

PIONEER

QX-8000

THE QUADRAPHONIC RECEIVER

A single unit, all-encompassing 180-watt stereo receiver for the creation of a living presence four-channel sound field.



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Archiv Michael-Otto*





An Introduction to Quadraphonic Sound

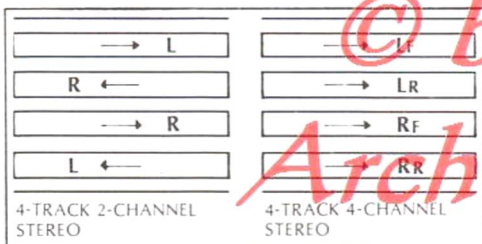
Audio technologists have long been concerned with the potential of four-channel sound for the reproduction of an authentic "living presence" within the usual confines of the home music room. Four-channel sound technology is such a rapidly progressing field today for the reason that no other form of sound reproduction can so accurately re-create the ambiance of the concert hall or the reality of original sound characteristics. It is the ultimate in home music entertainment.

Remember, as you sit in a concert hall or auditorium, you are bombarded by sound waves from all conceivable directions. What you hear is not simply the sound of the musical instruments that are being played in front of you, but the sounds which are reflected from the walls on both sides or the rear of the hall, as well as the reverberations of your own applause. The sound you hear, thus, is composed of both direct and indirect sound waves as they converge upon your ears.

Conventional two-channel stereo has had as its main objective the re-creation — in the best tonal quality possible with the use of two microphones — of the sounds being played on the stage in front of a concert audience. But four-channel stereo takes the sound of music a completely new step forward — to the re-creation of the entire sound field that surrounds you while you listen to a concert. With quadraphonic sound, loudspeaker systems are placed in front and in back of you. You are enveloped in sound, you are able to hear the reproduction of the actual reverberations and reflected sounds of the concert hall. And the results, as well you might imagine, are stunningly effective.

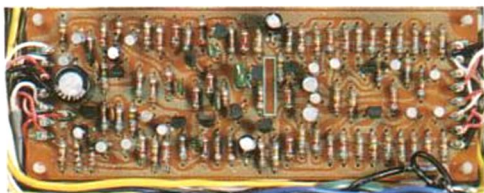
There are today a number of different four-channel stereo sound systems, each with certain key advantages for the music listener, but until Pioneer manufactured the QX-8000, no one unit was capable of providing each of the different four-channel modes. The QX-8000 can be set by a single switch to provide any of three different four-channel modes, as well as provided reproduction of conventional two-channel stereo.

DISCRETE FOUR-CHANNEL STEREO This system of four-channel sound employs a four-channel tape deck which reproduces sound recorded on each of four separate tracks. It is both the most authentic in terms of sound quality, and the most expensive since it requires not only a four-channel tape deck but special four-channel tapes. Since the sounds are reproduced at a very high degree of fidelity. But since the length of the stereo recordings is halved, cost of the tape is almost twice as expensive as tape used for conventional four-track, two-channel recording. Program sources available today for discrete four-channel stereo include standard open-reel tapes, and eight-track tape cartridges.



DISTRIBUTION OF TRACKS FOR OPEN-REEL TAPES

FOUR-CHANNEL STEREO AND THE QUADRALIZER At present, program sources for discrete four-channel stereo systems (in which all four channels are completely independent) are both limited and expensive. Pioneer's QX-8000, however, allows you to achieve the effects of four-channel stereo sound from conventional two-channel stereo program sources by use of a special device called a "Quadralizer." This special circuit device can provide both matrix and phase-shift mode four-channel stereo, and allows you to choose whichever mode you prefer simply by pushing a front panel button. The Pioneer quadralizer source which corresponds to your own taste, thus giving double value and musical pleasure from your Pioneer stereo investment.



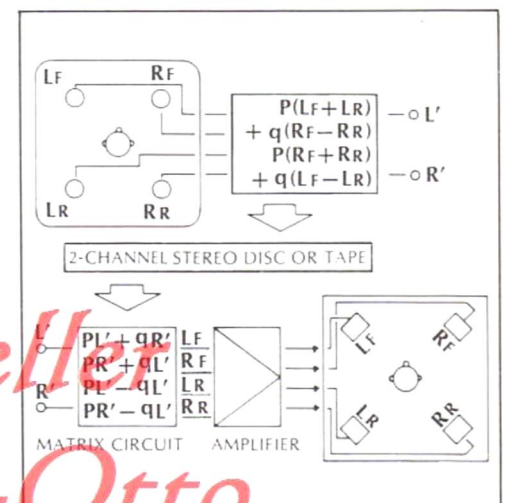
MATRIX-TYPE FOUR-CHANNEL STEREO

One mode of achieving four-channel stereo sound from conventional two-channel program sources is the "matrix" system, one of the two quadralizing effect systems in the Pioneer QX-8000. With this system, signals from a two-channel program source are fed through a unique matrix circuitry contained within the receiver, analyzed, and divided into four different signals which are then fed to four loudspeaker systems for sound reproduction from these systems. The four signals include:

