

# ***BOSE***<sup>®</sup>

## **Professional Products**

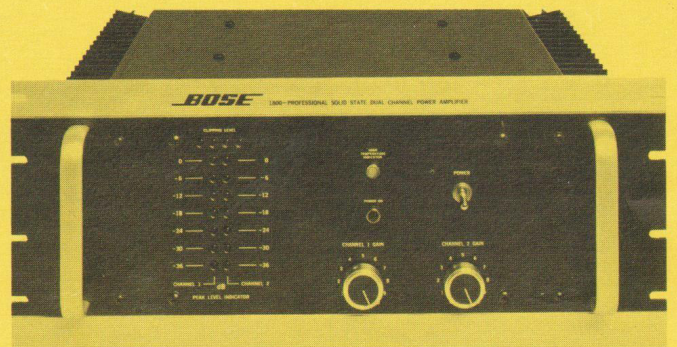
***BOSE 800***<sup>™</sup>

**professional  
loudspeaker  
system**



***BOSE 1800***<sup>™</sup>

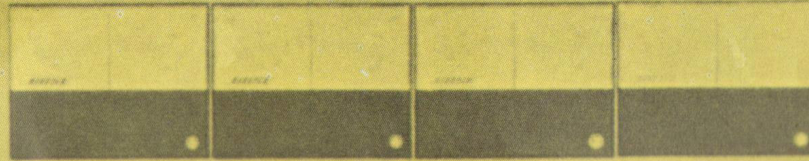
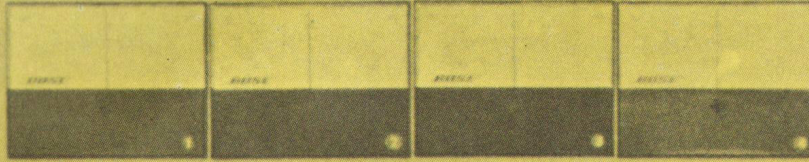
**professional  
solid-state  
dual-channel  
power amplifier**



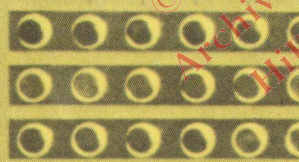
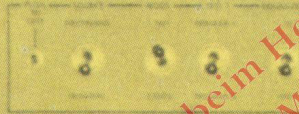
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BOSE 103420

BOSE METER DISPLAY-103387



BOSE



SYNCOM II

DIAPHRAGM ANALYZER SYSTEM - 103410



BOSE Corporation was founded in 1964 by Dr. Amar G. Bose for the purpose of advancing the state-of-the-art of music reproduction. Today BOSE has become an international leader in the development of audio equipment for use by professionals and in the home. Headquartered in a modern engineering and manufacturing facility in Framingham, Massachusetts, the company maintains sales offices in the United States and in Frankfurt, Amsterdam, Stockholm, Basel, Naha, Taipei, and Seoul.

The thrust of BOSE's efforts is toward innovation in engineering and quality control. In engineering, our goal is to design equipment which provides more realistic sound reproduction than has ever been possible, at a level of reliability that sets a new standard for the industry. To accomplish this requires a fundamental understanding of the mechanisms of human hearing and perception and a careful, analytical approach to product design. We are proud that our engineering department examines technical problems with an outlook that is based firmly on facts, in an industry which is too frequently guided by misconception and folklore.

In quality control, we have developed some of the most advanced techniques in the industry for maintaining the quality of our parts, subassemblies, and finished products. The best example is the Syncom™ II computer, which helps to test each individual loudspeaker for frequency response and dispersion characteristics. This system allows us to perform far more testing than would be possible with conventional manual techniques. At BOSE, stringent tests are performed at every stage of production; on incoming electronic components and mechanical parts, on subassemblies such as completed circuit boards, and on finished products.

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# BOSE

BOSE Corporation follows a strategy of marketing a small number of products, each one having wide applicability. In this way we can devote a substantial design and development effort to each product to assure that it incorporates the best combination of quality, usefulness, and reliability. We can also build each product in truly economical quantities, so that users can obtain the best value possible through modern manufacturing techniques.

In the final analysis, it is the people behind the products that make the difference. BOSE has assembled what we believe to be the finest technical team in the industry. More than a dozen of our staff members hold advanced degrees from Massachusetts Institute of Technology. The depth and breadth of their knowledge assures you that BOSE will continue to lead in the development of audio equipment of the highest quality and reliability.

# **BOSE 800**

**professional  
loudspeaker  
system**

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# performance of the **BOSE 800**

The BOSE 800 incorporates a number of major departures from the traditional design of sound reinforcement loudspeaker systems. These differences provide the user with many benefits in performance, ruggedness, and portability.

## **CLEAR, NATURAL SOUND; FREE OF ARTIFICIAL COLORATION**

The use of multiple, identical drivers with close acoustical coupling results in a smoothing and broadening of individual resonances. The full-range driver design eliminates the crossover and the problem of crossover coloration. The resulting clarity and realism of the 800 must be heard to be appreciated.

