SP-5

Multi-Channel Speech Processor

Visonic Ltd

Installation Instructions

1. INTRODUCTION

1.1 Description and Capabilities

The SP-5 is an advanced 4-channel record/playback device for short voice messages. A different message can be recorded on each of the 4 "channels", and each channel can be played back separately by triggering the corresponding input. A unique design feature allows the number of messages at one site to be increased virtually without limit by cascading any number of SP-5 units (para. 1.6).

The total available recording time for all 4 messages is 20 seconds (or, optionally, 90 seconds). For maximum efficiency, each outgoing message can be composed of a short "individual" message (alarm, fire, etc.) and a longer "common" message (location, address or alert signal). The common message can be joined to the beginning or the end of each individual message, as desired. Upon triggering one of the 4 channel inputs, the relevant individual message and the common message are played back in succession, in the order chosen (Para. 1.3B), and in accordance with the selected playback mode (Para. 1.3C).

The SP-5 provides 1-Watt audio output that can be applied to a loudspeaker, or to the Visonic Ltd. 10 W power amplifier AMP-10, or to a dialer that has special speech processor input. The unit may be used for verbal reporting of burglar or fire alarms and for making access control systems and vending machines "speak out". It may also provide automatic playback of warnings, announcements, guidance and advertisements in elevators, stairwells, corridors, exhibitions, museums, etc.

Playback from each channel can be triggered by motion detectors or any type of momentary or on/off switch. The channel inputs can function with normally open or normally closed switches (Para. 1.4A).

A microphone, RECORD pushbutton, volume control potentiometer and LED status indicator are included on board (Fig. 1). An audio source selector permits the installer to choose between recording speech directly with the internal microphone or using a pre-recorded message from an external audio source such as a tape recorder. The SP-5 recognizes priority levels and will therefore interrupt a lower priority message in favor of a higher priority message (Para. 1.4B).

The SP-5 is suitable for mounting within a host system cabinet or inside a loudspeaker housing. Two units may be mounted in an optional plastic cabinet - model UPB-3. Operating power is drawn from the host system or from an external 12VDC supply.

1.2 Message Structure

The SP-5 can store four separate individual voice messages plus a common message linked to all 4 channels. The overall recording time must not exceed 20 seconds (or 90 seconds as an option). The common message may be used to indicate the location of the particular SP-5 or to identify its user or to play an alert signal. The 4 individual messages provide information associated with the specific channel inputs.

Suppose the SP-5 is installed in an imaginary warehouse known as **Acme Storage** and wired to report verbally via an automatic dialer. Four distinct alarm messages could be recorded for transmission and linked to a common message, as demonstrated in the following example:

Chan.	Combined Message (common + individual)
1	*Acme Storage,* fire alarm
2	*Acme Storage,* intrusion alarm
3	*Acme Storage,* flooding alarm
4	*Acme Storage,* power failure

In this example, the common message is "Acme Storage". The individual messages relate to the type of alarm associated with particular channel input.

Memory space (recording time) can be divided freely between the four individual messages and the common
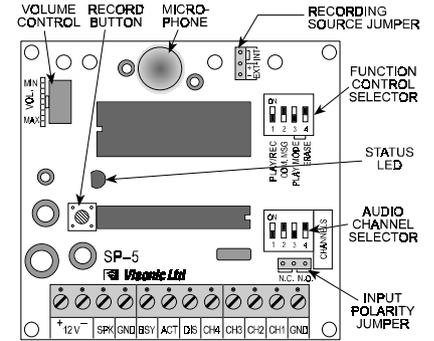
Figure 1. PC Board Layout

message, provided that the total accumulated recording time of all 5 messages will not exceed the 20-second time limit. Omitting a certain channel message or the common message will leave more memory space for the rest of the messages.

1.3. Selectable Functions

Figure 2 presents the Function Control 4-lever DIP switch. The tasks of all four switches are explained in the following sub-paragraphs.

A. Play/Record (SW1)

The PLAY/REC switch (marked **1**) enables you to determine the standby state of the SP5.

