SR-520, SR-520 ER

SpiderAlert Dual RF+IR Receiver

SpiderAlert®

Installation Instructions

1. INTRODUCTION

The **SR-520** is a dual-technology, microprocessor-controlled receiver designed for use in the SpiderAlert network. It accommodates a UHF receiver and an IR (infrared) receiver that operate together, to receive signals from combined RF+IR transmitters.

Attention! *The receiver is compatible with both previous SpiderAlert transmitters that use 12-bit codes, and the new SpiderAlert transmitters that utilize 24-bit codes and 36-bit total message length.*

The **SR-520 ER** is the extended range version of the SR-520. It has the following features:

- Higher receiver sensitivity for longer communication range.
- Improved receiver selectivity (narrower bandwidth) to prevent reception of interfering signals from undesired transmitters (whose frequencies are on or near the receiving frequency).

Signals received from RF+IR transmitters are sent via the SpiderBus to the Local Control Unit SLC-5 and through it to the head-end computer.

Each receiver has a factory-programmed, 8-bit digital identification number (in a 2-digit hexadecimal form), that allows the SpiderAlert Local Control unit SLC-5 to distinguish it from other receivers used in the system. The identification number is marked on top of its microprocessor IC and it can be changed from the SpiderAlert main station.

The data bus over which the SR-520 (ER) reports to the head-end computer control unit is constantly supervised (see Para. 3.3, Supervision Method).

An on-board sensitivity control (marked RANGE) enables the installer to reduce the RF reception range. The SR-520 (ER) is protected by a tamper switch that is actuated by removing the cover. Once tampered with, the receiver sends out its ID number plus a special tamper code to the head-end computer.

Benefit Gained by Utilizing Patented RF+IR Technology

The main benefit of using the dual (RF+IR) technology is the capacity to pinpoint the user (transmitter) location in multi-room buildings.

The RF transmission, including 24-bit user ID, penetrates walls, floors and ceilings. The IR transmission serves as room pinpoint confirmation and is blocked by walls, floors and ceilings.

The combination of RF+IR signals enables accurate definition of the room in which the user is located.

Reception of dual transmissions is defined as a "verified Alarm".

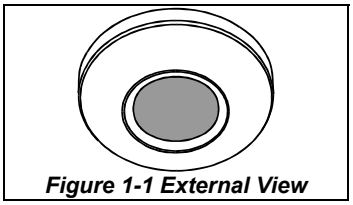


Figure 1-1 External View

Reception of RF transmission only, in another room, indicates that the user is within this receiver's range but not necessarily in the same room.

The signals, that are received at the central station, can be filtered to indicate either dual transmission reception of pinpointed location (Verified Alarms) or single (RF) transmission reception as an approximate location. Undefined transmission codes can also be filtered out in the software. This option is especially important in multi-story buildings, where sending assistance to the wrong floor, may be counter productive.

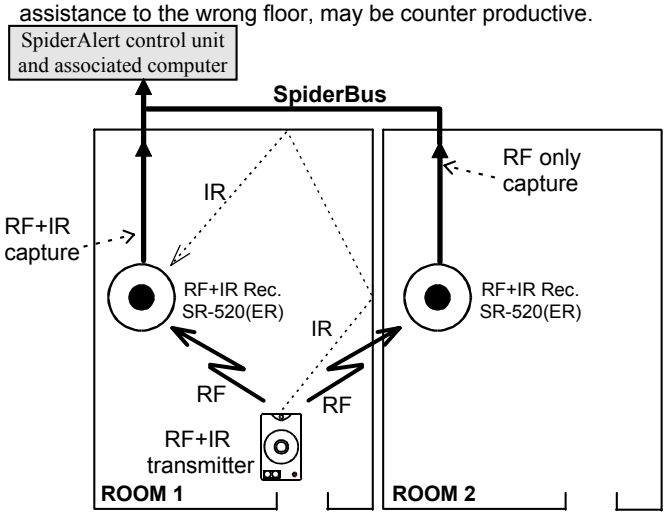


Figure 1-2 - Demonstration of RF+IR technology advantage

Note: *In this illustration, the receiver in room #1 receives the RF and IR signals and sends a verified alarm message. The receiver in room #2 receives RF transmission only and sends unverified alarm message that is filtered out by the PC software.*

2. SPECIFICATIONS

Operating Frequency: 315, 404, 418, 433.92 MHz or other frequencies, depending on country of operation.

