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ALERT EAGLE® 100 and 120

Diagnostic SAME/EAS Decoder and System Interface

07/21/15

The Alert Eagle® 120 is an upgraded version of the ALERT EAGLE® 100. Most of the features are the same in both units. The Alert Eagle 120 has a smaller foot print (approx. 6" x 4.75" vs. 7" x 6") and diodes have been added to the output lines to make interfacing easier. The test button has been added to the outside of the case.

Instruction Manual

- 1- Power Supply (12VDC, Wall Transformer, Battery Backup, UPS)
- 2- Programming the Match Events and Locations
- 3- Readback the AE Match Database
- 4- Set the Alert Activation Time
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Product Description:

The patented AE diagnostic SAME/EAS (Specific Area Message Encoded/Emergency Alert System) decoder monitors unmuted audio and decodes SAME/EAS alert messages.

The user configures a text file of events and locations to 'match' against the incoming alert SAME/EAS alert message. Upon detecting a match, the AE will close a relay, and if connected to a Weather Eagle® (WEATHER EAGLE®), will unmute the WEATHER EAGLE® for a period of time until either end of message signal is decoded, or the timeout which default is 90 seconds. At the end of the alert period, the relay will open and the WEATHER EAGLE® will re-mute.

As a result of years of research and development, the AE has many patented diagnostic features that provide the user with positive feedback about the operation of the system. These include a FSK Lock detect LED, digitally saving the last alert into the AE (including each SAME/EAS burst and the event and location matched and whether the End of Message signal has been decoded). An Audio In port is provided to enable the user to test the system with recorded .wav audio files. The operation of these features will be described in this document.

The AE may be installed as a 'filter' to automatically place selected weather warnings, and live weather reports, on other communication systems such as public address systems and police, fire, public utility radio systems, etc. in manners that should minimize disruption of the other communication system.

The AE is engineered for durability with modern surface mount technology and few moving parts. The AE has special audio filters and amplifiers to provide the most reliable SAME/EAS decoding capabilities. The AE is especially useful for emergency operations centers, security offices, mobile communications vehicles, command posts, and search and rescue units, when combined with audio supplied by the WEATHER EAGLE®.

The firmware in the AE is flash memory for customer field upgrade, using the optional Thunder Eagle® programmer. Upgraded firmware may be posted on www.wxeyeagle.com/login and downloaded by the client and then programmed into the

AE. This feature will prevent unit downtime and will eliminate shipping time and expense in keeping the unit in operation.

The AE has many different configurations. It can be standalone in a plastic case, 19" rack mounted alone and 19" rack mounted with the WEATHER EAGLE®.

NWR is broadcast from over 1000 transmitters located throughout the United States and Canada on seven FM channels operating between 162.400 MHz and 162.550 MHz. Most populated areas of the United States and Canada are covered by at least one channel. Some areas are covered by more than one channel. Maps and a database of the NWR transmitters and a listing of the county location codes and which location codes are broadcast on each transmitter are located at www.weather.gov/nwr.

The alert match text file is easily created by using the Thunder Eagle® free FipsFilemaker™ software. These files can be edited by the user to add new alerts and locations, so there will be no delay in decoding new alerts as the SAME/EAS system evolves. The alert match text file is easily uploaded from a user's workstation using the Thunder Eagle® free FipsFileloader™ software. These software programs are available to Thunder Eagle® customers at www.wx eagle.com/login. User names and passwords will be provided to Thunder Eagle® clients.

A watch means that conditions are favorable for the occurrence of severe weather. A warning means that severe weather is imminent. You may wish to contact your local forecast office or www.weather.gov for further information.

The NWS normally tests the tone alert system once per week, on Wednesdays, between the hours of 11 a.m. and noon, if no severe weather is anticipated. Please make sure that your AE receives the weekly alert message.

1) POWER SUPPLY:

The AE is powered by 12 volts DC. The unit draws about 100 milliamps. Plug the wall transformer into 120-volt AC 60 Hz and plug the 2.1 mm plug, center positive

connector into the rear panel of the unit. Where available, it is recommended that the AE be plugged into an uninterruptible power system to provide service during power failures. A computer UPS of 500VA should power the AE for 24 to 36 hours and will also provide power surge protection for the unit. The AE is operational as soon as it receives power. There is NO on/off switch.

