

SOLID STATE 4-CHANNEL PREAMPLIFIER

# QC-800A

FVW



OPERATING INSTRUCTIONS

**PIONEER**<sup>®</sup>

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Thank you for the confidence you have shown us in purchasing the new Pioneer 4-channel preamplifier, model QC-800A. It will serve as your passport into a new world of listening experience — the world of Pioneer 4-channel stereo sound. Connected the two stereo power amplifiers and four speakers, model QC-800A will give you the most thrilling of all sound adventures: wrap-around 4-channel hi-fi sound.

## FEATURES

### ACOUSTICAL FIELD REPRODUCTION FROM 4-CHANNEL STEREO

The control amplifier section consists of four separate channels having excellent frequency response and very low distortion, providing for 4-channel discrete reproduction of a 4-channel source (recorded tape).

### CHOICE OF MATRIX DECODER

The QC-800A offers a choice of two matrix decoder, the regular matrix and the SQ matrix. The source may be a matrix recording or FM broadcast of a matrix recording. The result is realistic 4-channel reproduction.

### MATRIX CIRCUIT FOR ORDINARY 2-CHANNEL STEREO

Use of the internal matrix circuit enhances the effect of ordinary 2-channel stereo source material, over and above that normally obtainable.

### HIGH STABILITY IN HEAD AMPLIFIER

The head/equalizer amplifier is a professional design with three directly coupled, low-noise silicon transistors and emitter-to-emitter feedback. These features result in accurate equalizing characteristics with a wide dynamic range and stable performance.

### FET-EQUIPPED CONTROL AMPLIFIER, SWITCH-TYPE TONE CONTROLS

The tone control amplifier is a directly coupled three-stage design with a low-noise FET in its first stage. Its high, stable input impedance guarantees precise tone control at any setting without affecting the head amplifier. The tone controls are true switch types regulating negative feedback, and each switching step has an effect of  $\pm 3$ dB. What's more, separate controls are provided for the front and rear channels, permitting complete control over the total tonal quality.

### LEVEL CONTROLS FOR EACH CHANNEL

There's a level control for each of the four channels, permitting complete control over the sound field intensity even if different types of speakers are used for the front and rear.

### FULL ARRAY OF TERMINALS AND AUXILIARY CONTROLS

Inputs accept two turntables, two tape decks, a tuner and two other sound sources. Separate headphone jacks are provided for monitoring the front and rear channels. Controls include an output on/off switch, a  $-20$ dB muting switch, high and low filters and tape monitor switches.

### VERSATILE TAPE-TO-TAPE DUPLICATING FACILITIES

Normal 2-channel tape-to-tape duplicating is possible too, as well as 4-channel tape-to-tape duplicating.

### ALL NEW "4-CHANNEL" EXTERIOR DESIGN

Cabinet and control panel are visual symbolizations of the Pioneer "4-channel" concept, with a modernistic and logically arranged control panel.

## LINE VOLTAGE AND FUSE

### CHANGING LINE VOLTAGE AND FUSE

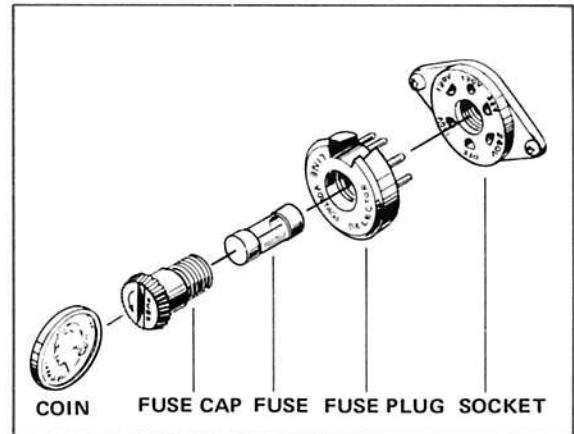
To remove the fuse, turn the fuse cap located on the line voltage selector in the direction of the arrow. Then remove the fuse plug from the unit.

Put the fuse plug back so that the proper line voltage marking can be seen through the cut in the edge of the plug. Whenever the position of the selector is changed, check the rating of the fuse. A 0.2-ampere is to be used for either 220V or 240V operation and a 0.3-ampere fuse for 110V, 120V, 130V operation.

If the rating of the fuse is correct, replace cap.

### FUSE REPLACEMENT

If the fuse blows, remove the fuse cap and replace the fuse with a new one.



