

Emergency Alert Radio



Model 5124 – WEATHER EAR



Technical Specifications

Physical Size

6.5 (w) x 3.5 (d) x 1.5 (h) inches

Operating Environment

Extended Indoor Environment

0 to +50 degrees C.

0 to 95% R.H. (Non-Condensing)

Power Input: 9 - 18Vdc @ 200 mA max.

115 Vac wall transformer supplied

Maximum RF Input Level: +10 dBm

Input Impedance: 50 ohms

Audio Bandwidth: 5 kHz

Carrier Threshold: 0.5uV

Sensitivity: 0.5uV for 10 dB S/N

Weather EAR

Tuning Range; 162.400 to 162.550 MHz

Tuning Steps: 25 kHz

(All 7 NOAA VHF frequencies included)

Backup Batter

3 x AA Alkaline penlight cell

Battery Life

More than 24 hours (EAR Muted)

Emergency Alert Radio – Contents

Emergency Alert Radio User Manual

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• FRONT PANEL FEATURES •

THE BUTTON

The button on your Emergency Alert Radio performs four functions. The button can:

1. Toggle the internal speaker ON and OFF or
2. RESET the Alarm
3. Force EAR's radio receiver to the other frequency
4. Completely reset EAR's internal microprocessor and radio receiver.

1. TOGGLE the SPEAKER

Each momentary press/release operation toggles the speaker to its alternate state. Hold the button down for one second or less. (You can say the phrase "one second" in about one second.)

If the internal speaker is OFF and you want to listen to the radio channel your Emergency Alert Radio is receiving, momentarily press and release the button.

2. RESET the ALARM

When EAR receives a message which matches your alert specifications, the internal speaker is automatically turned ON, the front panel indicator

changes to flashing red, and the external alarm output is activated. Momentarily press and release the button to reset the alarm conditions and silence the speaker.

3. FORCE EAR to the OTHER FREQUENCY

When you want your EAR to listen to the optional alternate radio frequency, press and hold the button until the indicator lamp changes to flashing green, then release the button.

You will hold the button for more than one second, but less than three seconds to enter this command.

4. COMPLETELY RESET EAR

You can completely reset ears internal circuitry, including the microprocessor and radio receiver.

To reset the system, press and hold the button until the front panel indicator changes to winking red, then release the button.

THE INDICATOR

Indicator Meaning:

STEADY GREEN – receiving the primary channel
WINKING GREEN – receiving the alternate channel
FLASHING GREEN – switch channels when you release the button

STEADY RED – not receiving a radio signal
WINKING RED – reset when you release the button
FLASHING RED – an alert message was received

ALTERNATING RED/GREEN – decoding a data message

WINKING means a long period ON and a short period OFF – like the wink of an eye

FLASHING means short, equal periods ON and OFF

• END PANEL FEATURES •

ANTENNA CONNECTOR

EAR's Antenna Connector is a standard RCA phono-type jack. If you are close enough to the station monitored by your Emergency Alert Radio you can use the supplied telescoping whip antenna. Mount the antenna at the top right corner of the cabinet. Extend the whip to full length and experiment with different locations for best reception. If you add an external antenna the whip antenna must be removed.

If EAR's internal monitor speaker is muted (OFF), momentarily press the front panel button to activate the speaker. Then you can experiment with the position of the receiver to achieve best reception.

In some area, especially those distant from the transmitting station, the whip antenna supplied with your Emergency Alert Radio may not work well enough to assure reliable operation. An outside antenna almost always helps resolve this situation.

Electronic equipment outlets carry outdoor antennas designed for scanners which are well suited to both the Weather EAR and the FM EAR.

After installing the antenna, connect the lead-in wire from the antenna to the Antenna Connector on the end panel of the Emergency Alert Radio. If you are using an external antenna, remove the telescoping whip antenna.

POWER CONNECTOR

The wall transformer power unit supplied with your Emergency Alert Radio plugs into the Power Connector on the end panel.

If you have an alternate source of well filtered **DC** between 9 volts and 18 volts, you can use that source to power EAR instead.

The power connector is a standard 2.1 x 5.5 mm Coaxial Power Plug. The center pin is the positive terminal.

WARNING: *Incorrect power or incorrect power plug wiring can (and usually does) cause permanent damage to your Emergency Alert Radio. If you are uncertain about the plug or the connections to it, please ask for help!*

RELAY CONNECTOR

The 3.5 mm Relay Connector provides one form A dry contact. The circuit is closed when EAR detects an alert event. The maximum rating of the contact is 30 volts DC at 50 mA.

