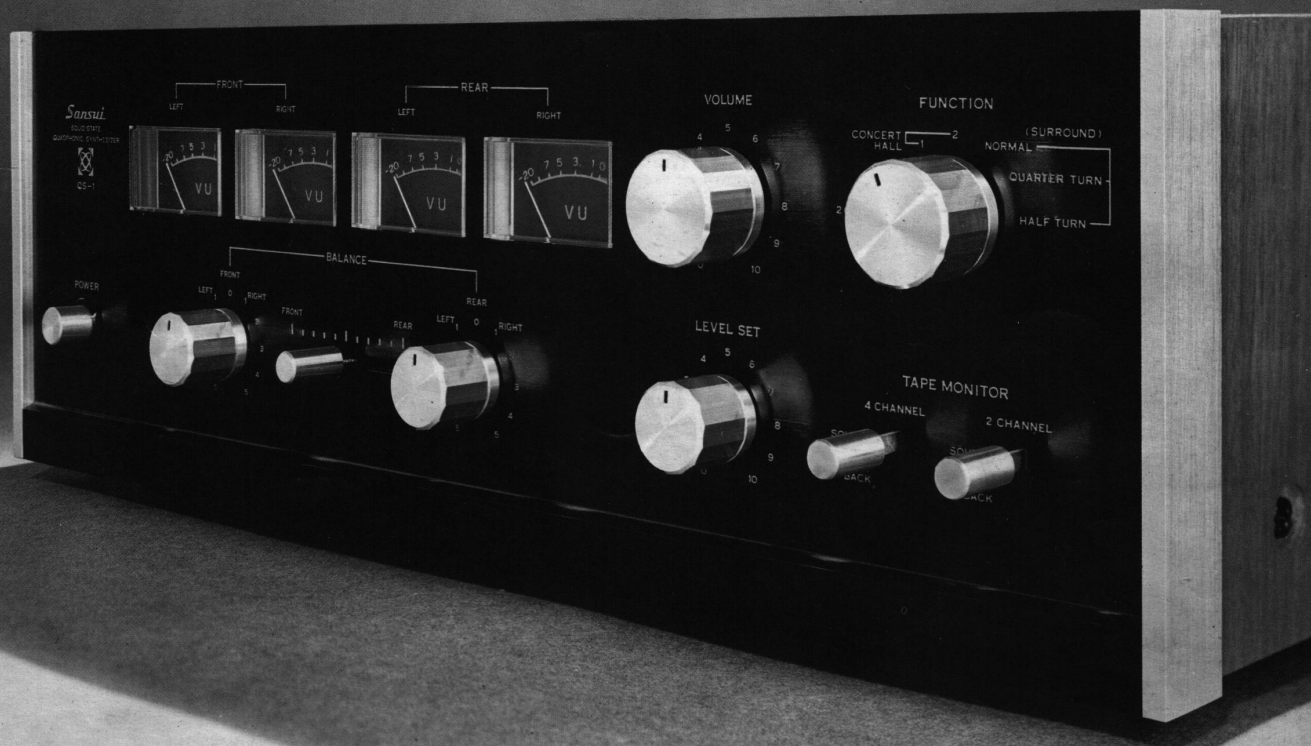



# 4-Channel Synthesizer Decoder

# SANSUI QS-1



 The Symbol of Sansui 4-Channel Sound

## THE SANSUI 4-CHANNEL SYNTHESIZER DECODER QS-1 FOUR-CHANNEL STEREO FROM TWO-CHANNEL SOURCES

Here it is, Sansui's history-making 4-Channel Synthesizer Decoder QS-1, the ingenious yet inexpensive Sansui instrument that magically transforms two-channel stereo signals into a breathtakingly live sound field. An extraordinary stereo achievement, the QS-1 is having a profound impact on the entire world of stereo in two ways. First, it permits stereo enthusiasts to continue to use and enjoy their present 2-channel stereo equipment and program sources while moving into the new audio era. And secondly, it is obviating the need for 4-channel equipment and program sources *per se* because, as distinguished audio technicians have attested, the QS-1 actually surpasses any 4-channel devices yet developed in terms of sound field brilliance. This remarkable reproduction is accomplished

