



Automated Heat Stress System (AHSS)

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Overview – The Automated Heat Stress System (AHSS)

- Highly accurate environment monitoring system.
- Continuous, on-line measurement of:
 - Dry Bulb (DB).
 - Temperature.
 - Wet Bulb (WB).
 - Relative Humidity (RH).
- Measurements used to calculate Wet Bulb Globe Temperature (WBGT) Heat Stress Index for a specific location.
 - Determines safe limitations for human activity in a hot and humid environment.
 - Physiological Heat Exposure Limits (PHEL) stay times.

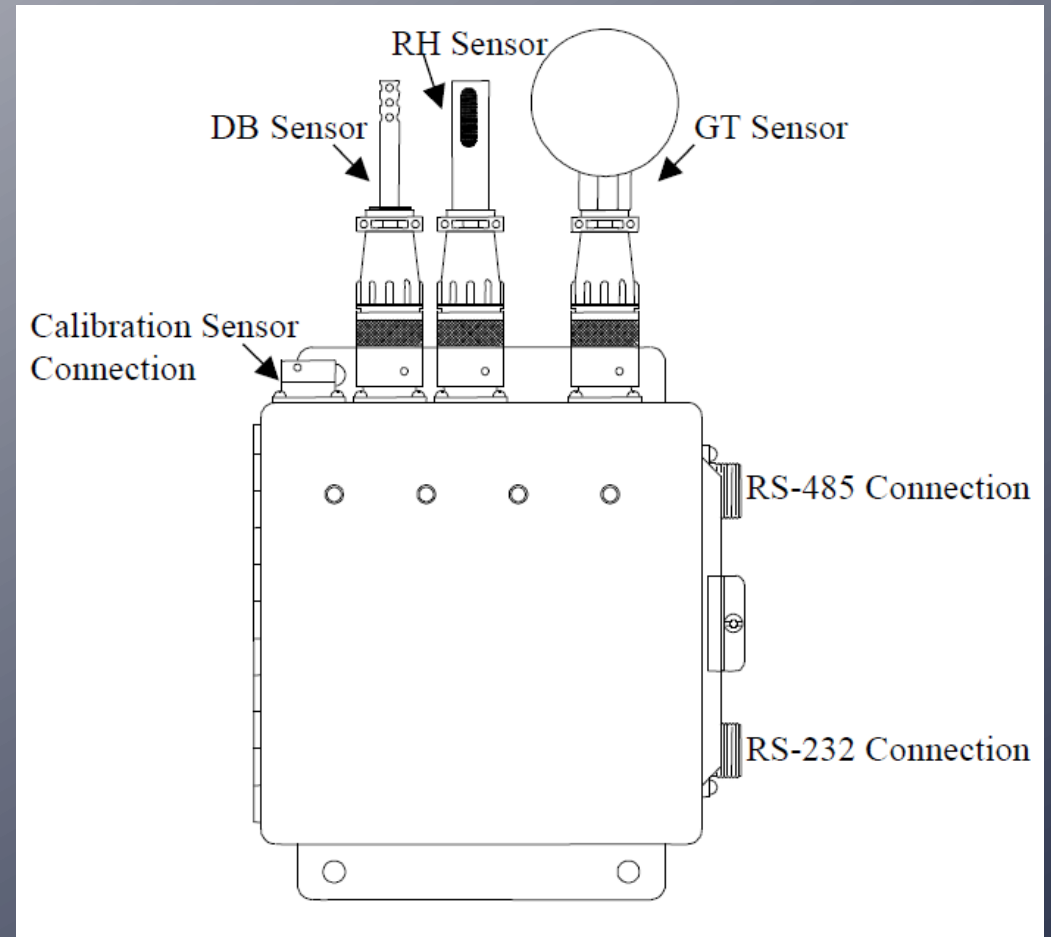


Current Applications

- Safety monitoring in hot and humid locations on US Navy ships, US Navy and Marine Corps bases, and more.
- Versatile enough to be used anywhere with hot and humid conditions. For example:
 - Factories.
 - Warehouses.
 - Farms and fields.
 - Parks.

AHSS Enclosure (Model 19506) and Sensors

- RH Sensor (Model 19509):
 - Measures relative humidity.
- DB Sensor (Model 19510):
 - Measures ambient temperature.
- GT Sensor (Model 19511):
 - Measures radiant energy.
- Calibration Sensor Connection:
 - Only used during unit calibration.
- RS-485 Connection:
 - Power and network connection.
- RS-232 Connection:
 - Used for setup and calibration.



Indoor Installation

- Can be mounted on walls or poles, or above walkways.
- Minimum 6 inches of clearance above sensors for easy removal.
- Need ventilation/air circulation to prevent dead air:
 - Could result in inaccurately high temperature readings.
- In picture: metal bars included to protect enclosure and sensors.