If the AE is used with the WEATHER EAGLE®, the power from the AE will power the WEATHER EAGLE® and NO second power supply is needed.

The unit may also be operated from any 12 volt DC, negative ground system in a car, boat or other vehicle. Vehicle connections should be protected by a 1-amp fast blow fuse. An optional fused cigarette lighter adapter is available from the Thunder Eagle, Inc.

2) Programming the Match Events and Locations

The user can select any combination of the 53 possible events and any of the over 5500 location codes to 'match'. BOTH the event and the location need to match for the AE to activate the alert sequence.

The AE can hold up to approximately 2000 match codes, although most users will usually have less than 31 match locations programmed into the AE as each NWS transmitter can transmit up to a maximum of 31 locations. Each transmitter only transmits the locations in the transmitter's broadcast coverage area. Check www.weather.gov/nwr for transmitter/county code coverage.

All events and the nationwide 000000 code are defaults. It is highly recommended to also include each statewide alert code for every state that you can monitor. These are in the FipsFilemaker™ database and are in the format of OXX000 where the XX is the state code. For example, 051000 is the statewide code for Virginia. Many important alerts, such as the Amber missing child alert are transmitted with the OXX000 statewide code. The FipsFileMaker™ software will verify the format of the file

before it permits the file to be saved. Save the file in a location on your workstation where you can find it with the FipsFileLoader™ software.

If needed, the user can edit the text file in the FipsFileMaker™ to add new event codes or location codes. This will be very important as the SAME/EAS system evolves and changed. With this field upgrade system there should be no need to have your unit out of service or to be returned for upgrade.

Use the following steps to load the match text file into the AE:

- a) Unplug the AE.
- b) Open the FipsFileLoader™ software on your workstation.
- c) Connect the supplied standard serial cable between your workstation's comm port and the comm1 port on the rear of the AE.
- d) HOLDING IN the AE Reset/Program button, plug the power into the AE.
The AE should enter programming mode as shown by the Match and No Match LEDs staying lit.
- e) Open the FipsLoader™ software and open the comm port on your workstation. Make sure you get a green confirmation light that the comm port is open. On XP you can quickly find which comm ports are installed on your workstation by right clicking on the My Computer desktop icon, then go to properties/ hardware/ device manager/ ports (comm-lpt) and the comm port numbers should be listed.
- f) Press the FipsLoader™ connect button and a green icon indicating that the Alert Eagle is Ready to Program should appear.
- g) Press the Erase button (and OK in the confirmation message box) and the AE memory should erase. This should take less than 90 seconds. The memory must be erased before programming to prevent prior information stored in the memory from causing unreliable operation. Once the memory has been erased, the new match file MUST be uploaded for any matches to occur.

- h) Click the Select File button and navigate on your drives to the text file you created with the FipsFileMaker™.
- i) Click the Upload button and the uploading progress should take less than one minute and is tracked by the progress bar and by the byte counter.
- j) When the file has been successfully uploaded, a green success icon will appear. If it does NOT appear, retry the above steps.
- k) Power up the AE.
- l) Close FipsFileLoader™.

3) Readback the AE Match Database

- a) Connect the AE to your workstation's comm port.
- b) Open a Hyperterminal session
(start/programs/accessories/communications/Hyperterminal). Create and save a new connection with the following parameters (9600 baud, 8, N, 1 NO flow control). In Hyperterminal setting, ascii set up, you should check local character echo and add line feeds to incoming data.
- c) Hold in the Last Alert button on the AE while you power up the unit and the programmed database should appear on your Hyperterminal. Review the match events and locations for accuracy.

4) Set the Alert Activation Time

- a) Connect the AE to your workstation's comm port.
- b) Open a Hyperterminal session
(start/programs/accessories/communications/Hyperterminal). Create and save a new connection with the following parameters (9600 baud, 8, N, 1 NO flow control).
- c) Hold in the Reset/Program button AND the Last Alert button on the AE while you power up the unit and the Alert Time menu should appear on your Hyperterminal.