SPEAKER VOLUME CONTROL

The speaker volume control connector is located on the end panel. Your Emergency Alert Radio has a built-in speaker so that you can hear the radio channel which EAR monitors and the audio portion of received messages.

You can control the volume by adjusting the Speaker Volume Control on the end panel. Use a narrow straight-blade screwdriver to set the volume to a comfortable level.

Note that you cannot turn the volume all the way down. This feature prevents the volume from being set so low that a message cannot be heard when the speaker is activated. EAR can't alert you to hazardous conditions if the volume is all the way down.

DATA I/O PORT

- TRANSMIT DATA -

The decoded data message is presented at the Transmit Data pin (6) during reception of the SAME or EAS data stream which accompanies all emergency events.

SAME and EAS are transmitted with non-standard mark and space tones, at a non-standard rate, in a non-standard format.

The Emergency Alert Radio translates the completely non-standard SAME and EAS data into a standard serial data stream at 2400 bits per second, with 8 bit characters and one stop bit.

This translated data signal may be sent to a PC serial port and captured using any terminal emulator.

EARWatch is a Windows PC software package capable of translating the coded data message into plain text, and displaying the message on the PC Screen, sending the message as electronic mail, and updating a WWW page.

Details of the EARWatch package are available on the web: <http://EmergencyAlertRadio.com>

- AUDIO OUTPUT -

When the internal speaker is unmuted (ON), the audio signal is presented at the Audio Output pin (10).

This audio output may be routed to a recorder, for audio message logging or review.

The audio output may also be routed to any other device, such as a public address system, for distribution to other areas unable to hear the Emergency Alert Radio internal speaker.

The level at the Audio Output pin varies with the speaker volume.

- BACKUP BATTERY -

Your Emergency Alert Radio (EAR) is equipped with a backup battery power system to keep the radio functioning in the event of loss of commercial power. The batter system can operate EAR for over 24 hours with the speaker muted.

The backup battery access cover is on the bottom of the enclosure. EAR requires three AA (penlight) cells. For best performance and longest batter life, you should install high quality alkaline cells. Low cost “regular” (carbon-zinc) cells will work, but their lifetime is very much shorter than that of alkaline cells.

IMPORTANT:

DO NOT INSTALL RECHARGEABLE Ni-Cad or NiMH CELLS!

EAR’s battery backup system does not support recharging. The energy available from rechargeable batteries is not sufficient to operate the Emergency Alert Radio.

-ACCESSORY I/O PORT DIAGRAM AND PINOUT-

2 4 6 8 10

1 3 5 7 9

EAR		DB9		
Pin	Function	Pin	Function	Notes
1	UNUSED	1	NONE	UNUSED
2	DSR	6	DSR	Do not connect
3	TXD	2	RXD	Data from EAR to PC 2400 bps 8N1
4	RTS	7	RTS	Do not connect
5	RXD	3	TXD	Data from PC to EAR 2400 bps 8N1
6	CTS	8	CTS	Do not connect
7	DTR	4	DTR	Do not use
8	Not Used	9	RI	Do not use
9	GND	5	GND	Circuit Ground
10	AUDIO	--	--	Low-Z Receiver Audio Output

- SAME / EAS MESSAGE FORMAT -

```
[PREAMBLE]ZCZC-ORG-EEE-PSSCCC]+TTTT-JJJHHMM-LLLLLLLLL-  
[PREAMBLE]ZCZC-ORG-EEE-PSSCCC]+TTTT-JJJHHMM-LLLLLLLLL-  
[PREAMBLE]ZCZC-ORG-EEE-PSSCCC]+TTTT-JJJHHMM-LLLLLLLLL-
```

(at least a one second pause)
(optional transmission of 8 to 25 seconds to
Attention Signal)
(optional transmission of audio, video or text
messages)
(at least a one second pause)

```
[PREAMBLE]NNNN  
[PREAMBLE]NNNN  
[PREAMBLE]NNNN
```

[PREAMBLE] – A string of sixteen bytes of 0xAB hex or 171 decimal, the 8 bit byte 10101011 sent to clear the system, set AGC and set asynchronous decoder clocking cycles.

The preamble is transmitted before each header and End Of Message.