## **SMOOTH FREQUENCY RESPONSE**

Multiple drivers in an air-sealed enclosure provide smoother response than ported bass cabinets (often boomy) or horn-loaded drivers (which often sound piercing or "peaky") The smoothness of the 800 not only provides a more natural sound, but sharply reduces listener fatigue.

## **FULL MUSICAL FREQUENCY RANGE PERFORMANCE**

Active equalization, tailored to the acoustics of the BOSE 800, assures that a flat power spectrum is radiated, not just in the vocal range, but from the deepest tones of the bass drum or electric bass to the highest treble of cymbals or snares.

## **EXCELLENT TRANSIENT RESPONSE**

Small cones, powered by massive magnetic structures, provide rapid response to transient signals. The sound of drums and cymbals through the 800 provides the best demonstration of this property. Drummers have commented that they have never heard amplified drums sound so lifelike.

## **UNPRECEDENTED PORTABILITY**

The 800 is the first truly portable music reinforcement system of its kind. Air-sealed cabinet and active equalization allow the use of a cabinet which can be lifted easily with one hand and transported on the seat or in the trunk of a compact car. A complete speaker, with its protective cover, weighs only 43 pounds.

## **PHYSICAL RUGGEDNESS**

The 800 is permanently built into a case which is made of 7-ply birch plywood, covered with heavy-duty cloth-backed vinyl, bound with hard vulcanized fibre edges and protected by riveted metal corners and angle clamps. The airtight phone jack is covered with a spring-loaded, rubber-gasketed cap. The case can be checked as baggage on commercial airlines and stands up to the punishment of airline baggage handling.

## **MODULAR NATURE**

Because a large sound system may consist of a number of identical cabinets, a small portion of a large system can easily be used for performance in smaller rooms. Cabinets can be stacked to produce a "column effect," which provides long throw for auditorium and outdoor concert work.

## **FREEDOM FROM FEEDBACK**

The smooth frequency response and excellent spatial properties of the multiple-driver design lead to a low peak-to-average frequency response ratio at the microphone. This allows unusually high average gain before feedback. Performers can work very close to the speakers without causing feedback problems.

**VOCAL AND MUSIC REINFORCEMENT**

The BOSE 800 is used primarily as a musical sound reinforcement speaker (musician's P.A.). The versatility and sound quality of the 800 suits it to a wide range of applications, from the reinforcement of vocals for small, "acoustic" groups to the reinforcement of vocals, guitars, organ, horns and drums for loud "rock" groups. Multiple pairs of 800s can provide sound for concerts in the largest of halls and auditoriums. (Just eight pairs have provided total sound for a 20,000 seat sports arena).

**STAGE MONITOR**

The smoothness of frequency response of the BOSE 800 makes it a superb stage monitor speaker. Because there is so little "peakiness," the average level at the performer's ears can be quite high before feedback occurs. The size of the 800 makes it unobtrusive and easy to place on stage.

**LEGITIMATE THEATRE AND MOTION PICTURE**

BOSE loudspeaker systems are finding increasing acceptance in movie houses and in the legitimate theatre. A level of sound quality not obtainable with conventional horn systems makes theatre presentations more realistic than ever. The ease of placement of the BOSE system also appeals to theatrical sound specialists.

**PORTABLE PLAYBACK**

Producers of traveling multimedia shows and other productions requiring high-quality audio will find that the BOSE 800 offers them the opportunity to stop relying on sometimes inadequate "house" sound systems. Operators of portable discotheques will be delighted to shed the burden of carrying heavy, bulky "theatre" speakers with them.

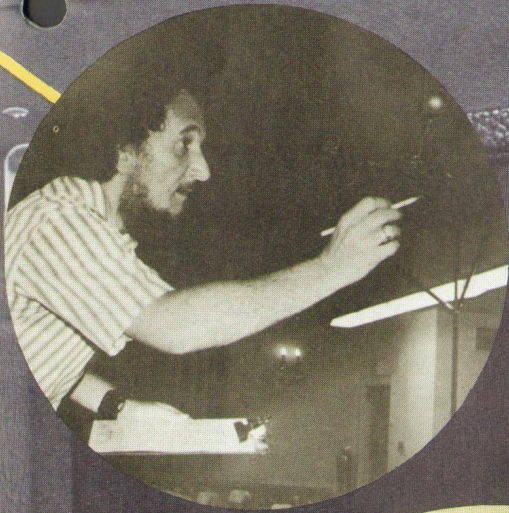
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**applications  
of the  
BOSE  
800**



## ELECTRONIC MUSICAL INSTRUMENTS

The broad frequency response and remarkable electrical ruggedness of the BOSE 800 have endeared it to manufacturers and users of electronic music synthesizers, electric pianos, and other electronic instruments. No longer must the synthesizer player worry that his square waves will be indistinguishable from sawtooth waves or that the high-frequency energy content of his synthesized waveforms will blow out a high-frequency horn driver.



