

WHAT YOU SHOULD KNOW ABOUT FOUR-CHANNEL STEREO

A non-technical guide from Pioneer

 PIONEER®



The New Sound of '70s

For many years now, audio engineers have been involved in research which had, as an objective, the answer to a simple question: Is contemporary two-channel stereo the zenith of sound reproduction? Obviously, the current array of four-channel stereo products now on the marketplace is sufficient evidence that the answer is a resounding "no." Conventional two-channel stereo has taken a remarkable step forward—and the pleasure is all yours. Four-channel stereo is much more than an engineering reality, it is a genuine revolution in music for the home. Here today. At prices well within the reach of many music enthusiasts. And hearing is, quite simply, believing. But what is this new sound of the '70s, and why is it so different from the two-channel sound you're so used to hearing? If you have ever sat outdoors and listened to the sounds around you, say the chirping of a bird, the ripple of water in a mountain stream, the sound of a jet airplane as it speeds above you; or if you have ever given yourself up to the powerful fortissimo of a full orchestra and the roar of the applause of the audience—if you have experienced all these sounds, then returned home to your own stereo system, you will have noticed the distinct difference between the sounds of "reality" and the sounds that emanate from your stereo system, no matter how advanced or costly a system it might be. The difference is not unlike watching television immediately after you've viewed a motion picture on a wrap-around 70-millimeter screen. There is hardly a comparison at all. And the reason is simple. Conventional stereo sound doesn't have what the audio experts call "living presence."

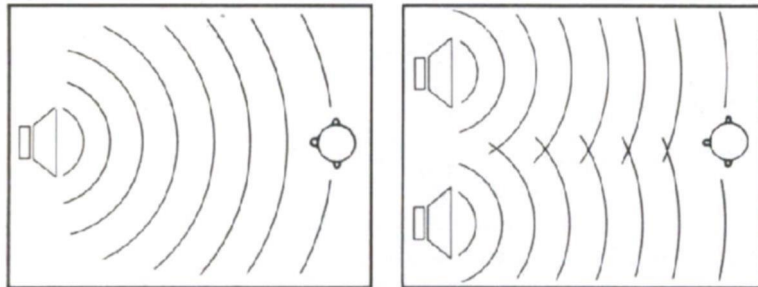
Four-channel stereo makes possible the re-creation of that "living presence." In a very real sense, it places you "outdoors", again where you can hear that bird, listen to that mountain stream, or that jet airplane. It puts you in a near acoustically-perfect concert hall where sound reverberates around you. It brings sound to life. Four-channel sound technology is such a rapidly progressing field today for the reason that no other form of sound reproduction can so accurately recreate the ambiance of the concert hall or the reality of original sound characteristics. It is the ultimate in home music entertainment, and Pioneer is among the very few audio companies in the world that has researched, designed and built a total system of four-channel sound components.

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A Short Introduction to Four-Channel Stereo

Monophonic Sound Goes Stereo

We heard our first two-channel stereo sound about 15 years ago. Most of us changed our music reproduction systems from one speaker to two. We were thrilled, often flabbergasted, by the difference that another speaker could make. And developments within the stereo industry continued to impress us. Somebody invented 45°/45° stereo discs. FM stereo broadcasts were inaugurated. The tube-type amplifier and radio practically disappeared. In their place, thanks to exciting research in electronics, came solid state stereo components that seemed to play forever, and didn't even get warm. All of these innovations contributed to the immense popularization of stereo sound, to the great growth of recording companies and, of course, to the growth of audio companies—Pioneer included. But the objective of all this development in audio technology was the improvement of tonal quality. Not surprisingly, audio engineers spend most of their time trying to create products that themselves create authentic, realistic sound. Thus the impetus behind the development of two-channel stereo sound was dissatisfaction with monophonic sound. You see, it was always easy to produce high tonal quality sound with monophonic reproduction. But it was impossible to re-create the movement and spreading of sound. (See figure 1.)



Monophonic reproduction

Stereo reproduction

Figure 1

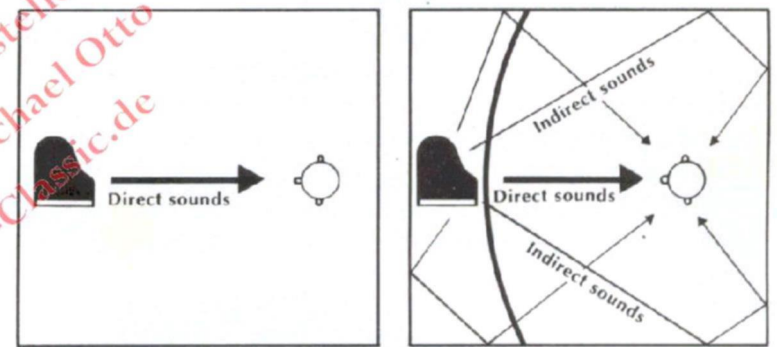
So stereo sound, with two speakers, replaced monophonic sound, with one speaker. And many of us thought that stereo sound couldn't go much further. But it has. Just as the change 15 years ago from single-channel monophonic to two-channel stereo was hailed as a development of the highest significance in music reproduction, so too today is the broad scope of research now underway by major electronics manufacturers to extend the usage of stereo channels from two to four—and perfect the products which are created by the research. Four-channel stereo is a better means of sound reproduction than two-channel stereo. We'll explain why later on. But, first, an explanation why the real sounds we hear daily, and the live music we hear in concert halls, sound so "alive."

The Thrill of a Live Sound Field

The roar of that jet in the sky, the chirping of those insects from the ground, the tinkle of a bell wafted along on a summer breeze, the sound of soft rain on our window—all of these sounds that dress up the space that surrounds us are of many hues, and they also reach our ears from an infinite number of directions.

In reality, we never experience a situation where sound comes only from in front of us—like from a conventional stereo system. Conventional stereo cannot effectively reproduce indirect sounds. And for living presence sound, reproduction of indirect sounds is necessary.

Imagine, if you will, two orchestras. One is seated in the middle of a spacious outdoor sports arena. The other is seated in an acoustically-perfect concert hall. We need not ask which would produce the most listenable sound, but the diagram below explains why one orchestra excites with rich nuances, while the other is often lost to the winds.



1. Listening to music in a place without echoes.

2. Listening in a concert hall

Figure 2

When we listen to music played on a sports field, or in a place like an anechoic chamber where there is virtually no echo effect, only direct sounds from the sound source reach our ears. The result is rather barren, dreary music. (See figure 2-1).

On the other hand, concert hall music is always comprised of the direct sounds from the original sound source and an infinite number of indirect sounds that reflect one or more times off walls and ceilings. These indirect sounds are vital in creating a pleasant sound field. They not only reach our ears from in front of us, but from above us, below us, behind us. They come from every conceivable direction, and they contribute to the great richness of all music we hear in the concert hall, of all sound we hear in our daily lives.

The Problems of Two-Channel Stereo

If we pause to consider the importance of indirect sound waves, some of the limitations of two-channel stereo should come logically to mind. Figure 3 shows the recording and reproduction processes of a typical two-channel

stereo system. If this system is used to make a live recording of a requiem mass, placing choirs or instrumental groups in the four corners of a vast cathedral, it will be possible to re-create the side-to-side spread of the sound with the two microphones, one on the left and the other on the right. However, effects such as the sounds of instruments in the front and rear of the microphones, plus the positioning of the choirs and the many types of indirect sounds—such as applause—that reach the microphones from all directions will be mixed together in the final recording.

