

# **BOSE** Owner's Guide Acoustic Wave® Cannon™ System



## **Before you begin . . .**

Thank you for purchasing the Bose® Acoustic Wave® Cannon system (AWCS-1). We are confident that its advanced technology and quality construction will provide you with many years of reliable service.

**IMPORTANT: The Acoustic Wave® Cannon system should be installed, as instructed in this manual, by an experienced and licensed sound contractor only. If you have any questions concerning the controls or functions of the Bose AWCS-1, please contact your local Bose representative.**

This owner's guide applies primarily to the Bose Acoustic Wave® Cannon system, a component of the Bose Wave System and the Bose Cinema Sound System. Although references are made within to the Bose Wave System Controller (WSC-1) and Bose Cinema System Controller (CSC-1), please consult their respective owner's guides for details concerning their operation.

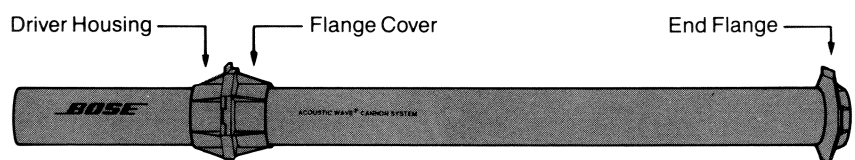
## **I. Product Description**

The Bose Acoustic Wave® Cannon system (AWCS-1) is a high-performance, extended-bandwidth bass loud-speaker system intended for use in permanent installations. The Cannon system must be used in conjunction with the Bose 802 series-II loud-speaker system and the Bose Cinema System Controller (CSC-1) or Wave System Controller (WCS-1).

**Figure 1** illustrates the Cannon system and its primary parts. The AWCS-1 contains one specially designed Bose® 12" woofer. The pipe-shaped enclosure is made of custom-extruded polyvinylchloride. Custom-molded flanges made of polyether-based structural

polyurethane foam act to capture the woofer, interlock multiple Cannon systems together in arbitrary arrays, and provide hanging points.

**NOTE:** The Bose Acoustic Wave® Cannon system and 802 series-II speakers are actively equalized systems. **A separate WCS-1 or CSC-1 controller must be connected to ensure proper use.** Do not attempt to use the Cannon system with any other type of system controller. **The performance of the Acoustic Wave® Cannon system (AWCS-1) is not guaranteed unless it is used with the proper factory-supplied system controller.**



**Figure 1**

## II. Unpacking the AWCS-1

The Acoustic Wave® Cannon system is packed one unit per carton. Unpack the unit carefully, saving the carton and all packaging material for possible later use.

If the unit appears to be damaged when unpacking, **do not operate it or proceed with its installation.** Repack the unit in its original carton and notify your authorized Bose® Professional Products dealer immediately.

## III. Safety Information

**Please read this safety information before connecting or operating any equipment.** (This information applies to the AWCS-1 only. Consult the WSC-1 and CSC-1 owner's guides for safety information specific to these controllers.)

1. Retain all safety and operating instructions provided for future reference.
2. For your safety, follow all cautions and warnings in the operating instructions and on the unit.
3. Do not install Cannon systems in excessively damp areas—for example, near a beverage service area, swimming pool, or in a wet basement.
4. Do not install Cannon systems near excessive heat sources such as radiators, heat registers, flood lamps, spotlights, stoves, or other appliances.
5. Connect the Cannon system to an appropriate professional-grade audio power amplifier, one capable of generating at least 150 watts continuously into eight ohms (see Section IV).
6. Route the speaker cables running to the Cannon system where they will not be walked on, pinched, or cut by heavy sharp objects.

