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Portable Safety Megaphone

Product Numbers 2204, 2204B, 2206, 2206B, 2208, 2208B



Product Support Manual

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ACR ELECTRONICS, INC.

Product Support Manual
Portable Safety Megaphone

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1. Description

The ACR/EM-1A, ACR/EM-2BA and ACR/EM-1D are battery operated solid state megaphones specifically developed for use in enclosed areas such as in the interior of an aircraft or ship cabin. Each has been designed to minimize regenerative acoustic feedback that results in whistling and other oscillations of this nature. It has a 90° sound projection angle to direct the sound to persons in its immediate vicinity, as well as in the rear sections of any aircraft. The amplifier frequency band-pass has been selected to produce a crisp, clear reproduction of voice signals. The operating power level is also sufficient to provide adequate sound under high ambient noise level conditions without being over-powering. Specific attention has been given to the physical size so that it can be used effectively in a crowded environment.

The integrated circuit amplifier only uses a small current when turned "ON". This extends the life of the batteries so that several hours of operation may be expected when used normally in an intermittent manner. A simplified block diagram of the megaphone is shown in Figure 1.

1.1 Options Matrix

This table shows the various options between the portable safety megaphones.

Purchase Part Number	Main Assembly Part Number	Model Number	Lanyard	Volume Control	Alarm Activator	Battery Monitor	
						Visual	Audible
2204	A3-06-1402	ACR/EM-1A	Yes	Yes	Yes	Yes	No
2204 B	A3-06-1402	ACR/EM-1A	Yes	Yes	Yes	Yes	No
2206	A3-06-1405	ACR/EM-2BA	No	No	No	Yes	No
2206 B	A3-06-1405	ACR/EM-2BA	No	No	No	Yes	No
2208	A3-06-1402-1	ACR/EM-1D	No	Yes	No	Yes	Yes
2208 B	A3-06-1402-1	ACR/EM-1D	No	Yes	No	Yes	Yes

2. Operation

A siren, incorporated into the megaphone, is automatically activated by unplugging the alarm plug pin. (ACR/EM-1A only)

NOTE: A long lanyard with an alarm plug pin is supplied with the megaphones for use as an anti-theft alarm (optional).

Squeezing the handle stops the siren, and the megaphone is ready for use. Re-insert the alarm pin so that the alarm will not be reactivated when the handle is released.

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Hold the megaphone in one hand. Place your mouth almost in contact with the microphone mouthpiece at the rear of the assembly. Squeeze the handle, which will flex slightly, turning the megaphone "ON" and speak slowly with loud, crisp, clear tones.

Adjust the volume control knob to a suitable sound level. The volume control may be adjusted with the thumb of the same hand holding the megaphone.

When not in use, carry the megaphone by the neck strap, attached to the top of the unit.

2.1 Battery Monitor

Two types of battery monitors are available on the ACR/EM series megaphones.

Visual – when the megaphone is activated by squeezing the handle, note if the green LED (located near the volume cap) is flashing. If the green LED is out, replace batteries.

Audible – when the megaphone is activated by squeezing the handle, a chirp heard in the speaker means the remaining battery capacity is greater than 50% of initial capacity. If the beep is not present, replace the battery. (ACR/EM-1D only)

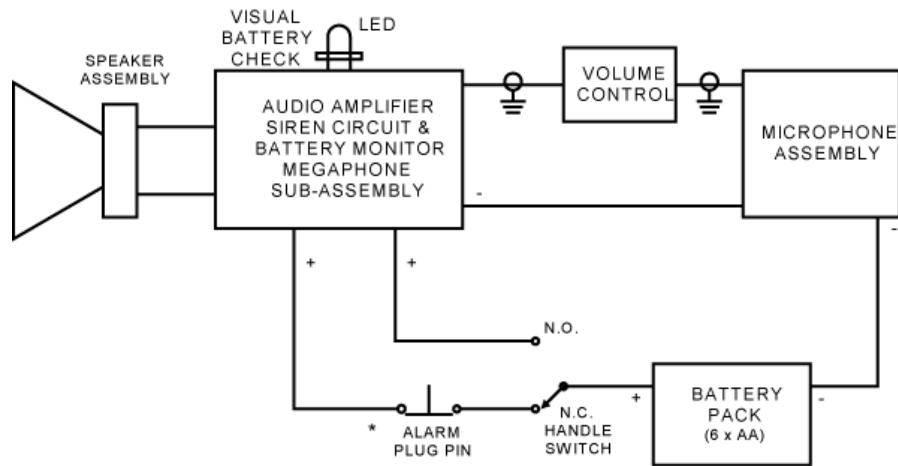


Figure 1
Block diagram
ACR/EM-1A, ACR/EM-2BA and ACR/EM-1D Portable Safety Megaphone