- (1) For the left front loudspeaker, a composite signal, comprised of a double strength left channel signal to which is added a single strength right channel signal, is extracted and fed to the loudspeaker ($2L + R$).
- (2) For the right front loudspeaker, a composite signal, comprised of a double strength right channel signal to which is added a single strength left channel signal, is extracted and fed to the loudspeaker ($2R + L$).
- (3) For the left rear loudspeaker, a composite signal, comprised of a double strength left channel signal from which the elements of the right signal have been eliminated, is extracted and fed to the loudspeaker ($2L - R$).
- (4) And, for the right rear loudspeaker, a composite signal, comprised of a double strength right channel signal from which the elements of the left signal have been eliminated, is extracted and fed to the loudspeaker ($2R - L$).

To appreciate the technology of the matrix system, it is important to remember that today the majority of conventional two-channel stereo sound programs are produced by first recording the original sounds on a multi-channel system using a series of microphones. This multi-channel sound is then fed through a complex mixing system where reverberations and echo effects are often added, and then it is released, on tape or disc, as a two-channel stereo sound program. When the two-channel program is fed through the matrix circuit contained in the QX-8000, it is possible to achieve the effects of

four-channel stereo. Nonetheless, when the matrix system is used there is a tendency for the point of sound to wander. Thus, the system is more suited for the reproduction of popular music or small combo group performances than for large ensemble musical groups.



PHASE SHIFT FOUR-CHANNEL STEREO

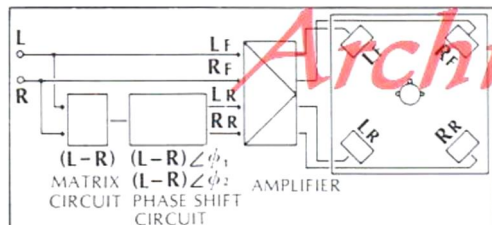
This system was developed by Pioneer for the ultimate in four-channel stereo reproduction. With the phase shift system, the conventional left and right stereophonic channels are reproduced from the two loudspeaker systems situated in front of the listener. But added to this conventional stereo sound is a phase-shifted "wall of sound" or concert hall effect which emanates from a pair of loudspeakers placed behind the listener. The result is the rich depth of a live performance, a slight enveloping echo effect through the two rear speakers, a genuinely thrilling musical experience.

The principle of the phase shift system has a great deal to do with the way the human ear perceives sound waves. The reflected sounds of a concert hall which we hear as we sit in the audience are distinguished by their relative phase differences; we are bombarded by different levels of sound waves at different times. But since it is technically impossible to reproduce this multitude of varying sound waves on a conventional two-channel stereo recording, all two-channel musical programs available today are a long ways from re-

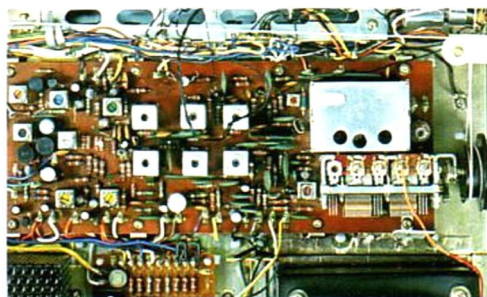
creating the original sound field that we perceive in person at a concert.

The uniqueness of the Pioneer Phase Shift mode is its ability to reproduce to a great extent the time or phase differences in four-channel sound that are impossible to reproduce in two-channel stereo. The concert hall effect is made possible from the two rear loudspeakers. To overcome all unnatural sound effects, moreover, a 90° phase difference has been established between the left and right signals. The sound is thus an "uninpointed" sound, sort of a floating sound diffused over a broad area to provide much the same effect as the reflected, audible sounds of a concert hall.

While phase shift four-channel stereo will add extra living presence to most any musical program, it is most effective in the reproduction of classical or operatic music.

