

Telephone Announcement System

Model TAS-1

– INSTALLATION AND OPERATION –

*This documentation is valid for
Telephone Announcement System hardware version 1.00 with firmware version 1.01*

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Section I — Safety Information



WARNING!

The Telephone Announcement System should be installed only by qualified technical personnel. An attempt to install this device by a person who is not technically qualified could result in a hazardous condition to the installer or other personnel, and/or damage to the TAS-1 or other equipment. Please ensure that proper safety precautions have been made before installing this device.

The TAS-1, as any electronic device, can fail in unexpected ways and without warning. Do not use the Telephone Announcement System in applications where a life-threatening condition could result if it were to fail.

The TAS-1 is designed for indoor use in a dry location. Installation and operation in other locations could be hazardous. Use only the original wall-plug power supply supplied with the unit.

The purchaser and user of the TAS-1 bears the sole responsibility for determining suitability of this equipment for their intended use. Because this equipment can fail in an unpredictable or unexpected way, even in normal use, Sine Systems, Inc. cannot be held responsible for damages, either direct or indirect, resulting from use of this equipment.

Section 2 — FCC Information

2.1 Part 68 Compliance

The TAS-1 complies with Part 68 of the FCC rules. A label on the TAS-1 contains, among other information, the FCC registration number and ringer equivalence number (REN) for this equipment. If requested, this information must be provided to the telephone company.

The REN is used to determine the quantity of devices that may be connected to the telephone line. Excessive RENs on the telephone line may result in devices not ringing in response to an incoming call. In most areas, the sum of the RENs should not exceed 5.0. Contact the local telephone company to determine the maximum REN for the calling area.

The TAS-1 is designed for use with standard modular (RJ11C) telephone jacks.

The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the TAS-1. If this happens, the telephone company will provide advance notice in order for you to make the necessary modifications to maintain uninterrupted service.

If the TAS-1 causes harm to the telephone network, the telephone company will notify you in advance of service disconnection. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

Please contact Sine Systems, Inc., for repair and/or warranty information if you suspect that the TAS-1 has malfunctioned. If a defective device is causing harm to the telephone network, the telephone company may request you remove that device from the network until the problem is resolved.

The TAS-1 cannot be used on public coin service lines provided by the telephone company. Connection to Party Line Service is subject to state tariffs. Contact your state public utility commission, public service commission, or corporation commission for information.

The TAS-1 is registered with the Federal Communications Commission and is certified to meet specific safety requirements. It is extremely important that the TAS-1 not be modified in any way. Modification of this equipment will void the FCC certification, void the warranty, and perhaps pose a hazard to the user of this equipment or to maintenance personnel of your local telephone company.

Service should be performed only by qualified technical personnel who are familiar with the implications of FCC Part 68 registration. Extreme caution should be used if the TAS-1 case is opened while still connected to the telephone line. High voltages may be present on telephone lines.

Section 3 — System Description

3.1 General Description

The Telephone Announcement System delivers the time and temperature along with a brief announcement or commercial message over a telephone line. The normal procedure goes like this:

- the TAS-1 answers a ringing phone line
- it plays an opening message
- it announces the time and temperature
- it plays a closing message (optional)
- then it hangs up the phone line

There can be more than one opening message and the closing message is optional. When multiple opening messages are used, the TAS-1 rotates through the different messages. Figure 3.1 shows the message options. There are six message modes with different numbers of messages and corresponding message lengths. The times shown in the table are the maximum message lengths available in each mode--shorter messages may be used.

Message Mode	Mode 1	Mode 2	Mode 3	Mode 4	Mode 5	Mode 6
Opening message 1	30 secs	15 secs	10 secs	30 secs	15 secs	10 secs
Opening message 2	—	15 secs	10 secs	—	15 secs	10 secs
Opening message 3	—	—	10 secs	—	—	10 secs
Closing message	—	—	—	15 secs	15 secs	15 secs

Figure 3.1; Message mode selections

Several other features are available in the Telephone Announcement System. The TAS-1:

- counts the number of calls that it receives
- monitors for an inactive (defective) phone lines
- delivers the temperature in Fahrenheit or Celsius
- automatically adjusts the time for daylight savings time
- synchronizes the clock to AC line power for long-term accuracy

The TAS-1 can connect to a maximum of 2 telephone lines. More telephone lines can be added with the use of one or more TAS-1/ex expansion units. Each expansion unit increases the system capacity by six telephone lines. Ten expansion units can be added to a single TAS-1 for a total of 62 telephone lines.

The Telephone Announcement System contains an internal rechargeable battery that allows the system to maintain accurate time in the event of a power failure. The battery is charged when AC line power is available.

3.2 Switches and Indicators on the TAS-I

The front panel of the Telephone Announcement System has five pushbutton switches that are used to adjust the system and three LED's that indicate the status of the system.