Encoding: Factory programmed 8-bit ID number

Data Transfer to Bus: Serial, software controlled

Operating Voltage Range: 10 - 16 VDC

Current Consumption: 15 mA

Open Collector Output Current Sinking Capability: 100 mA

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

Dimensions (Diameter x H): 86 x 24 mm (3-3/8 x 15/16 in.)

Weight: 66 g (2.3 oz)

Color: White, IR window - dark red

Patent: US 5661471

Optional Accessories: SK-1, SK-2 vandal-proof enclosures

3. FUNCTIONS

3.1 Transmitter Identification

Each **12-bit** (previous generation) transmitter used in the SpiderAlert system is identified by a randomly selected 12-bit digital code (0001 through 4087). Each transmitter used in the SpiderAlert system is identified by a randomly selected 24-bit digital code (over 16-million possible code combinations).

An alert transmission made by a dual-technology transmitter is composed of an RF (Radio Frequency) signal modulated repetitively by a digital pulse train, and a pulse modulated IR (infrared) signal.

The receiver reports reception of RF-only or RF + IR signals to the head-end computer. RF-only signals may be received from RF-only (UHF) transmitters used in the SpiderAlert network, or

when there is no direct or indirect path between the dual-technology transmitter and receiver (as shown in room #2, Figure 1-2). Dual-technology reception will invariably provide a more accurate indication of the area where the transmitter was located when activated.

3.2 Message Handling Routine

The receiver functions in the following manner:

A. If a valid RF signal and correctly timed IR pulses are both received within a 1-second period, the receiver registers a "dual capture", and immediately reports this to the head-end computer, together with its own 8-bit ID number and the transmitter's ID. **A dual capture is indicated by flashing of the receiver's LED.**

B. Upon reception of a valid RF signal but no IR, the SR-520 (ER) registers an "RF-only" capture and reports this to the head-end computer, together with its own 8-bit ID number and the transmitter's ID. **An RF only capture is indicated by steady illumination of the receiver's LED**.

Note: *Some users may press the transmission button for as long as 5 seconds. To prevent repetitive reporting of the same message, the SR-520 (ER) is programmed to ignore identical messages (dual and RF-only alike) received within a 5-second time frame.*

C. Before reporting to the SLC-5, the SR-520 (ER) checks whether the bus is busy. If the bus is busy, the SR-520 (ER) pauses to prevent collision of its message with messages sent by other receivers, and then tries again.

D. Once the SLC-5 receives a valid message, it returns an "acknowledge" signal to the receiver, causing it to stop sending the data. Without a response from the SLC-5, the SR-520 (ER) will keep sending the data repeatedly, until the message is acknowledged. The receiver will not be free to receive new alert transmissions unless it gets this acknowledgment.

E. Regardless of whether it lights steadily (RF only) or pulsates (dual capture), the receiver's LED will go off 5 seconds after lighting, provided that the SLC-5 has already acknowledged the message. Without an acknowledgment, the LED will continue to light (or flash).

3.3 Supervision Method

Once every 90 seconds, the SR-520 (ER) sends an "attendance report" code to the head-end computer. The computer automatically registers all receivers that "checked in" and displays a "Restoral" message. Whenever an attendance report from a previously registered receiver is overdue, the head-end computer displays a "receiver trouble" message. This feature allows the head-end computer personnel to detect a cut data bus or a faulty/vandalized receiver.

