Multirole Acoustic Stabilized System Light Weight

LW MASS SX-424(V)3xx family

LW MASS CS-424(V)300 Doc.STC300			
Revision	**Date**	**Author**	**Approval**
03	**19/12/2017**	**L.C.**	**F.S.**

www.sitepitalia.it

COMMERCIAL IN CONFIDENCE

FOREWORDS

Small vessels, military fast boats or USV (Unmanned Surface Vehicles) have frequently the mission to navigate through hostile and dangerous waters and need a proper device to engage potentially hostile targets with non-lethal emissions.

The **SX-424(V)3xx** is a stabilized light weight system designed to generate different emissions - acoustical, laser and light - to engage targets during critical missions.

Acoustic emissions are voice messages (pre-recorded or live) sent over a long-range path and disturbing sounds to grant a degree of deterrence.

Furthermore, a green Laser Dazzler with associated Laser Range Finder and a powerful Search Light are used as additional deterrents against threats or as supporting tools during SAR missions.

The **SX-424(V)3xx** is also equipped with cameras, one low light Video Camera and one Thermal for night operations, to watch over and recording events in real time.

The two cameras are also used to automatically video track targets through a very effective Video Tracker Module the system is equipped with.

The system allows also to record audio messages sent to targets and images from the cameras, to be used as evidences during after-event analysis, legal procedures or as proof of the actions put in place.

The equipment is designed to meet the most severe military specifications.

PURPOSE

This document has the purpose to describe the Light Weight (LW) Multirole Acoustic Stabilized System (MASS) and identified by:

LW MASS SX-424(V)3xx

in its standard version.

COMPOSITION

The **SX-424(V)3xx** system, in its standard version, is composed of:

- No. 1 Pedestal **CS-424(V)3xx** including:
  - No. 1 Stabilized Pedestal (0-359°/±30°)
  - No. 1 Acoustic Emitter (Hailer) 14”
  - No. 1 High Intensity Search Light (12 Mcd, 3.500 m range)
  - No. 1 Laser Range Finder (1.500 m range)
  - No. 1 Laser Dazzler (5W)
  - No. 1 TV Color camera (low light, full HD, 30 X optical zoom)
  - No. 1 Thermal Camera (un-cooled LWIR)
- No. 1 Control Console **C-424(V)4** with proper software modules for
  - Functions management
  - Video display
  - Video Tracker
  - Trouble shooting

In the following paragraphs a description of the system components is provided.

Pedestal CS-424(V)3xx

DESCRIPTION

LW MASS CS-424(V)3xx

The LW MASS **CS-424(V)3xx** allows a long-range communication towards a target where human people can hear it.

It can find application in:

- **SAR missions** where it is important to be heard from people at a long distance;
- **Anti-piracy missions** to warn vessels approaching the boat to keep distance and not to come close;
- **Self-defence** to deter an approaching vehicle by means of extremely high-volume sounds or by a green laser light or a powerful white light.

A short description of the various components of the LW MASS CS-424(V)300 is given here below.

Stabilized Pedestal

The Pedestal is a 2-axes motorized platform with the function to keep the Acoustic Emitter and the other devices pointing the target. The pointing is achieved by means of a remote control driven manually by the operator or in automatic mode thanks to an effective video tracking module.
The pointing is very fast - maximum speed of rotation is 40°/s in both azimuth and elevation – and accurate.
The Pedestal is stabilized against ship's motions via interface with the vehicle/boat gyrocompass from which it receives AHRS data (Heading, Roll and Pitch) necessary for the motion compensation.
Furthermore, the Pedestal is equipped with an internal IMU (Inertial Measurement Unit) allowing the stabilization even in case of absence of interface with the vehicle/boat gyrocompass system.

Acoustic Emitter

The Acoustic Emitter has the following characteristics:

- Long range and directive acoustic communication, with maximum range of 2.000 m for intelligible voice messages (ideal conditions)
- Maximum acoustic output (Sound Pressure Level) of 151 dB_{SPL} at 1 m (SPL Peak Max)
- Maximum output directivity at 2 kHz of ± 12° (24° conical) with more than 3dB reduction compared to the beam centre.
- Frequency response: 300 Hz to 8 kHz.

Search Light

It is a High Intensity Search Light Projector with the capability to illuminate a target up to a distance of 3.500 m.
The device is IP-66 grade protected and grants the possibility to be adjusted both in terms of power and focus of the light beam.

