Essential Features of an Outdoor Warning System

It has been proven time after time that the most effective way to notify the largest number of people in the shortest possible time is via electronic warning alerts and announcements. Electronic warning systems have been installed throughout the world for at least 20 years and continue to be installed throughout the world to alert-inform-direct people of impending threats and continue to operate during and after the threats to eliminate confusion and restore and maintain order.

For outdoor areas this is achieved using fit for purpose mass notification devices which include an alert tone to bring to attention, pre-recorded voice messages to inform and direct and where needed live Public Address announcements to reinforce messages.

USA manufactured Whelen WPS2900 series mass notification device - effective, robust and reliable technology designed for harsh conditions and extreme events – note the aerodynamic design of the speakers and the solid mounting plate that attaches the speakers to the pole.

The purpose of this document is to outline the essential features of a properly engineered mass notification system for outdoor warning both permanent and transportable.

Transportable Emergency Warning System equipment complete with Telemetry

Essential Features

Hardware

The materials used must be designed for long life and harsh coastal conditions.

1. **Speaker materials:** UV stabilised LEXAN® 3433R or equivalent which is designed to stand up to moisture, salt and wind

2. **Electronics cabinets:** 5052 corrosion-resistant aluminium-magnesium alloy or equivalent with a tensile strength range 31,000 to 44,000 psi. This is superior to stainless steel which will corrode in coastal environments. 5052 will not rust.

3. **Speaker design:** omni-direction aero-dynamic design to allow for high wind conditions. Multiple speakers that are not designed for high wind loadings should not to be used.

4. **Speaker drivers and amplifiers –** single coil 400W/500W RMS drivers, one per omni-directional speaker. One 400W/500W RMS amplifier per driver

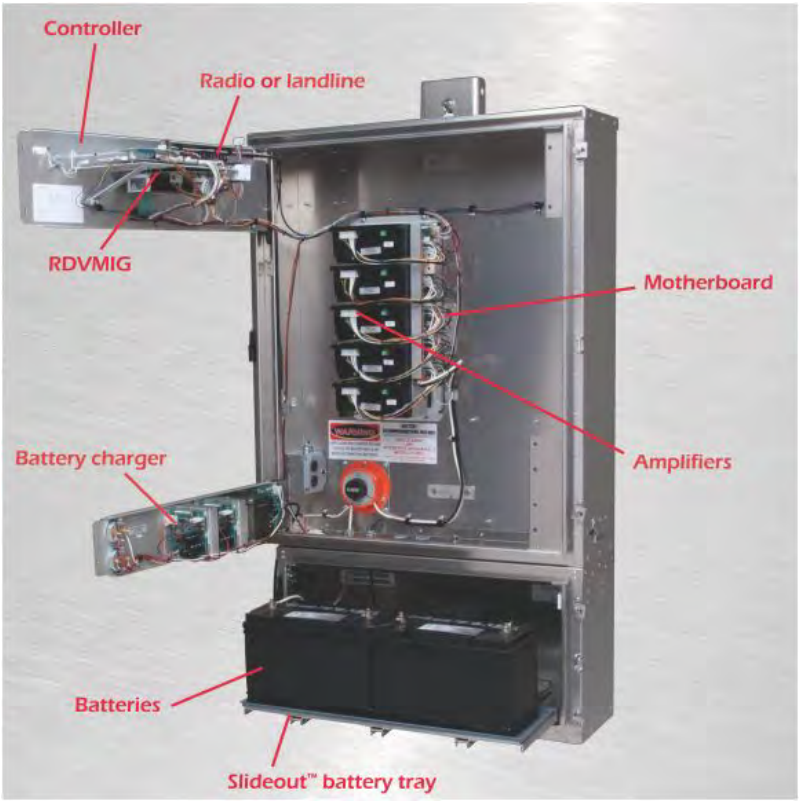
which operates at 400W RMS for alert tone broadcast and 500W RMS for Voice Announcements. Speaker drivers should be easy to replace.

5. **Speaker column mounting hardware –** the speaker column is to be attached to a solid diecast base with 4 large mounting bolts. When installed on a timber pole a solid steel mounting bracket to be supplied that slips over the top of the pole.

6. Visual ALERT
is included to provide both visual alerts. LED's positioned around the radius flash when the alert and messages are broadcast. 360 degree coverage.