## IV. How the Cannon System Operates in a Bose® Wave System or Cinema Sound System

**Figure 2** shows a signal flow diagram for a small Wave System. Low frequency information from the WSC-1 (or CSC-1 if in a Cinema Sound System) is sent to the Cannon system's power amplifier. In addition, a signal must be returned from the output of one of the Cannon system's amplifiers, via a small jumper, to the AWCS-1 protection circuit terminals on the rear of the WSC-1 or CSC-1. **This connection must be completed or warranty may be voided.**

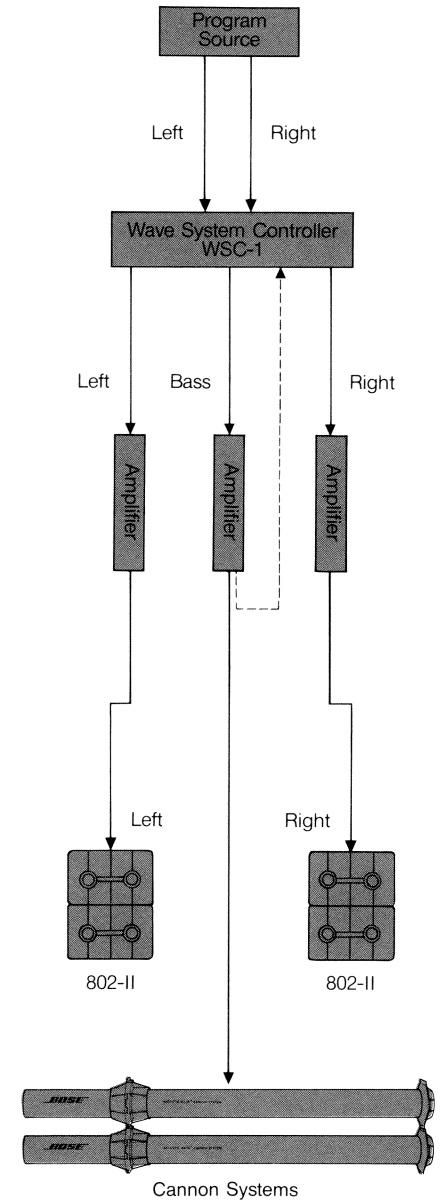
The AWCS-1 protection circuit monitors the bass signal produced by the amplifier and ensures that it is operating within safe power levels. If unsafe levels are detected by this circuit, the gain of the bass output channel will be adjusted automatically to reduce the risk of damage to the Cannon system(s).

Additional graphic or parametric equalizers are normally not needed for the AWCS-1. If an auxiliary equalizer should be necessary, it should be connected between the CSC-1 or WSC-1 and the power amplifier.

## V. Amplifier and Wiring Requirements

Each Cannon system is capable of continuously handling 150 watts of IEC-265-5 noise filtered through the WSC-1 or CSC-1 and having peak power 6 dB greater than the average power. (IEC noise represents an average music spectrum.)

Choosing the proper amplifier and wire size is critical to the performance of the sound system. When considering appropriate amplifiers for a particular system, be sure to account for power loss due to long speaker wires. Refer to **Table 1** as a guide for choosing adequate wire gauges. The table shows the maximum length cable allowed for a given Cannon system array load impedance to achieve less than 1:5-dB wire insertion loss.



**Figure 2**

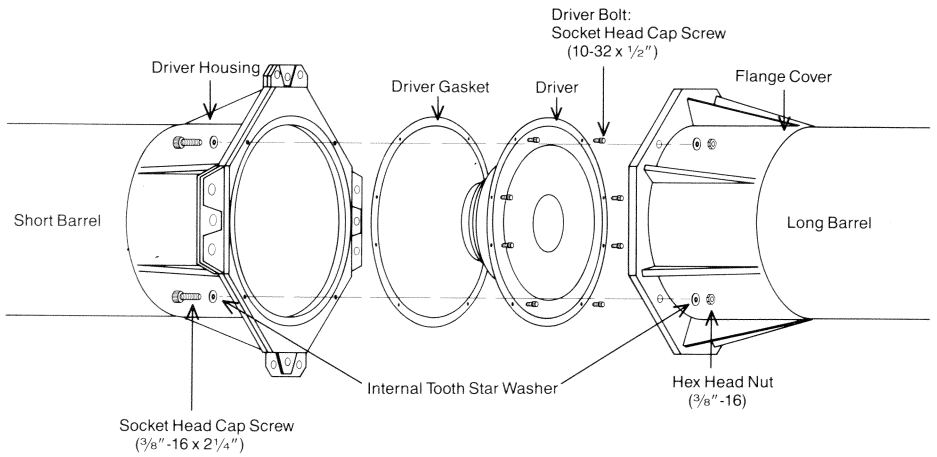
Load (Ω)	Wire Size (Gauge)	Max. Length (Feet)
8	10	755
8	12	470
8	14	375
8	18	300
4	10	375
4	12	235
4	14	190
4	18	150
2	10	190
2	12	120
2	14	95
2	18	75

