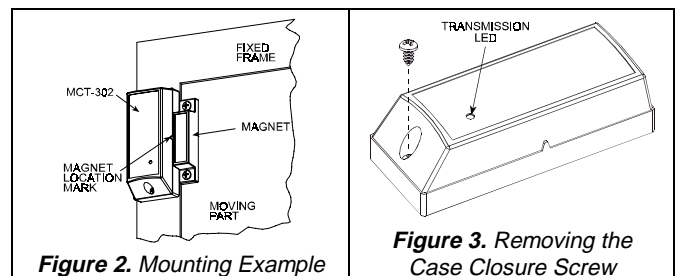


Figure 2. Mounting Example

Figure 3. Removing the Case Closure Screw

- Drill the holes and fix the base to the wall using the 2 screws with countersunk heads supplied in the package.

**CAUTION!** Screws with other type or size of head may short circuit the bottom side of the printed circuit board.

- F. Mount the magnet near the marked side of the MCT-302.
- G. Insert the edge of the P.C. board with the RF module into the edge supports, and press the other edge against the flexible retainer until it snaps home with a click.

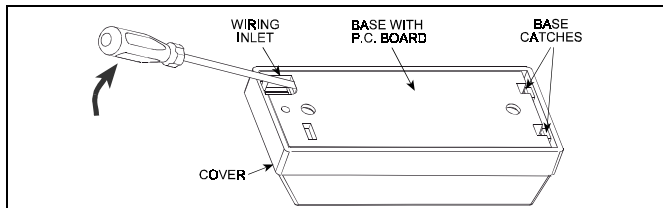


Figure 4. Separating the Cover from the Base

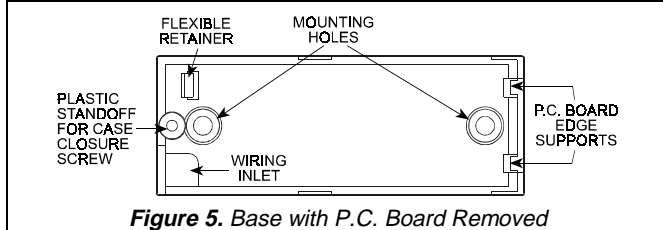


Figure 5. Base with P.C. Board Removed

### 3.2 Auxiliary Input Wiring

**Remember!** If your application does not require the auxiliary input, be sure to set DIP switch SW-1 to OFF.

- A. Connect the auxiliary detector's alarm contacts across the MCT-302 auxiliary input terminals.
- B. If the auxiliary input of the MCT-302 is defined as a Normally Closed (N.C.) type (SW-2 set to OFF), series connected N.C. sensor contacts must be used exclusively. An E.O.L. resistor will not be required.
- C. If the auxiliary input is defined as an E.O.L. type (SW-2 set to ON), Normally Closed (N.C.) as well as Normally Open (N.O.) sensor contacts can be used. A 47kΩ E.O.L. resistor must be wired at the far end of the zone loop, as in Figure 6.

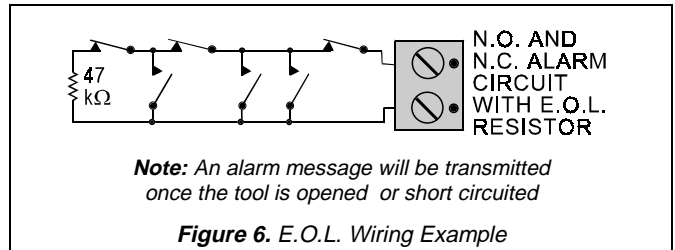


Figure 6. E.O.L. Wiring Example

## 4. PREPARATION FOR USE

### 4.1 The Function Switches

#### A. Switch Tasks

The MCT-302 is equipped with a 4-position DIP switch function selector (Fig. 7). Each switch lever allows you to select one of two options, as explained below:

#### B. Setting the Switches

Set the function switches as desired prior to applying power. Use a ball point pen or another pointed object to shift the switch levers. The ON position is indicated by the arrow on the switch body.



Figure 7. Function Selector

Table 1. Getting acquainted with the function selector

Switch	Function	Pos.	Selected Option
SW-1	Aux. Input enable/disable	ON	Aux. Input is enabled
		OFF	Aux. Input is disabled
SW-2	Aux. Input type selector	ON	Aux. Input is E.O.L. (47kΩ)
		OFF	Aux. Input is N.C.
SW-3	Restore reports enable/disable	ON	Restore events reported
		OFF	Restore events not reported
SW-4	Transmit mode selector	ON	Alarms reported every 3 minutes
		OFF	Alarms reported only once

**SWITCH SW-1:** Determines whether the auxiliary input will be active or inactive.

**Note:** With SW-1 set to OFF, the auxiliary input will not initiate periodic supervision transmissions.

**SWITCH SW-2:** Determines whether the auxiliary input will behave as a 47kΩ End-of line (E.O.L.) input or as a normally closed (N.C.) input.