3. Maintenance

3.1 Cleaning

External surfaces of the megaphone may be cleaned with a soft cloth, dampened in a solution of mild detergent. Do not immerse in water or use strong solvents. Clean electrical contacts with a cloth dampened with isopropyl (rubbing) alcohol.

3.2 Battery Replacement

The power supply used in the megaphone consists of six standard 1½ volt "AA" size batteries. In order to maintain continued airworthiness, ANSI C18.1M, Part 2-2017 compliant cells must be utilized for all field replacements of the batteries. Please consult with the manufacturer of the proposed replacement cells to insure compliance. Current drain is minimal (12 mA) with the megaphone "ON", and increases when the user speaks into the microphone.

Battery replacement is accomplished by removing three set screws while holding the microphone and mouthpiece assembly in place. The six cells, contained in three tubes with two cells per tube, are immediately accessible and will drop out when the megaphone is tilted. New batteries may be dropped into the tubes, observing polarity marking adjacent to each tube.

Replace microphone and mouthpiece assembly. Align keyway and secure with the three set screws.

CAUTION: Carefully observe polarity of cells before replacement.

4. Testing, Troubleshooting and Repair

4.1 Testing

NOTE: The megaphone consists of three major assemblies; the microphone and mouthpiece assembly, the megaphone sub-assembly, and the horn and speaker assembly. To locate a defect, follow the procedure outlines below:

1. Squeeze the handle. If a clicking sound is heard, the speaker is operating.
2. Remove the pin that activates the siren. If the alarm is of normal amplitude and sound character, the amplifier and siren circuitry are functioning properly. If the amplification is low, check the batteries and then the amplifier. If the sound character is abnormal, check the batteries and then the siren circuitry. (ACR/EM-1A only)
3. If no sound is heard, remove the microphone and mouthpiece assembly and the batteries. Check that both the microphone and battery contacts are clean. If not, clean with a mild, non-abrasive cleaner such as isopropyl (rubbing) alcohol.
4. Test amplifier and speaker assembly by replacing the microphone with a spare microphone assembly. If no sound can be produced after microphone replacement, it may be assumed that the amplifier or speaker assembly is defective.
5. To test the speaker, disassemble the speaker. Unplug the wires and apply 1½ volts intermittently across the speaker. If no clicks are heard, the speaker is defective.

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Possible faults and corrections are summarized below for ready reference.

TROUBLE	POSSIBLE CAUSE	CORRECTION
No sound from speaker when handle is squeezed (Step 1).	Exhausted batteries, defective microphone, speaker or amplifier assembly.	Replace defective component.
No siren when alarm pin is pulled (Step 2, ACR/EM-1A only).	Exhausted batteries, defective siren circuitry or defective amplifier.	Replace defective component.
Sound is abnormally low or distorted.	Exhausted batteries or wrong polarity of battery series.	Check proper insertion of batteries or replace batteries.
Speaker does not respond to Step 5.	Defective speaker	Replace speaker

4.2 Repair

The megaphone consists of three major sub-assemblies; the microphone and mouthpiece assembly, the megaphone sub-assembly, and the horn and speaker assembly. Repairs are restricted to the replacement of these defective sub-assemblies or the batteries and lanyard assemblies.

5. Disassembly and Assembly

5.1 Disassembly

Megaphone should be disassembled for repair or replacement of components only.

1. Remove the microphone and mouthpiece assembly by removing the three set screws.
2. Remove battery cells from the three tubes by tilting megaphone to allow cells to drop out into the hand.
3. Unplug alarm plug pin from side of housing. (ACR/EM-1A only)
4. Remove volume control knob. (does not apply to ACR/EM-2BA)
5. Remove the three oval head screws at periphery of the speaker end of the housing.
6. Extract speaker and megaphone assembly by first turning horn clockwise 45°. Pull entire assembly gently until it stops. Turn horn counterclockwise 45° then pull the entire assembly out.
7. Separate speaker assembly and megaphone subassembly by first unplugging the speaker wires from the "out" header. Remove hex screw that holds the assemblies together.
8. FURTHER DISASSEMBLY IS NOT RECOMMENDED.