**Table 1**

## XI. Identifying and Replacing a Damaged Driver (Figure 6)

**Warning: Do not use any driver other than one supplied by Bose® Corporation. The performance of the Cannon system is highly dependent on driver characteristics.**

1. Connect an oscilloscope to the Cannon system's input terminals. Look for obvious clipping or corruption. If they are clean, apply a 25-Hz, 15-Vrms sine wave to the input in question. Sweep the frequency slowly and evenly from 25-200 Hz. If a highly-distorted sound results, the driver has been damaged.
2. If the damaged driver is contained in a Cannon system which is part of an array, separate the suspect system.
3. Remove the four flange bolts which hold the driver housing and flange cover together.
4. Use a hex-head wrench to remove the eight bolts which mount the driver to the driver housing, and remove the driver.
5. Remove the two faston connectors from the damaged driver's terminals.
6. Fasten the two faston connectors to the new driver.
7. Bolt the new driver into the driver housing using the original eight bolts. Make sure that the driver gasket is situated evenly on the driver basket.
8. Insert and tighten the four flange bolts. Make sure that the star washers are included. Ensure that the driver housing and end flange are similarly oriented by inspecting the tabs in the interlock area.
9. Verify the performance of the new driver by sweeping with a sine wave at 15 Vrms from 25-125 Hz. Listen for buzzes, rattles or leaks. Repair leaks with Mortite™ sealant or equivalent. Tighten all bolts (driver and flanges) to eliminate buzzes and rattles.



**Figure 6**

To return the defective driver to Bose® Corporation for credit, call (617) 879-7330, ask for Customer Service, and request a Return Authorization number and specific return instructions. Credit for damaged and defective units will not be granted unless the unit has been sent to Bose Customer Service and evaluated.

## XII. Specifications

### General

Dimensions: 150" L x 17" W (3.81 x 0.43 m) (maximum)  
 Weight: 55 lbs (25 kg)  
 UL flammability rating: Complies with UL 94-5V

### Barrels (2)

Long barrel length: 112" (2.86 m)  
 Short barrel length: 38" (0.96 m)  
 Material: Polyvinylchloride (custom-formulated)  
 Color: Black  
 Barrel inside diameter: 10.25" (260.4 mm)  
 Barrel outside diameter: 10.50" (266.7 mm)  
 UL flammability rating: Complies with UL 94-5V

### Flanges (3)

Material: Polyurethane foam (custom formulated)  
 Color: Black  
 UL flammability rating: Complies with UL 94-5V

Driver mounting nuts (8): 10-32 Encapsulated mounting plates: 12-gauge cold-rolled steel  
 Plate load bearing capacity: 400 lbs (182 kg) per plate

### Driver

Resonant frequency: Approx. 30 Hz in air  
 Cone excursion: 1.0" peak-to-peak  
 Power handling: 150 watts (nominal, IEC noise, through WCS-1)

Driver impedance: 8Ω (nominal)  
 Basket: 16 gauge cold-rolled steel

### Environmental

Temperature range: -10°C to 70°C  
 Humidity: 20-95% relative humidity

### Acoustics

Sensitivity: 90 dB-SPL (30 Hz, 1 W/1 m)  
 130dB-SPL (30 Hz, 150 W, 1 m, ¼ space loading)  
 Frequency response: 25-125Hz ± 3 dB  
 Maximum distortion: 20% THD, full power