- d) The default setting for the relay to close and the WEATHER EAGLE® to unmute on an alert is 1 minute and 30 seconds. You can reset the time by choosing menu option 1 and N for new. Then press in the hours, minutes and seconds of the alert time. Then press E to end the menu session. The alert time can be set from 1 second to 2 minutes.
- e) Power down and power up the AE. Note: In addition to the timeout menu, the AE will automatically reset upon decoding the NWS End of Message signal. The NWS signal should issue not more than two minutes after the beginning of the alert. If the timeout is set for more than two minutes, it will act as a backup to the NWS EOM signal to reset the AE.

5) Reset Button

Pressing the reset button resets the AE, mutes the WEATHER EAGLE®, opens the alert relay and sends a reset message to comm port1 and Hyperterminal (9600 baud, 8,N,1 NO flow control).

6) Last Alert Button

Pressing the Last Alert button sends the details of the last received alert to the AE comm port 1 and Hyperterminal (9600 baud, 8, N, 1 NO flow control) with the following information:

- a) Each of the 3 possible 3 bursts received:

```
ZCZC-WXR-RWT-011001-024009-024017-024021-024031-024033-024037-051013-051043-051047-051059-051061-051099-051107-051113-051137-051153-051157-051177-051179-051510-051600-051610-051630-051683-051685-054037+0030-2761515-KLWX/NWS-À*
```

```
ZCZC-WXR-RWT-011001-024009-024017-024021-024031-024033-024037-051013-051043-051047-051059-051061-051099-051107-051113-051137-051153-051157-051177-051179-051187-051510-051600-051610-051630-051683-051685-054037+0030-2761515-KLWX/NWS-€*
```