If a receiver already on the "trouble list" resumes sending attendance reports, a "restoral" event is again registered by the head-end computer.

3.4 Output Control

The SR-520 (ER) provides a single open-collector output terminal (OUT). This circuit is controlled by the head-end computer software - it can be activated (pulled LOW), deactivated or pulsed LOW by manual or automatic computer command. The output circuit may be wired to sound an alarm, switch lights on and off, open a door controlled by an electrical door strike, control a CCTV camera or perform many other tasks. Since this open collector output can not sink more than 100 mA, an interface relay might be required for operating external devices.

4. INSTALLATION

4.1 Selecting the Mounting Location

As far as reflection and refraction are concerned, infrared emission behaves like visible light. Strict rules must therefore be observed for obtaining optimum results.

A. The IR reception range may reach 10 m (30 ft) when the transmitter's IR radiating elements are pointed directly at the receiver. With an indirect reflection path, the range may be reduced to 5 - 6 m (15 - 18 ft) or less, depending on the quality of reflection.

B. Installation in the center of the room is preferable, provided that the ceiling height does not exceed 4 m (12 ft). Installation on the ceiling near a wall or in a corner will yield poor results.

C. If ceiling installation is impossible, choose the middle of a side wall, slightly lower than the ceiling.

D. When selecting a mounting location, be sure to consider the possibility of reflections from bare tile floors, smooth walls and ceilings. The IR signal may be directed towards the reflecting object and still reach the receiver (see Fig. 1-2).

E. In large rooms, make sure that the coverage areas of adjacent receivers overlap a little, to prevent "dead spots" for the IR signal. Check reception in the various zones and add receivers if necessary.

F. Since the RF signals reach the receiver regardless of the transmitter's position within the room, it is not important to keep the receiver's antenna wire vertical. You may conceal the antenna behind false ceilings, or insert it into the duct which hides the wiring, or simply tape it to the ceiling.

IMPORTANT! *To prevent interference to IR reception, do not install the unit facing direct sunlight or near fluorescent lamps.*

4.2 Mechanical Mounting

A. Remove the front cover as shown in Figure 4-1.

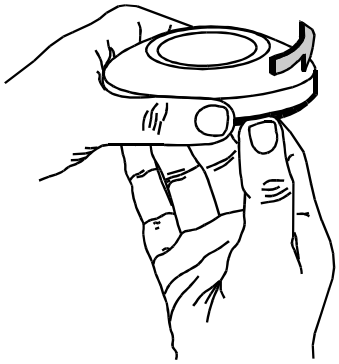


Figure 4-1. Removing the Cover

B. Hold the base, complete with the printed circuit board against the mounting surface in the selected location.

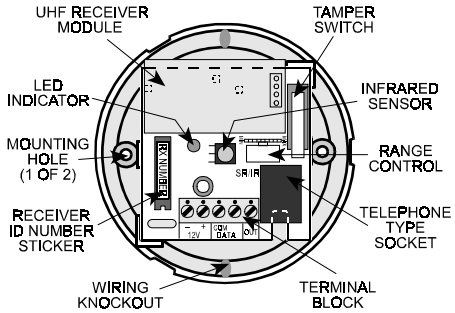


Figure 4-2. Receiver with Cover Removed

C. Mark the points for drilling, put the unit aside and drill the mounting holes.

D. Attach the unit to the mounting surface using two screws and anchors (if required).

E. Complete the wiring as instructed in Section 4.3.

4.3 Wiring Terminal Block

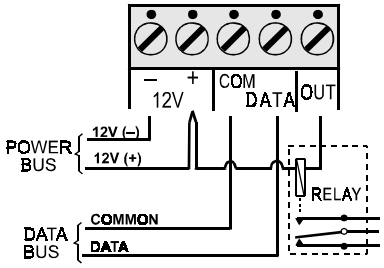


Figure 4-3. Terminal Block Connections

A. Connect the 2-wire data bus to the **DATA** terminals on the receiver's circuit board. One of these terminals is marked **COM**, indicating connection to the common (negative) lead of the data bus. The other (unmarked) data terminal must be connected to the data lead of the bus, which is kept HIGH by a pull-up resistor in the SLC-5 for as long as the data bus is free. **Do not reverse the data bus wires!**