### Mechanical Hardware

Driver mounting bolts (8): 10-32 cap head  
 Driver flange bolts (4): ¾"-16 x 2 ¼"  
 Interlock system bolts: ¾"-16 x 2 ¼"  
 Floor mounting system bolts: ¾"-16 x 2 ¼"

When more than one Cannon system is used on a single amplifier output, they must be wired in parallel. (This ensures the proper operation of the AWCS-1 protection circuitry in the WSC-1 and CSC-1.) Two Cannon systems in parallel form a nominal load of  $4\Omega$ ; three in parallel, a load of  $2.7\Omega$ ; and four in parallel, a load of  $2\Omega$ . Check the audio power amplifier manual to ensure that it can drive loads of  $4\Omega$  and below when using two or more systems.

Use ordinary AWG-18 speaker wire to make the connection from the Cannon system amplifier to the AWCS-1 protection circuit inputs on the rear panel of the CSC-1 or WCS-1.

Use the spade lugs contained in the literature pack to connect the speaker wire to the Cannon system.

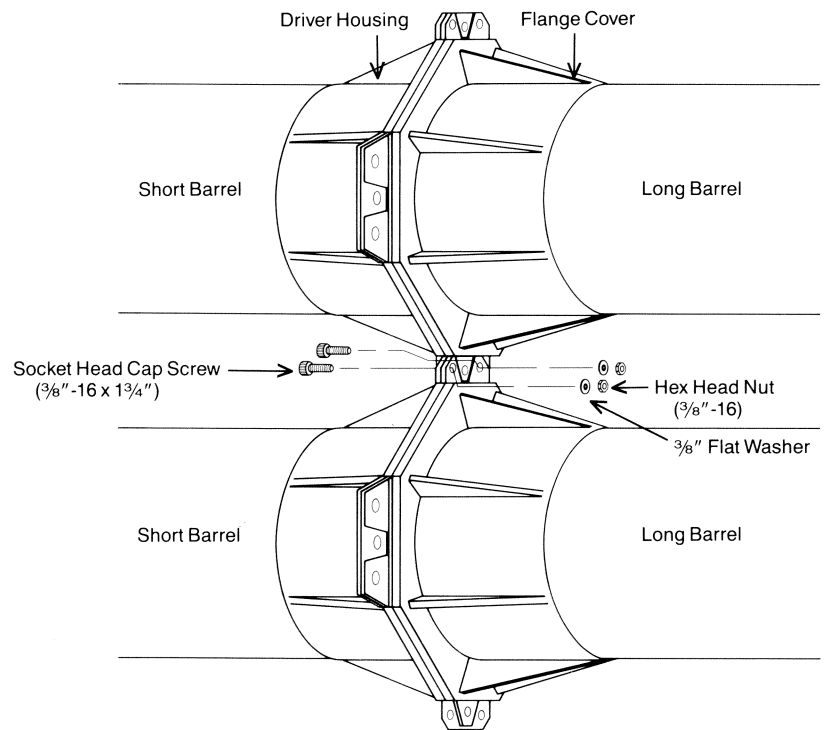
## VI. Cannon System Mechanical Interlocking System

When more than one Cannon system is required, they can be interlocked to form a rigid array. You can create arrays of almost any size and shape, depending on the intended location of the array. This not only makes it simpler to install the system, but the resulting acoustic coupling ensures optimal performance. **Figure 3** shows how the interlocking system works.

A special **Interlock Kit (IK-1)** is offered as an accessory and must be used when forming arrays of Cannon systems. Please refer to the owner's guide that accompanies the kit for detailed instructions. Four sets of  $3/8''$  (approx. 9 mm) nuts, bolts and star washers are supplied in each kit; two are used at the driver housing/flange cover area and two at the end flange. The two Cannon systems being interlocked are nested together at the flanges. The bolts, nuts, and washers are then inserted and tightened.