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ZCZC-WXR-RWT-011001-024009-024017-024021-024031-024033-024037-051013-051043-051047-051059-051061-051099-051107-051113-051137-051153-051157-051177-051179-051187-051510-051600-051610-051630-051683-051685-054037+0030-2761515-KLWX/NWS-À*
```

- b) Whether an Event match was found and which one:

EventMatchFound*
-RWT--RWT--RWT-a*

c) Whether a Location Match was found, and which one:

Location Match Found:*
-----051059--051059--051059-a*
-----*

d) Whether the End of Message signal was decoded

End of Message Signal Received*

This information provides a wonderful diagnostic for the entire system. If a good signal is being received, at least two of the three bursts should regularly decode. If one or no bursts are decoded, try to improve your signal quality by changing antenna location or using an outside and/or directional antenna.

By reviewing the SAME/EAS Location codes, you will learn what codes are being transmitted on your local transmitter and you can adjust your match files accordingly.

7) Function Test Button

The function test button is located INSIDE the AE 100 and outside the AE120 and provides a way to quickly test the core functions of the AE.

Pressing the function test button causes:

- a) The Match, No Match, Relay and EOM leds to light.
- b) The WEATHER EAGLE® to unmute and then remute.
- c) The relay to close.
- d) The match database to output on the rs232 port (9600, 8, N, 1).
- e) The software version number to output on the rs232 port.

This button will be very useful for system diagnostics.

8) Audio Input and FSK Lock LED

The AE needs 'clean, filtered' audio with an amplitude of about 100mV (millivolts) peak to peak. The audio is input into the AE from ONE (**use only one audio input at a time!) source: a) RCA connector on the rear of the AE; b) DB15 connector on the rear of the AE (pin 9); or c) a ribbon cable to the WEATHER EAGLE® inside the AE.

When the unit is powered up, and audio is applied to the AE, the FSK Lock LED on the front panel should flash each time the audio 'passes through' the SAME/EAS audio passband. Thus, by looking at the FSK Lock LED you can tell if the decoder is receiving audio and whether the unit is 'locked' onto a SAME/EAS alert, during which the LED should stay on solidly for the duration of each SAME/EAS burst.

The decoder can be tested by placing a recorded .wav audio file into the rear RCA audio in jack of the AE using a standard workstation's Sound Recorder (start/programs/accessories/communications/sound recorder). Connect a cable between the workstations speaker output (1/8" phono) the RCA jack on the rear of the AE. Audio cables and adapters are available from many electronic stores. The audio volume on your workstation should be set no higher than 1/3 of maximum volume. The AE responds well to low audio level signals. High level signals, despite the AE's filters, may cause distortion of the signal and a failure to properly decode.

Sample .wav files are posted on www.wxeyeagle.com/support/audiofiles

9) Description of Front Panel LEDs

- a) No Match - Lights when the last alert does NOT match EITHER the Event or the Location.
- b) Match - Lights when the last alert matches BOTH the last Event and Location.
- c) FSK Lock - Lights when the input audio is in the alert audio passband. See above description of operation.
- d) Relay - Lights during the alert cycle when the relay is closed (and the WEATHER EAGLE® is unmuted).
- e) EOM - Lights when the EOM signal has been detected.
- f) Data - Flashes as data is moved in and out of the digital memory. This is a great diagnostic. You will see this LED flash briefly at the end of each SAME/EAS burst

as the data is saved to memory and you will see this light flash during the match sequence at the end of each new alert sequence.

g) Power - This light indicates that the AE has power.

10) Description of Rear Panel Connections

a) Comm1 - This is a standard 3 wire serial port using pins 2,3 and 5. Pins 2 and 3 are transmit and receive, but can be reversed (instead of using a null modem cable) by reversing the position of jumpers J66 and J71. Change both settings so one jumper is from pins 1-2 and the other are from pins 2-3. Pin 5 is a ground.