B. Connect the 12 VDC power source to the **12V(+)** and **(–)** terminals. Operating power may be supplied via the common 2-wire power supply bus. If required, individual power sources may be used for each group of receivers (see Paragraph 2-2 in the SLC-5 manual, Publication DE7115).

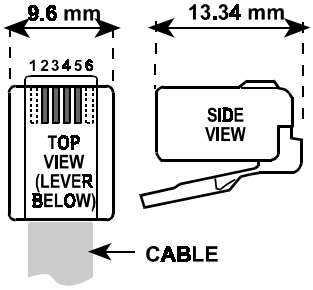
Note: *In multi power-supply installations, interconnect the (–) terminals of all power supply units.*

C. You may connect a 12 VDC buzzer, an LED or the operating coil of an auxiliary relay across the **OUT** and **12V(+)** terminals. The OUT terminal is pulled low (–) by computer command (see Para. 3.4, Output Control).

4.4 Wiring with Telephone Type RJ-11 Socket

If you prefer the quick attach/detach feature of telephone type connectors, you can wire the receiver to the SpiderAlert bus using the on-board four-position RJ-11 socket and a junction box with a similar built-in socket. Prepare the following items:

- An appropriate length of a 4-lead color-coded modular cable.
- Two 4-position RJ-11 male plugs (see Fig. 4-4).
- A crimping tool for RJ-11 type telephone plugs.



Pin No.	Lead Assignment
2	12 VDC (–)
3	Common (data bus)
4	Data (data bus)
5	12 VDC (+)

Figure 4-4. 4-Position RJ-11 Plug

With all these items in your possession, proceed as follows:

A. Identify the 4 wires of the bus and connect them to the numbered terminals within the junction box, maintaining the order required for correct patching (see Figure 4-5)

B. Prepare an RJ-11-to-RJ-11 patch cord, long enough to bridge the distance between the bus junction box and the SR-520 (ER). Make sure a "one-for-one" configuration is obtained, whereby pin 2 is connected to pin 2, pin 3 to pin 3, etc.

CAUTION: *Do not use ready-made TELCO RJ-11 to RJ-11 patch cords, because they very rarely have the above mentioned "one for one" design.*

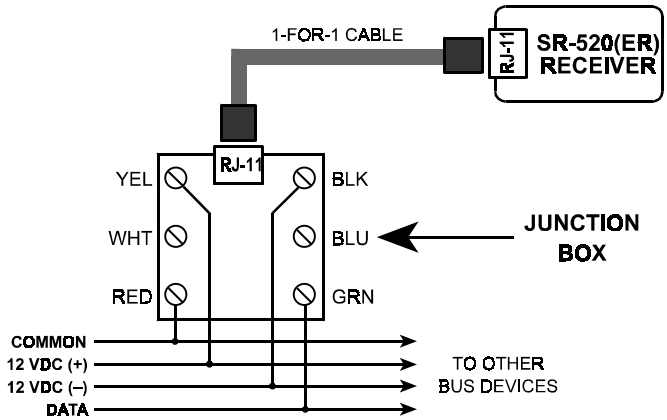


Figure 4-5. Using a Junction Box

4.5 Final Assembly and Test

After wiring, set the RANGE control of each receiver to mid-position. Align the ridge on the cover with the cavity in one of the two projections on the base circumference (see Figure 4-6). Fit the cover over the base, and rotate the cover clockwise until it stops. The translucent "lens" filters out visible light, but allows omni-directional reception of the IR signal.

