THE SCIENCE ACR OF SURVIVAL

Product Support Manual

ACR/EM-1A, ACR/EM-1D™

Portable Safety Megaphone

FAA PMA Approved under A3-06-1402-

Product No. 2204, 2208

Y1-03-0014 Rev. AC

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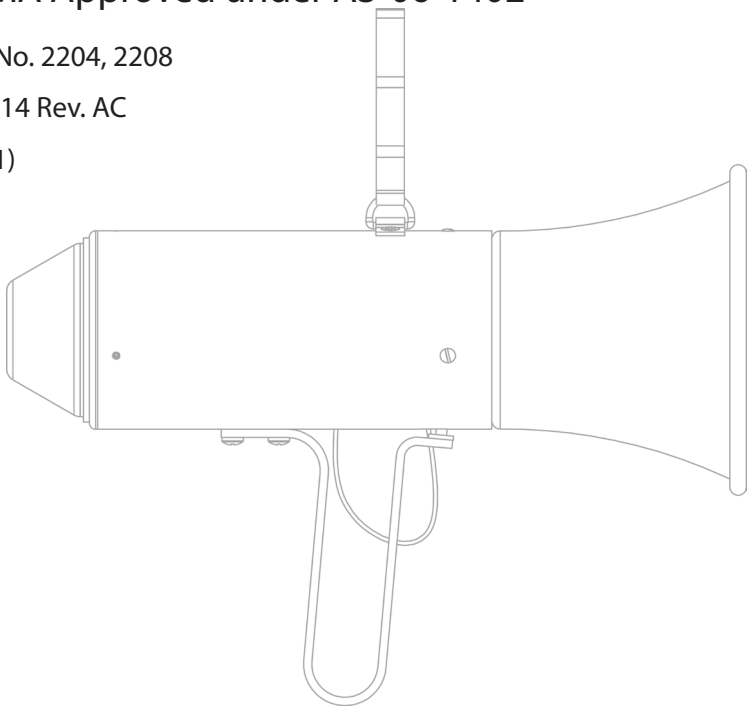

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REV	DESCRIPTION	DATE	APVD.
L	Format changes, add ACR/EM-1D content.	9/8/98	T. Martin
M	Update parts list to reflect design changes.	5/20/99	T. Martin
N	Update and make corrections to parts list.	7/13/99	T. Martin
P	Update to assign 4-digit product codes to parts list.	12/8/99	L. Subrattee
R	Add FAA approval info to front cover.	4/27/04	T. Martin
U	Update to add revision table and updated formatting.	2/7/08	T. Martin
V	Updated for rebranding	4/3/09	T. Martin
W	Updated to add export admin regulatory statement	11/24/09	T. Martin
Y	Updated to make product references more consistent	1/15/10	T. Martin
AA	Updated sheet 7 to add screw torque to note 4 in section 5.2 to prevent loose horns.	4/15/11	T. Martin
AB	Update to remove Useful Life Policy	10/11/11	T. Martin
AC	Remove Cobham logo	3/29/12	T. Martin

IF YOU HAVE ANY TROUBLE WITH YOUR NEW MEGAPHONE, DO NOT RETURN IT TO THE STORE! CALL ACR ELECTRONICS AT +1 (800) 432-0227. WE WILL HELP YOU RESOLVE ANY PROBLEMS YOU MAY BE EXPERIENCING. MANY QUESTIONS CAN BE ANSWERED OVER THE PHONE.

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SECTION 1 – DESCRIPTION

The ACR/EM-1A or ACR/EM-1D is a battery operated solid state megaphone specifically developed for use in enclosed areas such as in the interior of an aircraft or ship cabin. It 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 (shown on page 5).

The ACR/EM-1A & ACR/EM-1D are the same except for installed options:

1.1 Options Matrix

MODEL	MANUAL GAIN	ALARM ACTUATOR	BATTERY MONITOR	
			Visual	Audible
ACR/EM-1A	Yes	Yes	Yes	No
ACR/EM-1D	Yes	No	Yes	Yes

SECTION 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 megaphone 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.

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 top of unit.

2.1 Battery Monitor

Two types of battery monitors are available on the ACR/EM-1 series megaphones.