ZCZC – Indicates the start of an ASCII text message.

ORG – The Originator code indicates who originally initiated this message. Valid codes are EAS, WXR, CIV and EAN.

EEE – The Event code and indicates the nature of the activation.

PSSCCC – The Location code indicates the geographic area affected by the alert. There may be 31 Location codes in an alert. The Location codes uses the Federal Information Processing System (FIPS) numbers described by the U.S. Department of Commerce in National Institute of Standards and Technology publication 772.

P defines county subdivisions as follows:

- 0 = all or an unspecified portion of a county
- 1 = Northwest
- 2 = North Central
- 3 = Northeast
- 4 = West Central
- 5 = Central
- 6 = East Central
- 7 = Southwest
- 8 = South Central
- 9 = Southeast

The use of county subdivisions will probably be rare and generally for oddly shaped or unusually large counties. Any subdivisions must be defined and agreed to by the local officials prior to use.

An **SS** number is assigned to each state. A **CCC** number is assigned to each county. A **CCC** number of 000 refers to an entire State or Territory.

+TTTT – The valid time period of a message in 16 minute segments up to one hour and then in 30 minute segments beyond one hour; i.e., +00015, +00030, +0045, +0100, +0430, etc. The ‘plus’ character signifies the end of FIPS data and the beginning of the valid time.

JJJHHMM – The day in Julian Calendar days (JJJ) of the year and the time in hours and minutes (HHMM) when the message was initially received by the originator using 24 hour Universal Coordinated Time (UTC). These codes remain unchanged for retransmitted messages. On January 1st for instance, JJJ=1

LLLLLLLL – The call sign or other identification of the broadcast station, or NWS office transmitting the message. These codes will be automatically affixed to all outgoing messages by the EAS encoder.

NNNN – Signifies the end of an ASCII text message.

• EAR CONFIGURATION OVERVIEW •

EAR Configuration allows you to select the Event codes and Location codes which activate EAR's alarm, and which events EAR should ignore. In some installations, it may be appropriate to configure EAR to alert you to every event it receives, regardless of the location. Other applications may require EAR to respond to a single Event code affecting a single location. Most users will want something between these extremes.

INSTALLING THE SOFTWARE

To install the EAR Configuration Software, just double-click on the icon named EARSETUP.

EAR Configuration files are located in the Program Files / ear-cfg folder.

To remove the EAR Configuration Software from your system, use Control Panel's Add/Remove Programs application.

USING THE SOFTWARE

Start EARConfig by double-clicking on the EARConfig Icon.

CHANGE RADIO FREQUENCIES

The Emergency Alert Radio can listen to two different radio frequencies, one at a time. You can set EAR to automatically switch to an alternate frequency upon loss of the primary signal. This option is most valuable in the FM EAR.

Owners of the Weather EAR should be certain that a frequency selected as Alternate will broadcast SAME events for your area. Call your local NWS office for advice. Being able to hear a NWR station does not necessarily indicate that station will send SAME events affecting your area.

The radio frequency selections are contained in a drop-down list. To change from the current setting to a new selection, select the new frequency from the list.

When you are finished making changes to the configuration, be sure to click the “PROG” button to send the new configuration data to EAR’s memory.

SET EAR OPTIONS: RESET AND ALT. FREQ.

- RESET MODE -

The Emergency Alert Radio can be reset after an alert event in two different ways. Every SAME or

EAS data message contains an End-Of-Message data stream which follows any alert tones or audio message accompanying the event.

Your EAR can detect the End Of Message (EOM) data stream, silence the internal speaker and place the radio in its idle state. You may also program your EAR to remain active after an alert message until you press the front panel button

For automatic reset, click on the AUTO radio button. EAR will activate when a selected alert message is received, remain active during the message, then reset itself following the message.

This mode is best when EAR is used with external equipment, such as a tape recorder, PA system or radio transmitter.

For manual reset, click on the MAN radio button. EAR will remain in the alarm mode following a selected alert message, until you press the front panel button to reset the alarm.

When you are finished making changes to the configuration, be sure to click the “PROG” button to send the new configuration data to EAR’s memory.

- ALT FREQUENCY MODE -

If there is more than one reliable signal source available to you, you can program EAR to change to the alternate frequency upon loss of the primary signal. This option is suggested mainly for the FM EAR, but may be used with the Weather EAR under certain conditions.