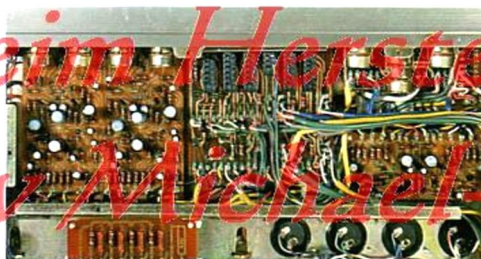


FET-EQUIPPED FM TUNER The FM front-end of the QX-8000 employs FET (Field Effect Transistor) for extra-high sensitivity. The IF section uses hybrid ICs combining ceramic filters and transistors, and monolithic ICs, for greatly improved selectivity, to assure extraordinarily clean, distortion-free reception, even in weak FM signal areas. Additionally, two precision meters are provided on the QX-8000's front panel—one an FM center tuning meter and the other a signal strength meter for accurate tuning of stations at all times.

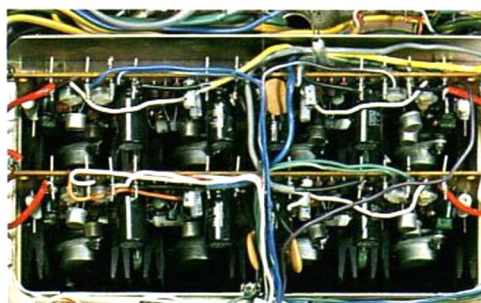


STABLE MULTIPLEX SECTION The QX-8000 utilizes a proven Time-Switching multiplex circuit for stable operation in the multiplex section. This device assures high channel separation throughout the entire audio spectrum, from the ultra-low ranges to the ultra-highs.

DISTORTION-FREE AUDIO SECTION The preamplifier section utilizes two-stage direct-coupled negative feedback equalizer circuits for extremely low noise and an extra-wide dynamic range. The control amplifier section, employing long-life silicon transistors in negative feedback circuitry, is featured by extremely low distortion and smooth performance in the all-important mid-ranges.



The power amplifier section uses quasi-complementary single-ended push-pull output circuitry for high power output at very low distortion. The total music power output of 180 watts (IHF rating at 4 ohms output) is more than ample for clean, dynamic reproduction, even when driving low efficiency loudspeaker systems.



FULL RANGE OF SUPPLEMENTARY CIRCUITS The QX-8000 is fully equipped with supplementary circuits. Included are a muting circuit, which eliminates inter-station noise in FM tuning; high and low filters; three balance controls (front left/front right; rear left/rear right;

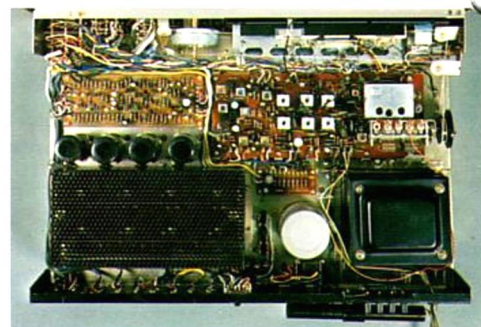
and front/rear). These controls give you complete control over the four-channel stereo sound field.

VARIETY OF INPUTS AND OUTPUTS The versatility of the QX-8000 is enhanced by a variety of inputs, including two pairs of PHONO, AUX, and TAPE MONITOR. These inputs permit comparison tests of pickup cartridges, when you would use two turntables, then switch back and forth between the two; or continuous tape recording or playback using two tape decks; or duplicating of tapes. There are also two headphone jacks provided, one for the front channels and the other for the rear channels.