**SWITCH SW-3:** Determines whether the transmitter will report a restore event when an input restores from an alarm condition.

**Note:** Selecting the ON position enables you to find out whether the door or window under surveillance are open or closed.

**SWITCH SW-4:** In non-supervised systems, it is sometimes required to report an alarm repeatedly at short intervals, until the disturbed input reverts to its normal (undisturbed) state. SW-4 is used to select between repetitive and one-shot transmission.

### 4.2 Testing the Unit

Before testing, set DIP switches SW1 through SW4 as required for the particular application (Para. 4.1).

- A. Insert the ½ AA battery between the battery clips, making sure that the polarity is correct. **For proper operation, only Lithium Thionyl Chloride battery (as specified in Section 2) should be used.**
- B. Press the tamper switch once and release it.
 

**Note:** Since the cover is removed and power is applied, a tamper situation exists. Verify that the MCT-302 transmits (the LED lights briefly) once every 3 minutes.
- C. When you are satisfied that tamper alerts are transmitted properly, put the cover on to return the tamper switch to its normal (undisturbed) position. Wait slightly over 3 minutes to verify that tamper transmissions cease. If all went well, secure the front cover to the base with the case closure screw.
- D. Momentarily open the door or window and verify that the transmitter LED lights, indicating that transmission is in progress. If SW-4 is ON, wait 3 minutes to verify that the transmission is repeated at 3-minute intervals.
- E. Close the door or window, thus restoring it to the undisturbed state and watch the LED. If SW-3 is set to ON, a "restore" transmission will now take place.
- F. If the auxiliary input is used, momentarily activate the detector connected to it and check for a response similar to that described in C above. Then restore the input loop to its undisturbed state. The response should be as in D above.
- G. Refer to the target receiver's installation instructions, and let the receiver "learn" the ID codes associated with the reed switch and the auxiliary input (if used).

**REMEMBER!** Because each input of the MCT-302 acts as an independent transmitter with an individual ID, make sure that both input IDs are learned by the receiver.

## 5. MISCELLANEOUS COMMENTS

Visonic Ltd. wireless systems are very reliable and are tested to high standards. However, due to low transmitting power and limited range (required by FCC and other regulating authorities), there are some limitations to be considered:

A. Receivers may be blocked by radio signals occurring on or near their operating frequencies, regardless of the digital code used.

B. A receiver responds only to one transmitted signal at a time.  
C. Wireless equipment should be tested regularly to determine whether there are sources of interference and to protect against faults.

The user is cautioned that changes or modifications to the unit, not expressly approved by Visonic Ltd., could void the user's FCC or other authority to operate the equipment.

## APPENDIX A. THE VISONIC LTD. POWERCODE SYSTEM

### A-1. The PowerCode Message Format

The PowerCode message transmitted by the MCT-302 includes the 24-bit ID of the input of origin and a status report (see Fig. A1).

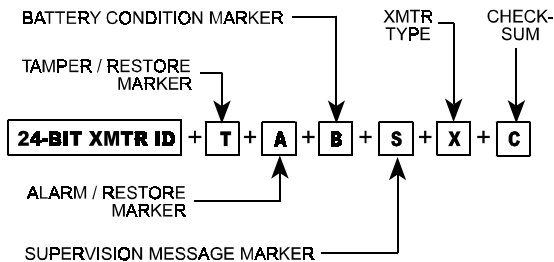


Figure A1. Transmitted Data

A message includes the following data:

- **Input ID:** The 24-bit ID of the input sending the message.
- **Tamper / Restore:** Upon removal of the unit's cover, the reed switch input will initiate a message with a "tamper marker" set to ON. If the unit's cover is put back, the reed switch input will send a message with the tamper marker set to OFF ("Tamper Restore").
- **Alarm / Restore:** Once the input loop is disturbed, a message will be transmitted with an "Alarm marker" ON. Upon restoral of the input loop, a message will be transmitted with the alarm marker set to OFF (provided that restore reporting is desired - SW-3 has been set to ON - see Para. 4.1).
- **Low Battery:** The battery is tested once an hour and if found low, the reed switch input will initiate a message in which the "Low Battery" marker is set to ON. **This marker will be ON in all messages that follow, whatever the cause for trans-**

mission. Once the battery is restored to normal, this marker will be OFF in all messages that follow ("Battery Restore").