ON: The unit will stand by for **recording** (see Section 4 for recording procedure).

OFF: the unit will stand by for **playback**. Playback will start if channel input is triggered, or a channel DIP switch is set to ON.
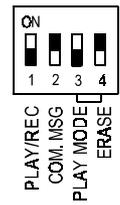
Figure 2. Function Control Switch

B. Playback Order

The COM MSG switch (marked **2**) determines which part will be played back first: the individual channel message or the common message.

ON: The common message will be played back first, and then the individual channel message.

OFF: The individual channel message will be played back first, and then the common message.

C. Playback Mode (SW3, SW4)

The PLAY MODE / MEMORY ERASE selectors (levers **3** and **4** of the Function Control switch) can be set to four different combinations as follows:

3	4	Resultant Mode
ON	**ON**	Erase mode - all recordings are erased (if REC button is pressed 3 times*).
OFF	**OFF**	Single playback (non repeating) in response to momentary or continuous triggering of any input.
ON	**OFF**	Repeated playback with timeout after 3 minutes, in response to momentary or continuous triggering of any input.
OFF	**ON**	Repeated playback for as long as the channel input is kept triggered, but subject to the 3-minute timeout.

* The button must be pressed for at least 1/2 second each time - all within 4 seconds.

1.4 Input Channel Characteristics

A. Input Polarity Definition

All 4 channel inputs, CH1 through CH4, can be programmed to function as Normally Closed (N.C.) or Normally Open (N.O.), by changing the position of the on-board input polarity jumper (see Figure 1).

B. Channel Priorities

Each channel has a priority level commensurate with its number. This means that channel 1 has the highest priority and channel 4 has the lowest priority.

For example, if CH2 is triggered while Channel 1 is engaged in playback, Channel 2 will have to wait until Channel 1 times out. Conversely, if Channel 1 is triggered while Channel 2 is engaged in playback, Channel 2 will become disabled on the first pause between message repetitions, and Channel 1 will take over (will start its own playback).

1.5 The Channel Selector

The **CHANNELS** selector allows you to select the channel into which you are going to record a message. It also allows you to initiate a test playback from each channel (see Para. 4.3). The various settings possible with the four switch levers are:

"**1**" ON and the rest OFF - Channel 1 is selected

"**2**" ON and the rest OFF - Channel 2 is selected

"**3**" ON and the rest OFF - Channel 3 is selected

"**4**" ON and the rest OFF - Channel 4 is selected

"**1**", "**2**", "**3**" and "**4**" ON - All four channels are selected for recording the common message.

1.6 The Control Terminals

In applications requiring more than four audio channels, several SP-5 units may be installed to operate harmoniously into the same loudspeaker or into the same communicator device. This is possible by virtue of 3 special control terminals that play a very important role in multi-unit configurations (Fig. 3). The control terminals are:

DIS - DISABLE input. If pulled LOW (grounded) by an external circuit, this terminal disables the SP-5.

ACT - ACTIVE output. This terminal, which is normally HIGH, is pulled LOW by internal circuitry in the following cases:

– While the SP-5 is engaged in playback.

– While the SP-5 is disabled via its DIS input.

– While the SP-5 stands by because the BUSY line indicates that the audio amplifier is currently engaged in amplifying speech played back by another SP-5 unit.

BSY - BUSY Input/Output terminal. While an SP-5 is engaged in playback, its BSY terminal is pulled to ground by internal circuitry, to indicate that a message is being played back into the speaker. The other SP-5 units sense this indication via their own BSY terminals (Fig. 3).

In the example of Figure 3, the first SP-5 unit has higher priority than other units, because it can not be disabled (its DIS input is not connected). When it starts playing back, its ACT output goes LOW and disables the second

Figure 3. Multi-Unit Configuration

unit, which in turn disables the third unit and so on. Suppose the 2nd unit is triggered into playback before the 1st unit. In the course of this playback, the first unit can also be triggered into playback. The BUSY line informs the first unit that the system is busy. However, when the 2nd unit pauses between message repetitions, the first unit senses the momentary release of the BUSY line and starts playing back. Simultaneously, the first unit's ACT output disables all other units to prevent them from taking over at the first pause.