Figure 3.2; TAS-I front panel

3.2.1 Front Panel Switches

The front panel switches are as follows:

- Operate is used to switch the TAS-1 between normal operation and setup mode
- Previous/Next are used in setup mode to step through system options
- Down/Up are used in setup mode to change the value of a system option

While recording messages the Down and Up buttons operate as Stop and Start buttons.

3.2.2 Front Panel Indicators

The front panel of the TAS-1 has three LED's that indicate several things.

- The Power LED is normally on to indicate that external power is present and the unit is operating normally. This LED blinks every 2.5 seconds when the TAS-1 is operating off the backup battery.
- The Power LED blinks off, briefly, once a minute at zero seconds. This can be used to set the time exactly with a reference clock.
- The Power LED blinks repeatedly while in the setup mode.
- The Line 1 and Line 2 LED's indicate when the corresponding telephone line has a call in progress.
- The Line 1 and Line 2 LED's blink every 2.5 seconds when system clock needs to be set.
- When the inactive line indicator is enabled, the Line 1 or Line 2 LED will blink repeatedly to indicate an inactive line. When a call is received on the line, the LED will respond normally to indicate line use.
- The LED's will blink in a rotating sequence during message recording as a visual indication of recording in progress.

3.3 Switches and Indicators on the TAS-1/ex Expansion unit

The front panel of the Telephone Announcement System has six LED's that indicate the status of the system and a Unit ID selector switch.

3.3.1 Front Panel Switches

There is only one switch on the front panel of the TAS-1/ex Expansion Unit. The Unit ID selector switch sets the Expansion Unit ID. Each TAS-1/ex must have a unique ID.



Figure 3.3; TAS-1/ex front panel

3.2.3 Front Panel Indicators

The TAS-1/ex has six LED's on the front panel that indicate the status of the six telephone lines. They behave exactly like the line indicator LED's on the TAS-1 main unit.

3.4 Connections on the TAS-1

3.4.1 Front Panel Connections

The TAS-1 has three audio connections on the front panel for audio connections. Figure 3.2 shows the location of these connectors.

- The Play 1/Play 2 jacks are the audio outputs from the two message delivery systems. Headphones connected to these outputs are used to audition the messages stored in the system.
- The Mic input connector provides the input signal when recording messages in the system.

3.4.2 Rear Panel Connections

The TAS-1 has two modular connectors, one pin/plug connector and two phone connectors that provide a variety of system I/O. Figure 3.4 shows the location of these connectors.

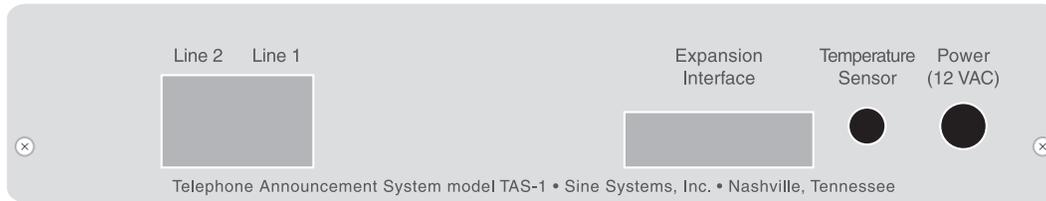


Figure 3.4; TAS-1 rear panel

The rear panel connections are as follows:

- Line 1 and Line 2 are modular connectors for the telephone lines
- Expansion Interface provides an interface for up to ten TAS-1/ex Expansion Units
- Temperature Sensor is the connection point for the air temperature sensor
- Power is the 12VAC main supply input

3.5 Connections on the TAS-1/ex Expansion Unit

3.5.1 Rear Panel Connections

The TAS-1 had six modular connectors, one pin/plug connector and one phone connectors that provide a variety of system I/O. Figure 3.5 shows the location of these connectors.

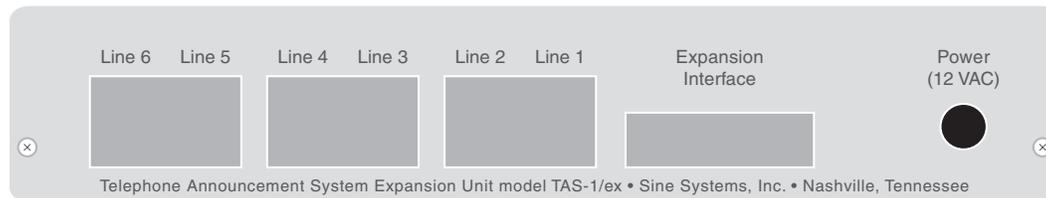


Figure 3.5; TAS-1/ex rear panel

The rear panel connections are as follows:

- Line 1 through Line 6 are modular connectors for the telephone lines
- Expansion Interface provides an interface to the TAS-1 main unit
- Power is the 12VAC main supply input

Section 4 — Installation and Setup

4.1 System Includes

The Telephone Announcement System package contains these items:

- Telephone Announcement System model TAS-1
- temperature sensor with cable
- rechargeable battery (installed)
- microphone and headphones
- power supply for use in the US
- operation manual

4.2 Installing the Unit

The Telephone Announcement System is designed to be placed almost anywhere. It generates little heat and can be mounted in just about any convenient location where the ambient temperature does not exceed 120°F.