Laser Dazzler

It is a very effective device to temporarily glare or disorient people on board a vehicle (target) with intense (5 W) and very focused radiation.
The Laser Dazzler can be used in continuous or "Strobe" mode emission (frequency 10 Hz) to enhance the capability of the system to disorient and frighten the threat.

In terms of safety, when the distance of the target is below the NOHD (Nominal Ocular Hazardous Distance) the control electronics, automatically provides the shutdown of the Laser Dazzler.

Laser Range Finder

It is a eye-safe type Laser, allowing the operator to measure the distance of the threat/target up to 1.500 meters of range, so as to facilitate the adoption of proper security countermeasure.
Furthermore, it is used in combination with the Laser Dazzler for disabling it when the distance of the target is below the NOHD.

Color camera

A low light Color Camera with 30 X optical zoom is installed and aligned with the center of the acoustic beam.
This camera is seen on the display of the Control Console and allows the operator to better evaluate how to engage a potential threat, to precisely point the target, to activate the video tracker module, to record scenes, etc.

Thermal camera

It is a very sensitive un-cooled Long Wave Infrared Red (LWIR) sensor, aligned with the center of the acoustic beam.
The thermal camera is displayed on the Control Console and allows the same functions of the visible camera: pointing the target, activating the video tracker module, recording scenes, etc.

CONTROL CONSOLE C-424(V)x

The Control Console **C-424(V)x** is the system HMI (Human Machine Interface) and embodies all the controls/commands to operate the system: activate the Pedestal motion, emit acoustic messages, activate the Laser Dazzler, etc.

The Control Console displays the Video and the Thermal Cameras and hosts the Video tracking module, allowing the operator to lock on the target automatically, either exploiting the Colour Camera video or the Thermal one.

Human Machine Interface (HMI)

The operator, through the Control Console HMI, can perform the following functions:

- Switch on and off the System
- Point the MASS device towards the target (by means of a joystick control).
- Activate the automatic pointing function (Video Tracker)
- Activate the microphone for directly speaking to the target
- See the distance of the target (Range Finder)
- Activate the Laser Dazzler
- Transmit pre-recorded voice message or disturbing sound in MP3 format
- Adjust the acoustic volume
- Illuminate the target by means of the search light
- Control the power and the beam width of the search light
- Display the video camera (or the thermal camera)
- Record images from the video or the thermal camera [*]
- Adjust the video camera zoom
- Record messages (or sounds) sent to the target [*]
- Set the sectors in which the operation of the MASS (audio emission, light emission, laser emission) is inhibited to preserve the personnel safety
- To see detailed troubleshooting messages

[*] This feature, available only if the LAN Server Option is exerted, allows to show evidences, in the post event analysis, of the engagement rules followed by the operator and the actions made by the target during the occurrence.

In terms of physical construction, the Control Console can be supplied in either Rugged version or as a Commercial Laptop computer.

The two types of Control Consoles provide the same functions, while differentiating in terms of design and the construction.

Rugged Control Console C-424(V)4

Laptop computer C-424(V)3

Control Console types

In both cases the Control Consol is equipped with proper keyboard and mouse (integrated), Joystick and Microphone.

LAN SERVER (Option)

A LAN server can enrich the system in case the interface with the vessel CMS (Combat Management System) or audio and video recording capabilities are needed.

The LAN Server then, if connected to the same LAN of the other components of the system, has the aim to allow the direct control of one (or more) Pedestals **CS-424(V)3xx** from the CMS.

TECHNICAL DATA

LW MASS Pedestal CS-424(V)3xx

Dimension and weight

Dimensions (mm)	970 (h) x 790 (w) x 690 (d)
Weight (Kg)	140 approx
Material	Aluminium