## COMPOSITION OF A 4-CHANNEL STEREO SYSTEM

To compose an ideal 4-channel stereo system, the QC-800A, a solid state 4-channel preamplifier, can be combined with a 4-channel stereo power amplifier (Pioneer QM-800A, for instance) or two units of conventional 2-channel stereo power amplifier (Pioneer SM-700, for instance), four speaker systems, 4-channel (or 2-channel) stereo tape decks, turntables, an AM/FM stereo tuner, etc. as shown in Fig. 1.

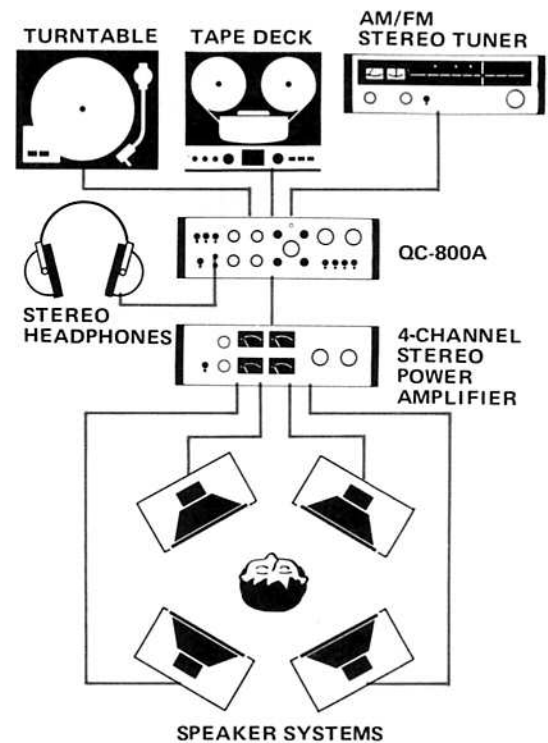


Fig. 1

# PERFORMANCE OF QC-800A

## 4-CHANNEL STEREO PERFORMANCE

With a 4-channel stereo tape deck installed, the QC-800A can provide a 4-channel stereo playback of programs recorded on tape as shown in Fig. 2.

## 4-CHANNEL REPRODUCTION FROM MATRIX 4-CHANNEL SOURCE

The self-contained matrix decoder circuit permits 4-channel reproduction from matrix 4-channel records or FM stereo broadcasts. The matrix switch has positions for regular matrix and SQ matrix reproduction, allowing reproduction to take either of these forms (Fig. 3).

## MATRIX REPRODUCTION FROM 2-CHANNEL STEREO SOURCE

2-channel information from a record or FM broadcast can be reproduced in 4-channel form via the regular or SQ matrix circuit. In this case, the result is an improvement over ordinary 2-channel stereo reproduction.

## 2-CHANNEL STEREO PERFORMANCE

Conventional 2-channel stereo performance can be provided through an arrangement of two speaker systems in the left-side speaker system and right-side speaker system.

# INSTALLATION

The fully-transistorized QC-800A generates no heat. When installing it, however, check the following points:

- The place should be well-ventilated, and free from dampness and dust.
- The unit should not be exposed to direct sunlight.