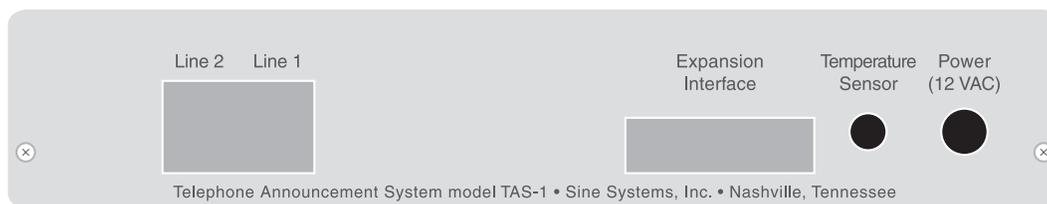


Figure 4.1; TAS-1 rear panel

Installation is quite simple and only a few connections are needed. All the necessary cables and accessories are included with the TAS-1 package.

4.2.1 Temperature Sensor

Plug the temperature sensor into the rear panel of the TAS-1 main unit at the jack labeled Temperature Sensor.

The temperature sensor comes with 100 feet of cable. If more cable is necessary, a 100 foot extension cable is available. Up to 1000 feet of cable can be used. Extension cables should be protected from moisture at the connectors. Winding the connectors in black electrical tape is usually sufficient.

4.2.2 Telephone Lines

The TAS-1 requires one or more telephone standard analog telephone lines (POTS). Connect the telephone lines to the rear panel jacks labeled Line 1 and Line 2. If only one telephone line is used, it can be connected to either jack.

The main TAS-1 unit has a two line capacity. More lines may be added to the system through the use of TAS-1/ex Expansion Units.

4.2.3 Power Supply

The Telephone Announcement System is powered by 12 volts AC from the included wall plug supply. Connect the power lead into the jack labeled 'Power' on the rear of the TAS-1 and plug the other end into a standard 120V wall outlet.

4.2.4 Backup Battery

A backup battery that powers the internal clock in the event of AC power failure is installed at the factory. The TAS-1 has a charging circuit that will keep the battery charged when AC power is available.

Allow at least 72 hours for the battery to reach full charge when the TAS-1 is powered up for the first time.

4.2.5 Expansion Units

Up to ten TAS-1/ex Expansion Units can be used with one TAS-1 main unit. Each expansion unit must have a unique Unit Number that is set by a rotary switch on the front panel of the expansion unit. Set the Unit Number to 1 for the first expansion unit, 2 for the second and so on for all the expansion units in the system.



Figure 4.2; TAS-1/ex rear panel

The expansion units receive data from the TAS-1 main unit via the expansion interface cable. The easiest way to connect the units is to stack them on top of one another (in any order you prefer) and connect the interconnect cable to the Expansion Interface connector on the rear of each device.

Each expansion unit can accommodate up to six telephone lines. For optimal system performance, use all telephone lines on the expansion units before using the telephone lines on the main unit.

Each device in the system is powered by a 12 volt AC wall transformer that is included in the system package. Connect the power lead into the jack labeled 'Power' on the rear of the TAS-1/ex and plug the other end into a standard 120V wall outlet.

4.3 Programming Mode

Any time the TAS-1 clock is not set it will refuse to answer calls. This includes the first time the TAS-1 is powered up after shipping from the factory or any time after that when both AC and backup battery power are lost. The Line 1 and Line 2 LED's will blink to indicate that the clock is not set.

4.3.1 Mode Selection

The TAS-1 powers up in the operating mode. In this mode, it answers calls and delivers the appropriate time and temperature messages.

- To enter programming mode, press the Operate and Previous buttons at the same time. The Power LED will blink to indicate that the TAS-1 is in programming mode.
- To return to operating mode, press the Operate button. The Power LED will stop blinking to indicate that the TAS-1 is in operating mode.

4.3.2 Using the Programming Mode

The front panel of the Telephone Announcement System has five pushbutton switches that are used to setup the TAS-1 using the programming mode. This mode is used to:

- set the clock
- calibrate the thermometer
- record/playback the messages
- indicate an inactive phone line
- count the number of calls received

The Telephone Announcement System will not answer calls when it is in the programming mode.

No programming changes are allowed when a call is in progress. The TAS-1 will disconnect all calls if programming changes are made while any calls are in progress.

A set of headphones should be plugged into the Play 1 jack so that you can hear the system prompts.



Figure 4.3; TAS-1 front panel

The Power LED blinks when the TAS-1 is in programming mode. It lights without blinking in operating mode.

All three LED's will blink in a rotating sequence during message recording as an indication that recording is in progress.