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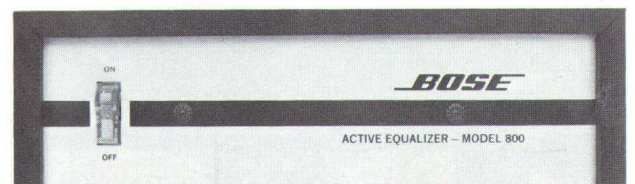
BOSE

## **SPEAKER UNIT**

<b>Speaker Complement:</b>	8 long-throw, 4½" full-range BOSE drivers
<b>Magnets:</b>	Ceramic, 80 oz. total per cabinet
<b>Impedance:</b>	8 ohms
<b>Frequency Range:</b>	Full musical frequency spectrum
<b>Dimensions:</b>	19 5/16" x 15" x 12 15/16" with cover
<b>Weight:</b>	43 lbs. including cover
<b>Power Handling:</b>	Maximum Recommended Amplifier Power: 270 watts (rms) Maximum Continuous Power (Full-Range Material): 125 watts Maximum Continuous Power (No Bass Content): 90 watts
<b>Mounting:</b>	Can be set on stage floor, stacked in small columns (using the lids for added height), or mounted on an Atlas SS-2 speaker stand
<b>Active Equalizer:</b>	The BOSE 800 Active Equalizer is supplied with each "Standard Pair" of BOSE 800 Loudspeakers. Because one Equalizer can drive several power amplifiers in a sound system, the 800 is also available as an "add-on" pair (without the Equalizer).

## **ACTIVE EQUALIZER**

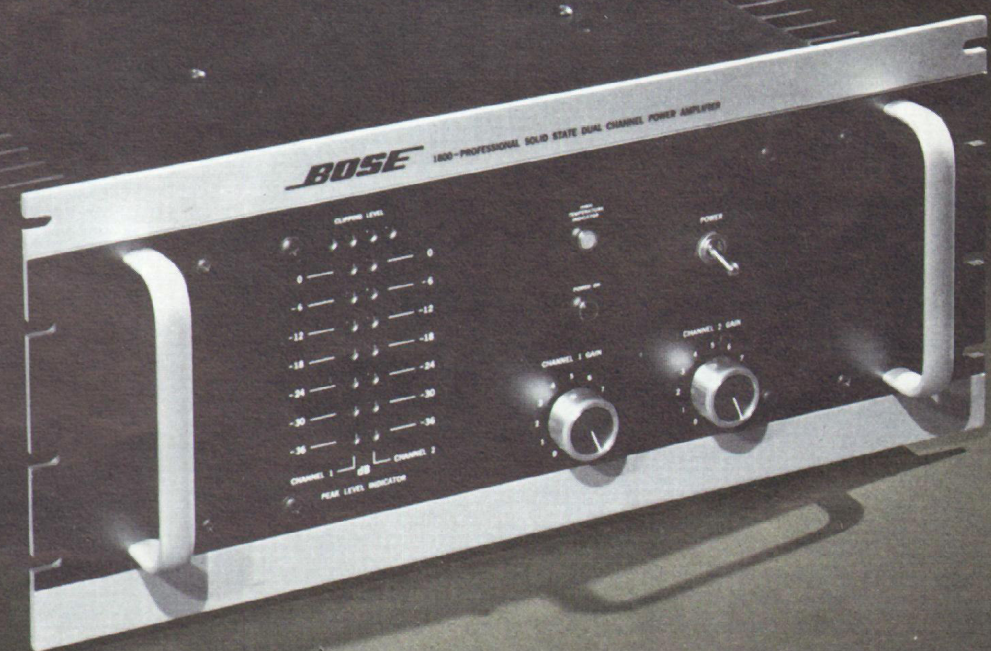
	(supplied with each standard pair of the BOSE 800)
<b>Input Impedance:</b>	150K ohms
<b>No. of Channels:</b>	2
<b>System Connection:</b>	BOSE 800 Active Equalizer is connected between the mixer (or preamplifier) and the power amplifier of a sound system.
<b>Maximum Output Voltage:</b>	4.0 VAC (will drive load impedance down to 5K ohms)
<b>Gain:</b>	0 dB at midband (200 Hz - 4 kHz) 12 dB @ 40 Hz 15 dB @ 16 kHz
<b>Maximum Input Voltage:</b>	4.0 VAC at midband (200 Hz-4 kHz) 0.8 VAC @ 40 Hz 0.6 VAC @ 16 kHz
<b>Dimensions:</b>	9 ¼" W x 2¾" H x 6½" D
<b>Power Requirements:</b>	3 watts