Power Supply

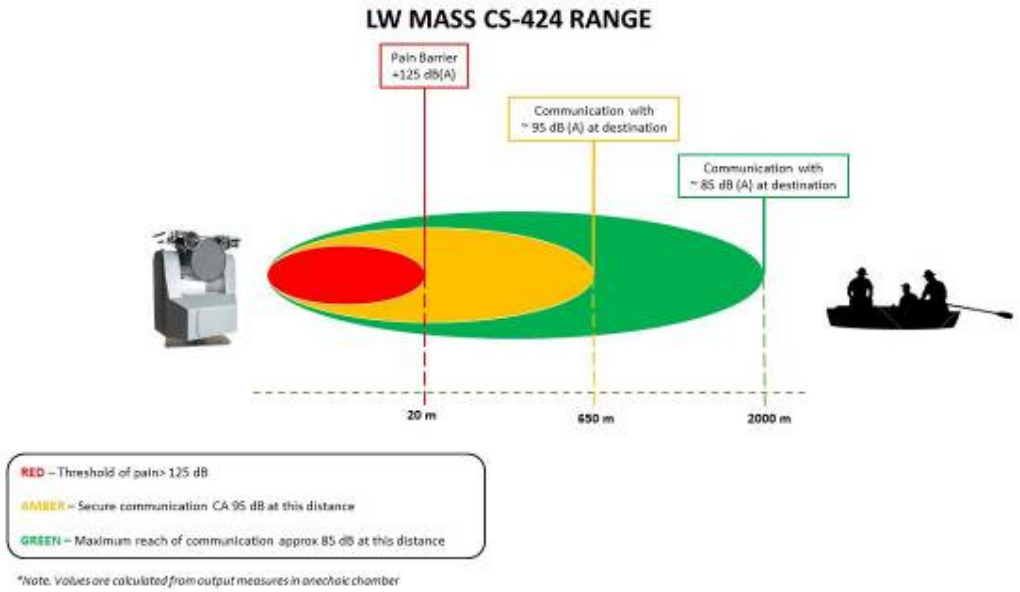
Voltage	115 - 230 Vac +24/+28 Vdc (with external inverter – option)
Consumption	400 W (average) 1 KW (maximum)

Motorized Pedestal

Azimuth	0-359 °
Elevation	+/- 30°
Pointing accuracy	+/- 0.5°
Rotation speed	40°/sec
Rotation Safety	Mechanical limits
Stabilization against	Roll, Pitch, Heading

Acoustic Emitter

Audio messages	Voice (live via microphone or pre-defined text messages stored in the memory) Sound (pre-recorded uncomfortable sounds)
Audio emission	151 dBA at 1 m (LL Peak Max)
Range	*See graph below*
Beam-width	+/- 12° (24° conical at 2 kHz/3dB)
Frequency response	300 Hz to 8 kHz



Search light

Range	3.500 m
Protection Grade	IP 66
Adjustments	Power and Focus (1° to 40°)

Video Camera

Sensitivity	0,01 Lux
Optical zoom	30 X optical zoom
Resolution	1920 x 1080 (full HD)
FOV(H)	from 63,7° to 2,3°
Detection range	1,5 Km [Medium FOV, target size: 3 m x 1 m, visibility: 10 Km, Probability of detection: 90 %]

Thermal Camera

Type	Un-cooled LWIR, 17 µm
Resolution	640 x 480 pixels
FPS	30
Focal length	100 mm, 75 mm, 60 mm available
FOV	100 mm lens: 6.2° (H) x 5° (V) 75 mm lens: 8.3° (H) x 6.2° (V) 60 mm lens: 10.4° (H) x 8.3° (V)
Detection range	4 Km [100 mm optics, target size: 3 m x 1 m, visibility: 10 Km, Probability of detection: 90 %]

Laser Dazzler

Laser power	5000 mW
Wavelength	532 µm
Beam output (module)	100-micron core fiber
Divergence	5 mrad (up to 10 mrad, on request)
Type of emission	Continuous or Strobe mode (10 Hz)

Laser Range Finder

Type	Class I (eye safe), 905 nm
Covering range	1.500 meters (*referred to 10 m^2 NATO target, visibility higher than 20 Km*)

Environmental (Designed to meet)

Vibration	MIL-STD-167-1A
Shock	MIL-STD810G
Temp. (hot)	MIL-STD-810G Meth. 501.5 Proc. II (60°C)
Temp. (cold)	MIL-STD-810G Meth. 502.5 Proc. II (-33°C)
Rain	MIL-STD-810G Meth. 506.5, Proc. I, Blowing rain
Humidity	MIL-STD-810G Meth. 507.5, Proc. II, "aggravated cycle"
Salt fog	MIL-STD-810G Meth. 509.5
EMC	MIL-STD-461F Class IV

LW MASS Console C-424(V)