Visual - when the megaphone is activated by squeezing the handle, a green LED indication means the remaining battery capacity is greater than 50% of initial capacity. 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)

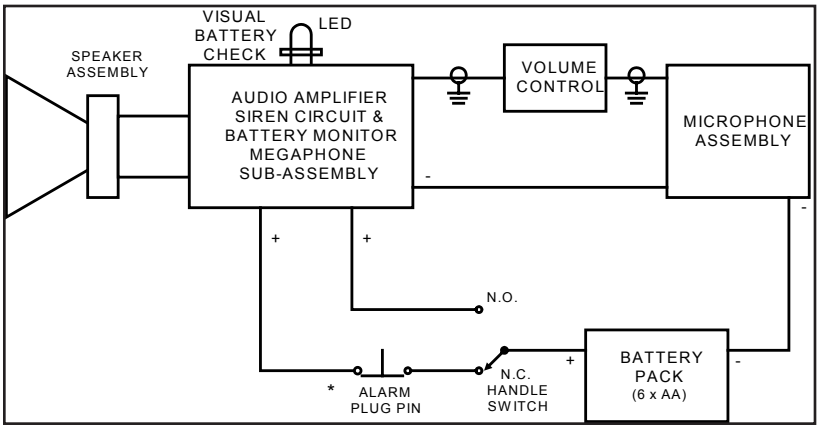

FIGURE 1
BLOCK DIAGRAM
ACR/EM-1A, ACR/EM-1D PORTABLE SAFETY MEGAPHONE

SECTION 3 – MAINTENANCE

3.1 Cleaning

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

3.2 Battery Replacement

The power supply used in the megaphone consists of six standard 1½ volt "AA" size batteries. 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 (2) while holding the microphone and mouthpiece assembly (1) 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 (1). Align keyway and secure with the three set screws (2).

CAUTION: Observe polarity of cells carefully before replacement.

SECTION 4 – TESTING, TROUBLESHOOTING & 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 outlined 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 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 1 ½ volts intermittently across the speaker. If no clicks are heard, the speaker is defective.

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.

SECTION 5 – DISASSEMBLY & ASSEMBLY

5.1 Disassembly

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

1. Remove microphone and mouthpiece assembly (1) by removing the three set screws (2).
2. Remove battery cells (3) from the three tubes by tilting megaphone to allow cells to drop out into the hand.
3. Unplug alarm plug pin (5) from side of housing. (ACR/EM-1A only)
4. Remove volume control knob (4) (pulls off).
5. Remove the three oval head screws (10) at periphery of the speaker end of the housing (14).
6. Extract speaker (6) and megaphone assembly (9) by firstly turning horn (17) clockwise 45°. Pull entire assembly gently until it stops. Turn horn (17) counterclockwise 45° then pull the entire assembly out.
7. Separate Speaker Assembly (6) and Megaphone Subassembly (9) by firstly 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.

5.2 Assembly

1. Attach Horn (17) and Speaker Assembly (6) to Megaphone Subassembly (9). 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 (14), until it stops. Turn clockwise 45° and push all the way in. Turn counterclockwise 45° and align holes.
4. Secure with screws (10). Torque to 3 in/lb.
5. Replace volume control knob (4) on volume control shaft.
6. Plug the alarm plug (5) attached to lanyard into jack in the side of the case near volume control. (ACR/EM-1A only)
7. Replace the six batteries (3) 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 (1). Align keyway, and secure with the three setscrews (2).
9. Assembly is complete. Test unit in accordance with Section 4.1.

SECTION 6 – TECHNICAL DATA

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 (5) watts
	90° dispersion angle
Microphone	High Sensitivity
Batteries	Six (6) 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)