TAS-1 programming is based on the table of options shown in figure 4.4. In programming mode,

- the Next button steps down one location in the table
- the Previous button steps up one location in the table
- the Up/Start button performs the function in the Up/Start column
- the Down/Stop button performs the function in the Down/Stop column

To program the TAS-1,

- connect a set of headphones to the Line 1 jack on the front panel of the TAS-1
- press the Operate and Previous buttons simultaneously to enter programming mode
- press the Next button. The TAS-1 responds, "Location 01: Value 00000". The TAS-1 is reading the value of the call counter which is at location 01 in table 4.4.
- press the Next button one or more times to select another option
- press the Up or Down buttons to adjust the selected option
- press the Operate button to exit the programming mode

Location	Name	Description and Value Range	Up/Start function	Down/Stop function
1	Call counter	total number of calls since reset	read call counter	reset call counter
2	Hours	0 to 23--use 24 hour clock	increase hours	decrease hours
3	Minutes	0 to 59 minutes	increase minutes	decrease minutes
4	Temperature calibrate	current temperature	increase temp. 1°	decrease temp. 1°
5	Temperature scale	set to 0=Fahrenheit; 1=Celsius	Celsius	Fahrenheit
6	Month	1-12 month or set to 0 to disable auto daylight savings adjust	increase month	decrease month
7	Day	1-31 day of month	increase day	decrease day
8	Year	00=2000, 01=2001, ...	increase year	decrease year
9	Message mode	1-6 from message mode table	increase mode	decrease mode
10	Inactive line indicator	toggle indicator on/off	on	off
11	Software version	read software version	read version	—
12	Message 1	playback recorded message 1	start playback	stop playback
13	Message 2	playback recorded message 2	start playback	stop playback
14	Message 3	playback recorded message 3	start playback	stop playback
15	Closing Message	playback closing message	start playback	stop playback
16	Message 1	record new message 1	start recording	stop recording
17	Message 2	record new message 2	start recording	stop recording
18	Message 3	record new message 3	start recording	stop recording
19	Closing Message	record new closing message	start recording	stop recording

Figure 4.4; Programming options table

4.4 Setting up the System

This section describes specific programming features available in the TAS-1. You should have read the previous section that describes the TAS-1 programming mode to use this information effectively. The options are described in order corresponding to the Location column of Figure 4.4.

4.4.1 Location 1--Call Counter

The call counter is a running total of how many calls are received by the Telephone Announcement System. The maximum value of the counter is 65,535. When this value is exceeded, the counter will reset to 0 and start counting again.

The call counter is read automatically when location 1 is selected. Press the Up button to repeat the count information or press the Down button to reset the counter to 0.

4.4.2 Location 2--Clock Hours

The clock hours are read automatically when location 2 is selected. In programming mode, press Next or Previous until you hear the system prompt "Location 02: Value xx" where xx is a number from 0 to 23.

Press the Up or Down button until the correct clock hours are given. Set the clock using 24 hour time. The TAS-1 delivers the time in 12 hour format but the correct 24 hour time is necessary for the calendar to operate properly.

4.4.3 Location 3--Clock Minutes

The clock minutes are read automatically when location 3 is selected. In programming mode, press Next or Previous until you hear the system prompt "Location 03: Value xx" where xx is a number from 0 to 59.

Press the Up or Down button until the correct clock minutes are given. Each time the minute changes, the seconds are reset to 0. This allows you to precisely calibrate the clock to a standard time keeping device or service. The TAS-1 always speaks the time to the nearest minute.

4.4.4 Location 4--Temperature Calibration

The temperature sensor must be installed to adjust the temperature calibration.

The temperature calibration is read automatically when location 4 is selected. In programming mode, press Next or Previous until you hear the system prompt "Location 04: Value xx" where xx is the current temperature.

The temperature range is from -40°F to 120°F. The temperature can be adjusted up or down 7° from the sensors' true unadjusted temperature to calibrate it. Press the Up or Down button until the correct temperature is given.

4.4.5 Location 5--Temperature Scale

The temperature scale is read automatically when location 5 is selected. In programming mode, press Next or Previous until you hear the system prompt "Location 05: Value x" where x is either 0 or 1. A value of 0 represents Fahrenheit and a value of 1 represents Celsius. Press Up or Down to select a different scale. The temperature must be recalibrated after changing the scale.

4.4.6 Location 6--Calendar Month

The month is read automatically when location 6 is selected. In programming mode, press Next or Previous until you hear the system prompt "Location 06: Value xx" where xx is the current month. Press the Up or Down button until the correct month is given.

The sole purpose of the calendar in the TAS-1 is to provide for automatic clock setting for daylight savings time. If you are in an area that does not observe daylight savings time or if you do not want the clock to adjust automatically on the first Sunday of April and the last Sunday of October, set the month to 0 to disable the calendar. With the calendar disabled, the TAS-1 will not adjust the clock for daylight savings time.