# BOSE 1800

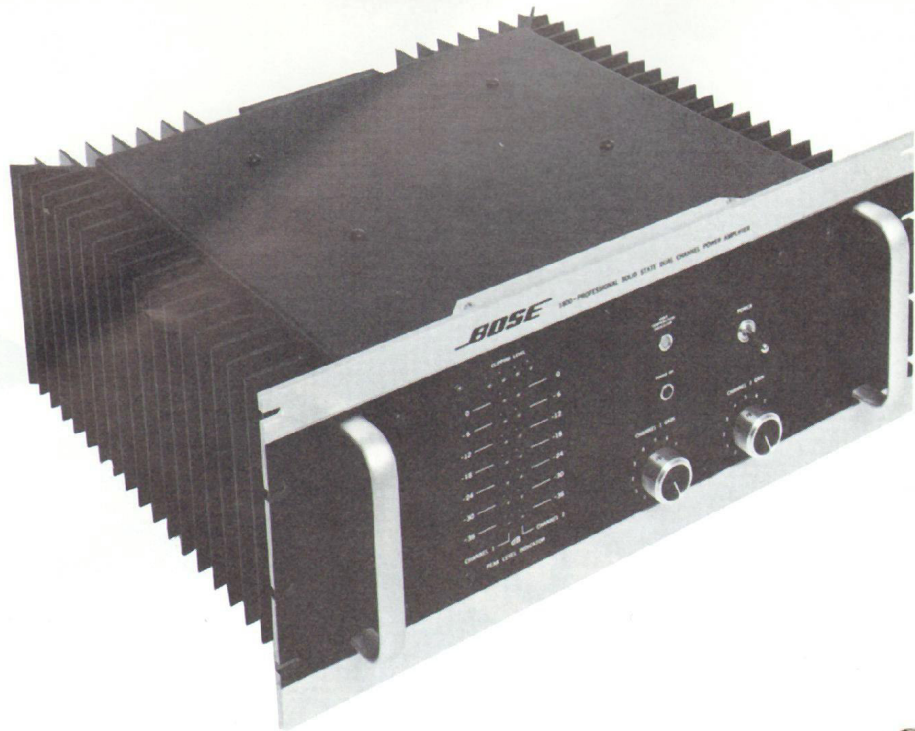
professional  
solid-state  
dual-channel  
power amplifier

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# **BOSE** **1800**

## **design features**



### **PEAK LEVEL INDICATORS**

One cannot hope to get the greatest amount of "clean" power out of an amplifier without knowing how much it is putting out at any moment. The BOSE 1800 is equipped with twin arrays of light-emitting diodes (LEDs) which monitor the instantaneous power level being supplied.

The LED array is particularly useful because of its rapid response, wide dynamic range, and mechanical ruggedness. The LEDs respond to transient signals in less than one microsecond, far faster than any mechanical meter, thus insuring that no musical peak can go undetected. The array displays a dynamic range of 36 dB, or a power ratio of 4000:1. No mechanical meter is capable of such dynamic range. Because the LED array has no moving parts, it can withstand the rough treatment of repeated shipping without damage. Those who have seen power amplifiers with masking-tape labels over the meters, saying "METER OUT, AMP OK," will appreciate this advantage particularly.

The 0 dB LED position indicates a momentary power level of 256 watts into 4 ohms or 128 watts into 8 ohms. Each successive LED indicates a power level 6 dB (four times) lower than the LED above it. The clipping level is near full power, or approximately 3 dB above the 0 dB level. This interval will vary somewhat because the clipping level depends upon the AC line voltage and the load impedance being driven by the amplifier.

### **SPECIAL TURN-ON CIRCUIT**

A special delay circuit is used to limit power supply inrush currents at the instant of turn-on. Controlling these inrush currents extends the life of

the power supply capacitors, rectifiers, and pilot light.

### **14 SILICON POWER TRANSISTORS PER CHANNEL**

The reliability of an electronic instrument is highly dependent upon the degree to which its components are subjected to stress. Thermal stress on the power transistors is one of the major factors contributing to power amplifier failure. The BOSE 1800 employs 14 power transistors per channel to deliver its rated power. Equal sharing of power among so many transistors results in unusually low thermal stress on each device.