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2. SPECIFICATIONS

Maximum Recording Duration: 20 sec (90 sec optional)
Memory Type: EEPROM (no need for battery backup)

Number of Audio Channels: 4

Channel Input Types: N.O. or N.C., jumper selected
Control Terminals:
BSY - Normally HIGH Input/output. Goes LOW while the SP-5 plays back a message. Prevents playback if pulled LOW externally.
DIS - Normally HIGH input. Disables the SP-5 if pulled LOW (disable takes effect only when pausing between message repetitions).
ACT - Normally HIGH output. Goes LOW during playback, or when the DIS input is LOW, or while the SP-5 waits for release of the BSY line.

Interval between Message Repetitions: 2 seconds

Loudspeaker Output: 1W across 8Ω (attenuated to 1 V p-p max. if the VOL control is set to MIN.)

External Audio Input: 100 mV p-p max./ 4 kΩ
Supply Voltage: 12 VDC ± 15%

Current Consumption: 10 mA (standby), 30 mA (record), 300 mA peak (playback into loudspeaker).
Operating Temp.: 0°C to 50°C (32°F to 122°F)

Size: SP-5: 70 x 74 x 16.5 mm (2-3/4 x 2-7/8 x 5/8")
UPB-3 (optional): 165 x 108 x 38 mm (6-1/2 x 4-1/4 x 1-1/2 ")
Weight: SP-5: 48 g. (1.7 oz),
     UPB-3 (optional): 154 g. (5.4 oz)

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3. INSTALLATION

The SP-5 is supplied as a module without a case, for installation within a host system cabinet. It may be also installed in an optional UPB-3 plastic housing that can accommodate two side-by-side SP-5 units or a single unit, as desired (Para.3.2)

3.1 Mounting an Unpacked SP-5

Mounting the SP-5 module within a host system cabinet is simple, by using the mounting holes at the 4 corners of its printed circuit board (Fig. 4).

Be sure to leave at least 6 mm clearance between the bottom of the PCB and any metallic chassis. This is easily achieved by inserting plastic standoffs over the mounting screws, to serve as spacers between the printed circuit board and the chassis.

3.2. Mounting in the UPB-3 Cabinet

If your wish to use a UPB-3 cabinet for mounting two SP-5 modules, refer to Figures 5, 6 and 7 and proceed as follows:

A. Remove the screw that secures the UPB-3 cover to the base.

B. Insert a small screwdriver blade into the slot near one of the snap-in tabs, as shown. Carefully flex the
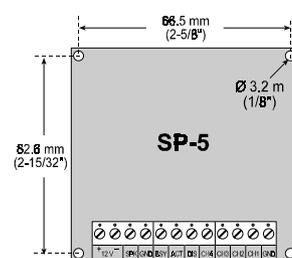

Figure 4. Mounting Hole Plan

cover edge out, until the cover disengages from the tab. Repeat this with the other tab to free the cover completely.

C. Lift the free edge of the cover diagonally up and get the other edge free by pulling it backwards to disengage the tabs at the back.