When the month is set to 13, the clock will automatically jump ahead one hour the next time it reaches 2:00 AM. When the month is set to 14, the clock will automatically jump back one hour the next time it reaches 2:00 AM. When either of these special cases execute, the month will be reset to 0 to keep the clock from resetting again at 2:00 AM.

4.4.7 Location 7--Calendar Day

The day is read automatically when location 7 is selected. In programming mode, press Next or Previous until you hear the system prompt "Location 07: Value xx" where xx is the current day. Press the Up or Down button until the correct day is given.

4.4.8 Location 8--Calendar Year

The year is read automatically when location 8 is selected. In programming mode, press Next or Previous until you hear the system prompt "Location 08: Value xx" where xx is the current year (represented by two digits). Press the Up or Down button until the correct year is given.

4.4.9 Location 9--Message Mode

The message mode is read automatically when location 9 is selected. In programming mode, press Next or Previous until you hear the system prompt "Location 09: Value x" where x is the message mode. Select a mode from the table in Figure 4.5 and press the Up or Down button until the message mode is set accordingly.

Message Mode	Mode 1	Mode 2	Mode 3	Mode 4	Mode 5	Mode 6
Opening message 1	30 secs	15 secs	10 secs	30 secs	15 secs	10 secs
Opening message 2	—	15 secs	10 secs	—	15 secs	10 secs
Opening message 3	—	—	10 secs	—	—	10 secs
Closing message	—	—	—	15 secs	15 secs	15 secs

Figure 4.5; Message mode table

The times in the table are the maximum allowable recording time--shorter messages can be recorded. A maximum of three intro messages can be used with an optional closing message. Intro messages are rotated on each incoming call when more than one intro message is used.

Messages should be recorded again when the message mode is changed.

While mode 1 allows for a single 30 second message, most callers will not wait through an advertisement this long. We recommend that you use shorter messages that advertise features individually. For example, a bank may use three shorter messages that rotate to talk about their low rates on auto loans, high interest saving accounts, and no fee checking account instead of a single message that talks about all three.

When used, closing messages should be kept very short. A quick weather update or cross-promotion may work well in the closing. The caller has no reason to sit through a lengthy message.

4.4.10 Location 10--Inactive Line Indicator

It may be difficult to determine if the all telephone lines are working properly. The inactive line indicator provides a mechanism to test the incoming lines. When the inactive line indicator is enabled, all line indicator LED's will flash. When a call is received on a line, the corresponding line indicator LED will stop flashing. Call each line until all LED's stop flashing. If an LED does not stop flashing, the corresponding telephone line may be defective.

In programming mode, press Next or Previous until you hear the system prompt "Location 10: Value x" where x is 0 or 1. Press the Start button to enable the inactive line indicator or the Stop button to disable it.

4.4.11 Location 11--Software Version

If necessary, the software version can be read by selecting Location 11 and pressing the Start button. The system will deliver the software version in a voice prompt over the headphones.

4.4.12 Location 12--Message 1 Playback

To review outgoing message 1 that is recorded in the TAS-1 memory, press the Next or Previous button until Location 12 is selected. Press the Start button to begin message playback. Press the Stop button to cancel message playback. Playback will stop automatically when the end of the message is reached.

4.4.13 Location 13--Message 2 Playback

To review outgoing message 2 that is recorded in the TAS-1 memory, press the Next or Previous button until Location 13 is selected. Press the Start button to begin message playback. Press the Stop button to cancel message playback. Playback will stop automatically when the end of the message is reached.

4.4.14 Location 14--Message 3 Playback

To review outgoing message 3 that is recorded in the TAS-1 memory, press the Next or Previous button until Location 14 is selected. Press the Start button to begin message playback. Press the Stop button to cancel message playback. Playback will stop automatically when the end of the message is reached.

4.4.15 Location 15--Closing Message Playback

To review the closing message that is recorded in the TAS-1 memory, press the Next or Previous button until Location 15 is selected. Press the Start button to begin message playback. Press the Stop button to cancel message playback. Playback will stop automatically when the end of the message is reached.

4.4.16 Location 16--Message 1 Recording

You may want to use a production studio to pre-record the TAS-1 messages. Music can be added to the messages and audio processing equipment (equalizers and limiters) can be used. Figure 4.6 shows a Line-to-Mic level attenuator for the TAS-1 Mic audio input.

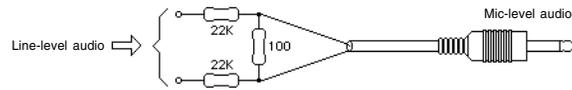


Figure 4.6; Line-level to mic-level attenuator cable

This circuit has an attenuation of about 53 dB and will work with any balanced or unbalanced audio source from 0 dBm to +8 dBm in level. When producing messages for the TAS-1, the audio should be moderately limited. Audio will sound better on a telephone line if an equalizer is used to boost 2.5 to 3 kHz about 10 to 15 dB.

Before recording your messages, make sure that the message mode is set properly at location 9.

To record a new message 1, enter programming mode and press Next or Previous until Location 16 is selected. Prepare the audio source.