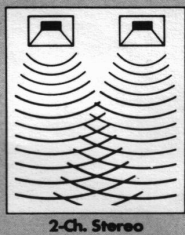
through the use of an exclusive new decoding matrix which establishes more distinct images of original sound sources than ever before, and through a technique called "phase modulation" by which direct and indirect sound waves are fused to precisely duplicate the way they would be heard in concert hall surroundings. In addition, the QS-1 so dramatically improves the smoothness and dynamic range of reproduced sound that even compact speaker systems can render sound as life-like and powerful as that heard from much larger systems. With the QS-1, the age of the multi-dimensional sound field has arrived. Styled to match the elegance of other distinguished Sansui components, it can nonetheless be incorporated in any quality stereo system. And for a very modest investment, the new audio age is yours to enjoy.

*Sansui*

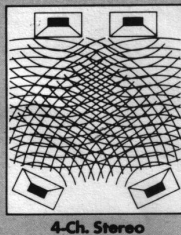
**THE SANSUI 4-CHANNEL SYNTHESIZER DECODER AND 4-CHANNEL STEREO:**

Four-channel stereo is the most advanced means yet devised of faithfully reproducing an original sound field. Two-channel stereo has reached the limit of its potential in this respect, restricted as it is to merely reproducing sound source points (Fig. 1). By moving up to 4-channel stereo with the Sansui 4-Channel Synthesizer Decoder, you are not merely doubling the stereo effect as you might suppose, but rather you are multiplying the effect many fold to approximate a sound field as it would be experienced in a concert hall (Fig. 2). In other words, you are moving from a sound source point method of reproduction to the reproduction of an entire sound field. This is made possible by the Sansui QS-1's capability of handling reflected or indirect sound, in addition to direct sound, as an independent sound source.

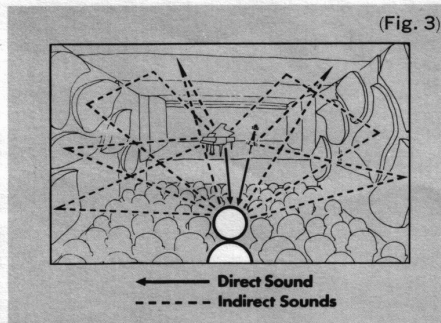
(Fig. 1)



(Fig. 2)

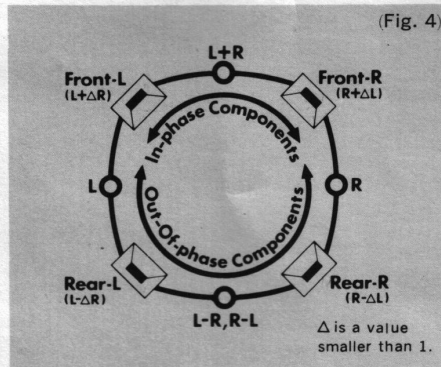


**SOUND FIELD:** By sound field we mean *all* of the sounds that you are exposed to in a live performance—not only those coming directly from a stage—but those far more numerous indirect sounds which are reflected by the ceiling, walls, floor and furnishings as well (Fig. 3). The extra pair of speaker systems in the 4-channel stereo format gives the resources needed for reproducing a great deal more of such sounds and to approximate for the first time a sound field in the living room. Besides the second pair of speaker systems, you need only add the QS-1 and an additional amplifier to your present 2-channel system to achieve the new 4-channel stereo system. And while it may be a few more years before standardized 4-channel stereo records and FM broadcasts become available, the QS-1 offers the immediate advantage of converting existing 2-channel program sources to the new 4-channel format. This is done by letting the second pair of speaker systems take over much of the sound burden formerly borne by one pair alone. The two pairs are then repositioned so that indirect sounds and extreme end sounds are processed through the QS-1's decoding matrix before being emitted through the rear speaker systems, for a remarkable increase in liveliness and presence.



**HOW THE QS-1 WORKS:** The QS-1 more closely approximates such a sound field than any other system yet devised. It accomplishes this by singling out indirect sound components from 2-channel sources by the use of the Sansui-developed QS decoding matrix, shifting their phase to achieve complete 2- to 4-channel conversion, then finally modulating their phases anywhere from 0 to 180 degrees to create the apparent effect of emitting sound from numerous directions (Fig. 4). This results in a revolutionary increase in the sense of 'presence', giving you the same feeling you'd experience at a live performance. Further, if you were to reproduce discs recorded with a 4-channel encoding matrix, each speaker system would render the sound effect assigned to it during the original 4-channel recording session.