Inspect unit for any evidence of damaged parts, loose mountings or broken leads, and dirty electrical contacts.

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5.2 Assembly

1. Attach horn and speaker assembly to megaphone subassembly. Ensure alignment with location pins. Pass speaker wires through the provided slot.
2. Plug speaker connector into the "out" header on PCB.
3. Push entire assembly gently into the housing until it stops. Turn clockwise 45° and push all the way in. Turn counterclockwise 45° and align holes.
4. Secure with screws. Torque to 3 in/lb.
5. Replace volume control knob on volume control shaft. (does not apply to ACR/EM-2BA)
6. Plug the alarm plug attached to lanyard into jack in the side of the case near volume control. (ACR/EM-1A only)
7. Replace the six batteries in three tubes at microphone end of megaphone case.

CAUTION: Observe polarity of batteries during installation procedure (see instructions on battery tubes).

8. Replace microphone and mouthpiece assembly. Align keyway, and secure with the three setscrews.
9. Assembly is complete. Test unit in accordance with Section 4.1.

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Portable Safety Megaphone**6. Technical Data****Table 1**

Dimensions	5.5" max diameter bell, 11.5" max long
Weight	2.3 lbs., including batteries
Materials	Horn, handle – Anodized Aluminum
	Housing – Aluminum
	Attachment – Neck strap at top of unit
Gain Control	Thumb operated
Amplifier	Integrated circuit, 2 watts power output
Speaker	Re-entrant horn and driver type
	Input power five watts
	90° dispersion angle
Microphone	High Sensitivity
Batteries	Six standard 1½ volt "AA" cells
Power Drain	12 milliamps static current
	550 milliamps maximum current
Frequency Response	500 to 3500 Hz
Anti-Removal Alarm (ACR/EM-1A only)	Warbling tone 500-1200 Hz
	Plug pin, retained by nylon cord
Battery Test Circuits	Visual Flashing Green LED
	Acoustical Beep (ACR/EM-1D only)
FAA PMA Approved	Part numbers 2204, 2206 and 2208 only