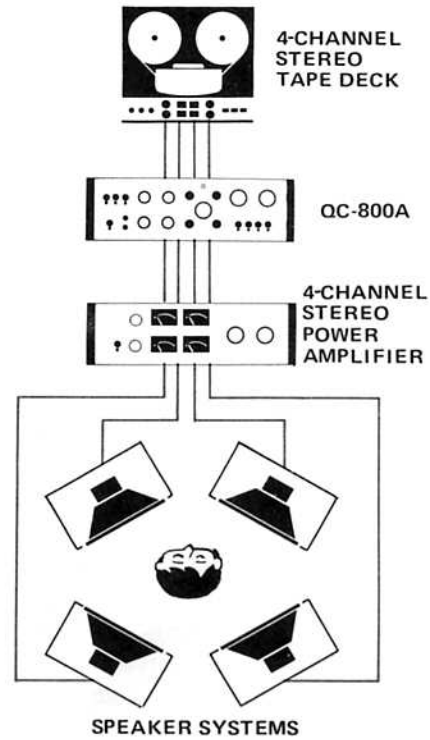


Fig. 2

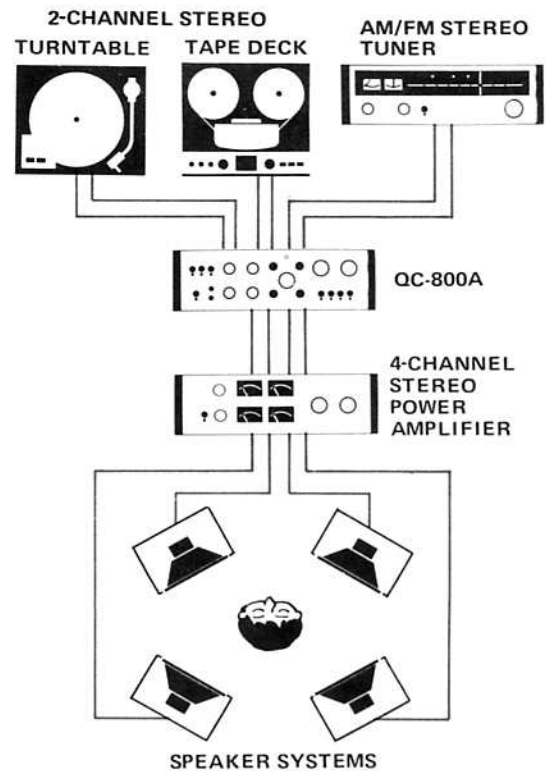


Fig. 3

## CONNECTING THE POWER AMPLIFIER

Connect the OUTPUT of the QC-800A to the INPUT of the 4-channel power amplifier as shown in Fig. 4.

- NOTES:
- Two sets of OUTPUT jacks are arranged on the rear panel. When connecting two units of 2-channel stereo power amplifier to the QC-800A, use both sets of the OUTPUT jacks.
  - The OUTPUT jacks are arranged in the order of FRONT LEFT (CH. 1), FRONT RIGHT (CH. 3), REAR LEFT (CH. 2) and REAR RIGHT (CH. 4). Make sure to connect each OUTPUT jack to the corresponding input jack of the power amplifier.

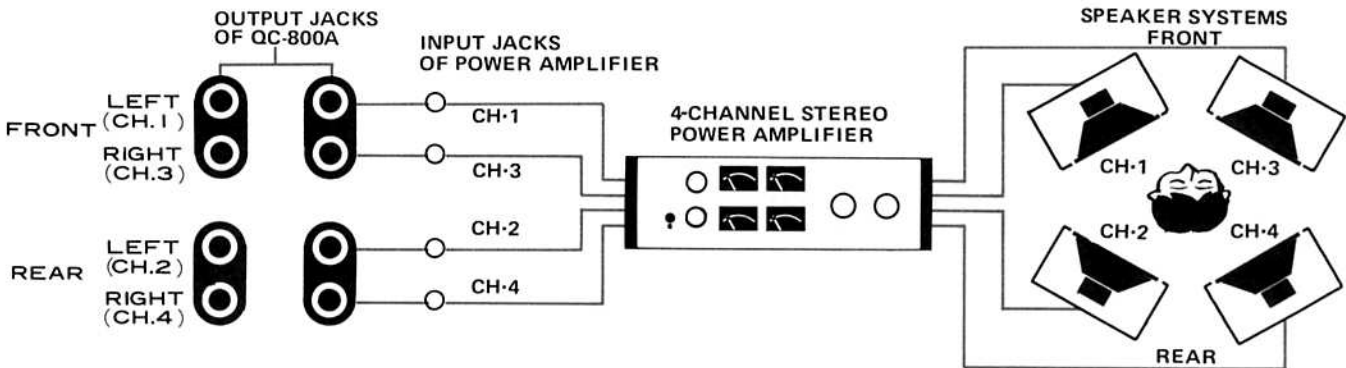


Fig. 4

### • SPEAKER SYSTEMS ARRANGEMENT

As shown in Fig. 5, the 4-channel system employs four speakers, one each on the left and right at the front and rear. Locating the rear speakers anywhere in the blue shaded area of this figure will give an ample 4-channel effect.

- Front left — Channel 1
- Front right — Channel 3
- Rear left — Channel 2
- Rear right — Channel 4

NOTE: For a better 4-channel stereophonic effect, it is suggested that the rear speaker systems be installed on the level a little higher than the listening position.

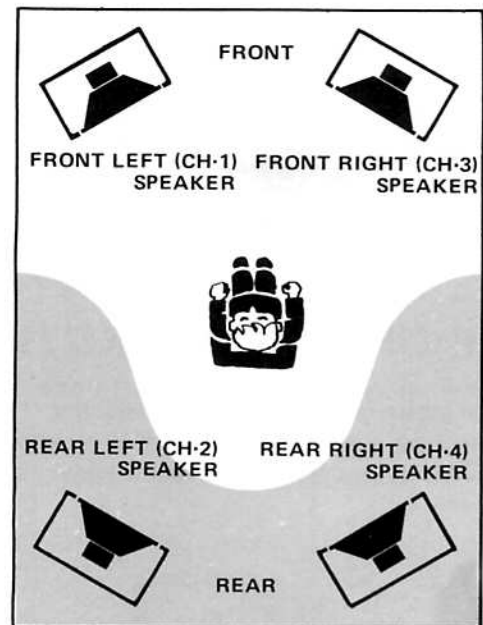


Fig. 5

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## CONNECTING THE TURNTABLE

Connect the output from the turntable equipped with a moving-magnet phono cartridge to PHONO 1 input jacks. When two turntables are used simultaneously, connect the second turntable to PHONO 2 input jacks. The upper jack is for the left channel, and the lower jack for the right channel.