7. Power Supply

The System must operate from a DC power supply. The Batteries to be incorporated into the electronics housing but in a separate compartment with easy serviceability.



Charging of the batteries is by AC supply or Solar panels. In high wind areas it is best to use AC power. The battery charger must be in-built into the system and incorporate easy to read voltmeter and ammeter to enable visual confirmation of charging status.

8. Silent Testing

Perhaps one of the most important features is the ability of the system to conduct silent testing.

EMALTE designed and installed system at Grantham, QLD, Australia

Silent testing provides a regular update on critical system components including:

1) Battery health
2) Amplifier and speaker status

Silent testing can be programmed to be undertaken on a regular basis or upon demand when a Supervisory and Control System is used.

Silent testing includes:

- Disconnecting the charging source from the batteries in order to place the batteries under load and ensure they are holding charge

- Generating a 20KHz tone

- Broadcasting the tone for a short duration through the speakers – thus testing the amplifiers and speakers

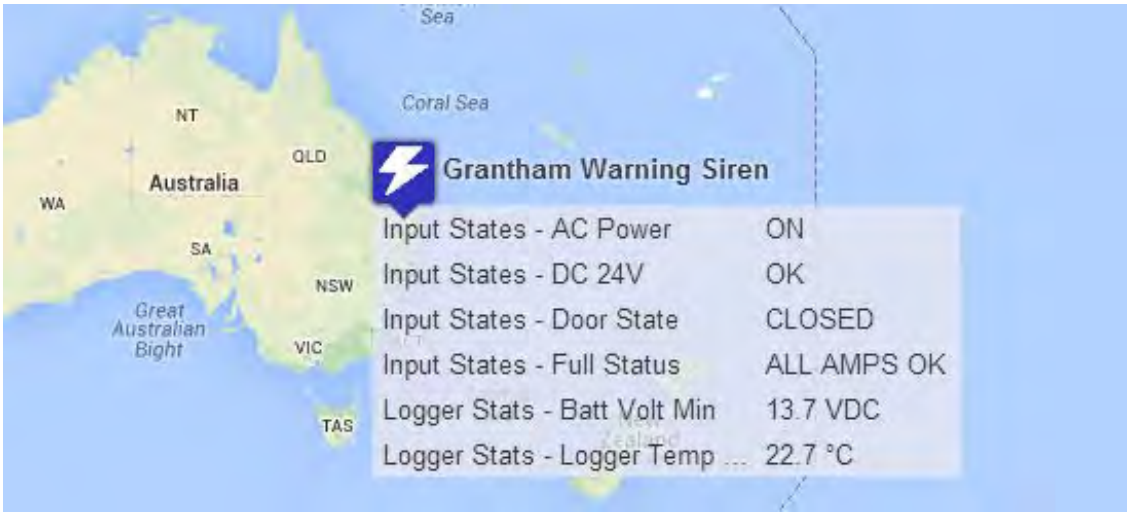
The results of the Silent Test are available via switched outputs on the telemetry card.

The results include:

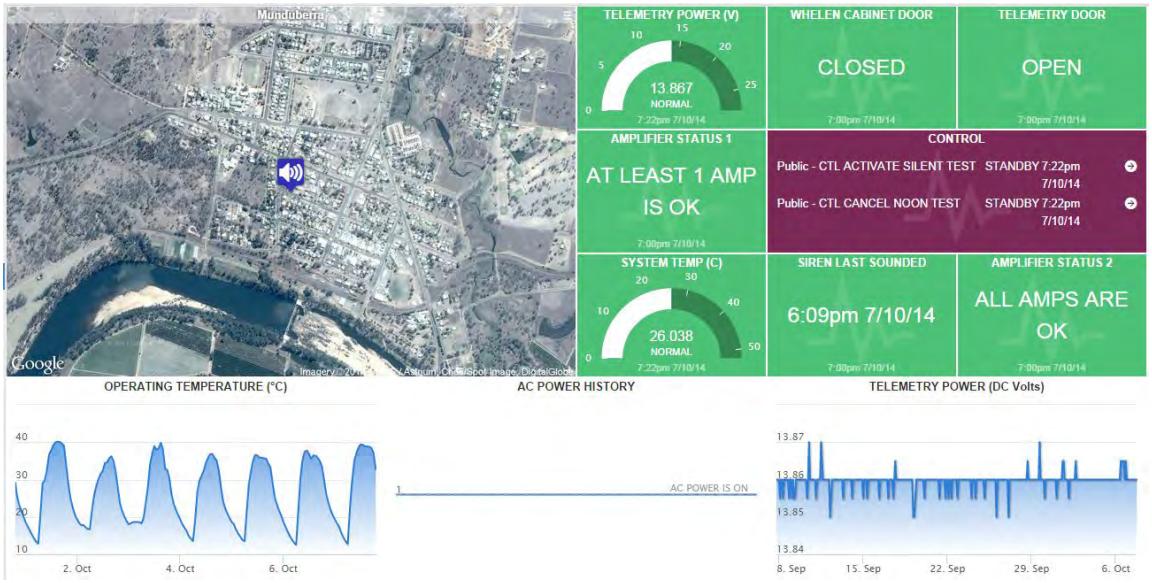
- DC power status
- Enclosure Door Security status (Main cabinet, Battery compartment)
- All Amplifiers and speaker working
- At least one amplifier and speaker working