Thus, it follows in playback, too, that the dynamic area sound source, incorporating both direct and indirect sounds from the front and rear, and left and right, that existed at the time of the recording, will be converted and digested into a two single point sound sources from one speaker on the left and another on the right. Obviously, from the point of view of reproduction of an entire sound field, two-channel stereo is far from ideal.

Or think of two-channel stereo in another way. Isn't it unnatural for audience applause to emanate from a pair of loudspeakers in front of you while you listen to a live recording of a concert performance? Of course, it is. Which brings us to the beauty of four-channel stereo.

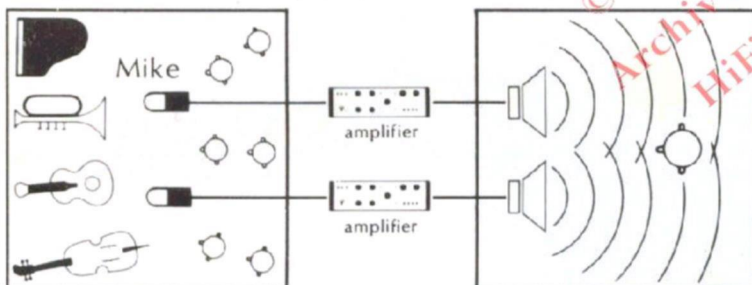


Figure 3

Four-Channel Stereo Explained

Four-channel stereo has been created to solve the biggest problem inherent in conventional two-channel stereo, that is the fact that all sounds—both direct and indirect, and of different phases—are heard from the two loudspeakers placed in front of the listener. Four-channel stereo employs four speakers, usually two in front and two in the rear of the listener, as illustrated in Figure 4.

The two major advantages of four-channel stereo are: (1) The listener can enjoy in his own home a musical environment often comparable to a concert hall, since the two rear loudspeakers reproduce the natural sounds of the concert hall—mainly the indirect sounds. (See Figure 5-1). And (2), a new world of sound, one heretofore inconceivable, is created. What one hears is music that has been composed, arranged and recorded with the effects of four-channel stereo in mind, i.e., two orchestras in position, one in front, another in the rear to enable switch-

ing back and forth between the two; surrounding the listener with music; or enjoying the movement of sound. (See Figure 5-2).

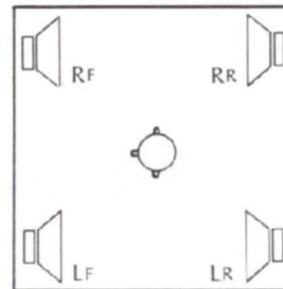


Figure 4

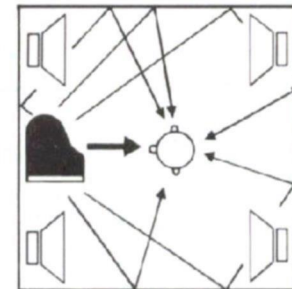
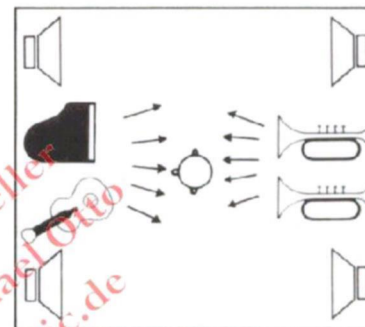
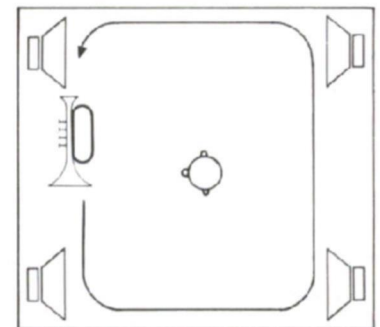


Figure 5-1



Listener enjoys unique sounds of music switching back and forth between two orchestras.



Unique sound experiments, featuring movement of sound from loudspeaker to loudspeaker.

Four-Channel Stereo Program Sources

There are today a number of different forms and types of four-channel stereo program sources. But, generally speaking, they can be classified into the following three categories.

Discrete System

This system is the most authentic in terms of sound quality, since it not only requires four-channel equipment, but also four-channel tapes or records. When the sounds are reproduced, four independent playback amplifiers are used, so that optimum four-channel stereo effects are achieved. Conceivable program sources for discrete four-channel stereo include open reel, 8-track cartridge, or disc recordings and FM broadcasts. Today, open reel and 8-track cartridge tapes, and discs are already available on the market. At Pioneer, research teams are presently at work to develop systems that would enable discrete four-channel stereo reproduction using other sources. But for now, discrete stereo is still expensive and, in a sense, limited to only a few musical programs.

Regular Matrix System

Four signals recorded in the form of four-channel stereo are fed through a special encoder and converted into two-channel signals. In the playback process, they are fed through a decoder to recreate the original four-channel

stereo sound field. This system is called the matrix, or 4-2-4 system, and, when used, does not require a special tape deck or turntable as is the case of discrete stereo. All matrix systems available today (except SQ matrix system) can be classified into this "regular matrix" group. All basically have compatibility with each other.

SQ Matrix System

The one matrix four-channel system that has no compatibility with any of the others is called the SQ system. Its encoding/decoding process is dramatically different, and thus a special SQ decoder is required in order to reproduce SQ matrix program sources.

Since the SQ matrix is very popular, and since there are also different and important regular matrix-type systems, both kinds of matrix decoding circuits are required for true four-channel versatility. And in Pioneer's four-channel equipment, both of these circuits are built-in.

How Discrete Four-Channel Tape Works

As we have discussed earlier, the one system of four-channel stereo that provides the best tonal quality reproduction, as well as the most distinct separation of sounds, is discrete four-channel stereo. An illustration of how open reel tapes and 8-track tape cartridges function in discrete stereo is shown in Figure 6.

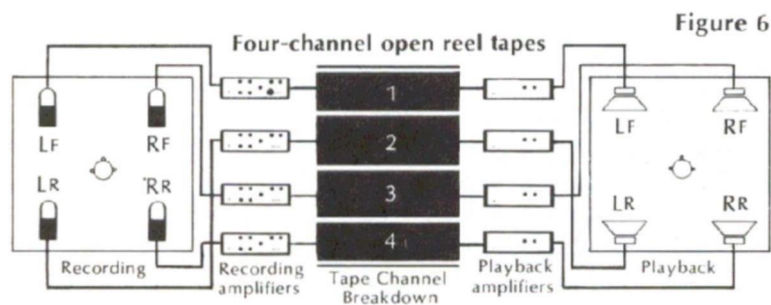
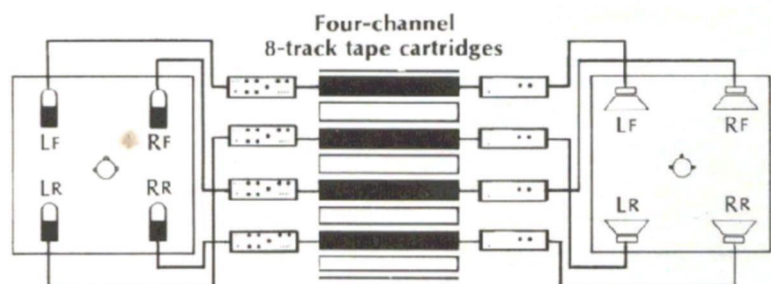


Figure 6

(Conventional two-channel stereo tapes use tracks 1 and 3 moving in one direction, and tracks 2 and 4 moving in the other direction. Four-channel stereo tapes use all four tracks simultaneously, and provide only one-way operation.)