- press the Start button to begin recording
- start the audio source material
- press the Stop button to stop recording

The three LED's on the TAS-1 main unit will blink in a rotating sequence during message recording to indicate that recording is in progress.

4.4.17 Location 17--Message 2 Recording

Before recording your messages, make sure that the message mode is set properly at location 9.

The instructions in section 4.4.16 apply to recording all messages. For message 2, use location 17 instead of location 16.

4.4.18 Location 18--Message 3 Recording

Before recording your messages, make sure that the message mode is set properly at location 9.

The instructions in section 4.4.16 apply to recording all messages. For message 3, use location 18 instead of location 16.

4.4.19 Location 19--Closing Message Recording

Before recording your messages, make sure that the message mode is set properly at location 9.

The instructions in section 4.4.16 apply to recording all messages. For the closing message, use location 19 instead of location 16.

4.5 Temperature Sensor Placement

To get readings that give good correlation to those reported by the nearest NOAA weather station, it is important to measure the temperature the same way they do. Just hanging the sensor out a window will almost surely produce temperatures that fluctuate wildly. The key measuring the temperature accurately is to mount the sensor in a standard enclosure. It provides very accurate air-temperature readings.

An alternative to buying a standard enclosure is to make one using inexpensive materials. The primary raw material is two 12 inch wide louvered wood shutters—louvered doors might also work. Cut the shutters so you end up with four equal lengths of shutter about 13 to 16 inches long. A little improvising may be required depending on the style of shutter or door. Some can be cut along a solid horizontal reinforcement piece and others will require the end louvers to be stabilized with glue or a piece of wood. In either case, you will build a box with the four pieces of shutter using them for the four walls. The floor and roof of the box are made of 3/8 inch exterior grade plywood.

Attach three of the four sides together with glue and nails or screws. The pieces of shutter should be oriented so the louvers will drain outside of the enclosure. Attach this assembly to the floor. The roof should overhang about 3 inches on all sides. Attach the roof with a couple of 1/4 inch spacers near the front so that it slopes slightly to the rear. This will prevent water from standing on top. The remaining wall should be attached with two hook-and-eye sets so it can be removed.

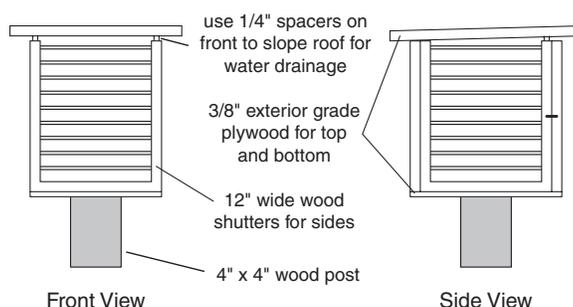


Figure 4.7; Standard enclosure for temperature sensor

Mount the enclosure on a 4 inch square wooden post. The floor of the enclosure should be 4 feet above the ground. Drill a small hole in the floor near the edge of the post for the sensor cable to come through. A 1/4 inch hole drilled in one of the walls about an inch above the floor makes an easy way to insert a calibration thermometer without removing the louvered panel. The enclosure should be given at least two coats of white exterior paint inside and out.

Place the enclosure at least 20 feet from the nearest building, preferably on grass covered soil. It should be as far away as possible from concrete and pavement. Do not place the enclosure near air-conditioner compressors or under trees.

Run the cable for the sensor up the post and through the hole in the floor. Lay the sensor in the center of the floor of the enclosure. Be careful not to cut or puncture the outer insulating jacket of the cable. The inner conductors must be protected from the weather. If an extension cable is used, wrap electrical tape around the connectors to seal out moisture.

When visiting the enclosure during the summer months you might want to take a can of wasp and hornet killer with you. They just love to build nests in these things.

Section 5 — Troubleshooting and Repair

5.1 Common Problems

Problem: The TAS-1 won't answer a call. The green Power LED is blinking.

Solution: The TAS-1 is in the setup mode. Push the Operate button to exit setup mode and resume operation.

Problem: The TAS-1 doesn't answer calls. The green LED is on and the yellow "Line 1" and "Line 2" LED's are blinking.

Solution: The LED's are signaling that the clock needs to be set. Rather than have the TAS-1 answer calls and give the wrong time, it does not answer calls if the clock is not set. Set the clock and the system will operate properly.

Problem: The TAS-1 gives the time but not the temperature.

Solution: The TAS-1 will skip the temperature announcement if the temperature sensor is defective or disconnected. Verify that the sensor is connected to the jack labeled Temperature Sensor on the rear panel of the TAS-1 and that the sensor cable has not been damaged.

Problem: The TAS-1 plays only part of the opening message.

Solution: Check the Message Mode setting. The Message Mode must be set before the messages are recorded. If a 30 second message is recorded in Message Mode 4 and the Message Mode is changed to 6, some callers will hear only a 10 second segment of the message.