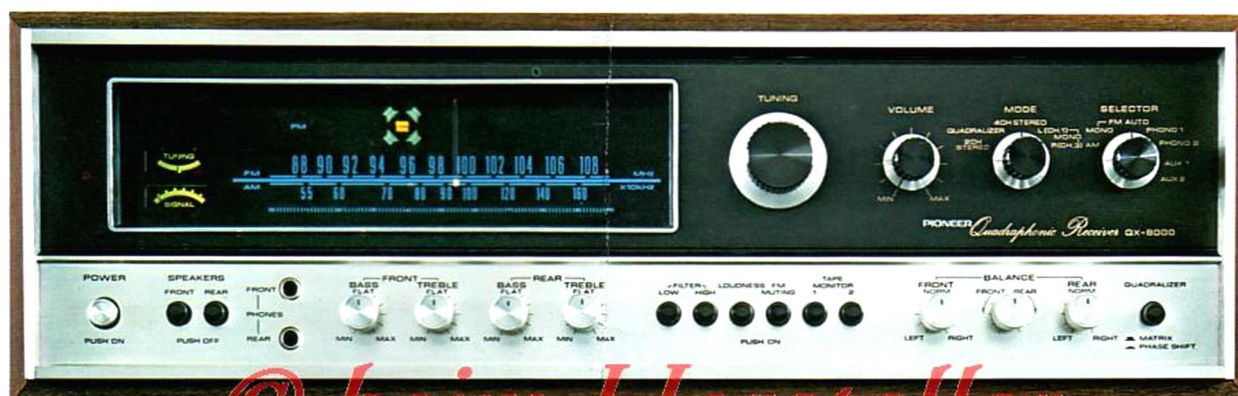
PREAMPLIFIER SECTION/POWER AMPLIFIER SECTION SEPARATION SWITCH

A switch is provided on the QX-8000 to separate or couple the preamplifier and power amplifier at will. This enables you, if you choose, to upgrade your system into a multi-amplifier stereo system.

NEW "QUADRALIZED" EXTERIOR DESIGN Cabinet and control panels are visual symbolizations of the Pioneer "Quadralizer" concept. The square tuning dial is recessed and framed, the control panel is modernistic and logically arranged, and the overall design is in famed Pioneer silver-black-wood.



The Pioneer Quadraphonic Receiver is the very latest advance in four-channel sound realism. It gives you a choice of two Quadralizing Effect Systems from any existing two-channel stereo source.



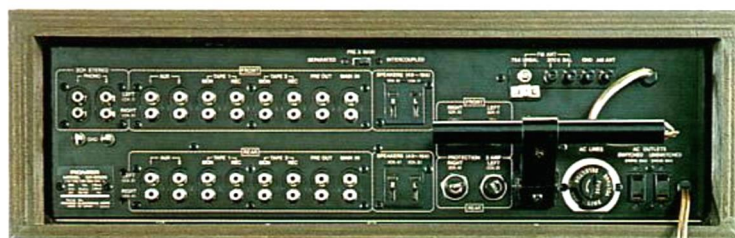
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Just as the change years ago from single-channel mono to two-channel stereo was hailed as a development of the highest significance in music reproduction, so too today is the research now underway by major electronics manufacturers to extend the usage of stereo channels from two to four. Pioneer's first quadraphonic system, available now after a comprehensive research and development program, is the QX-8000, a total capability quadraphonic receiver that permits the creation of a concert hall acoustical field in your own home without the additional cost of multiple stereo accessories.

Contained within the QX-8000 are a total of four amplifiers for four-channel stereo reproduction, as well as a ultra high sensitivity stereo tuner and 180 watts of music power (measured at 4 ohms, IHF). With this stunningly effective unit also comes the capability of creating four-channel sound from any existing two-channel stereo source which you may now possess: pre-recorded tapes, your own stereo record collection, or FM radio. Equally significant, the QX-8000 offers a choice of two Quadralizing Effect Systems for home music reproduction: (1) "Matrix" operation, which creates a room-enveloping sound field without specifying instrument locations, and (2) "Phase Shift" operation, which produces normal, transparent two-channel stereo sound from the front speakers, but adds a phase-shifted "wall of sound" or concert hall effect with a slight echo effect from two rear speakers. The change from "matrix" sound to "phase shift" sound is accomplished, furthermore, by the simple push of a button located on the front panel of the receiver.

Judged from most any quadraphonic stereo point-of-view, the QX-8000 represents an impressive investment for the person about to upgrade his existing two-channel system. For one thing, the QX-8000 is a self-contained quadraphonic music system. The receiver, four speakers and your favorite musical source (tape, records, FM) are all that is required for the new four-channel sound. You do not need additional amplifiers or synthesizers. Secondly, the QX-8000 may be used as a standard two-channel stereo receiver. If at this time your stereo budget prohibits the move to quadraphonic stereo, you can use the new Pioneer receiver with your existing two speakers, then add another pair of speakers at a later date to achieve the brilliance of quadraphonic sound. Finally, you can use the unit with either a two-channel or four-channel tape deck. By using the "matrix" or "phase shift" quadraphonic systems incorporated in the QX-8000, two-channel tapes will deliver four-channel performance. A four-channel tape deck, naturally, will deliver discrete four-channel performance when used with four-channel tapes and the QX-8000. Thus, the QX-8000 is the first of the new quadraphonic receivers to offer both the virtues of supreme versatility and economy of choice. Although there are today a number of different modes of four-channel stereo sound now available, the QX-8000 is capable of providing any of them —and with the same extraordinary sound brilliance that you might associate only with expensive four-channel "system" costing much, much more.