(In the illustration, the blank tracks accommodate another four-channel program.)

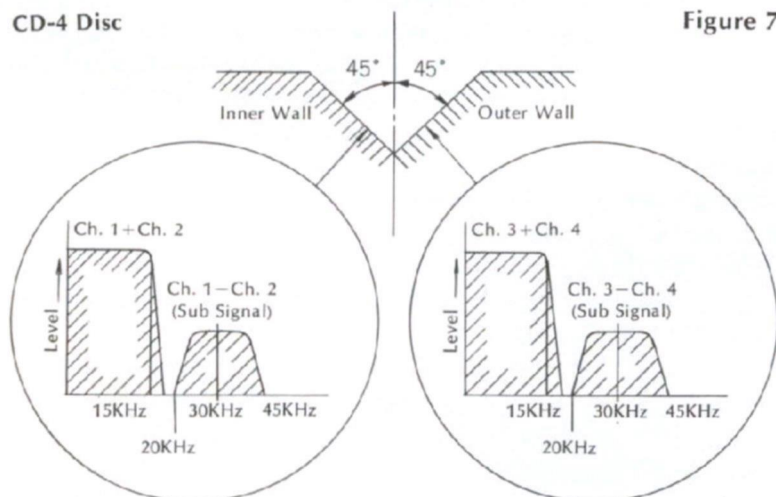
The discrete system possesses a number of important advantages for high quality tonal sound, the most important being the fact that independent signals can be recorded on each track, so that the playback effects provide the same rich and abundant sounds of the concert hall for classical or popular music. Additionally with this system, other unusual effects are possible, such as the switching back and forth between sounds of two orchestras or the movement of a sound field at bewildering speeds. All three Pioneer four-channel tape decks provide outstanding reproduction of discrete stereo—the QT-6600 open reel tape deck (which also permits four-channel recording), the QT-6100 open reel deck, as well as the QT-2100 8-track tape cartridge player.

How Discrete Four-Channel Disc Works

Because the groove of a record has two walls, it is easy to engrave two independent signals into a single groove. This, of course, is the principle of the stereo record that is so popular today. However, when it comes to engraving four independent signals into one groove, new techniques are required, and that is the challenge of four-channel recordings today. Two types of four-channel records are in wide use at present. One is the matrix type four-channel disc, the other is the CD-4 four-channel disc. In the CD-4 disc, four independent signals are recorded by using special modulation techniques. This disc maintains the conventional $45^\circ/45^\circ$ record groove, but on its inner groove wall, left channel sum signals (channel 1 plus channel 2) are engraved, while on the outer wall right channel sum signals (channel 3 plus channel 4) are engraved. When this record is played back on a conventional two-channel stereo system, what you hear are the left channel sum signals from the left front speaker, and right channel sum signals from the right front speaker. Summed up, this type of recording has compatibility with a conventional stereo record. Remember though, on monophonic equipment the total sum signals (channel 1 + channel 2 + channel 3 + channel 4) are reproduced. And this is why this disc is called CD-4 (Compatible Discrete) four-channel disc. Additionally, important signal components for the rear channels are transmitted by the inaudible subcarrier, center of which exists at 30KHz. These signal components consist of the differential signals (channel 1 minus channel 2) of the left channels, as well as the differential signals (channel 3 minus channel 4) of the right channels. These signals are frequency modulated and are then added to the two walls of the record groove in addition to the above-mentioned sum signals. When we matrix these sum signals and differential signals, four independent signals are obtained.

CD-4 Disc

Figure 7



$$\begin{aligned} \frac{1}{2} \{ (\text{Ch. 1} + \text{Ch. 2}) + (\text{Ch. 1} - \text{Ch. 2}) \} &= \text{Ch. 1} \\ \frac{1}{2} \{ (\text{Ch. 1} + \text{Ch. 2}) - (\text{Ch. 1} - \text{Ch. 2}) \} &= \text{Ch. 2} \\ \frac{1}{2} \{ (\text{Ch. 3} + \text{Ch. 4}) + (\text{Ch. 3} - \text{Ch. 4}) \} &= \text{Ch. 3} \\ \frac{1}{2} \{ (\text{Ch. 3} + \text{Ch. 4}) - (\text{Ch. 3} - \text{Ch. 4}) \} &= \text{Ch. 4} \end{aligned}$$

$$\begin{aligned} \left. \begin{array}{l} \text{Ch. 1} + \text{Ch. 2} \\ \text{Ch. 3} + \text{Ch. 4} \end{array} \right\} &\text{Direct Signal} \\ \left. \begin{array}{l} \text{Ch. 1} - \text{Ch. 2} \\ \text{Ch. 3} - \text{Ch. 4} \end{array} \right\} &\text{Modulated Signal} \end{aligned}$$

In the CD-4 disc, the upper limit of the modulated frequency is 45KHz; the record groove itself becomes much more complicated than on conventional stereo records. Thus, to play a CD-4 disc requires the use of a special phono cartridge that can trace the extremely high frequency ranges around 45KHz. Also, since this disc is the modulation type, a CD-4 demodulator unit is required for exclusive playback of this disc in addition to a high-quality stereo turntable.

FM Discrete Four-Channel Broadcasts

Matrix-type four-channel FM broadcasts are growing in popularity today in certain countries, and even discrete four-channel FM broadcasts are in the process of research and development. The FM discrete system uses the multiplex modulation technique as well as conventional stereo FM broadcast techniques, and also employs the wide carrier bandwidth. For discrete FM broadcasts, a number of factors are important, including compatibility with mono or conventional stereo, frequency bandwidth and others. A number of systems have already been announced at present, including the "Dorren" system. The future of FM discrete broadcasts is bright, although government regulations regarding this system are still pending in the United States and other countries.

The Pioneer Four-Channel Stereo System

Pioneer's research in four-channel stereo, underway now for some years, was culminated in 1972 by the introduction

of an impressive group of four-channel stereo components, as advanced as any yet placed on the market. The company's planning and design objectives were basic: to equip the components with every function and performance capability to satisfy even the most demanding audio enthusiast, and to build-in ease-of-operation so that anyone could operate the equipment.

Pioneer's four-channel product line-up includes two open reel tape decks that offer reproduction of discrete four-channel stereo, as well as full convertibility for use as two-channel stereo tape decks. These decks, the QT-6600 and QT-6100, are unusually easy-to-operate, handsomely designed, and marked by outstanding performance specifications. The QT-6600 provides four-channel stereo recording, as well as playback.