Problem: The TAS-1 skips the closing message.

Solution: Check the Message Mode. The mode must be set to 4, 5 or 6 to deliver a closing message.

5.2 Circuit Description

The central component of the TAS-1 is U5 a Motorola microprocessor. The pushbutton switches and LED indicators on the TAS-1 are controlled directly by the microcontroller. U4 is a low-voltage interrupt that shuts down the microcontroller when the supply voltage drops below 4.5 volts. A sample from the 50/60 Hz AC power signal is fed into the microcontroller to synchronize the time-of-day clock. This insures the long-term accuracy of the clock.

The TAS-1 has a NiCad backup battery that keeps the clock and calendar operating during a power failure. The battery is a standard 9 volt rechargeable NiCad. It is charged through RN1 at a rate of about 0.5 milliampere. This is a very slow charge rate (to insure long battery life) so it takes several days to fully charge a dead battery. The microprocessor senses when external power fails and switches all non-vital circuits to a low power condition to preserve battery life.

A serial I/O port is connected to the Expansion Interface connector to control the expansion units. The serial format is 0-5 volt logic level, NRZ, 8 data bits, no parity and one stop bit at 31.5 K baud. A single conductor is used for data send and receive using tri-stated transmitters and a proprietary communication protocol. RN3, C8 and D4 provide RF and surge protection for this port.

The TAS-1 contains two audio recording devices at U2 and U3. Each IC has the ability to store 90 seconds of audio in non-volatile memory. About half of this memory is reserved for the data necessary to deliver the time and temperature. The other 45 seconds is available for user-recorded messages.



WARNING!

Do not test or apply power to U2 or U3 outside of the TAS-1 system board. Factory programming may be damaged if these IC's are removed from their sockets and power is applied.

Components R3 and C15 control the characteristics of the AGC circuit and should not be altered. The playback audio feeds the telephone line network interface, the headphone jacks and the Expansion Interface. The Expansion Interface is protected from RF and transients by RN5, C9, C10, D5 and D6.

Starting at the modular jack, the telephone line interface consists of a series resettable fuse and a shunt solid-state circuit protector. A solid-state hookswitch and ring detector is used. Diodes D7 through D10 and capacitors C12 and C14 provide additional RF and transient protection.

The temperature sensor has three terminals: ground, +5 and temperature output. The temperature output of the sensor is approximately a 45 Hz square wave with the temperature encoded in the duty cycle of the square wave. The duty cycle is precisely measured by the TAS-1 and the temperature is decoded. The sensor is factory calibrated to about $\pm 3^{\circ}\text{F}$. You can calibrate the sensor to reduce the error to $\pm 1^{\circ}\text{F}$. The system will ignore the sensor reading if it appears defective or if the reading is below -70°F or above 150°F .

5.2.1 Expansion Unit

The TAS-1/ex Telephone Announcement System Expansion Unit contains a microcontroller that is similar to the that in the main unit. All I/O signals interface directly to the microcontroller. The telephone line interfaces on the Expansion Unit are identical to the main unit. The audio source is a differential amplifier preceded by a SPDT solid-state switch to select the audio source. The audio source can be either of the two message recorders in the main unit. The audio input to the SPDT switches comes from two audio buffers U6a and U6b.

The Unit Number switch gives each Expansion Unit a unique identity to the main unit and allows all Expansion Units to communicate on a common line.

5.3 Factory Service Policy

These policies are effective August 1999 and are subject to change without prior notice.

5.3.1 Factory Warranty

Sine Systems, Inc. guarantees our products to be free from manufacturing defect for a period of one year from the original date of purchase from Sine Systems, Inc. This warranty covers the parts and labor necessary to repair the product to factory specifications. This warranty does not cover damage by lightning, normal wear, misuse, neglect, improper installation, failure to follow instructions, accidents, alterations, unauthorized repair, damage during transit, fire, flood, tornado, hurricane or acts of God and/or nature.

5.3.2 Factory Return Policy

The factory return policy only applies to equipment purchased directly from Sine Systems, Inc. Equipment purchased through a third party (dealer) is subject to the return policy of the dealer and arrangements for return or exchange must be handled through the dealer.

Sine Systems policy on returns and exchanges with the factory is broken down according to the following schedule:

30 days "no questions asked"

During the first thirty days from the date that equipment ships from our factory we will accept it back for a full refund less shipping charges provided that the equipment is still in new, resellable condition with no cosmetic damage. This does not constitute an evaluation program. It is for legitimate purchases only.

less than 60 days, may be returned less 15% restocking fee

Between 31 and 60 days from the time we ship the equipment, we will accept unmodified equipment back for a refund less shipping charges and 15% of the invoice cost. This is to cover the cost of restocking the items which must then be sold at a discount as reconditioned instead of new.

no return after 60 days

We will recondition the equipment for you according to our repair rates but we will not accept it for refund or exchange after 60 days from the initial purchase.