BACK VIEW OF QX-8000



SPECIFICATIONS

SEMICONDUCTORS

FET:	1
IC(s):	2
Transistors:	65
Diodes:	27

FM TUNER SECTION

Frequency Range:	87.5 to 108 MHz
Usable Sensitivity (IHF):	2.2 μ V
Capture Ratio (IHF):	3 dB
Selectivity (IHF):	More than 40 dB
Image Rejection:	More than 50 dB (98 MHz)
IF Rejection:	More than 85 dB (90 MHz)
Spurious Rejection:	More than 80 dB (98 MHz)
AM Suppression:	50 dB
Signal-to-Noise Ratio:	60 dB
Harmonic Distortion:	Mono; less than 0.6% (100% mod.) Stereo; less than 0.8% (100% mod.)
Tuning Indicator:	Signal strength type and center tuning type
Muting:	Switchable to ON-OFF
Stereo Separation:	More than 38 dB (1 KHz)
Sub Carrier Suppression:	More than 32 dB
Antenna Input:	Impedance 300 ohms balanced and 75 ohms unbalanced

AM TUNER SECTION

Frequency Range:	525 to 1,605 KHz
Usable Sensitivity (IHF):	15 μ V
Selectivity (IHF):	More than 25 dB
Image Rejection:	More than 45 dB (1,000 KHz)
IF Rejection:	More than 30 dB
Signal-to-Noise Ratio:	More than 50 dB
Antenna	Built-in ferrite loopstick antenna

PREAMPLIFIER SECTION

Output Voltage:	400 mV (rated output), 2.5V (max.)
Harmonic Distortion:	Less than 0.7%
Frequency Response:	10 to 40,000 Hz $\pm$ 3 dB
Input Sensitivity/Impedance:	PHONO 1; 2 mV/50 Kohms PHONO 2; 2 mV/50 Kohms AUX 1,2; 170 mV/110 Kohms TAPE MONITOR 1,2; 180 mV/120 Kohms
Recording Output:	TAPE REC 1,2 (pin jack); 170 mV
Bass Control:	-12 dB, +11 dB/100 Hz
Treble Control:	-8.5 dB, +10.5 dB/10 KHz

Low Filter:	-6.5 dB/50 Hz (6 dB/oct.)
High Filter:	-11.5 dB/10 KHz (6 dB/oct.)
Equalization Curve:	PHONO; RIAA S.T.D.
Loudness Contour:	+11.5 dB/100 Hz, +7 dB/10 KHz with volume control set at -40 dB position
Hum and Noise (IHF):	PHONO; more than 75 dB TUNER, AUX; more than 90 dB

POWER AMPLIFIER SECTION

Music Power Output (IHF):	180 watts (4 ohms) 130 watts (8 ohms)
Continuous Power Output:	32 watts+32 watts/32 watts+32 watts (4 ohms) 25 watts+25 watts/25 watts+25 watts (8 ohms)
Continuous Power Output:	25 watts $\times$ 4 (4 ohms) 20 watts $\times$ 4 (8 ohms)
Power Output in the range of 20 to 20,000 Hz:	21 watts+21 watts (8 ohms, harmonic distortion; less than 1%)
Harmonic Distortion:	Less than 1% (continuous power output) Less than 0.2% (20 watts+20 watts/20 watts+20 watts, 8 ohms)
Inter Modulation Distortion:	Less than 0.4% (20 watts+20 watts/20 watts+20 watts, 8 ohms)
Power Bandwidth (IHF):	15 to 80,000 Hz (8 ohms, harmonic distortion; less than 1%)
Frequency Response:	5 to 100,000 Hz $\pm$ 3 dB
Input Sensitivity/Impedance:	400 mV/70 Kohms
Speakers:	4 to 16 ohms
Damping Factor:	35 (8 ohms, 1KHz)
MISCELLANEOUS	
Power Requirements:	110, 120, 130, 220, 240 V (switchable)
Power Consumption:	330 watts (max.)
Dimensions (overall):	20(W) $\times$ 6 $\frac{3}{4}$ (H) $\times$ 15 $\frac{5}{8}$ (D) inches 509(W) $\times$ 172(H) $\times$ 377(D)mm
Weight:	Without package; 34 lb. 5 oz./15.6 kg With package; 40 lb. 15 oz./18.6 kg



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