SECTION 7 - PARTS LIST

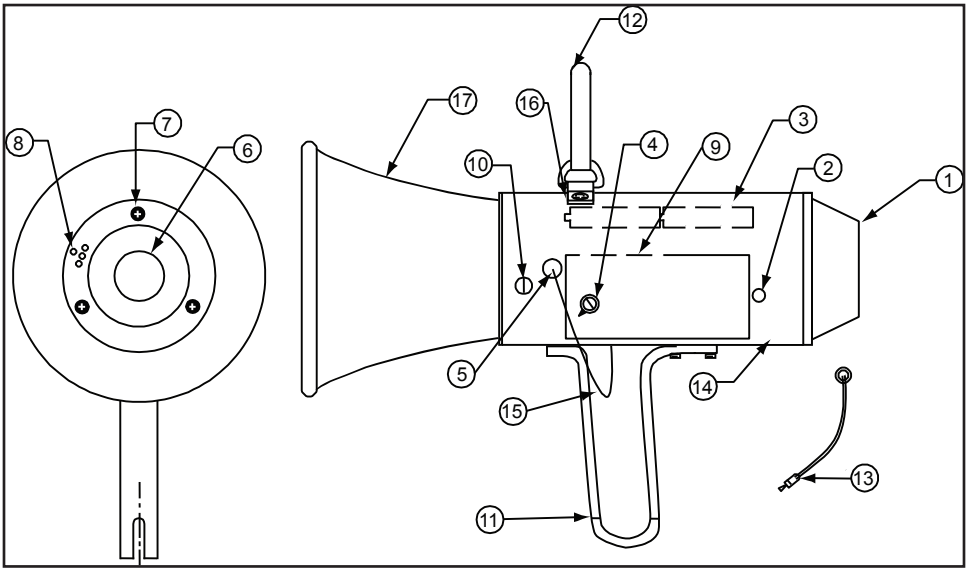

FIGURE 2
ACR/ EM-1A, ACR/EM-1D PORTABLE SAFETY MEGAPHONE
ILLUSTRATED PARTS LIST

Replaceable parts are illustrated in Figure 2 (shown above) and listed in the table (shown on page 9). 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.

ITEM	QTY	NOMENCLATURE	ORDER SPARE PARTS		
			ACR/EM-1A S/N < 9000	ACR/EM-1A S/N ≥ 9000	ACR/EM-1D ALL S/N
1	1	Microphone & Mouthpiece Assy	9211	9211	9211
2	1	Socket Setscrew Kit	9416	9416	9416
3	6	Battery AA Alkaline	Commercial	Commercial	Commercial
4	1	Knob, control	9022	9022.1	9022.1
5	1	Plug pin, Alarm	Included in 9161 & 9164		N/A
6	1	Speaker Assembly	9417 (upgrade kit)	9418	9418
7	3	Screw, Self tap (#4 x ¾)	Commercial	N/A	N/A
8	2	Wire leads speaker (#26AWG)	Commercial	N/A	N/A
9	1	Megaphone Subassy	9417 (upgrade kit)	9420	9422
10	3	Screw Machine (#4-40 x 3/8)	Commercial	Commercial	Commercial
11	1	Handle Kit	9423	9423	9423
12 / 16	1	Strap Assembly Kit	9233	9233	9233
13	1	Lanyard Assembly, Anti theft	9164	9164	N/A
14	1	Housing Megaphone	A1-18-1149	A1-18-1149	A1-18-1151-1
15	1	Lanyard Assembly, Siren	9161	9161	N/A
17	1	Horn, Megaphone	A1-17-0809	A1-17-0809	A1-17-0809

**S/N ≥ 9000 are date coded 4/99 +*

APPENDIX - WARRANTY, NOTICES

A.1 Limited Warranty

This product is warranted against factory defects in material and workmanship for a period of 1 (one) year* from date of purchase or receipt as a gift. During the warranty period ACR Electronics, Inc. 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@acrartex.com, Fax: +1 (954) 983-5087, Telephone: +1 (954) 981-3333.

This warranty does not apply if the product has been damaged by accident or misuse, or as a result of service or modification performed by an unauthorized factory. Except as otherwise expressly stated in the previous paragraph, THE COMPANY MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, AS TO MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR ANY OTHER MATTER WITH RESPECT TO THIS PRODUCT. The Company shall not be liable for consequential or special damages.

To place the warranty in effect, register online at www.acrartex.com or return the attached card within 10 days.

*Five years for the following products: EPIRB, PLB, S-VDR, SSAS.

A.2 Notices

ACR Electronics diligently works to provide a high quality Product Support Manual, however, despite best efforts, information is subject to change without notice, and omissions and inaccuracies are possible. ACR cannot accept liability for manual contents. To ensure that you have the most recent version of the Product Support Manual, please visit the ACR website at www.acrartex.com.

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