Monitoring equipment should not touch hot materials.



The Automated Heat Stress System (AHSS) measures dry bulb temperature, globe temperature and relative humidity, calculates the WBGT and displays PHEL stay times.

Source:

https://www.public.navy.mil/navsafecen/pages/acquisition/heat_stress.aspx

AHSS Software

- Used to display and monitor data from all AHSS units on the network.
- Samples data every 60 seconds (sample rate).
- PHEL Curve specifies stay time at a given location.
 - Can be changed under PHEL Curve setting.
- Data saved into daily files on an hourly basis.
- Program also allows review of historical data from any saved files.

SAMPLE RATE (SECONDS): 60 BASE 1 Jul 04 2018 00:36:19 FWD COM PORT COM1 AFT COM PORT COM1

WORKSPACE: LAUNDRY

WORK STATION	PHEL CURVE	DB	WB	GT	WBGT	RH	STAY TIME	PHEL 1	PHEL 2	PHEL 3	PHEL 4	PHEL 5	PHEL 6
PRESS DECK #1	3				0		>8:00	>8:00	>8:00	>8:00	8:00	6:35	4:30
PRESS DECK #2	3				0		>8:00	>8:00	>8:00	>8:00	8:00	6:35	4:30
PRESS DECK #3	3				0		>8:00	>8:00	>8:00	>8:00	8:00	6:35	4:30
PRESS DECK #4	3				0		>8:00	>8:00	>8:00	>8:00	8:00	6:35	4:30
FLAT IRON	3				0		>8:00	>8:00	>8:00	>8:00	8:00	6:35	4:30
WASH DECK #2	3				0		>8:00	>8:00	>8:00	>8:00	8:00	6:35	4:30
WASH DECK #1	3				0		>8:00	>8:00	>8:00	>8:00	8:00	6:35	4:30

WORKSPACE: ENLISTED GALLEY LOOPS: 1

WORK STATION	PHEL CURVE	DB	WB	GT	WBGT	RH	STAY TIME	PHEL 1	PHEL 2	PHEL 3	PHEL 4	PHEL 5	PHEL 6
STBD GRILL	2				0		>8:00	>8:00	>8:00	>8:00	8:00	6:35	4:30
PORT GRILL	2				0		>8:00	>8:00	>8:00	>8:00	8:00	6:35	4:30
MID GRILL	2				0		>8:00	>8:00	>8:00	>8:00	8:00	6:35	4:30
COPPER PIT	2				0		>8:00	>8:00	>8:00	>8:00	8:00	6:35	4:30
OVENS	2				0		>8:00	>8:00	>8:00	>8:00	8:00	6:35	4:30
DEEP SINK	5				0		6:35	>8:00	>8:00	>8:00	8:00	6:35	4:30
STBD SCULLERY	5				0		6:35	>8:00	>8:00	>8:00	8:00	6:35	4:30
PORT SCULLERY	5				0		6:35	>8:00	>8:00	>8:00	8:00	6:35	4:30

WORKSPACE: CPO GALLEY

WORK STATION	PHEL CURVE	DB	WB	GT	WBGT	RH	STAY TIME	PHEL 1	PHEL 2	PHEL 3	PHEL 4	PHEL 5	PHEL 6
GRILL	2				0		>8:00	>8:00	>8:00	>8:00	8:00	6:35	4:30
COPPER PIT	2				0		>8:00	>8:00	>8:00	>8:00	8:00	6:35	4:30
SCULLERY	5				0		6:35	>8:00	>8:00	>8:00	8:00	6:35	4:30

Shore Unit (Model 93185)

- To install the AHSS outdoors, a Shore Unit is required.
- Weather enclosure protects AHSS from the elements.
- Internal ventilation system to maintain air circulation.
- Specialized program for monitoring due to different application needs.



Shore Unit Installation

- Globe sensor must be exposed to sunlight at all points during the day.
- Avoid buildings, trees, and other large structures:
 - May cast shadows or block natural air flow.
- Avoid installing above asphalt:
 - Radiating heat may affect temperature readings.
- Note: images show older model of the Shore Unit Weather Enclosure; current model shown on previous slide.