### **41 - POUND POWER TRANSFORMER**

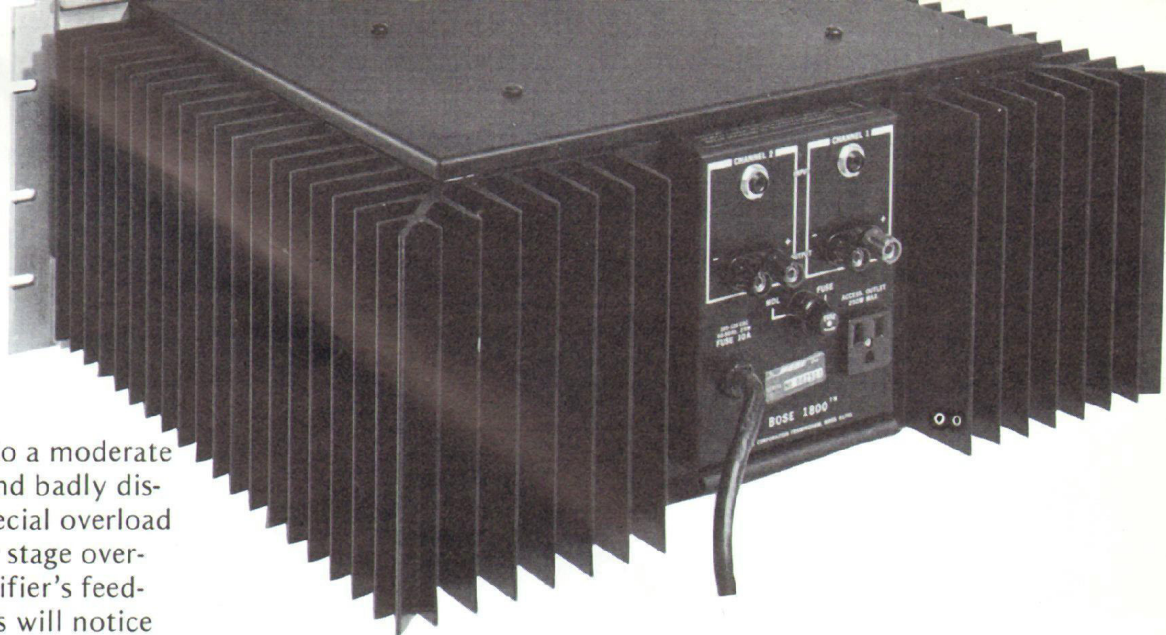
The 1800 uses a highly regulated power supply, requiring a massive power transformer. This well-regulated supply allows the power transistors to remain within their "safe operating area" at all times, even during musical transients. (Most musical transients last so long that highly unregulated power supply designs contribute little to dynamic range, and degrade the reliability of an amplifier.)

### **OVER 1300 SQUARE INCHES OF HEAT SINK FINS.**

A massive amount of heat sinking assures that the power transistors will operate at a low temperature, increasing the amplifier's reliability and lowering the probability of shutdown due to thermal overload.

### **85°C, COMPUTER-GRADE ELECTROLYTIC CAPACITORS**

The power supply capacitors in the 1800 are of the highest temperature rating available in industrial capacitors. Long life also is assured by operating these devices 15% below their voltage ratings.



## FAST OVERLOAD RECOVERY

Even when an amplifier is driven into a moderate amount of clipping, it need not sound badly distorted. The 1800 incorporates a special overload recovery circuit which senses power stage overload (clipping) and adjusts the amplifier's feedback to insure rapid recovery. Users will notice that the 1800 seems to "clip gently."

## ELECTRONIC CURRENT LIMITING

The 1800 is not equipped with individual power supply fuses. Fuses, which are used by some designers to protect an amplifier from abnormal loads, are not fast enough to protect semiconductors, which can be destroyed in a few milliseconds. The 1800 is equipped with electronic current limiting, which acts instantaneously to protect the amplifier from abnormal load conditions, including short circuits.