If you want EAR to automatically change to an alternate frequency upon loss of the primary signal, click the AUTO radio button. To prevent the automatic changeover, click on the OFF radio button.

Regardless of the setting of this option, you can always force ear to change to the other frequency by holding the front panel button down until the indicator changes to flashing green.

EAR indicates it is receiving a signal on the primary frequency with a steady green indicator light. When EAR is receiving the alternate frequency, the indicator lamp will show winking green.

When you are finished making changes to the configuration, be sure to click the "PROG" button to send the new configuration data to EAR's memory.

SELECT LOCATION CODES

The Location Codes determine which specific location codes EAR will respond to. EAR can respond to up to four Location Codes, though most applications will require just one or two.

The EAR Configuration Software has a list of all Location Codes for the United States.

To change a programmed Location Code, right-click on the code to be changed and select the desired Location Code from the list.

Next, indicate whether EAR is to respond to the entire area selected, or only a portion of the area. Click the Entire County radio button if EAR is to respond to messages addressed to the who county. Select of of the nine sub-county radio buttons to reduce the area to the selected 1/9 portion.

If EAR is located near the border of two or more counties, you will probably want to enter the location codes for the adjacent counties as well as those for the county where EAR is located.

To remove a Location Code from EAR's selected list, change the Location Code as described above, selecting the first item in the county list "XXXXXX, RIGHT CLICK TO SELECT".

When the Location Code is set, click the ACCEPT button to return to the main programming screen, or click CANCEL to discard the change.

When you are finished making changes to the configuration, be sure to click the “PROG” button to send the new configuration data to EAR’s memory.

ASSIGN ALERT EVENTS

Your Emergency Alert Radio can be programmed to recognize up to 80 different event codes. Every SAME or EAS transmission contains an event code indicating the nature of the current activation.

For example, the event code for a required weekly test is RWT, the event code for a hurricane watch is HUA, and so on.

The EAR Configuration Software contains a list of all known event codes. The list is displayed with check-boxes to indicate which events are designated as alert events.

If EAR receives a message containing a selected event code and a programmed location code, the internal speaker is activated, the front panel indicator flashes red and the external Alarm Active output is activated.

At the end of the list are several “wildcard” events. These events allow EAR to respond to all events of

a given type, for example, all warning events or all watch events.

To change the events your EAR responds to, click the check-boxes as desired. EAR responds to event codes which are checked and ignores those which are unchecked.

When you are finished making changes to the configuration, be sure to click the “PROG” button to send the new configuration data to EAR’s memory.

• FIPS LOCATION CODES •

FIPS stands for Federal Information Processing System: FIPS defines the method the federal government uses to store and process information. One part of the FIPS provides a means of identifying every state, county, and other political subdivision by a unique numeric code.

The National Weather Service and the Emergency Alert System use FIPS location codes to describe the area affected by a watch or warning. When an emergency message is transmitted, the FIPS location code is included.

Your Emergency Alert Radio receiver compares the FIPS location code it receives with those stored in memory, to determine where the radio should alert you to the message.

The FIPS location codes used by Emergency Alert Radio consist of six digits with these meanings:

Digit Position	Meaning
1	If 0 (zero) indicates the entire area described in the next five digits. Digits 1 through 9 indicate a portion of the area (see Sub-Divided Counties)
2 & 3	A two digit code identifying the state affected by the message.
4, 5 & 6	A three digit code identifying the county affected by the message.

The EAR configuration program contains a list of all FIPS codes for the entire United States, including territories, possessions and outlying areas. You need only select the area you want EAR to be aware of and click the mouse.

When you are finished making changes to the configuration, be sure to click the “PROG” button to send the new configuration data to EAR’s memory.

SUB-DIVIDED COUNTIES

Some message may affect an area smaller than an entire county. To permit the smaller areas to be defined within the framework of FIPS codes, a single digit is prepended to the standard five digit state/county code number.

Imagine an area over which is drawn a grid, three squares wide by three squares high. It looks like a tic-tac-toe board. The square in the upper left or Northwest is number one. The square at the bottom right or Southeast is number nine.

If you program your EAR to respond to a county sub-division, it will activate a message containing the programmed sub-division, state and county codes is received. EAR will also alert when the sub-division code is 0 (zero) because the sub-division is contained within the larger area. EAR will not alert when the sub-division code does not match the

programmed code when the programmed code is not zero.