b) Relay Output - A removable green screw terminal wire connector has outputs for 1) Ground, 2) Relay Normally Open, 3) Relay Common, and 4) Audio Out which can be either muted audio or unmuted audio. **CAUTION -- Connect this output to ONLY a high impedance audio device. Low impedance audio devices will cause the audio to the decoder to be attenuated and will make the AE not perform properly. The FSK lock light MUST be flashing to decode the NWS EAS/SAME signal.

c) Remote Control - This is a db15. The pin out is as follows:

- 1) **WEATHER EAGLE® Manual channel change (+5 VDC active high)
- 2) ** WEATHER EAGLE® Scan (+5 VDC active high)
- 3) ** Reset pulse to the WEATHER EAGLE® on alert (+5 VDC active high)
- 4) ** Live pulse to the WEATHER EAGLE® on alert (+5 VDC active high)
- 5) Relay common
- 6) Relay normally open
- 7) Relay normally closed
- 8) Busy Input into the WEATHER EAGLE®
- 9) Unmuted SAME/EAS audio input
- 10) Muted audio from the WEATHER EAGLE®
- 11) 12 VDC from the WEATHER EAGLE® or AE

12) N/C

13) **WEATHER EAGLE® play (+5 VDC active high)

14) N/C

15) Ground

**See the interface schematic on www.wxeyeagle.com.

d) Audio In - Place SAME/EAS high impedance audio into this port. **CAUTION -- DO NOT leave this test connected to an external audio source if you plan to receive alert audio from the WEATHER EAGLE®. It is permissible to insert external text audio into this port for testing while the AE is connected to the WEATHER EAGLE®.

e) 12VDC Power In

11) Location of Decoder

Like any piece of electronic equipment, the AE should be kept in a warm and dry location, away from direct heat sources and out of direct sunlight. Better reception may be obtained by moving the AE to a different location away from operating equipment. Computers and monitors generate significant RF and compete against the relatively weak NOAA All Hazards radio signals to capture the receiver. Always verify that you have good reception in order to receive severe weather alerts. Make sure you receive the weekly test.

12) Upload New Firmware

The AE is operated by a powerful computer (microcontroller) with electronically flash program memory. You need the ICD-40S programmer to update the firmware. Install the ICD-40S on your workstation. Open the AE case. With the AE powered on, plug the ICD-40S into the RJ-45 on the AE and plug the serial connector into your workstation.

****MAKE SURE YOU ONLY UPLOAD AE SOFTWARE TO THE AE. ***** A progress bar should appear and the download and file verification should take less than 30 seconds. Click the Run Program button. The AE should come to life. Press the buttons on the AE to make sure the download was successful and to test the unit with a test .wav audio file. Unplug the ICD-40S from the AE and from your workstation. Reassemble the AE case and close the ICD-40S software.

13) WEATHER EAGLE® Settings for Use with AE

Holding in the Manual button on the WEATHER EAGLE® during powerup, with the WEATHER EAGLE® connected to Hyperterminal, (9600 baud, 8,N,1 NO flow control).

Suggested menu options appear below:

- 1 - Channel on powerup (Last Selected).
- 2 - RSSI/Tone diagnostics on RS232 port (Disable).
- 3 - Remote Unmute Logic in (Disable).
- 4 - Rescan for strongest signal every 60 seconds (Disable).
- 5 - Relay closure on 1050 alert (Disable).
- 6 - Live audio on 1050 alert (Disable)
- 7 - Beep on 1050 alert (Disable).
- 8 - Set hrs/min/sec of live audio on 1050 Hz alert or live timeout. (At least 1 min 30 seconds)
- 9 - Set hrs/min/sec of relay closure on 1050 Hz alert. (n/a)
- A - Close relay on Live and Play. (Enabled)
- D - Restore default settings. (n/a)
- E - End menu setup routine. (n/a)
- F - Live Timeout Reset. (Enable).
- G - Beep channel number. (Disable).

The theory of operation is that on a match (event and location) the AE sends a pulse (+5) signal to the Weather Eagle® as if the Weather Eagle® live button was pressed electronically. If the Weather Eagle® is also interfaced to an outside remote control, and this line is held logic low, the AE will be unable to activate the Weather Eagle®. The solution is to place a diode on the incoming logic line into the Weather Eagle® for live and reset. See the interface schematic. At the end of the alert (timeout or EOM decoded) the AE sends a reset signal to the Weather Eagle®. The backup is the live timeout timer, which times out a set period after the Weather Eagle® goes live.

