**Issue: Airstrips that are not continuously manned or abandoned allow the chance for low flying aircraft to enter US airspace and land with out detection.**

**Proposed solution: Use non-radar-based acoustic detectors along an airstrip periphery to provide air strips or airport runways to listen to for landing aircraft, monitor airstrip activity, and report via telemetry.**

**Recommendation: Install passive, non-detectable sensors along airstrips with appropriate telemetry necessary to augment current surveillance efforts along US borders to enhance Homeland security**.

**Discussion:** Many landing strips and runways exist along US borders which are suitable as landing areas for low flying aircraft. Those that are unmanned during part of the 24-hour cycle may have automated landing lights which are activated by briefly activating a transmitter selected to the applicable control frequency. Aircraft may use such facilities under visual flight rules without filing any documentation. Further, there are abandoned airstrips that are still fully capable of being used for emergency or illicit purposes which are not manned or monitored in any fashion.

A method of monitoring air strips was demonstrated to the FAA in 1998 which utilized passive acoustic arrays mounted a taxi-way at Phoenix Sky Harbor Airport. The chosen ramp "R" is obstructed from the controller's view by terminal and parking facilities. The arrays were set up to track both aircraft and service vehicles along Ramp R as a demonstration aimed at allowing ground controllers "visibility" of ramp traffic regardless of weather or lighting conditions. Previous use of video monitoring had proven unsuccessful during periods of fog and dust storms. A simple 2.4 GHz transmitter was connected to each array placed along the ramp. Ramp activity was continuously displayed in the control tower on a computer monitor. A report documenting this demonstration is attached.

A single array was installed at the local airport in Ames, Iowa to count take-offs and landings for a one-month period. In this case, the sensor data was stored internally and downloaded on a weekly basis by connecting to a laptop computer.

In both cases, the sensor used was a passive acoustic array which was in listen only mode with no detectable emissions. The sensor may be deployed by singularly or in multiple unit arrangements. The array can be installed over 600 feet from the area containing aircraft to be monitored and may be solar powered. It can communicate via various means.

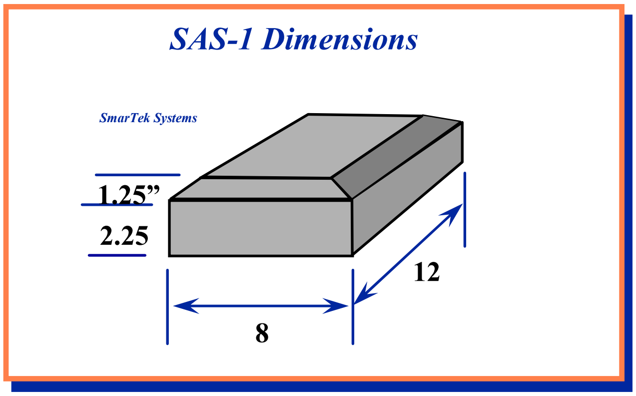
Several thousand of these inexpensive, passive acoustic sensors have been successfully deployed along US Highways since 1997 to monitor highway traffic speed and provide highway usage data. This domestically manufactured equipment is rapidly deployed and may be modified to further enhance covert use.


**SAS-1 with battery pack base in Ames, Iowa demonstration**

**Front view of SAS-1 with battery pack base in Ames, Iowa demonstration**

# Current Array Specification

## Model SAS-1 Acoustic Sensor




**Specifications**

**Number of Lanes and Message Formats**

The SAS-1 can monitor 5 lanes and provides for several different interfaces depending on the communication link and the cabinet controller interface desired. The standard SAS-1 output message provides per lane traffic flow measurements of vehicle volume, lane occupancy, and average speed for a selectable update period (1 to 220 seconds). A bit serial vehicle presence relay message or opto-isolated dry contact vehicle presence relay signals (using the SAS Relay Interface) can be provided.

**Measurement Archiving**

Up to 60 days depending on size of installed Flash Memory (1, 2, or 4 Mbits).

**Signal Interfaces**

1) RS-422 (Standard) ............. Hard Wired Home Run (up to 2000 feet)
2) RS-232 (Optional) .............. Hard Wired Home Run (up to 100 feet)
3) Wireless (Optional) ............ Wireless Link (2.4 GHz Spread Spectrum)
4) Relay via SAS-RLY card ….Type 170 Card, TS1, TS2, Terminal Block

**Power**

1) Supply Voltage at the Sensor ....... 8 to 24 VDC
2) Required Power ......................….. Less than 2 Watts

**Physical**

1) Dimensions ....................12 in long x 8 in wide x 3.5 in deep
2) Weight (with Bracket) ..Less than 7 lb.
3) Material/Finish .............Aluminum/Enamel/Stainless Steel Fasteners
4) Mounting Bracket .........2 inch Diameter Aluminum Tube/Stainless Steel Bands
5) Operating Temp....….....-40 Deg C to 75 Deg C
6) Humidity........................5% to 100%
7) Shock.............................NEMA TS2-2.1.10
8)Vibration.........................NEMA TS2-2.1.9

**Installation**

Mount on roadside structure for coarse mechanical positioning so that the sensor face is pointing toward the center of the lanes to be monitored. After the SAS-1 is mechanically oriented and locked down, the position and size of each detection zone (up to 5) are electronically set using the SAS Monitor and Setup program. All SAS-1 setup parameters are stored in non-volatile memory.

1) Height Above Pavement ..................................… 25 to 40 feet
2) Horizontal Distance to First Detection Zone ..… 5 to 30 feet
3) Coarse SAS-1 Orientation ...............................…..Mechanical
4) Precise Detection Zone Position and Size ...…….Electronic