5.3.3 Factory Service Policy

Sine Systems is proud to offer same day repair service on all of our products. When we receive damaged equipment, we will repair it and ship it back the same day it arrives. Because we offer immediate service, we do not send loaner equipment. If we cannot immediately repair equipment and return it, we may ship a loaner unit at our discretion.

While we do not require prior authorization on repairs, we suggest that you verify our shipping address before returning equipment for repair. Sine Systems is not responsible for items lost in transport or delivered to the wrong address. Emergency service may be made available on weekends or holidays, at our discretion, if arrangements are made with us in advance.

5.3.4 Warranty Service

There is no charge for repair service on items covered under warranty. You are responsible for shipping charges to return damaged equipment to us for repair. Damage due to negligence, lightning or other acts of nature are not covered under warranty.

5.3.5 Service Rates

For service not covered under warranty we have a flat rate repair fee. Flat rate repairs cover only components that fail electrically. Mechanical damage will be assessed on a per repair basis. Repair charges typically fall into one of these categories. Shipping fees are not covered in the repair rate.

Minor programming adjustments or no damage, \$50 plus shipping

Sometimes a system works exactly like it is supposed to when we get it or it can be fixed through a simple adjustment in firmware. We will do our best to identify intermittent hardware problems and correct them. The fee covers the time it takes our technician to thoroughly inspect and test the equipment.

Minor repairs are up to \$150 plus shipping

Five or fewer defective components are replaced in a minor to moderate repair. This accounts for most of our repairs. These repairs may cost less depending on the components replaced and the amount of time required to complete the repair.

Moderate repairs are \$250 plus shipping

Six to ten defective components are replaced in a major repair. Again, we may charge less depending on the components replaced and the amount of time required to complete repairs.

Major repairs cost more than \$250 plus shipping

This occurs rarely but it can happen. If the equipment has blown traces and scorch marks from burned components, it's a safe bet that it will take several components and quite a bit of bench time to repair. We assess this type of repair on a per incident basis.

Damaged beyond recognition, assessed on a per case basis

Hopefully you have insurance. In cases where the board is so badly damaged that it is not worth repairing we may, at our discretion, offer to replace the destroyed circuit board. The options and costs vary widely in these cases so we will call with options.

All repairs must be billed to a credit card or shipped COD. Specify which you prefer with your request for service. At your request, we will call with the total amount of the repair (including applicable shipping charges) so that suitable payment can be arranged before a COD shipment. If you need a COD total, do not forget to include a telephone number where you can be contacted.

5.3.6 Instructions for Factory Service

Please include a note with any specific information available about the equipment failure as an aid to our technicians. Pack equipment carefully to avoid further damage in shipping. We are not responsible for damage during transport.

When returning a system with multiple components, we strongly suggest that you return the entire system. We will repair the parts that are returned but lightning is rarely selective enough to damage only a single part of a system.

Be sure to include a street address for return shipping by UPS. The repair will be delayed if you neglect to give us enough information to return your equipment--this actually happens! If you prefer a carrier other than UPS or wish us to bill to your shipping account, we can usually accommodate these requests. Many carriers do not accept COD shipments so credit card billing may be required for carriers other than UPS. If you do not specify otherwise, return shipments will be made by the UPS equivalent of the received shipping method (i.e. Ground shipment, 2nd Day, Overnight).

We suggest that you verify our shipping address before sending equipment for repair. Same day service does not apply if you ship to an incorrect address and/or the carrier delivers the equipment too late in the day for repairs to be completed. Sine Systems is not responsible for equipment that is not delivered to our factory. It will be your responsibility to contact the carrier to retrieve your improperly delivered equipment.

Section 6 — Specifications

6.1 Electrical Specifications

Ports

Power Input (3.5mm phone connector)
Temperature Sensor (3.5mm phone connector)
Expansion Interface (10 conductor pin/plug connection)
Line 1/Line 2 (RJ-11C modular)

Mic Input (3.5mm phone connector--mono)
Play 1/Play 2 audio outputs (3.5mm phone connector--stereo)

Audio outputs are unbalanced, low level audio to drive headphones or a small 8 Ω speaker.

Switches

Operate/Previous/Next/Down/Up (momentary pushbutton)

Indicators

Power LED (green)
Line 1/Line 2 LED (yellow)

Adjustments

Temperature scale ($^{\circ}$ F/ $^{\circ}$ C) and calibration (in firmware)
Clock speed adjust (in firmware)

Sensor

Operating range: -40 $^{\circ}$ F to 150 $^{\circ}$ F (-40 $^{\circ}$ C to 65 $^{\circ}$ C) ambient air temperature
Absolute accuracy (at 72 $^{\circ}$ F): \pm 1 $^{\circ}$ F

AC Power

Input: 100-240 Volts AC, 50-60 Hz, 5 watts
Output: 12 Volts AC, 200 mA max

6.2 Mechanical Specifications

Dimensions

7.25" (w) x 6.5" (d) x 1.75" (h)

Weight

2 lbs.