D. Hold the base against the mounting surface and mark the points for drilling.

E. Drill the mounting holes and insert wall anchors (if necessary). Insert the wires into the base through the wiring holes. Attach the base to the mounting surface with the two long screws.
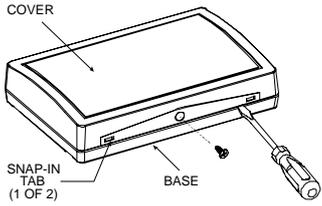
Figure 5. *Optional UPB-3 Cabinet, Cover Removal*
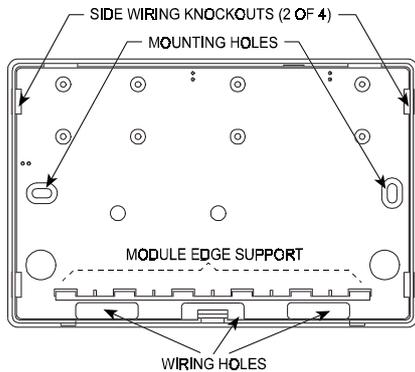
Figure 6. *Mounting and Wiring Provisions*
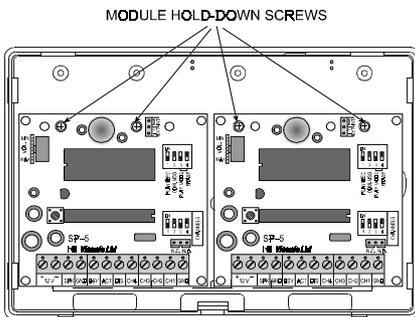
Figure 7. *Dual Module Setup in UPB-3 Cabinet*

F. Put the SP-5 modules in place as shown in Figure 7 (with the bottom edge seated in the module edge support). Align the holes in the top part of the PCB with the plastic stand-off in the base. Secure the modules to the base with the short hold-down screws.

4. PREPARATION AND TESTING

4.1 Erasing All Previous Recordings

This procedure is important if the SP-5 unit has been used before in another application, or tested on the installer's bench. Total erasure will remove the previous "memory partition table", allowing you to freely re-divide the recording time between the channel messages and the common message.

A. Set levers **3** and **4** of the Function Control switch to ON, and verify that lever **1** is set to OFF.

B. Press the REC button 3 times in succession (keep the button down at least 0.5 seconds each time). **There is a 4-second timeout for this operation.** If done properly, the on-board

3.3 Wiring a Single Unit

Refer to Figure 8 and perform the following steps:

A. Verify that the input polarity jumper (N.C./N.O.) is mounted on the desired pair of pins, depending on the type of switches used to trigger the SP-5.

B. Connect each triggering device across its respective input (CH1, CH2, CH3, CH4) and one of the ground (GND) terminals.

Note: Dry contact or open-collector triggering devices may be used.

C. Connect a 1-Watt loudspeaker across the SPK and GND terminals. Optionally, you may connect an audio power amplifier or a dialer audio input.
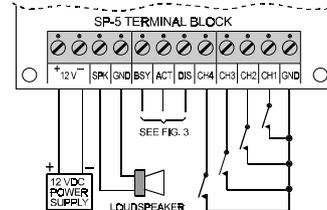
Figure 8. *Wiring the SP-5*

> **Important!** *For driving an amplifier or a dialer, you can attenuate the audio output level to 1 V p-p by turning the volume control (VOL) all the way down to MIN. (minimum).*

D. Do not make any connections to the BSY, ACT and DIS terminals. However, the BSY terminal may be used to mute/activate an external audio amplifier driven by the SP-5 audio output.

E. Connect a nominal 12 VDC power source across the 12VDC **(+)** and **(–)** terminals, making sure not to reverse the polarity.

3.4 Wiring a Multi-Unit Configuration

A. Perform steps A and B in Para. 3.3 above.

B. Interconnect all BSY terminals, all GND terminals and all SPK terminals (Fig. 3).

> *Note: The BSY line can be used to mute/activate an external audio amplifier driven by all SP-5 units in parallel.*

C. Select the SP-5 units to which you wish to assign priority. Leave the DIS terminal of this unit disconnected (Fig. 3).

D. Connect a wire between the ACT terminal of the first (high priority) unit to the DIS terminal of the second unit. Connect the ACT terminal of the second unit to the DIS terminal of the third unit, and so on. Do not connect anything to the ACT terminal of the last unit.

E. Connect a nominal 12 VDC power source across the 12VDC **(+)** and **(–)** terminals of all SP-5 units, making sure not to reverse the polarity.

Note: Once an SP-5 unit is disabled via its DIS terminal, its indicator LED flashes slowly.

LED will flash rapidly for half a second to indicate successful erasure.

C. Select the non-repeating playback mode by setting levers No. **3** and **4** of the Function Control switch to **OFF.** This mode is required for later testing (para. 4.3).