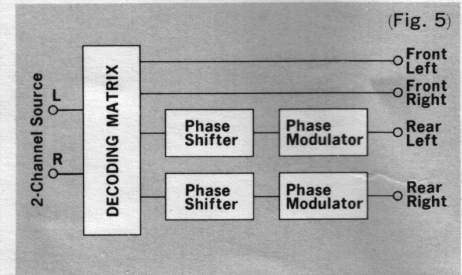
(Fig. 4)



**QS-1 DECODING MATRIX:** This is the first step on the way to converting 2-channel sound sources into the immensely richer sound of 4-channel stereo. To understand it fully, imagine an orchestra on stage. The two recording microphones in 2-channel stereo are normally spaced on either side of the center of the stage. Because of the limitations of this 2-point pickup arrangement, all the direct sounds (those which reach the microphones directly), indirect (those reflected by walls, ceiling, floor, etc., before reaching the microphones) and direct independent (those produced at the extreme ends of the stage) are randomly mixed and delivered as

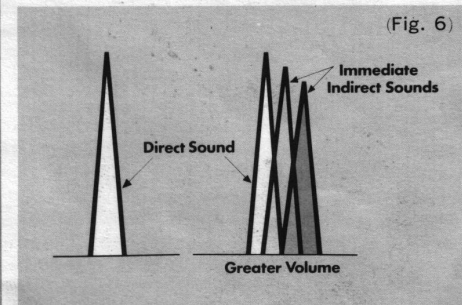
lump left and right channel signals. Sansui's QS decoding matrix takes these lump signals and reorganizes them. Now instead of having a mixture of direct, direct independent and indirect sounds, there is a separation of these components. The direct sounds are sent ahead for reproduction by the front channels, while the independent and indirect sounds are phase-shifted to render them identical in phase and establish clear sound images in the rear channels as well. These sounds are then phase-modulated and reproduced from the rear speaker systems (Fig. 5).

(Fig. 5)



**PHASE MODULATION:** As the illustration (Fig. 6) shows, the QS-1 takes the rear channel sound components—shown here as a regular pulse form—an through its unique process of phase modulation, gives it increased depth and richness without requiring an increase in power. The principle is easy enough to understand: As the rear channel sound components are phase-modulated from 0 to 180 degrees, sounds come out of the rear speaker systems with minute phase differences. This means, as Fig. 6 shows, the sense of sound volume dramatically increases, especially expanding the dynamic range of percussive sounds. Since the rear channel sounds now arrive at the listener's ear with fine time delays, the end effect very closely approximates the acoustic effect present in an actual concert hall where the original sounds are reflected by the walls, floor, ceiling etc. and converge upon the listener's ear with various time delays. This gives us a great increase in 'presence', and is the most important aspect of the 4-channel stereo effect made possible by the QS-1.

(Fig. 6)



**4-CHANNEL STEREO FROM 2-CHANNEL SOURCES:** The QS-1 is uniquely able to convert any 2-channel program source into 4-channel stereo sound. Thanks to Sansui's new decoding matrix and "phase modulation" technique, sounds from all four speaker systems merge in a perfectly integrated sound field for unprecedented presence of reproduced sound.

**ALL-ELECTRONIC CIRCUITRY:** The circuitry of the QS-1 is completely electronic, utilizing 8 new Sansui-developed integrated circuits (ICs) and 3 encapsulated modules. There is nothing mechanical which might impair the tonal quality of reproduced sound or cause a deterioration in the unit's performance with the passage of time.