14) Specifications

Specifications are nominal, unless otherwise indicated, and are subject to change without notice.

General:

- Input voltage: 12 volts DC adapter or battery
- Dimensions: 3.25" x 8" x 6" (H x W x D)
- Alarms relay, text and visual
- DC input power 12 volts DC (less than 100 milliamp draw)

FCC/ Industrie Canada Compliance Statements

FCC Part 15.21 requires that the Manual include the following statements:

“Changes or modifications not expressly approved by the manufacture could void the user's authority to operate the equipment.”

“NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.”

“Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.”

15) Warranty

Procedure

1. Refer to Operating Instructions Section of this User's Manual for proper operation.
2. If the above procedures do not correct the problem you are experiencing with your unit, return the unit with proof of purchase to where purchased for warranty exchange or further warranty instructions.

Limited One Year Warranty:

Equipment manufactured and sold by Thunder Eagle, Inc. (“ThunderEagle”) is warranted to be free from defects in workmanship and materials for a period of one (1) year from date of shipment.

If dissatisfied with the equipment within thirty (30) days of receipt, the Buyer may return the equipment freight pre-paid to ThunderEagle for a refund. The Buyer MUST contact ThunderEagle for a RMA (Return Merchandise Authorization) before returning any equipment. Shipments received without a RMA will not be accepted by ThunderEagle.

Should any item manufactured by ThunderEagle become defective during the warranty period, it will be repaired or replaced at ThunderEagle’s sole discretion.

Warranty repairs made at ThunderEagle’s factory, or in the field, shall be at no charge to the customer. ThunderEagle shall pay SURFACE transportation charges both ways within the contiguous United States if the equipment proves to be defective WITHIN 30 DAYS from the date of shipment. Throughout the remainder of the warranty period, the customer shall pay transportation charges to return the equipment to ThunderEagle, and ThunderEagle shall pay SURFACE transportation charges to return the repaired equipment to the customer. All requests for warranty service must be received within the warranty period.

All ThunderEagle warranties are contingent upon the proper use of the equipment, and will not apply if the equipment is subjected to unusual physical stress, neglect, misuse, or inadequate storage. Damage caused by electrical power surge, lightning, water, temperature and/or other environmental causes are SPECIFICALLY EXCLUDED from this warranty.

The Buyer, by acceptance of the equipment, assumes all liability for consequences of its use or misuses by the Buyer, the Buyer’s employees, and/or all others. No amount of engineering will

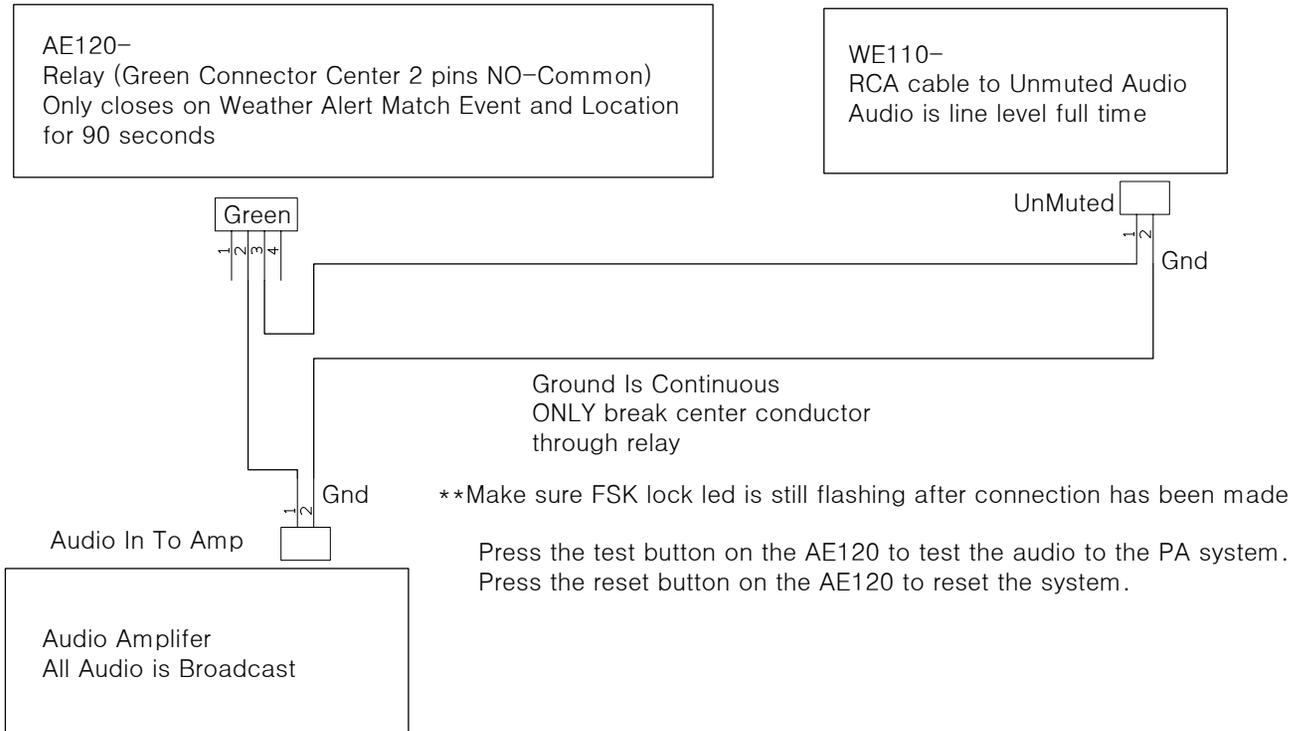
guarantee that ThunderEagle products will perform flawlessly in all circumstances. If the Buyer cannot accept this risk, the products should not be purchased.

In no event shall ThunderEagle be liable for any special, indirect, incidental, or consequential damages arising out of, or as a result of, the sale, delivery, servicing, or loss of use of the equipment or any part thereof, or for any charges or expenses of any nature incurred.

This warranty is in lieu of all other warranties, including without limiting the generality of the foregoing warranties of merchantability and fitness for a particular purpose, express or implied.

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Connection From WE110 to Audio Amplifier Using AE120 Relay to Gate the Audio for Alerts Active Only



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DESIGN TITLE: WE110-Relay-Audio Connection

Date Created: 04/12/15

REVISION:
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