4.2 Recording New Messages

To record with the on-board microphone, verify that the recording source jumper is mounted across the two **INT** pins of the recording source header.

Note: To make a good recording with the microphone, turn off nearby radio receivers and noisy machines, and ask people near

you to keep silent while you record. Speak at normal voice level about 50 cm from the microphone, but get closer to the microphone if background noise is too high.

To record a signal from an external audio source, remove the jumper from the **INT** position and connect the external audio source across the **EXT (+)** and **(–)** pins. However, a correct signal level is required for making a good quality recording. For instance, you could record from the loudspeaker output of a portable tape player, provided that you turn the tape player's volume almost all the way down. Hi-Fi amplifiers and CD players have a fixed level LINE output that would normally overload the **EXT.** input of the SP-5. A simple attenuator is therefore required (Fig. 9).

When using the attenuator, turn the 1 kΩ potentiometer all the way down, make an experimental recording (see Steps A through D below) and play it back (as explained in para. 4.3). If the recording level is too low, turn the potentiometer slightly up and make another recording. Continue like this until you are satisfied with the results.

Whatever the recording source, proceed as follows:

A. Prevent the 4 channel inputs from being accidentally triggered into playback.

B. Select the recording mode by setting lever No. **1** of the Function Control DIP switches to ON.

C. Select the 1st audio channel by setting lever No. **1** of the "CHANNELS" DIP switch selector to ON (verify that all other levers of this switch are OFF).

Figure 9. Line Output Attenuator

*Note: Time your recording carefully so as to leave memory space for all other message segments you intend to record. **Recordings shorter than 0.5 s will not be saved.***

D. Depress and hold down the REC button. The on-board LED will light. Start speaking immediately. The recording stops and the LED goes out once you release the REC button.

Note: The LED may flash rapidly, indicating that the new recording exceeds the time allocated to channel 1 by the previous "memory partition table". Cancel the previous memory partition table by erasing all previous recordings (para. 4.1). Rapid flashing may also indicate total recording timeout (see Step H below).

E. Set the lever No. **1** of the DIP switch "CHANNELS" selector to OFF and select the next channel by setting its respective switch lever to ON.

F. Record as in Step D above. Continue like this until you finish with the 4th channel.

G. Set all 4 levers of the DIP switch "CHANNELS" selector to ON.

H. Record the common message as in Step D above. If an alert tone is desired as an attention signal before or after the voice message, you could record a few seconds of a running siren as the common message. The siren speaker should be placed face down on a flat surface 30 to 60 cm (1 to 2 ft) from the SP-5. Adjust the distance between the siren and the SP-5 as needed until the desired sound quality is achieved.

> *Important! If the overall time limit is exceeded, the LED will flash rapidly. Erase all previous recordings (para. 4.1), rephrase your messages to make them shorter and record again. Save time by not pausing after pressing the REC button.*

I. Return all channel switches to OFF.

J. In a multi-unit installation repeat the entire recording procedure for each unit.

4.3 Testing by Playback

A. Verify that the non-repeating playback mode is selected (para.1.3C).

B. Select PLAY by setting lever No. **1** of the Function Control DIP switches to OFF (para. 1.3B).

C. Set lever No. 2 of the Function Control DIP switches to the desired playback order (para. 1.3B).

D. Select the first audio channel by setting lever No. **1** of the "CHANNELS" DIP switch selector to **ON** or by triggering input **CH1**. The common message will be heard over the loudspeaker, followed by the channel's individual message. Adjust the VOL (volume) control for the desired sound level.

E. Set lever No. **1** of the "CHANNELS" DIP switch selector to **OFF**. Select the second audio channel by setting lever No. **2** to **ON** or by triggering input **CH2**. Listen to the playback.

F. Test Channels 3 and 4 in a similar manner and return all channel switches to OFF.

G. In a multi-unit installation, repeat the entire testing procedure for each unit.

If all messages are coherent, the recording operation has been concluded successfully.