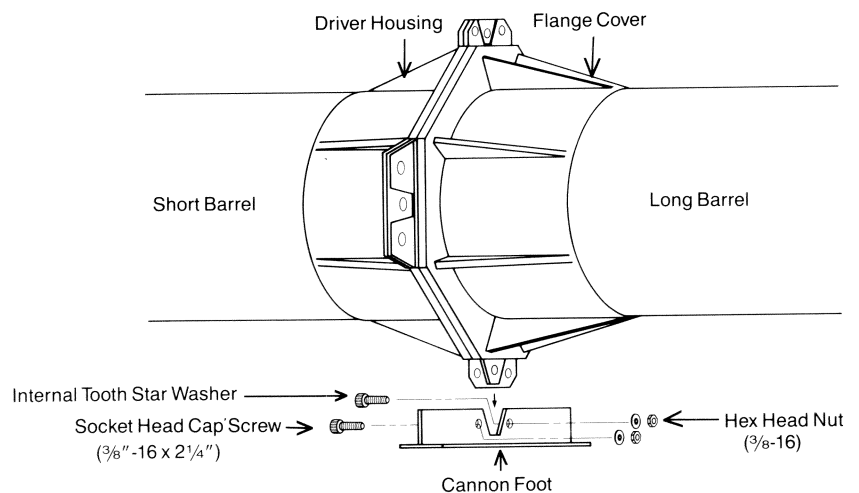
**Warning: Do not substitute other hardware for the Interlock Kit hardware.**

**IMPORTANT:** The interlocking hardware is subjected to low frequency vibration during operation. Please ensure that the star washers supplied in the Interlock Kit are used as shown in **Figure 3**. Tighten all interlocking bolts firmly using a socket wrench and a hex wrench, or their equivalents.



**NOTE:** Interlock repeats at the End Flange.

**Figure 3**



**NOTE:** Cannon Foot assembly repeats at the End Flange.

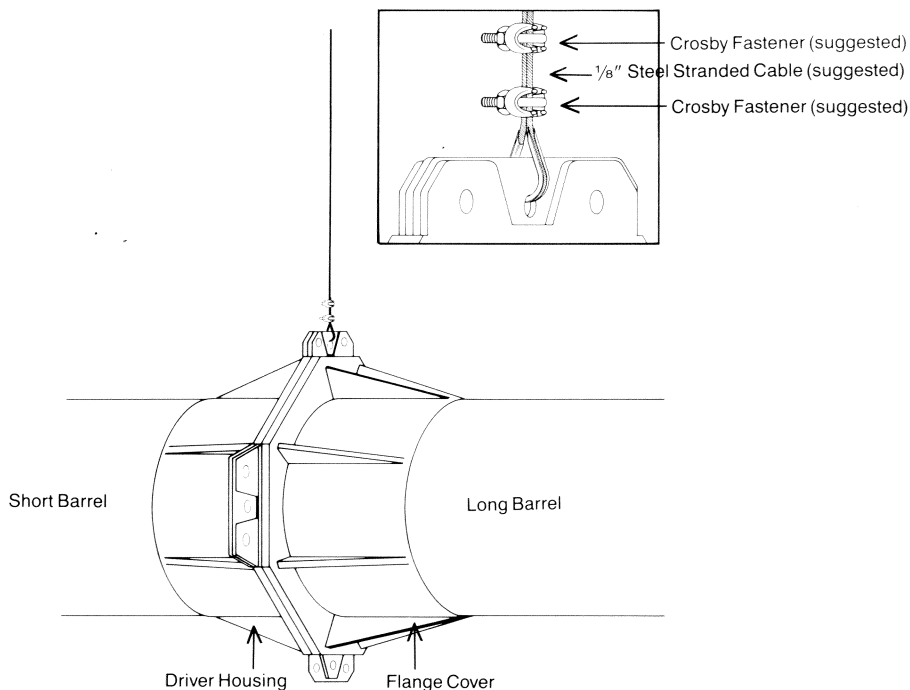
**Figure 4**

## VII. Floor Mounting of Cannon System Arrays

The optional **Floor Mounting Kit (FM-1)** should be used when a Cannon system array's height-to-width ratio exceeds 2:1. For example, when floor mounting an array of Cannon systems four high and two wide (eight Cannon systems) a Floor Mounting Kit is not required. However, an array four high and only one wide (four systems) requires an FM-1. Please refer to the owner's guide that accompanies the kit for detailed instructions.