Another Pioneer unit is the QT-2100 deck, designed for four-channel stereo reproduction using 8-track tape cartridges. The ease with which this deck can be operated ensures that it will provide top performance in home applications with either two-channel or four-channel cartridge tapes.

Pioneer's four-channel amplifiers are the equal of the tape decks in convenience and performance. The Model QA-800A four-channel integrated amplifier features four pre-amplifier and power amplifier channels, making it capable of handling tape, disc records or FM discrete four-channel stereo when the latter source mode is available. The QA-800A includes the unique Pioneer "Matrix Decoding Circuit" that is capable of decoding four-channel sound from any kind of matrixed four-channel program sources.

Other products include the Model QX-9900 and QX-8000A integrated four-channel stereo receivers equipped with sensitive AM/FM tuners, and the Model QC-800A four-channel stereo control amplifier and QM-800A four-channel power amplifier which features direct coupling OCL circuitry. Any of these Pioneer amplifiers may also be used initially as a conventional two-channel stereo amplifier, then graded up into four-channel stereo when you choose to add a pair of rear loudspeakers.

For these persons who already have a two-channel stereo system, Pioneer has introduced the Model QL-600A Decoder Amplifier, which converts your two-channel unit into four-channel capability with ease.

How good is Pioneer's four-channel stereo today? The answer to the question is in your ears. If you doubt the significance of four-channel stereo, we suggest you experience the extraordinary sound brilliance that Pioneer system can deliver. It's as much a surprise, as it is a moving musical experience.

Pioneer Matrix Decoding Circuit:

1. Regular Matrix Four-Channel Stereo

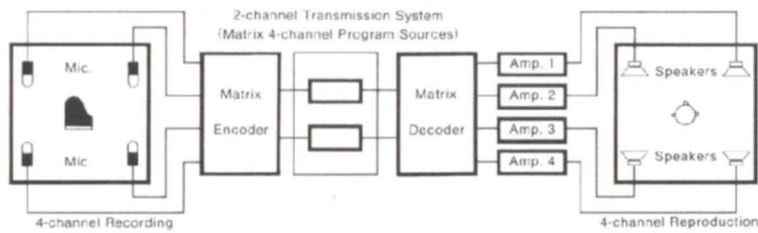


Figure 8

2. SQ Matrix Four-Channel Stereo

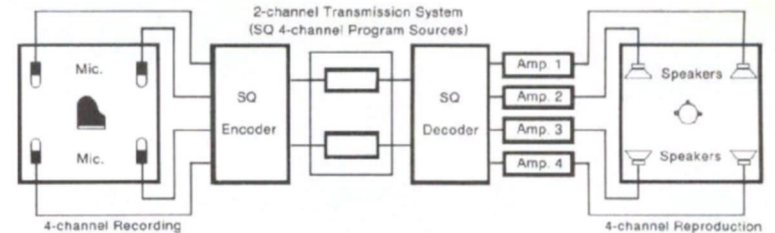
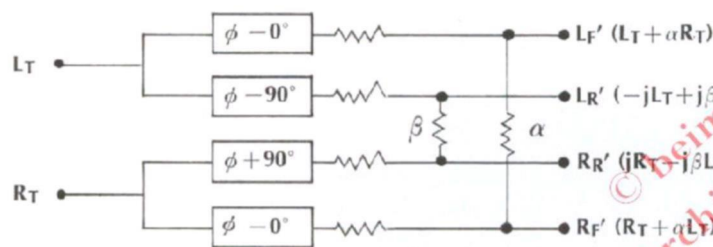


Figure 10

Block Diagram of Regular Matrix Decoder



NOTE: +j means +90° phase shift
-j means -90° phase shift
 $0 < \alpha < 1$, $0 < \beta < 1$
 ϕ = original phase

Figure 9

Above is a diagram of Pioneer's regular matrix decoding circuit, which is used for sound reproduction of regular matrix records (or matrix FM broadcasts) except the SQ-type records. As you can see, the original four-channel signals are converted into two-channel signals (L_T , R_T). L_T and R_T are blended after they pass through what is called a phase shifter. From the front, the blending ratio is " α " without phase difference (in short, 0°). In terms of the sound you hear, $L_T + \alpha R_T$ appear from the left front and $R_T + \alpha L_T$ from the right front speakers. From the rear speakers, L_T is phase-shifted -90° , and R_T is phase-shifted $+90^\circ$, with the blending ratio being β . Looked at another way, the $-jL_T + j\beta R_T$ signals emanate from the left rear speakers, and $jR_T - j\beta L_T$ emanate from the right rear speakers. This somewhat technical explanation of Pioneer's regular matrix decoding circuit with phase shift technique adds up to one thing: very natural and realistic four-channel sound reproduction. So well-designed is this system that it offers tremendous effectiveness in obtaining authentic four-channel sound effects from conventional two-channel program sources.

Block Diagram of SQ Matrix Decoder

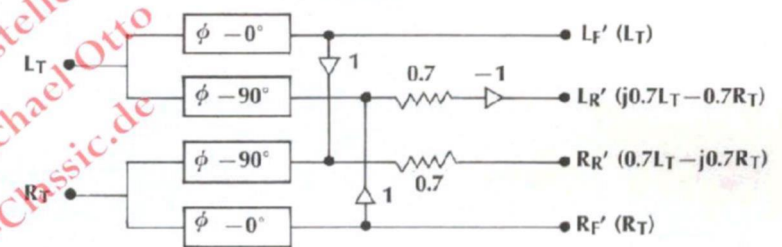


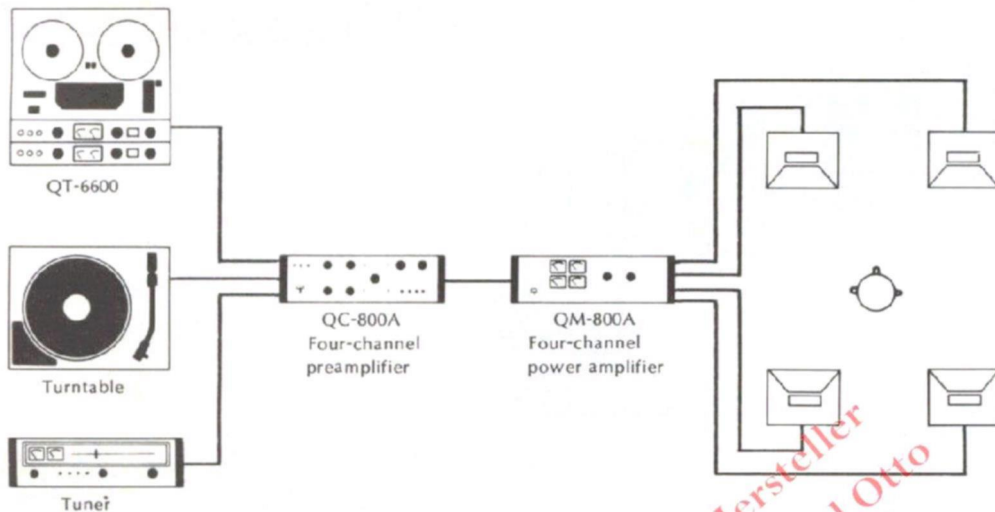
Figure 11

The diagram above describes the SQ system for four-channel sources, including records. Note the front side: L_T and R_T are not blended and are without phase difference. Put another way, the separation between the front two speakers is theoretically infinite. And thus, from the front left speakers, L_T appears without modification and R_T appears as it is, at the front right speakers. From the rear, L_T and R_T are blended after they pass through a -90° phase shift. These blended signals are then decreased by 0.7. In addition, signals emanating only from the left rear speakers are reproduced with an additional 180° phase conversion. Thus you can see, in SQ stereo front separation is basically the same as conventional stereo separation, and separation between front and rear is also somewhat limited. To improve the front/rear effects, two functions can be added electronically: when the sound source appears to be localized at the front center, the rear sound can be canceled; conversely, when the sound source is localized at the rear center, the front sound can be canceled. These functions (and the corresponding electronic hardware) are named "front/back" logic and employed Pioneer's SQ decoding circuit (except on the QX-4000). On the QX-4000, the limited front/rear separation is improved by employing special circuit techniques instead of front/back logic.