## FULL CURRENT DRIVE CAPABILITY

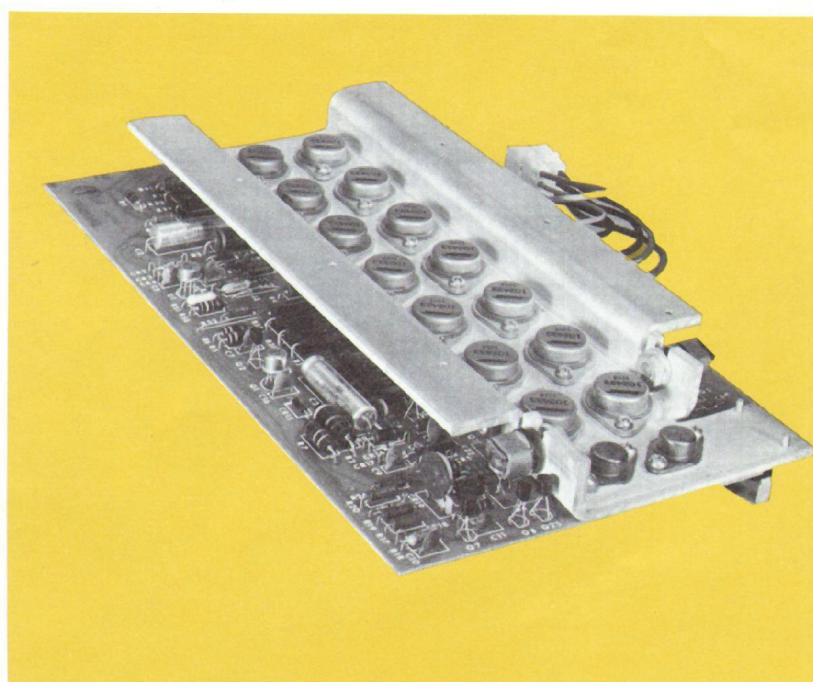
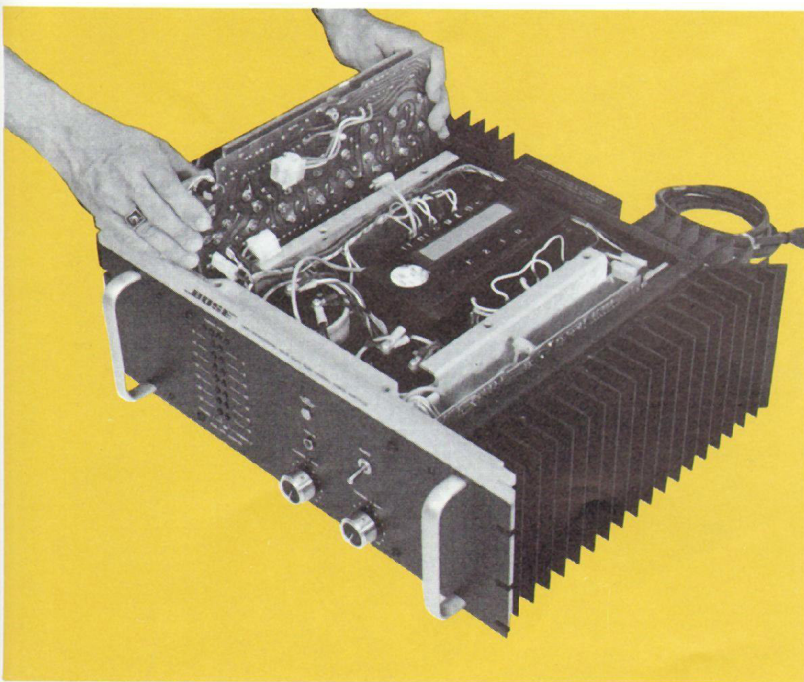
The 1800 has the capability to drive two four-ohm loads to its full power capability without entering the current-limiting mode. This means that, even at full output, the 1800 limits by clipping rather than by current limiting. Since clipping is a much less noticeable form of distortion than current limiting, users will notice again that the 1800 "overloads gently."

## INTEGRAL DESIGN™AMPLIFIER MODULE\*

BOSE engineers have taken an important step forward in amplifier design by eliminating most of the troublesome hand wiring in the power stage of this new amplifier. The 1800 incorporates two INTEGRAL DESIGN Amplifier modules, each one containing all of the circuitry of one channel. Each module includes a Heat Coupler, a massive aluminum structure which transfers heat from the power transistors to the heat sinks.

INTEGRAL DESIGN introduces an unprecedented degree of accuracy and reproducibility by providing precision etched conductor paths for all critical connections in the amplifier. The other principal advantage of INTEGRAL DESIGN is that a complete amplifier channel can be removed and replaced in the field in less than five minutes. Only six screws and three plug-in connections need be removed to accomplish this operation.

\*Patents Pending



# BOSE 1800

**BOSE**

1800-PROFESSIONAL SOLID STATE DUAL CHANNEL POWER AMPLIFIER

CLIPPING LEVEL

0  
-6  
-12  
-18  
-24  
-30  
-36

0  
-6  
-12  
-18  
-24  
-30  
-36

CHANNEL 1  
CHANNEL 2  
dB  
PEAK LEVEL INDICATOR

HIGH  
TEMPERATURE  
INDICATOR

POWER ON

POWER

CHANNEL 1 GAIN

3 4 5 6 7 8 9 10

CHANNEL 2 GAIN

3 4 5 6 7 8 9 10

# design goal

The goal of the research and development that produced the BOSE 1800 was to design an audio power amplifier of the highest practical power level, which would produce absolutely no audible distortion, sound coloration, noise, or hum. The amplifier also had to meet the stringent BOSE reliability standards.

The BOSE engineering staff knew that it would be possible to design an amplifier with dramatically "impressive" specifications. They also knew that to design such an amplifier, one which was numerically far "better" than the most sensitive human ear, would require that they compromise their high standards of stability, reliability, and ruggedness. The decision was made to develop an amplifier which would be audibly perfect, but with no sacrifices of reliability made to achieve inaudible (and therefore irrelevant) "improvements" in specifications.

# specification philosophy

Most users fail to appreciate that there are two prices to be paid for "impressive" specifications in a power amplifier. The first price is increased cost. The second is decreased reliability, which results when amplifier bandwidth and distortion are pushed far beyond the limits of audible perfection.