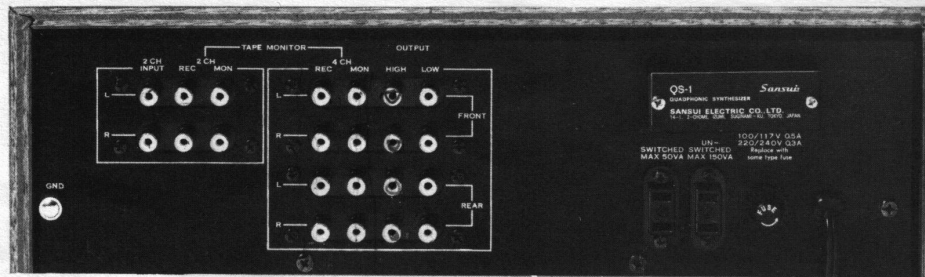
**VERSATILE AND ADAPTABLE:** The QS-1 can be connected to any stereo system which incorporates an amplifier with a tape monitor circuit, including control amplifiers, receivers, ensemble stereo and modular stereo. Further, its 4-channel control section can be independently used to control any 4-channel sound that may be fed from or to a 4-channel tape deck.

**TWO OUTPUT LEVELS:** With outputs provided at both high and low levels, the QS-1 permits the use of a high-input power amplifier to amplify the rear channels.

**2- AND 4-CHANNEL TAPE MONITOR CIRCUITS:** In addition to a conventional 2-channel tape monitor circuit, the QS-1 is also equipped with a 4-channel one. Thus a 4-channel tape recording can be made from a 2-channel program simply by connecting a 4-channel tape deck to this 4-channel tape recording terminal. And a 4-channel recording can be reproduced by the simple changeover of a single switch.

**INPUT LEVEL CONTROL:** In order to adjust input signals to an optimum level, the QS-1 has been equipped with a "LEVEL SET" control.

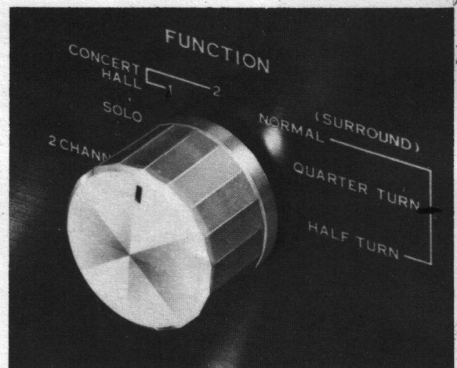
**4 VU METERS:** The QS-1 is provided with four VU meters to indicate the signal levels in each of the four channels. They permit monitoring the sound volume in each channel to see if the input signal level, channel balance and separation are adequate.



**4-CHANNEL VOLUME CONTROL:** A single 4-ganged control permits changing the output signal levels in all four channels simultaneously.

**INDEPENDENT BALANCE CONTROLS:** There are separate controls for balancing the front left and right channels, the rear left and right channels, and the front and rear channels respectively. The one for balancing the front and rear channels—the one most frequently needed—is of an easy-to-use sliding design.

**7-POSITION FUNCTION SELECTOR:** The QS-1 features a 7-position function selector to permit choosing the sound effect best suited to the type of program being heard. These 7 positions are:



**2-CHANNEL:** For regular 2-channel stereo sound from the front left and right speaker systems only.

**SOLO:** For solo performances or selections played by a small band. Establishes clearer sound images of the singer or band.

**CONCERT HALL-1:** For orchestras, big bands etc. Suitable for most purposes. Both the front and rear channels are amplified flatly.

**CONCERT HALL-2:** For exaggerated concert hall effects. In this position, considerable 4 channel effect can be obtained even from monophonic programs.

**SURROUND:** Suitable for programs which sound most effective with the musical instruments scattered throughout the room, such as popular music, mood music, rock'n roll, etc.

**NORMAL:** To obtain a normal surround stereo effect.

**QUARTER TURN:** For the same surround stereo effect, but, to turn around sound by 90 degrees; i.e., the front left and right sound will now be heard from the front and rear left speaker systems, and the rear left and right sound from the front and rear right speaker systems. Use this position to obtain a normal 4-channel stereo effect when hearing vocal or other types of programs where sound is loud only on one side.

**HALF TURN:** For the same surround stereo effect, but, to turn around sound by 180 degrees, so that the front sound will be heard from the rear speaker systems. Used with vocal numbers, this position makes the listener feel like he is right in the middle of the stage.