Choosing a Four-Channel Stereo System

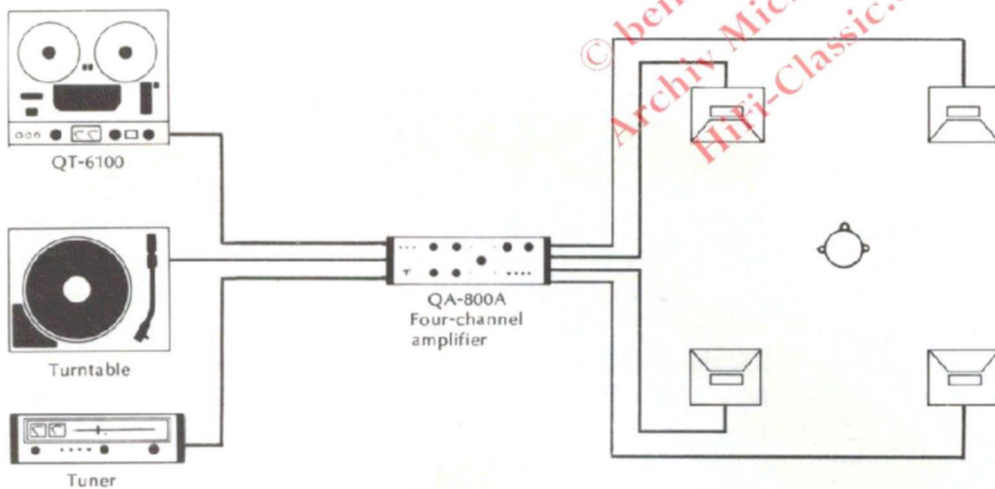
Pioneer now makes a full line of four-channel stereo components. Some are very expensive. Others are surprisingly inexpensive. Here are some component combinations that are recommended by Pioneer audio specialists. With them, you'll get the very best value for your money, as well as the superb sound that four-channel stereo makes possible.

THIS COMBINATION REPRESENTS THE ULTIMATE IN FOUR-CHANNEL STEREO



The QT-6600 tape deck permits recording and playback of discrete four-channel stereo, and the recording and playback of two-channel stereo. Use of the turntable and tuner, plus the Pioneer Matrix Decoding circuit, enables decoding four-channel sound from any matrix program sources.

THIS COMBINATION IS BUILT AROUND THE QA-800A

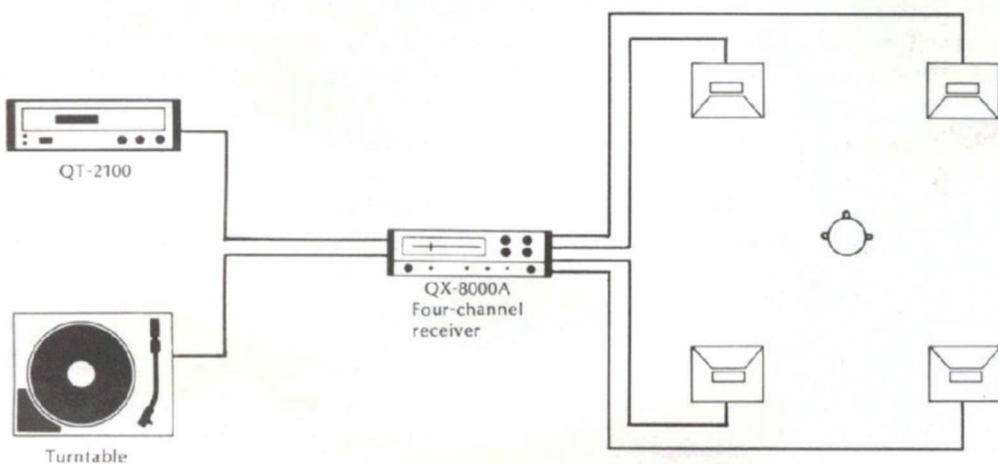


All functions required for four-channel reproduction are built into a single unit, the QA-800A.

It provides unexcelled ease in handling and operation.

The QT-6100 provides playback of pre-recorded four-channel tapes, as well as the recording and playback of two-channel stereo.

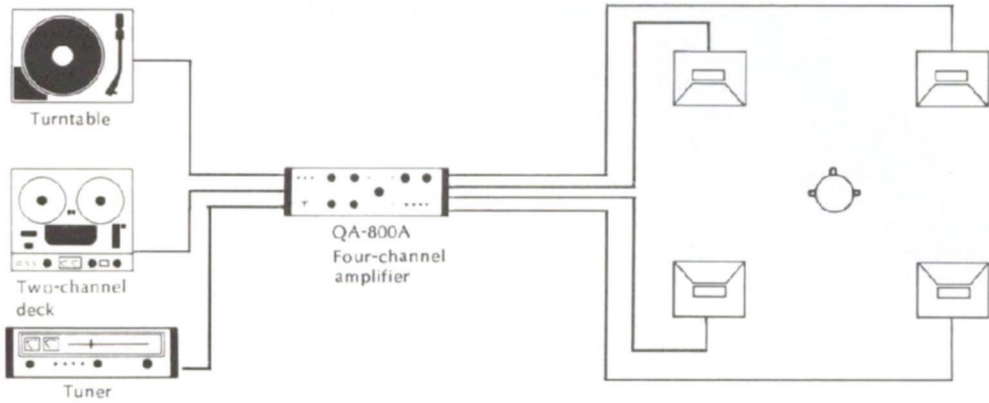
A SYSTEM FOR MAXIMUM CONVENIENCE



If you find mounting and threading open reel tapes to be a nuisance, this is probably the system for you.