- NOTES:
1. When using a turntable equipped with a moving-coil (MC) phono cartridge, use a head amplifier or step-up transformer.
  2. Prepare a cartridge and adaptor exclusively used for playing discrete 4-channel records. Plug the output jacks of the adaptor into the AUX jacks.
  3. If the plug of the output cord does not fit into the PHONO input jack, replace it with the pin plug furnished with the OC-800A.

## CONNECTING THE TUNER

Connect the left-channel output of an AM/FM stereo tuner to the FRONT LEFT (CH. 1) jack, and the right-channel output to the FRONT RIGHT (CH. 3) jack. Although the channels 2 and 4 are provided with the jacks, they are seldom, if ever, used usually.

## CONNECTING THE CARTRIDGE TAPE PLAYER

Connect the output of a cartridge tape player to either AUX 1 or AUX 2 input jacks.

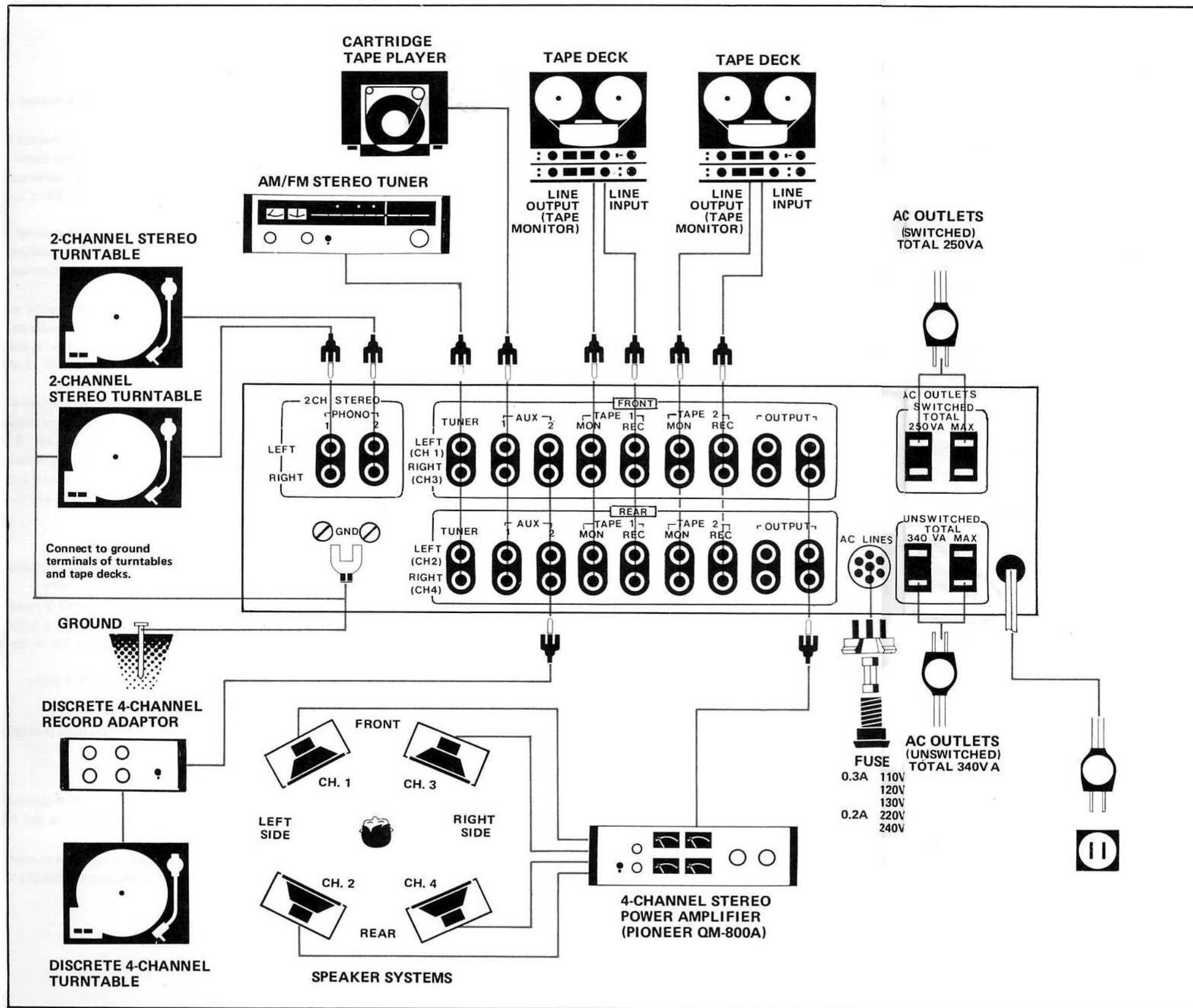
- NOTES:
1. When using a 2-channel stereo tape player, connect the left channel output to CH. 1 of AUX input jacks, and the right channel output to CH. 3.
  2. When using a 4-channel stereo tape player, follow the procedures as explained in the player manual.