Also when the system is managed via telemetry instant information is available re:

- Door Security
- AC power supply
- DC power supply



Silent Test Results



EMALTE Cloud based SCADA display showing the location, status (blue = ALL OK) and system status

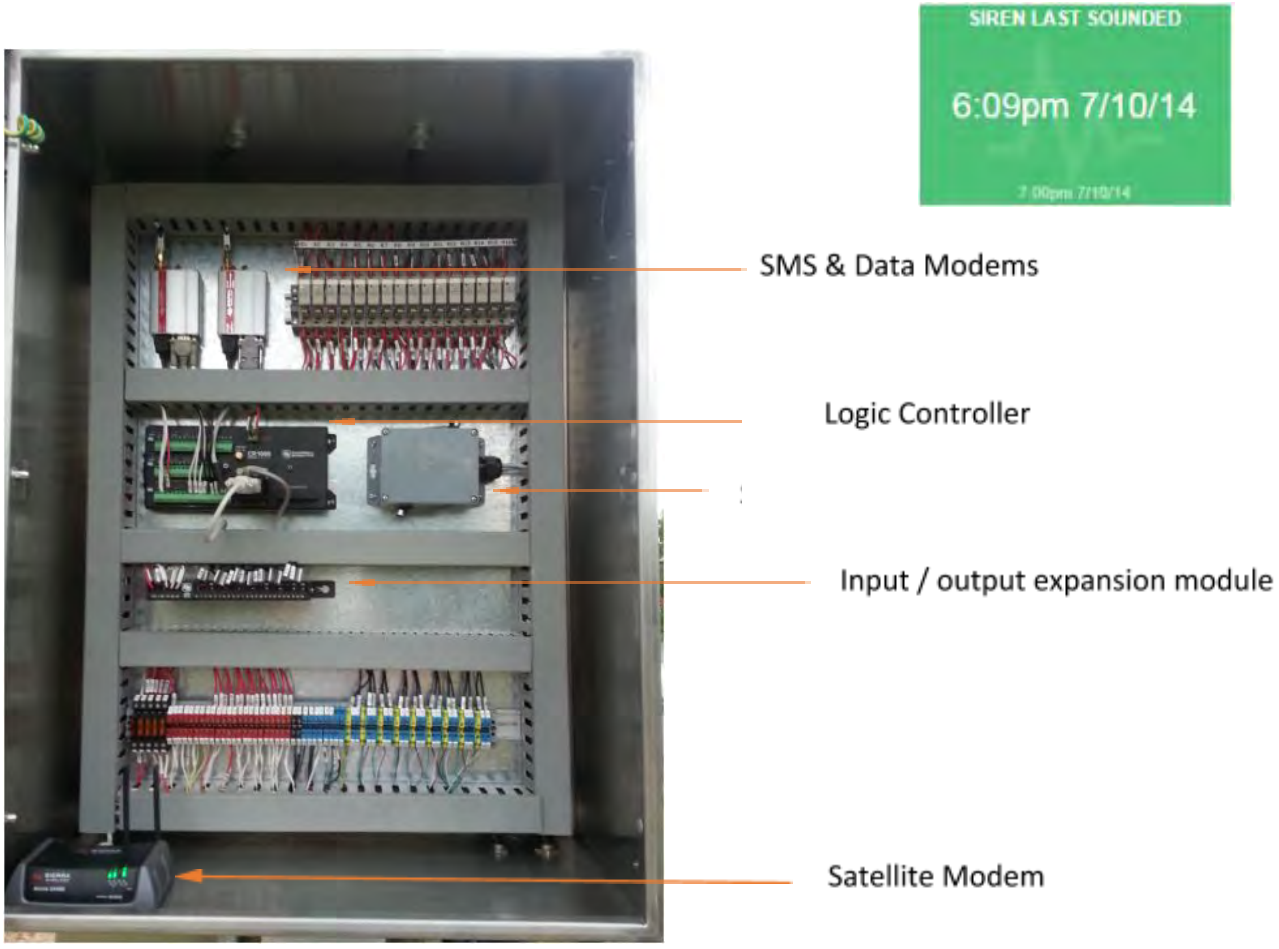
9. Confirmation of Broadcasts

Included in EMALTE designed systems is a device to confirm that the Outdoor warning system has functioned. This is known as a “Sound Collector”.

This comprises specially designed compact microphones which are connected to an electronics board complete with dual relay outputs.

When the ambient sound level exceeds a pre-set SPL the device triggers and confirms that the sound has been broadcast.

This is very important for post event verification or noon day test verification.



EMALTE Telemetry and Communications System

10. Speaker Cable

The speaker cable running from the amplifiers to the speakers must have both a strong out casing and be reinforced with woven SS protective inner sheath that is mechanically fastened inside the speaker housing base at the factory.

11. Speech Intelligibility

The clarity of the voice announcements is critical. It is essential that the supplied systems come with Speech Intelligibility Certification.

12. Noon- Day Testing

Noon-Day Testing can be automatically scheduled to ensure that locals and visitors are aware that the area is equipped with an emergency warning system. First the Test message is played and then the warning tone:

https://www.youtube.com/watch?v=6Q9UEy3IckQ

The above link will take you to the first test of the Grantham Warning system designed and installed by EMALTE's Principal Consultant Mark Wolf and his Team from EMALTE and Prospect Environmental (Prospect Environmental are certified installers of Whelen equipment in QLD, Australia).

Mounting Options: Pole and Rooftops

The systems should have factory designed mounting brackets for pole and rooftops!

13. Interconnection to various telemetry systems

The telemetry system interface must be extremely simple. Contact closures are the most reliable means of both activating:

At

- Alert tones
- Pre-recorded messages
- Public Address announcements
- Silent Tests
- Noon Day Tests

And