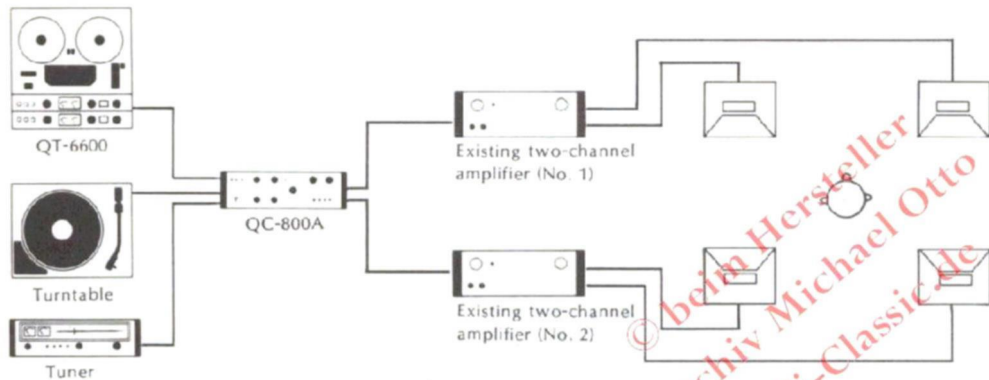
The QT-2100 8-track four-channel cartridge tape deck also converts automatically to play two-channel tapes. The QX-8000A AM/FM four-channel receiver includes the Pioneer Matrix Decoding circuit.

A SYSTEM TO CONVERT TWO-CHANNEL SOURCES INTO FOUR-CHANNEL STEREO, UTILIZING MATRIX DECODING CIRCUIT. THIS SYSTEM CAN ALSO BE USED AS A CONVENTIONAL TWO-CHANNEL SYSTEM



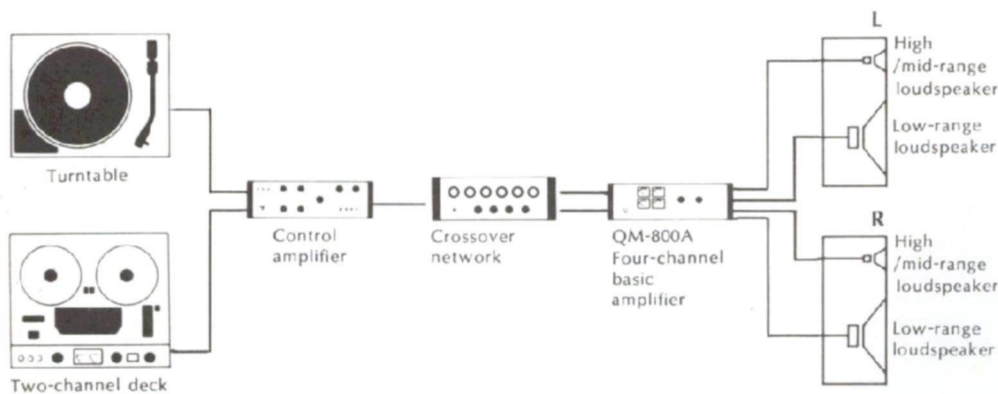
This system is recommended if you do not, at this time, wish to invest in a four-channel tape deck to enjoy discrete four-channel effects. This system is specially designed for the person who has an eye for updating his system in the future.

IF YOU ALREADY HAVE TWO TWO-CHANNEL STEREO BASIC AMPLIFIERS.



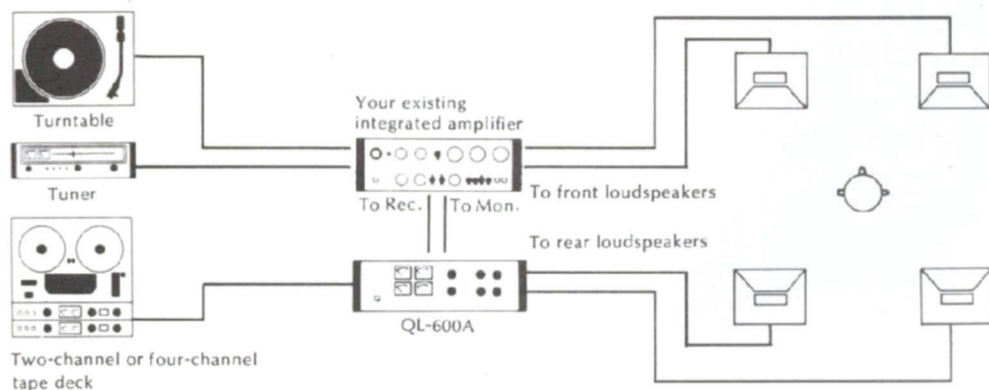
If you already own a pair of two-channel power amplifiers, all you need for four-channel stereo is a QC-800A unit and an additional pair of loudspeakers.

A UNIQUE SPLIT FREQUENCY RANGE AMPLIFIER SYSTEM.



Since the QM-800A is comprised of two pairs of stereo basic amplifiers, it may be used in a split frequency range amplifier system.

IF YOU ALREADY HAVE A TWO-CHANNEL STEREO SYSTEM.



Use of the Pioneer QL-600A enables you to up-grade an existing two-channel stereo system into a four-channel stereo system without sacrificing any of your existing components. All that is required is the addition of the QL-600A and two rear loudspeaker systems.

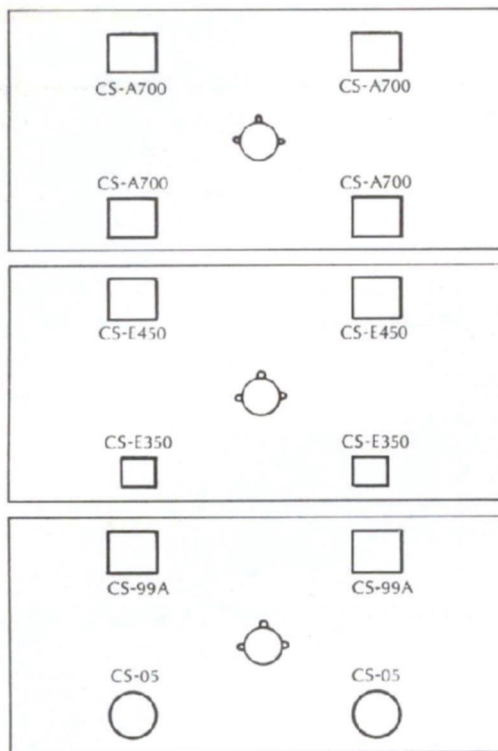
How to Get the Most from Four-Channel Stereo

Selecting the Loudspeakers

The kind and position of loudspeakers you use for four-channel stereo definitely affects the sound you'll hear. It is ideal, to use identical loudspeakers for both front and rear, especially when you are listening to the interplay between two orchestras whose sounds are alternating between the front and rear loudspeakers in discrete four-channel stereo.

However, since the total power output of a four-channel system is necessarily large, it is not absolutely imperative that the rear loudspeakers are full-sized models. If the rear loudspeakers provide the indirect sounds of the concert hall, more than adequate results can be obtained with small loudspeakers. Pioneer recommends, in this case, a combination of two sets of speakers: the CS-E450 loudspeaker system for the front, and a pair of CS-E350 speakers for the rear.

The wider the sound dispersion properties of the rear system speakers, the better will be the living presence sound field emanating from the rear. Recommended for this wide dispersion are Pioneer's Model CS-O5 omni-directional loudspeakers. It is also recommended, in all four-channel stereo, that the rear loudspeakers be mounted at a somewhat higher position than the front loudspeaker systems.