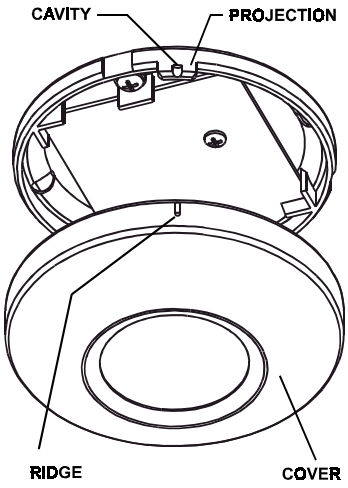


Figure 4-6. Installing the Cover

Operate transmitters in various locations within a receiver's coverage area to test the reception range of each receiver. Reception is verified when the LED lights steadily (RF-only capture) or flashes (dual capture) in response to each transmission.

Important: *Before testing, verify that the SLC-5 is active. If the SLC-5 happens to be OFF, each receiver that picks up an alert transmission will become "hung up" indefinitely, relaying the message over and over again.*

If "dead" or marginal reception areas are discovered, additional receivers may be located wherever necessary.

5. MAINTENANCE

5.1 Periodic Inspection

The supervision feature of the SpiderAlert system allows the head-end computer personnel to detect a disconnected data bus or a receiver that fails to perform its data transfer duties.

This supervision, however, does not cover the RF and communication part of the process. If the RF or IR sections of the SR-520 (ER) malfunction, the receiver will continue to send out regular attendance reports, but will not be able to receive wireless (or IR) transmissions. For this reason, the system manager should make provisions for testing the system periodically without alarming the monitoring personnel, as suggested below in Testing by the System Manager.

Individual transmitter holders (system users) should test their transmitters periodically without involving the monitoring personnel. This can be carried out as suggested below in Testing by Individual Users.

5.2 Testing by the System Manager

To ensure unfailing operation of the system, the system manager is advised to act as follows:

A. Define one or several transmitters as **test units** and ask the monitoring personnel to link a test message to these transmitters' ID numbers in the computer's data base. Transmissions received from these test transmitters will be registered in the on-screen event log but will not be considered an alert.

B. Use a **test transmitter** to test all receivers at least once a week by initiating a transmission in the coverage area of each receiver. Watch the receiver's LED light in response to your transmission and go off once the message is acknowledged.

C. Return to the monitoring station and check the event log to verify that all test transmissions were duly registered by the system's computer.

D. Call the installation company and report any receiver that failed to send a message to the computer.

5.3 Testing by Individual Users

Any SpiderAlert site may be easily equipped for transmitter tests by individual users:

A. Create a special **test station**, well away from the coverage area of all other receivers.

B. Define a receiver as a **test unit** and set its sensitivity control to MIN.

C. Wire a green LED with a 1kΩ resistor in series across the test unit's **OUT** and **12V+** terminals. The computer can be programmed to respond to messages received from the test unit by momentary activation of the test unit's output.

D. Ask the monitoring station personnel to link a test message to the test unit's ID number in the computer's data base. Any message collected from this receiver will thereby be considered a test message.

E. Inform all users about the test station, and encourage them to test their transmitters periodically at close range.

Momentary illumination of the green LED in response to each transmission serves as an assurance that the test is successful.

VISONETIX LTD. (ISRAEL): P.O.B 22020 TEL-AVIV 61220 ISRAEL. PHONE: (972-3) 645-6890, FAX: (972-3) 645-6891
VISONIC SYSTEMS INC. (U.S.A.): 10 NORTHWOOD DRIVE, BLOOMFIELD CT. 06002-1911. PHONE: (860) 242-9945, (800) 874-3989 FAX: (860) 242-0191
VISONIC LTD. (UK): UNIT 1, STRATTON PARK, DUNTON LANE, BIGGLESWADE, BEDS. SG18 8QS. PHONE: (01767) 600857 FAX: (01767) 601098

MADE IN ISRAEL