Sub-divided areas are expected to be used infrequently, and then only for special applications. Your Emergency Alert Radio will not become obsolete when your area begins using sub-division codes.

Examples:

Received FIPS	Programmed FIPS	EAR Alert
037181	037181	YES – Exact match
537181	037181	YES – within programmed FIPS
537181	537181	YES – exact match
937181	537181	NO – not within programmed FIPS

When you are finished making changes to the configuration, be sure to click the “PROG” button to send the new configuration data to EAR’s memory.

CUSTOM FIPS LOCATION CODES

Some areas with special applications may require FIPS location codes which are not part of the officially designated location codes. For example, a custom location code could be defined for the area

within a ten mile radius of a chemical plant which is capable of releasing toxic material into the air. A custom location code could define the area subject to flooding if a dam breaks.

You Emergency Alert Radio can be programmed to alert you when any combination of characters is received in the FIPS location code field of the message. Please contact the factory for specific instructions regarding the installation of these customized location codes.

When you are finished making changes to the configuration, be sure to click the “PROG” button to send the new configuration data to EAR’s memory.

• EVENT CODES •

Every emergency alert data message contains one Event Code to specify the nature of the alert message. An Event Code is a three character abbreviation of the message.

Your Emergency Alert Radio can recognize up to 80 different Event Codes. It can also recognize groups of event codes having characters in common.

An Event Code may contain both letters and numerals. For example, the three character Event Code for a Tornado Warning is TOW.

Your Emergency Alert Radio can be programmed to respond to individual Event Codes or to groups of Event Codes, such as “all Warning messages” or “All Test Messages”.

EAR accepts any combination of individual and group codes, giving you complete control over the events which your EAR listens for.

Event Codes issued by the National Weather Service usually indicate the general type of event by the third character of the three character group. If the event is a Warning, the third character is **W**. If the event is a Watch (or advisory) the third character is **A**.

Emergencies which are not weather events have **E** as the third character. Informational states of all kinds usually have an **S** as the third character.

Warnings, Watches and Statements about the same kind of event usually share the same first two characters. For example, a hurricane Warning is coded as **HUW**, a hurricane Watch is coded as **HUA**, and an informational statement about a hurricane is coded as **HUS**.

When you are finished making changes to the configuration, be sure to click the “PROG” button to send the new configuration data to EAR’s memory.

CUSTOM EVENT CODES

It is possible that the generic Event Codes used by the National Weather Service and the broadcast Emergency Alert System do not contain a code appropriate for a special application. In this case, the local Emergency Alert System committee may create a new Event code for local use.

Your Emergency Alert Radio is completely compatible with any three character Event Code. If your area needs special Event Codes, please contact the factory for specific instructions regarding the addition of the customized codes to the EAR Configuration program.

Warranty and Limitation of Liability

Multi-Technical Services, Inc., hereinafter referred to as MTS, warrants for equipment sold hereunto that for a period of six (6) months from MTS' shipment date that equipment shall be free from defects in material and workmanship and conform to published specifications for the equipment.

If a defect occurs within the warranty period, buyer shall immediately notify MTS and MTS shall repair or replace the defective equipment without extra charge.

This warranty does not apply to defects not caused by MTS (for example: lightning damage, accidents or abuse, work or installation done improperly or contrary to MTS standards) or to equipment on which the model or serial numbers, manufacture or shipment dates are changed or removed, or warranty seals broken.

No other warranty, expressed, or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose, shall apply.

Whether or not caused by MTS' negligence, MTS shall not be liable for any indirect, special, consequential or other damages, however caused (including late delivery). MTS' obligation to repair or replace equipment in accordance with the above warranty shall be buyer's exclusive remedy for breach of any warranty or from negligence. If MTS fails to repair or replace as aforesaid, MTS' entire liability to buyer shall not exceed the repair or replacement value, whichever is lower, of the defective item.

• How to Contact the Manufacturer •

Your Emergency Alert Radio was designed and manufactured by Multi-Technical Services, Incorporated of Clayton, North Carolina.

MTS is always glad to hear from customers, and we offer a variety of ways to contact us. If you want to discuss anything about the EAR, please feel free to contact us by any of the following means:

POSTAL MAIL:

Multi-Technical Services, Inc.
950 Highway 42 West
Clayton, NC 27520

ELECTRONIC MAIL:

earhelp@emergencyalertradio.com

Visit our website:

<http://www.EmergencyAlertRadio.com>

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