Placing the Loudspeakers

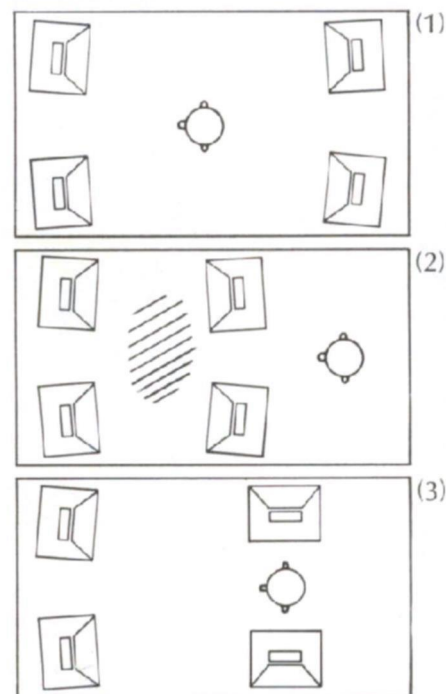
(1) This is the basic placement of loudspeakers for a four-channel stereo system. It is suited for all types of music sources. If this placement is used, the front and rear loudspeaker systems should not face each other squarely across the room, but instead should be directed slightly towards the center of the room.

(2) Many classical music enthusiasts question the idea of sounds coming at them from the rear. A suitable and effective speaker placement alternative is this one. Here, the rear loudspeakers are moved

up in front of the listener, to create a sound field as indicated by the shaded area in the center of the loudspeakers.

This placement is also tantamount to establishing the stage of the concert hall right in front of the listener, and thus provides exceptional "presence" that is quite unattainable with conventional two-channel stereo. Recommended for both classical music and jazz.

(3) An adaptation of (2) above is the placement of loudspeakers shown in illustration (3). By bouncing the sounds from the rear loudspeakers off the walls, a soft spread of sound is achieved.



PIONEER SPEAKER SYSTEMS: CS-05; OMNI-DIRECTIONAL 8" 2-Way 4-Speaker System/CS-E350; 8" 2-Way 2-Speaker System/CS-E700; 12" 3-Way 3-Speaker System/CS-66; 10" 3-Way 3-Speaker System/CS-A700; 12" 3-Way 3-Speaker System/CS-63DX; 15" 4-Way 6-Speaker System/CS-44; 8" 2-Way 2-Speaker System

PIONEER'S FOUR-CHANNEL STEREO COMPONENTS



QX-9900

Four-Channel Stereo Receiver

Pioneer's most advanced four-channel stereo receiver features direct coupling OCL circuitry in its power amplifier section, and sensitive FM tuner section employing ICs and ceramic filters. This receiver can decode any of the matrix four-channel program sources by means of the unique Pioneer Matrix Decoding circuit. It can also reproduce discrete four-channel and play conventional two-channel music sources. A reverberation unit is also incorporated to permit you to add reverberation effects to either front or rear speakers. The unit features two large tuning meters and a linear type FM dial scale for precise and easy station tuning.

SPECIFICATIONS: FM Usable Sensitivity (IHF): $1.8\mu\text{V}$ /FM Selectivity (IHF): More than 70 dB/Music Power (IHF): 240 watts (4 ohms), 180 watts (8 ohms)/Continuous Power (4-channels driven): 30 watts \times 4 (8 ohms)/Harmonic Distortion: Less than 0.5% (continuous power output)/Power Bandwidth (IHF): 5 to 70,000Hz (8 ohms, 4-channels driven, harmonic distortion less than 0.5%/Dimensions: $22\frac{1}{16}$ (W) \times $6\frac{1}{16}$ (H) \times $16\frac{5}{16}$ (D)/Weight: 46 lb. 14 z. (Not available in U.S.A. and Canada)



QX-8000A

Four-Channel Stereo Receiver

In addition to providing reproduction of discrete four-channel stereo, this advanced receiver is also capable of creating four-channel sound from any kinds of matrix four-channel program sources by means of Pioneer Matrix Decoding circuitry. It is a universal type receiver that will also provide reproduction of conventional two-channel stereo if the user owns only two loudspeakers. The tuner section, complete with ICs and ceramic filters, features outstanding sensitivity and selectivity for clean reception free of interference from adjacent stations or noise.

SPECIFICATIONS: FM Usable Sensitivity (IHF): $2.2\mu\text{V}$ /FM Selectivity (IHF): More than 40 dB/Music Power (IHF): 180 watts (4 ohms), 130 watts (8 ohms)/Continuous Power (4-channels driven): 22 watts \times 4 (8 ohms)/Harmonic Distortion: Less than 1% (continuous power output)/Power Bandwidth (IHF): 15 to 100,000Hz (8 ohms, 4-channels driven, harmonic distortion less than 1%/Dimensions: 20(W) \times $6\frac{3}{4}$ (H) \times $15\frac{3}{8}$ (D) inches/Weight: 34 lb. 5 oz.



QX-4000

Four-Channel Stereo Receiver

A tremendous four-channel receiver value, the QX-4000 features a linear type FM dial scale, an extra-large signal meter for precise FM tuning, and is equipped with Pioneer's Matrix Decoding circuitry for capability of decoding any kind of matrix four-channel program sources, including the SQ sources. Output power of up to 108 watts is more than enough to fill a conventional sized listening room with full-bodied distortion-free sound. The unit can also be used as a conventional two-channel receiver, in addition to discrete four-channel reproduction.

SPECIFICATIONS: FM Usable Sensitivity (IHF): 2.2 μ V/FM Selectivity (IHF): More than 40 dB/Music Power (IHF): 108 watts (4 ohms), 80 watts (8 ohms)/Continuous Power (4-channels driven): 10 watts \times 4 (8 ohms)/Harmonic Distortion: Less than 1% (continuous power output)/Power Bandwidth (IHF): 15 to 20,000Hz (8 ohms, 4-channels driven, harmonic distortion less than 1%)/Dimensions: 17 $\frac{3}{4}$ (W) \times 5 $\frac{1}{8}$ (H) \times 13 $\frac{3}{4}$ (D) inches/Weight: 22 lb. 4 oz.



QA-800A

Four-Channel Integrated Amplifier

This integrated amplifier, in addition to providing reproduction of discrete four-channel stereo, is also equipped with the Pioneer Matrix Decoding circuitry. It has two sets of tape or phonograph inputs. In addition to a master volume control, the QA-800A also has four independent level controls, one for each channel, for easy balancing of all channels.

SPECIFICATIONS: Music Power (IHF): 204 watts (4 ohms), 144 watts (8 ohms)/Continuous Power (4-channels driven): 20 watts \times 4 (8 ohms)/Harmonic Distortion: Less than 0.5% (continuous power output)/Power Bandwidth (IHF): 15 to 50,000Hz (8 ohms, 4-channels driven, harmonic distortion less than 0.5%)/Dimensions: 16 $\frac{5}{16}$ (W) \times 5 $\frac{7}{16}$ (H) \times 13 $\frac{1}{4}$ (D) inches/Weight: 24 lb.



QC-800A

Four-Channel Stereo Preamplifier

This is a four-channel preamplifier incorporating three-stage direct-coupled E-E circuitry for extremely wide dynamic range. Its professional click-stop tone controls provide precision setting of tone controls in 3dB increments. In addition to independent pre-set type level controls for each of the four-channels, there is also a master volume control for maximum ease in use. The QC-800A also is equipped with the Pioneer Matrix decoding circuitry which is capable of translating any matrix program sources into dramatic four-channel sound.