## SPECIFICATIONS

### INPUT LEVEL

RATED INPUT	2-CHANNEL:	130mV (50KΩ)
MINIMUM INPUT	2-CHANNEL:	90mV
TAPE MONITOR	2-CHANNEL:	130mV (50KΩ)
	4-CHANNEL:	775mV (50KΩ)

### OUTPUT LEVEL

RATED OUTPUT (OVU)	4-CHANNEL:	130mV (LOW OUTPUT) 430mV (HIGH OUTPUT)
MAXIMUM OUTPUT	4-CHANNEL:	1V (LOW OUTPUT) 3.5V (HIGH OUTPUT)
RECORDING OUTPUT	2-CHANNEL:	130mV
	4-CHANNEL:	775mV

### FREQUENCY RESPONSE

FRONT CHANNELS:	20-20,000Hz ±1dB
REAR CHANNELS:	
SOLO:	-10dB at 10,000Hz
CONCERT HALL-1:	20-20,000Hz +1dB, -2dB
CONCERT HALL-2 (left):	+6dB at 10,000Hz
(right):	+6dB at 50Hz
SURROUND:	+6dB at 50Hz

### REAR CHANNELS' PHASE MODULATION

180 degrees max. at 10,000Hz (by Sansui's phase modulation system)

### CONTROLS

VOLUME/LEVEL SET/FRONT BALANCE/REAR BALANCE/FRONT AND REAR BALANCE

### SWITCHES

FUNCTION:  
2-CHANNEL/SOLO/CONCERT HALL-1/CONCERT HALL-2/SURROUND  
NORMAL/SURROUND-QUARTER TURN/SURROUND-HALF TURN  
TAPE MONITOR:  
2-CHANNEL: SOURCE/PLAYBACK  
4-CHANNEL: SOURCE/PLAYBACK

### SEMICONDUCTORS

Transistors-20; IC-8; Diodes-12; Zener diode-1

### POWER REQUIREMENTS

POWER VOLTAGE: 100/117/220/240V, 50/60Hz  
POWER CONSUMPTION: 12W

### DIMENSIONS

127mm (5") H x 395mm (15 5/8") W x 278mm (10 9/16") D

### WEIGHT

5.5kg (12.1lbs.)

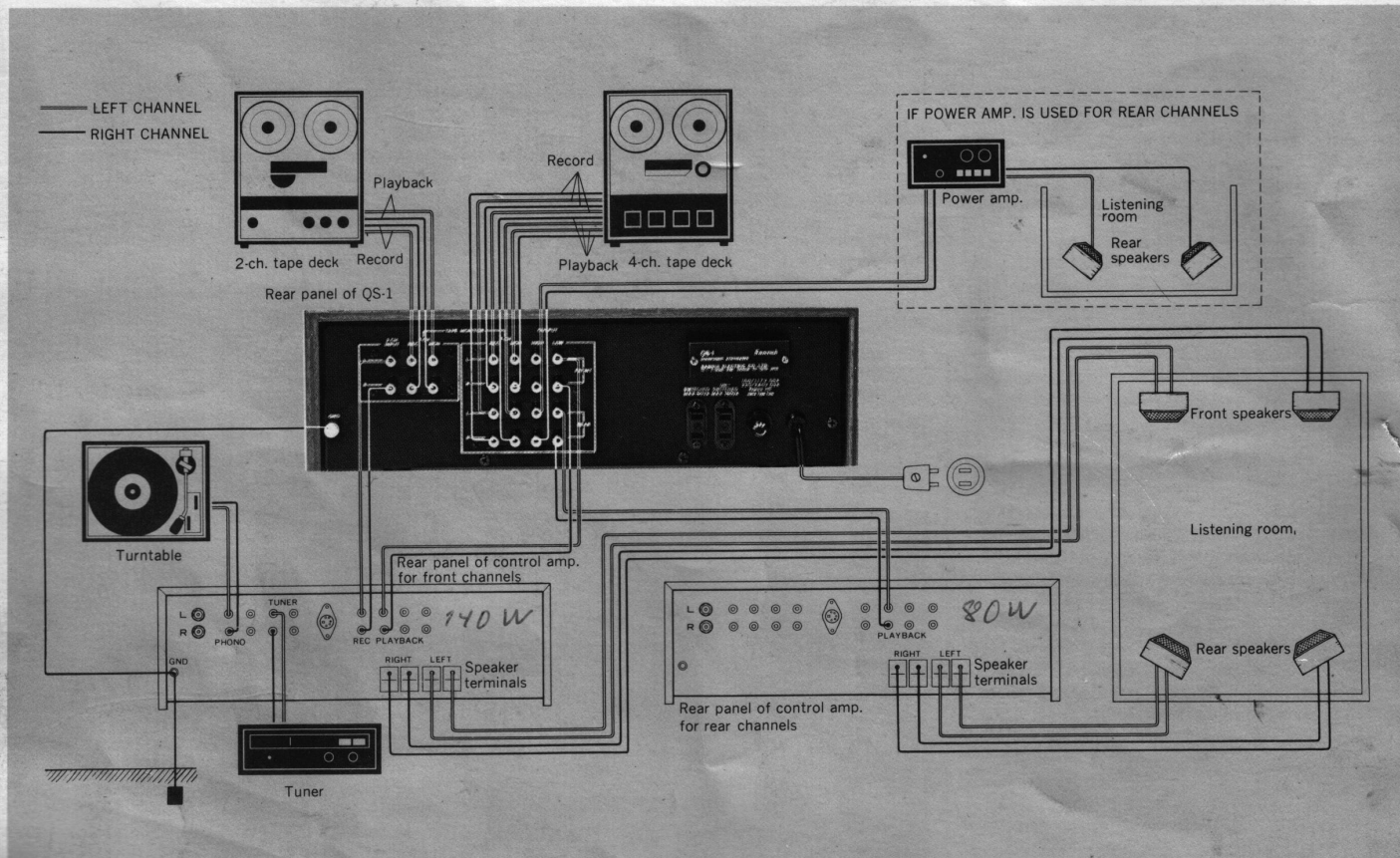
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**Sansui**  
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## CONNECTING THE QS-1