Rugged Control Console C-424(V)4

Operating System	Windows Embedded Industry Pro
Display	Touch Screen 13.3" TFT LCD FHD (1920 x 1080)
Memory	8 GB DDR3 SATA SSD 128 GB shock resistant
Rugged Features	MIL-STD-810G
Operating Temperature	- 20°C to + 55° C
Storage Temperature	- 40° C to + 71°C
Humidity	0- 95% RH
Dimensions	570(W)x360(H)x360(D)
Weight	Approx. 6kg

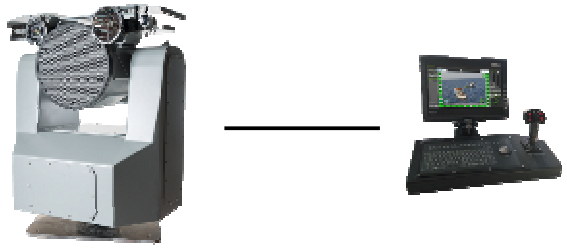
Laptop computer C-424(V)3

Commercial grade Computer with Windows 7 operating system

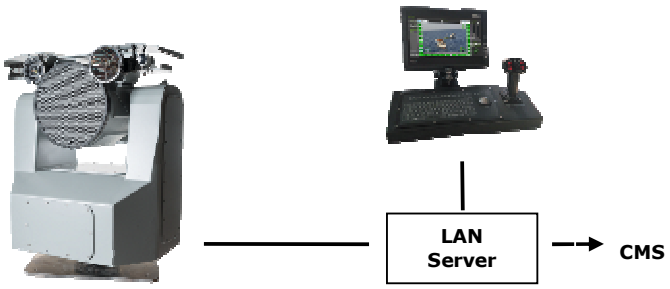
System Interfaces

With CMS	Ethernet 10/100 on copper
With AHRS	RS-422, NMEA 0187 protocol (Heading, Roll, Pitch)

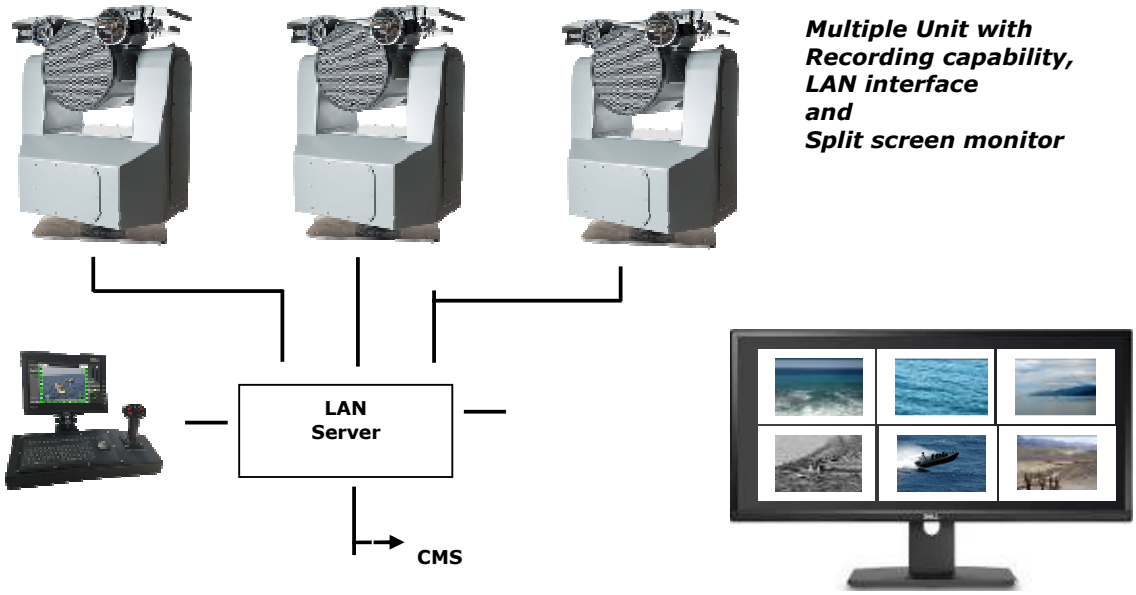
EXAMPLES of CONFIGURATIONs



Single Unit Configuration



Single Unit with Recording capability and LAN interface



Multiple Unit with Recording capability, LAN interface and Split screen monitor

Arsenale Marittimo Militare
Viale Amendola 1, Fabbricato 19
19121 La Spezia (Italia)
Tel. [+39] 0187 695911
Fax [+39] 0187 630503
E-mail: sales@sitep.it
www.sitepitalia.it