SPECIFICATIONS: Output Voltage: 2.5V (rated output), 4V(max.)/Harmonic Distortion: Less than 0.05% (rated output) / Frequency Response: 10 to 70,000Hz \pm 1 dB / Dimensions 16 $\frac{5}{16}$ (W) \times 5 $\frac{7}{16}$ (H) \times 13 $\frac{1}{4}$ (D) inches/Weight: 16 lb. 12 oz.



QM-800A

Four-Channel Power Amplifier

This circuitry in this advanced unit employs pure-complementary and direct-coupling OCL in all stages. It features outstanding performance over a wide frequency range, providing extremely flat response down to ultra-low ranges. The QM-800A is equipped with four full-size level meters, for great ease in balance control. It can also be used as it is, without modification, as the power amplifier for a two-channel two-way multi-amplifier system. In both design and performance, it matches the Pioneer QC-800A four-channel preamplifier.

SPECIFICATIONS: Music Power (IHF): 240 watts (4 ohms), 170 watts (8 ohms)/Continuous Power (4-channels driven): 30 watts x 4 (8 ohms)/Harmonic Distortion: Less than 0.5% (continuous power output)/Power Bandwidth (IHF): 10 to 50,000Hz (8 ohms, 4-channels driven, harmonic distortion less than 0.5%)/Dimensions: 16⁵/₁₆(W) x 5³/₁₆(H) x 13¹/₄(D) inches/Weight: 26 lb.

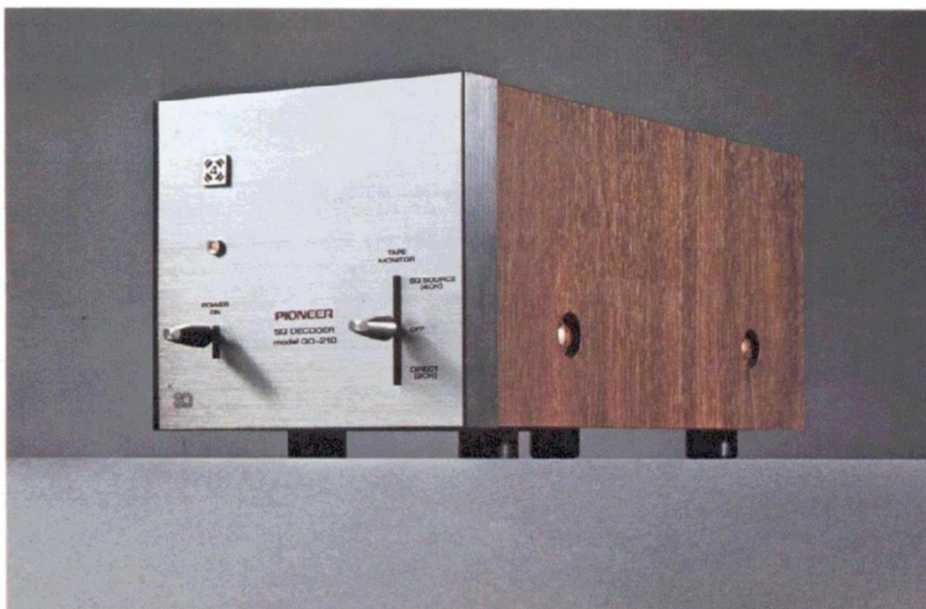


QL-600A

Decoder Amplifier

This is the ideal unit for persons who already own a two-channel stereo system. The simple addition of the QL-600A plus two loudspeakers provides four-channel stereo reproduction of both discrete and matrix program source including Regular Matrix and SQ. There are four pre-set level controls and level meters per each channel for the simple balancing of all channels.

SPECIFICATIONS: Music Power (IHF): 44 watts (4 ohms), 36 watts (8 ohms)/Continuous Power (both channels driven): 10 watts + 10 watts (8 ohms)/Harmonic Distortion: Less than 0.5% (continuous power output)/Power Bandwidth (IHF): 20 to 30,000Hz (8 ohms, harmonic distortion less than 0.5%)/Dimensions: 16⁵/₁₆(W) x 5³/₁₆(H) x 13¹/₄(D) inches/Weight: 18 lb.



QD-210

SQ Decoder

The recommended unit for persons who already own four-channel equipment that does not decode the SQ four-channel records. The decoder features a compact and low-distortion circuit design employing an FET. When coupled with one more pre-main amplifier, the QD-210 forms the perfect SQ four-channel system, for persons who already own two-channel equipment.

SPECIFICATIONS: Maximum Input Level: 4V/Harmonic Distortion: Less than 0.3% (front side, input 4V)/Frequency Response: 20 to 20,000Hz ± 2dB (front side)/Dimensions: 5³/₁₆(W) x 5¹/₁₆(H) x 13¹/₄(D) inches/Weight: 6 lb. 13 oz.



QT-6600

Four-Channel Stereo Tape Deck

This outstanding open reel tape deck provides four-channel recording and playback. It uses a one-motor belt-drive tape drive system, a simple but high precision mechanism for extremely low wow and flutter. The unit also provides two-channel recording and playback, in which mode the auto-reverse mechanism functions. In addition to pre-set type level controls for each of the four-channels, there is a master level control for extremely simple channel balancing.

SPECIFICATIONS: Wow and Flutter: Less than 0.12% at 7½ ips/Frequency Response: 30-20,000 Hz at 7½ ips/Signal-to-Noise Ratio: Better than 55 dB/Dimensions: 17(W) × 18½(H) × 8¾(D) inches/Weight: 37 lb. 7 oz.



QT-6100

Four-Channel Stereo Tape Deck

This is an open reel tape deck featuring outstanding performance. It is capable of four-channel playback, as well as two-channel recording and playback. The QT-6100 features very wide dynamic range for high fidelity playback with outstanding tonal quality. In two-channel playback mode, there is an auto-reverse mechanism. Like the QT-6600, the tape drive system is a one-motor belt-drive high precision mechanism, free of noise and tape distortion.

SPECIFICATIONS: Wow and Flutter: Less than 0.12% at 7½ ips/Frequency Response: 30-20,000 Hz at 7½ ips/Signal-to-Noise Ratio: Better than 55 dB/Dimensions: 16¾(W) × 14¾(H) × 6¾(D) inches/Weight: 27 lb. 8 oz. (Not available in U.S.A. and Canada)



QT-2100

Four-Channel Stereo 8-Track Cartridge Tape Deck

This unique unit is equipped with a full-size professional type hysteresis synchronous motor. Wow and flutter are very low, for extremely stable operation, providing high fidelity reproduction with emphasis on tonal quality. When a conventional two-channel stereo cartridge tape is inserted in the QT-2100, it automatically switches to two-channel stereo mode operation.

SPECIFICATIONS: Tape Speed: 3¾ ips/Wow and Flutter: Less than 0.2%/Frequency Response: 30-12,000 Hz/Signal-to-Noise Ratio: Better than 48dB/Dimensions: 16¾(W) × 5½(H) × 12¾(D) inches/Weight: 22 lb. 11 oz.

NOTE: Specifications and design subject to possible modification without notice.

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