Connect your present receiver (or control amplifier) and another control amplifier to the QS-1 as illustrated below, employing the former to amplify the front channels and the latter to amplify the rear channels. Using your present speaker systems for front channel reproduction, add a pair of speaker systems matching the performance of the new control amplifier to reproduce the rear

channels. Two- and 4-channel tape recording, playback or monitoring can be controlled on the front panel of the QS-1 by connecting appropriate tape decks to it. (Note: The QS-1 provides both high- and low-level outputs, so that the rear channels may be amplified, if desired, by an independent power amplifier connected to the high-level output.)

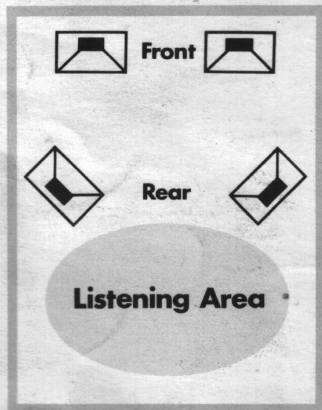


### 2-2 system



**2-2 System:** Regular 4-corner position widely accepted as "standard". Most effective for listening to mood music, rhythm and blues, vocal numbers and "recorded-live" records.

### Front 2-2 system

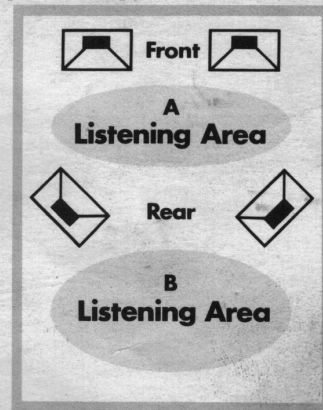


**Front 2-2 system:** Best for symphonies, operas, chamber music and big band jazz.

### 2-2/Front 2-2 Compatible systems



**Ideal Positioning Method:** Involves the use of six speaker systems and lets you choose the regular 2-2 or front 2-2 system by the simple changeover of the Speaker Switch on the rear-channel amplifier.



**2-2 / Front 2-2 Compatible Positioning Method:** With the rear speakers placed as shown here, you're able to enjoy both the regular 2-2 system and the Front 2-2 system by moving from point A to point B.

**Note:** Whatever your preference, better effect can be obtained by placing the front two speaker systems on the floor slightly in from the extreme left and right corners of the room, and by elevating the rear systems about three feet off the floor.