- **Supervision Report:** A special "supervision message" marker, when set to ON, identifies the periodic supervision messages transmitted automatically at 1 hour intervals. This marker will be OFF in all other messages.
- **Transmitter Type:** A special marker indicates the type of the transmitter:
  - Supervised or non-supervised
  - Reports or does not report restorals after alarm
- **Checksum:** Checksum bits at the end of the message allow the receiver to determine whether an incoming message is valid (error-free). This feature considerably upgrades the reliability of the wireless communication link.

### A-2. Anti-Collision

To overcome message collisions at the receiving end, PowerCode transmitters transmits 3 data bursts at random intervals, with 6 repetitions of the same message in each burst (Fig. A2). This redundancy improves the probability of reception.

**Note:** Periodic supervision messages are an exception to this rule - they consist of a single 6-message burst.

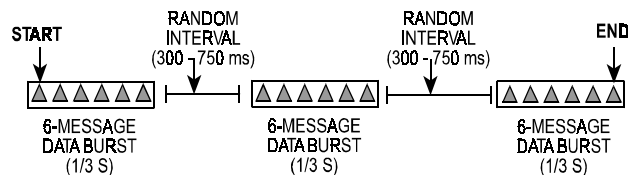


Figure A2. Anti-Collision Transmission Sequence

## WARRANTY

Visonic Ltd. and/or its subsidiaries and its affiliates ("the Manufacturer") warrants its products hereinafter referred to as "the Product" or "Products" to be in conformance with its own plans and specifications and to be free of defects in materials and workmanship under normal use and service for a period of twelve months from the date of shipment by the Manufacturer. The Manufacturer's obligations shall be limited within the warranty period, at its option, to repair or replace the product or any part thereof. The Manufacturer shall not be responsible for dismantling and/or reinstallation charges. To exercise the warranty the product must be returned to the Manufacturer freight prepaid and insured.

**This warranty does not apply in the following cases:** improper installation, misuse, failure to follow installation and operating instructions, alteration, abuse, accident or tampering, and repair by anyone other than the Manufacturer.

This warranty is exclusive and expressly in lieu of all other warranties, obligations or liabilities, whether written, oral, express or implied, including any warranty of merchantability or fitness for a particular purpose, or otherwise. In no case shall the Manufacturer be liable to anyone for any consequential or incidental damages for breach of this warranty or any other warranties whatsoever, as aforesaid.

This warranty shall not be modified, varied or extended, and the Manufacturer does not authorize any person to act on its behalf in the modification, variation or extension of this warranty. This warranty shall apply to the Product only. All products, accessories or attachments of others used in conjunction with the Product, including batteries, shall be covered solely by their own warranty, if any. The Manufacturer shall not be liable for any damage or loss whatsoever, whether directly, indirectly, incidentally, consequentially or otherwise, caused by the malfunction of the Product due to products, accessories, or attachments of others, including batteries, used in conjunction with the Products.

The Manufacturer does not represent that its Product may not be compromised and/or circumvented, or that the Product will prevent any death, personal and/or bodily injury and/or damage to property resulting from burglary, robbery, fire or otherwise, or that the Product will in all cases provide adequate warning or protection. User understands that a properly installed and maintained alarm may only reduce the risk of events such as burglary, robbery, and fire without warning, but it is not insurance or a guarantee that such will not occur or that there will be no death, personal damage and/or damage to property as a result.

**The Manufacturer shall have no liability for any death, personal and/or bodily injury and/or damage to property or other loss whether direct, indirect, incidental, consequential or otherwise, based on a claim that the Product failed to function.** However, if the Manufacturer is held liable, whether directly or indirectly, for any loss or damage arising under this limited warranty or otherwise, regardless of cause or origin, the Manufacturer's maximum liability shall not in any case exceed the purchase price of the Product, which shall be fixed as liquidated damages and not as a penalty, and shall be the complete and exclusive remedy against the Manufacturer.

**Warning:** The user should follow the installation and operation instructions and among other things test the Product and the whole system at least once a week. For various reasons, including, but not limited to, changes in environmental conditions, electric or electronic disruptions and tampering, the Product may not perform as expected. The user is advised to take all necessary precautions for his /her safety and the protection of his/her property.

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