7. Parts List

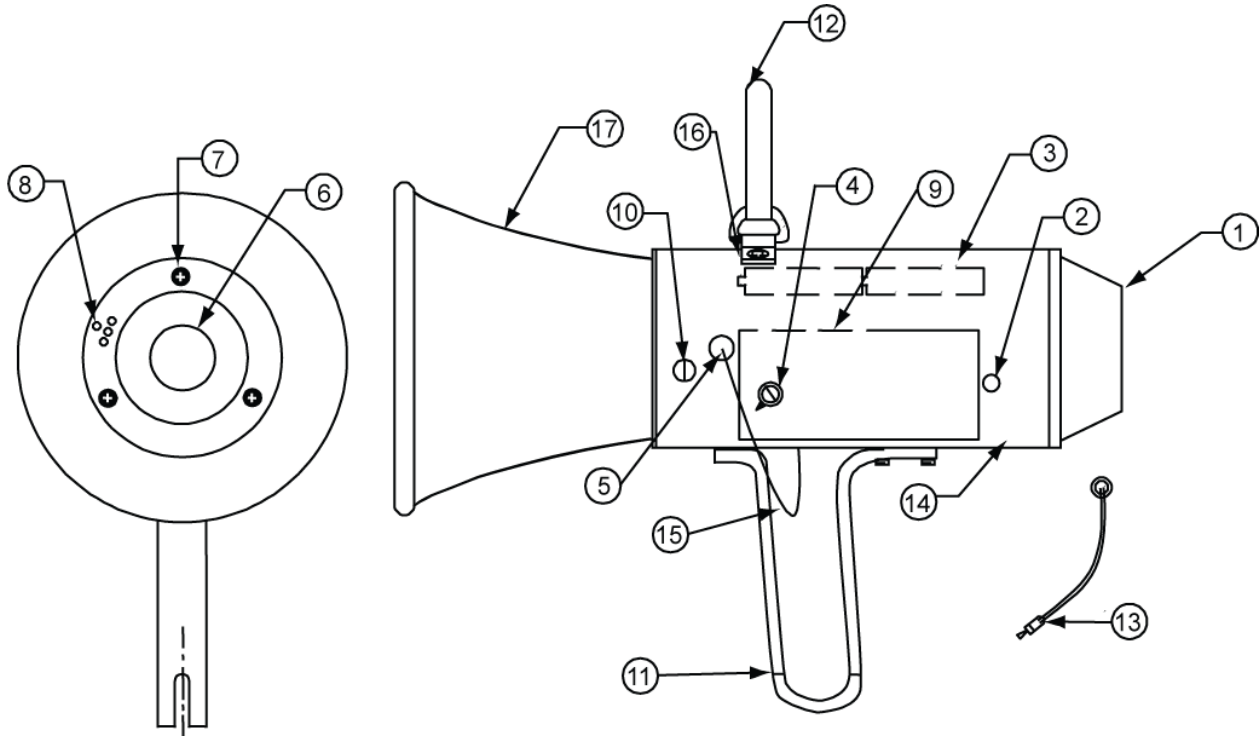


Figure 2
ACR/EM-1A, ACR/EM-1D Portable Safety Megaphone
Illustrated Parts List

Replaceable parts are illustrated in Figure 2 and listed in Table 2. Part numbers shown in the "Part Number" column may be ordered from ACR unless another manufacturer's name is given in parentheses in the "Description" column. In this case, replacement parts can be obtained directly from the original manufacturer. Standard parts (MS-, AN-, etc.) and commercially available hardware "Commercial" should be obtained from commercial sources.

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Table 2

Item	Quantity	Nomenclature	Order Spare Parts				
			ACR/EM-1A S/N < 9000	ACR/EM-1A S/N ≥ 9000*	ACR/EM-2BA S/N < 2000	ACR/EM-2BA S/N ≥ 2000*	ACR/EM-1D ALL S/N
1	1	Microphone and Mouthpiece Assembly	9211	9211	9211	9211	9211
2	1	Socket Setscrew Kit	9416	9416	9416	9416	9416
3	6	Battery AA Alkaline	Commercial	Commercial	Commercial	Commercial	Commercial
4	1	Knob, control	9022	9022.1	N/A	N/A	9022.1
5	1	Plug pin, Alarm	Included in 9161 and 9164		N/A	N/A	N/A
6	1	Speaker Assembly	9417 (upgrade kit)	9418	9419 (upgrade kit)	9418	9418
7	3	Screw, Self-tap (#4 x 3/4)	Commercial	N/A	Commercial	N/A	N/A
8	2	Wire leads speaker (#26AWG)	Commercial	N/A	Commercial	N/A	N/A
9	1	Megaphone Subassembly	9417 (upgrade kit)	9420	9419 (upgrade kit)	9421	9422
10	3	Screw Machine (#4-40 x 3/8)	Commercial	Commercial	Commercial	Commercial	Commercial
11	1	Handle Kit	9423	9423	9423	9423	9423
12/16	1	Strap Assembly Kit	9233	9233	9233	9233	9233
13	1	Lanyard Assembly, Anti-theft	9164	9164	N/A	N/A	N/A
14	1	Housing Megaphone	9483	9483	9495	9495	9496
15	1	Lanyard Assembly, Siren	9161	9161	N/A	N/A	N/A
17	1	Horn, Megaphone	9484	9484	9484	9484	9484

*S/N ≥ 2000 and S/N ≥ 9000 are date coded 4/99 +

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Appendix

A.1 Limited Warranty

This product is warranted against factory defects in material and workmanship for a period of one year (five years for the following products: EPIRB, PLB, S-VDR, SSAS) from date of purchase or receipt as a gift. During the warranty period, ACR Electronics, Inc. (ACR) will repair or, at its option, replace the unit at no cost to you for labor, materials and return transportation from ACR. For further assistance, please contact our Technical Service Department at ACR Electronics, Inc., 5757 Ravenswood Road, Fort Lauderdale, FL 33312-6645. Email: service@acartex.com, Fax: +1 (954) 983-5087, Telephone: +1 (954) 981-3333.

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