In order to help put an end to the "specsman-ship game," we will not engage in quoting specifications which are far in excess of those necessary to assure audible perfection. Rather, we will state first the requirements for audible perfection, and then confirm that the 1800 exceeds these requirements by a comfortable margin. Also we will explain the price some amplifier designers have paid to "improve" the specification for the purpose of "specsmanship."

## REQUIREMENTS FOR "PERFECTION" IN AN AUDIO AMPLIFIER

### Frequency Response

The frequency response of an amplifier should be flat within 1.0 dB from 20 Hz to 30 Hz, 0.25

dB from 30 Hz to 10kHz, 0.7dB from 10kHz to 15kHz, and 1.0dB from 15kHz to 20kHz to be audibly perfect. (The frequency response of the 1800 is well within these limits.) Extending the frequency response of an amplifier into the ultrasonic (inaudible) region requires the use of high-speed transistors, which are more subject to the failure mode called "second breakdown," and therefore would fail to meet BOSE reliability standards.

### Distortion

Basic psychoacoustic research will show that harmonic distortion below 0.5 percent up to 5 kHz and below 1.0 percent from 5 kHz to 10 kHz is inaudible. Harmonic distortion above 10 kHz is not important, because all of the distortion products fall above 20 kHz and are, therefore, inaudible. Intermodulation distortion less than 0.5 percent can be shown to be inaudible. (The distortion of the 1800 is well below these limits.)

To reduce the distortion much farther below the threshold of audibility would require the use of a very large amount of feedback in the amplifier circuit. This often leads to instability, which causes internal oscillations and a tendency for the amplifier to "blow up" when driving highly inductive or capacitive loads. (The 1800 can drive any load without danger of self-destruction.)

### Hum and Noise

The 1800 can produce sound pressure levels in excess of 120 dB with many loudspeaker systems. If the hum and noise is 100 dB below this level, it will produce a sound pressure level of 20 dB, which is not audible even in the quietest of listening rooms. (The hum and noise of the 1800 is below this level.) It would have been possible to produce a more "impressive" noise figure by designing an amplifier with lower input impedance. This was rejected because it could overload the mixer or preamplifier in a system, resulting in poor performance.

### Damping Factor

If the damping factor of an amplifier is 40 or greater, it will cause no audible coloration of the sound. (The damping factor of the 1800 is well above 40.) An extremely high damping factor could be obtained by applying feedback directly from the output terminals, but not without sacrificing stability and increasing quality control problems.

# ***BOSE 1800***

# **specifications**

<b>Frequency Response:</b>	Audibly perfect ( $\pm 0.5$ dB, 20 - 20,000 Hz)
<b>Distortion:</b>	Inaudible (less than 0.5 percent)
<b>Hum and Noise:</b>	More than 100 dB below full output
<b>Damping Factor:</b>	Greater than 40
<b>Power Output:</b>	250 watts (rms) per channel into 8 ohms, both channels driven 400 watts (rms) per channel into 4 ohms, both channels driven
<b>Input Impedance:</b>	Greater than 50K ohms
<b>Input Sensitivity:</b>	1.5 volts rms for 250 watts into 8 ohms
<b>Minimum Load Impedance:</b>	4 ohms
<b>Dimensions:</b>	19" W x 15" D x 8 $\frac{3}{4}$ " H (Requires 8 $\frac{3}{4}$ " of standard rack space. Dimensions do not include handles.)
<b>Weight:</b>	80 lbs. operating 91 lbs. shipping
<b>Heat Sink Area:</b>	Greater than 1300 sq. in.
<b>Power Consumption:</b>	1000 watts nominal 2000 watts peak
<b>Line Voltage:</b>	105-125 VAC (120 VAC nominal) 210-250 VAC (240 VAC nominal) (Export Version) 50-60 Hz
<b>Connectors:</b>	Input: $\frac{1}{4}$ " phone jacks Output: Dual banana jacks (5-way binding posts)
<b>Protection:</b>	Electronic current limiting protects the amplifier from all passive loads; resistive, inductive, capacitive, or short circuit. AC line fuse protects amplifier and power line from internal faults.

**Indicators:**

LED Array Instantaneous Power Indicator

Level	Clipping	0dB	- 6	-12	-18	-24
Power @ 8 $\Omega$	>250w	128	32	8	2	$\frac{1}{2}$
Power @ 4 $\Omega$	>400w	256	64	16	4	1