**Figure 4** shows how the floor mounting system works. Because the Floor Mounting Kit mates correctly with only two of the four flange sides, be sure that the Cannon system flanges are oriented to the floor as shown in the figure.

**Warning: Do not substitute other hardware for the Floor Mounting Kit hardware.**



**Figure 5**

## VIII. Hanging Cannon System Arrays

The steel plates encapsulated in the flanges are designed to support up to 400 pounds (182 kg), or a maximum of six Cannon systems. **Warning: Never hang more than 400 pounds (182 kg) or six Cannon systems from a flange plate.**

**Figure 5** shows one way to hang Cannon system arrays. Use the center hole of the three holes on each face of the driver housing and end flange for hanging. **WARNING: The loudspeaker mounting details shown in this owner's guide are not intended as universal mounting details. Mounting details for the Acoustic Wave Cannon and other Bose professional loudspeakers should always be specified by a licensed engineer, and equipment should be installed by an experienced and licensed contractor. Hanging heavy equipment requires great care and vigilant attention to static and dynamic loads as well as environmental conditions such as temperature, humidity, and wind loading.**

## IX. Cannon System Array Placement

Unlike bass systems whose crossover frequency is above 200 Hz or which produce significant distortion at high output levels, the Acoustic Wave<sup>®</sup> Cannon system may be placed almost anywhere in the listening environment without the audience being able to localize the bass. With a Wave System or Bose<sup>®</sup> Cinema Sound System, the audience will perceive the sound as coming entirely from the 802<sup>™</sup> loudspeakers.

To maximize the output of Cannon systems, place them, when possible, near hard, massive surfaces such as concrete slab floors. The open ends of the Cannon system can be placed to within one foot of a surface without impeding air flow.

## X. Maintenance, Repair and Service

An Owner's Registration Card is provided with this guide. Please return it to Bose Corporation within ten days of your purchase.

The AWCS-1 should be serviced by qualified personnel when the unit has been exposed to excessive moisture, if it does not appear to be operating normally, or if it exhibits a marked change in performance.

Instructions for identifying and replacing a defective driver in the Cannon system have been included in Section XI. **This procedure should be executed only by a professional sound contractor.** If you experience other problems with a Cannon system, or have questions about a defective driver, contact your authorized Bose Professional Products dealer. He will verify any defects and arrange for service by a factory-authorized Bose Service Agency or by a Bose manufacturing facility. Bose Corporation will make every effort to remedy any problem within the terms of the warranty at minimum inconvenience to you. Consult the Warranty Information section of this guide for details.

## Safety

The system shall comply with the following safety agencies:

USA: Underwriters Laboratories  
UL813, UL746C

Canada:

Canadian Standards Association  
CSA C22.2 No. 1-M1981

Europe: IEC-15

West Germany: VDE-0860

Japan: MITI

## XIII. Warranty Information

For a period of five (5) years from the date of purchase of a Bose® Acoustic Wave® Cannon system, Bose warrants the unit to be free from defects in materials and workmanship. During that period, Bose will remedy all such defects, without charge for parts or labor, upon return of the unit, together with the original sales receipt or other proof of purchase, to Bose or to an authorized Bose service agency. This warranty does not extend to damage resulting from improper installation, misuse, neglect or abuse, or to exterior appearance. IN NO EVENT SHALL BOSE BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

This warranty is void if the AWCS-1 is used without either the WSC-1 or CSC-1 or if the AWCS-1 protection circuit on the WSC-1 or CSC-1 is not used.

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Australia, Belgium, Canada, England, France, Germany, Ireland, Italy, Japan, Netherlands, Spain, Switzerland, United States

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