

## CHAPTER 16

### THUNDERSTORM SENSOR

#### SECTION I. DESCRIPTION AND LEADING PARAMETERS

##### 16.1.1 INTRODUCTION

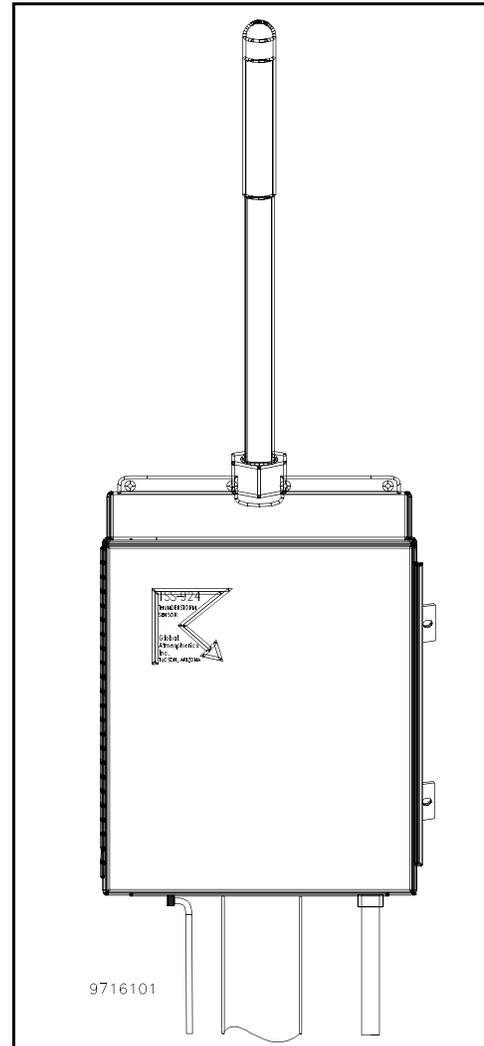
The ASOS thunderstorm sensor is a model TSS-924 electro-optical short-range thunderstorm detector manufactured by Global Atmospheric, Inc. of Tucson, Arizona. The sensor detects and differentiates between cloud-to-ground (CG) and cloud lightning discharges. The sensor provides a range estimate for CG lightning discharges from thunderstorms that occur within approximately thirty miles. The sensor indicates the count and range of CG discharges in three range categories of 0-5, 5-10, and 10-30 miles.

The sensor communicates with the data collection package (DCP), or Single Cabinet ASOS (SCA) via a fiberoptic serial data link. The DCP or SCA polls the sensor once every 60 seconds, and the sensor responds with the current flash count and sensor status. The DCP, in turn, passes the data to the acquisition control unit (ACU). When the ACU receives a flash count indicating lightning, the ACU issues a SPECI with a thunderstorm onset message. In addition to flash count data, the thunderstorm sensor provides built-in test (BIT) results that are interpreted by the ASOS continuous self-test (CST) to detect sensor failures.

##### 16.1.2 PHYSICAL DESCRIPTION

The thunderstorm sensor (figure 16.1.1) consists of a main enclosure installed on a mounting pole. The mounting pole itself is a part of the supporting structure for the sensor and does not have a reference designator. The main enclosure contains all sensor field replaceable units (FRU's), which include an electro-optical antenna assembly, power and communications module (power/comm module), an electronics module, and a fiberoptic module.

The antenna assembly supplies signals to the electronics module, the electronics module interprets and processes these signals, and the power/comm module provides power for the sensor and communications with the outside world. The main enclosure is a specially designed, weather-proof box with a hinged and gasket-sealed door held closed with two stainless steel fasteners. When closed, the box is air-tight and water-tight. The main enclosure contains the electronics module and the power/comm module. The electronics module contains the analog board and the processor board. The power/comm module consists of the power/comm board, the fiberoptic modem, and the heater, all of which are mounted on a special mounting plate.



**Figure 16.1.1. Thunderstorm Sensor**

## 16.1.3 THUNDERSTORM SENSOR CONFIGURATIONS

There is only one configuration of the thunderstorm sensor; the TSS 924.

**Table 16.1.1. Operational specifications**

<b>OPERATIONAL SPECIFICATIONS</b>		
Detection Efficiency	Thunderstorm detection	100% for thunderstorms within 10 miles with 3 or more cloud-to-ground discharges
	Cloud-to-ground flashes	Approximately 90% for flashes within 0-10 miles
False Lightning Reports		None. False lightning reports do not occur for properly installed and properly maintained sensors
Thunderstorm Range Resolution (user selections available)		0-5, 5-10, 10-30 miles
		0-5, 5-10, 10-30 nautical miles
		0-8, 8-16, 16-50 kilometers
Sensing Transducers		Wideband electric field change meter describing local thunderstorm conditions
Sensor Output		Serial ASCII alphanumeric message describing local thunderstorm conditions (automatic one-minute intervals or polled)
<b>ELECTRICAL SPECIFICATIONS</b>		
115 VAC Power Option		90-120 VAC, 50/60 Hz, 6 Watts maximum without heater, 80 Watts maximum with heater
230 VAC Power Option		180-250 VAC, 50/60 Hz, 6 Watts maximum without heater, 80 Watts maximum with heater
12 VDC Power Option		11.5-16.5 VDC available on special request
<b>ELECTRICAL SPECIFICATIONS</b>		
Communications line		Metallic or fiberoptic cable
Data type		Serial ASCII
Data transfer		9600 baud
Parity		None
Data bits		8
Stop bits		1
<b>ENVIRONMENTAL SPECIFICATIONS</b>		
Maximum wind load		120 knots, 222 kilometers/hour (standard mast mount)
Humidity		0-100% (Stainless steel NEMA 4X enclosure provides complete protection against corrosion and severe weather.)
Temperature		-40° to +60° C (with heater)
<b>ELECTRICAL SPECIFICATIONS</b>		
Ground mount		Standard mast (3-inch (~7.6 cm) inside diameter schedule 80 aluminum pipe, 4 feet (1.2 m) tall)
Mast mount		Mast-mounting brackets, outside diameter 4.5 inches (11.43 cm)
Maximum height		9.8 feet (3 m) maximum recommended
<b>SENSOR DIMENSIONS</b>		
Height		32.5 in (82.5 cm)
Width		11.0 in (27.9 cm)
Depth		8.0 in (20.3 cm)
Weight		28.0 lbs (12.6 kg)