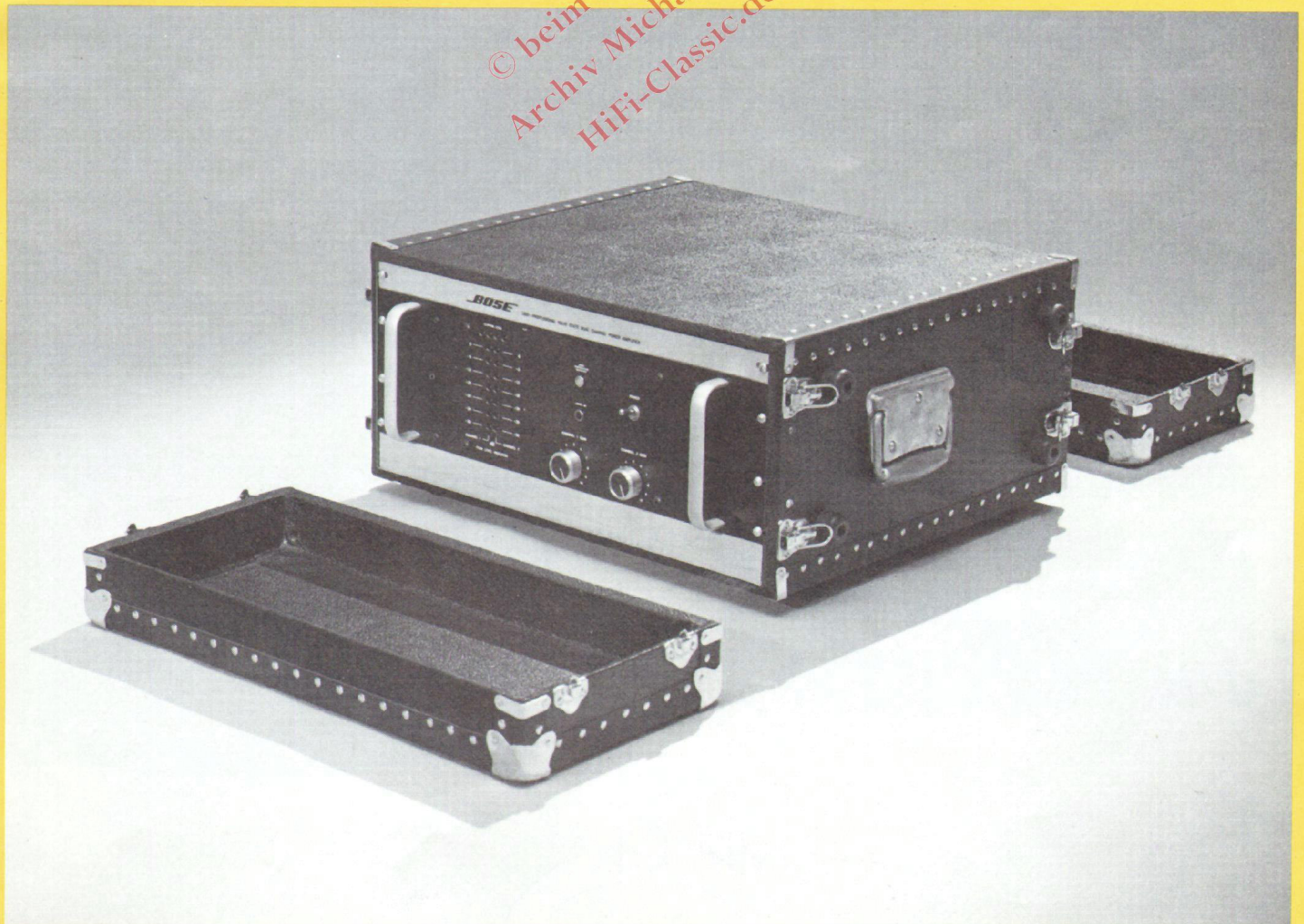
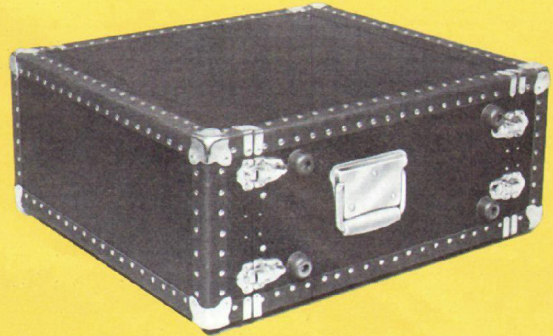
# amplifier transit case

As an optional accessory, BOSE offers a rugged carrying and shipping case for the 1800 amplifier. The case is made of tough, 7-ply birch plywood and protected by vulcanized fibre edge binding and metal corners, angles, and latches. Front and back covers are easily removed to operate the 1800 in its case.

A built-in fan and air-flow baffles force air through the heat sinks to keep the amplifier cool in its case, even under continuous high-power use.

## Specifications

Width: _____	20"
Height: _____	10"
Depth: _____	22"
Weight Empty: _____	25 lbs.
Weight including Amplifier: _____	105 lbs.



## **five year warranty**

The BOSE 800 Professional Loudspeaker System and the BOSE 1800 Professional Solid-State Dual-Channel Power Amplifier are warranted to be free of defects in workmanship and material for five years from the date of purchase. During that period, any defect that occurs in normal use will be repaired with no charge for parts or labor.

# **BOSE**<sup>®</sup>

THE MOUNTAIN, FRAMINGHAM, MASS. 01701