- Providing the results of the silent test
- Notifying if there is a real time change of state
    - Door open
    - AC power off
    - DC power fault
    - Sound has been sensed (from the Sound Collector)

14. Trailer Mounted Systems

Trailer mounted systems are identical equipment wise to the pole or roof top mounted systems except they are trailer mounted.

The masts are typically erected using hydraulic or pneumatic power packs. The trailer mounted systems are custom made to suit the sounding radius required. Live PA announcements are possible using a hand held microphone.

15. Calculating the Sound Pressure Level

The aim of the system is to be at least 20dB above the maximum ambient noise within the coverage zone.

Companies that state SPL at 80dB, 70dB and 60dB must do so such the calculated distances are based on the reduction in SPL as the distance doubles by 10dB for Emergency Warning purposes not 7dB which is the standard amount. By reducing by 10dB additional headroom is built up for overcoming additional ambient noise generated during an extreme event.

Consider for example the following relevant to Whelen WPS2910 system:

Distance	30 m	60m	120 m	240m	480 m	960 m	1920m
SPL with 7dB	129	122	115	108	101	94	87
SPL with 10dB	129	119	109	99	89	79	69
Additional dB	0	3	6	9	12	15	18

Therefore if the ambient noise is 50dB at 1920m from the source we are claiming 69dB with 18dB additional headroom so in total at 1,920m from the source we have 37dB above our 50dB background noise.

Conclusion

Mark Wolf and his team of specialists at EMALTE have been designing, integrating and construction systems specifically for public warning and that incorporate public warning for more than 20 years.

The information contained in this document comes from working with various technologies but is based primarily on the knowledge gained from working directly with Whelen Engineering of the USA Mass Notification products which are considered the world's best.

In addition to the mass notification equipment we also have both enterprise and cloud based SCADA applications for the management of networks of electronic warning systems and which can also trigger SMS and email alerts.

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