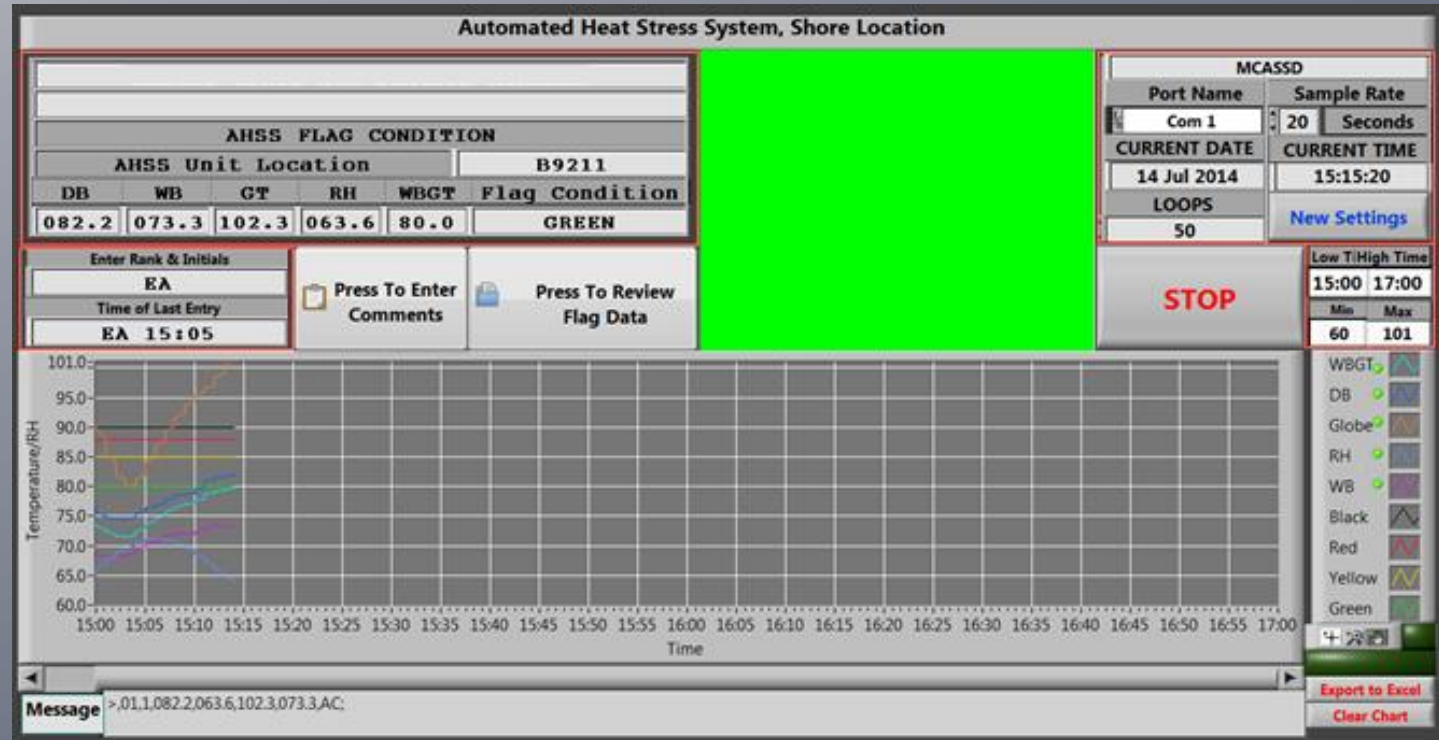
Sources:

<https://www.parrisland.com/2013/pi049-how-parris-island-minimizes-heat-related-incidents/>

https://www.public.navy.mil/NAVSAFECEN/Documents/SuccessStories/SuccessStories2/145_Rota_AHSS_Shore.pdf

Shore Unit Software

- Used to display and monitor data from a single Shore Unit.
- Individual, multiple, or all monitored parameters can be displayed on the graph to show full day activity.
- Data saved into daily files on an hourly basis.
- Displays Flag system as defined by the US military.
 - Definitions can be altered to suit organization requirements.



WGBT Flag System (as defined by the US military)

- Defines amount of physical exertion that can be safely done in a specified location.
- 5 flag system: no flag (white), green, yellow, red, and black.
- WGBT Index and Flag color definitions can be altered according to company requirements.

COLOR DEFINITIONS		
Flag Color	WGBT Index (F)	Intensity of Physical Exercise
White	Less than 80	<i>Extremely intense physical exertion may precipitate heat exhaustion or heat stroke, therefore, caution should be taken.</i>
Green	80 – 84.9	<i>Discretion required in planning heavy exercise for unseasoned personnel. This is a marginal heat stress limit for all personnel.</i>
Yellow	85 – 87.9	<i>Strenuous exercise and activity (e.g. close order drill) should be curtailed for new and unacclimated personnel during the first three weeks of heat exposure.</i>
Red	88 – 89.9	<i>Strenuous exercise curtailed for all personnel with less than 12 weeks training in hot weather.</i>
Black	90 and Above	<i>Physical training and strenuous exercise suspended for all personnel (excluding operational commitment not for training purposes).</i>

Source:

<https://www.ready.marines.mil/Stay-Informed/Natural-Hazards/Extreme-Heat/Flag-Conditions/>