## USE OF AUX JACKS (1, 2)

These jacks are spare input terminals. They may be used for connecting stereo output from a cartridge tape player, CD-4 adaptor, or multiplex television tuner, adding versatility.



CONNECTION DIAGRAM



CONNECTING THE TAPE DECK

• RECORDING

Connect the LINE INPUT of the tape deck to TAPE 1 REC output jacks of the QC-800A. When recording a 2-channel program source as a 4-channel program, connect the LINE INPUTS of the tape deck to the FRONT and REAR OUTPUT jacks of the QC-800A.

• PLAYBACK

Connect the LINE OUTPUT (or TAPE MONITOR) to TAPE 1 MON input jacks of the QC-800A.

- NOTES:
1. When using a 2-channel stereo tape deck, connect the left channel jacks to MON (REC) jacks (CH. 1), and the right channel jacks to MON (REC) jacks (CH. 3). In case of a 4-channel stereo tape deck, follow the procedures as explained in the tape deck manual.
  2. When using two tape decks simultaneously, connect the second tape deck to TAPE 2 REC and TAPE 2 MON jacks the same as in connection of one tape deck.
  3. For the above connections, use the connecting cord furnished with the tape deck.

• TWO TAPE DECK CONNECTIONS FOR DUPLICATING OR EDITING A RECORDED PROGRAM

Connect two tape decks as described in RECORDING and PLAYBACK.

# FRONT PANEL FACILITIES

## POWER SWITCH

With the switch set to ON, power is supplied to the unit. To cut off the power, depress the switch.

## FILTER SWITCH

LOW . . . . . Use this filter to eliminate low-frequency interference, such as motor rumbling or hum.  
HIGH . . . . . Use this filter to eliminate high-frequency interference, such as that from fluorescent lights.

## OUTPUT SWITCH

With the switch depressed to OFF, the output of the QC-800A will be disconnected regardless of a set position of the VOLUME control. Use this function when interrupting a playback to change the record, for instance.

## PHONES JACKS

For connecting stereo headphones.  
With the plug connected to FRONT jack, you will hear the sound through the speaker system (CH. 1) in the left ear, and the sound through the speaker system (CH. 3) in the right ear.  
With the plug connected to REAR jack, you will hear the sound through the speaker system (CH. 2) in the left ear, and the sound through the speaker system (CH. 4) in the right ear.

## VOLUME CONTROL

Controls the output volumes of all 4 channels simultaneously. Turning the control to the right will increase the volume, and to the left will decrease the volume.

## FRONT BASS CONTROL

Controls the bass of channels 1 and 3. Turning the control to the right from FLAT will increase the tone, and to the left will decrease the tone at 3dB step.

## REAR BASS CONTROL

Controls the bass of channels 2 and 4. Use the control in the same way as FRONT BASS CONTROL.

## FRONT TREBLE CONTROL

Controls the treble of channels 1 and 3. Use the control in the same way as FRONT BASS CONTROL.

## REAR TREBLE CONTROL

Controls the treble of channels 2 and 4. Use the control in the same way as FRONT BASS CONTROL.

## LEVEL CONTROLS (CH. 1, CH. 2, CH. 3, CH. 4)

Control the output level of each speaker system. Turn the control (CH. 1) to increase the level of the FRONT LEFT (CH. 1) speaker system. Likewise, turn the controls (CH. 2 to CH. 4) to increase the level of the corresponding speaker systems (CH. 2 to CH. 4).

## MODE SWITCH

This switch control the mode of reproduction, that is, 2-channel stereo, matrix 4-channel, and discrete 4-channel.

2 CH FRONT+REAR . . . . . Used for reproduction of 2-channel stereo. At this position, left channel signal comes from left front and rear speakers, right channel signal from right front and rear speakers.

2 CH FRONT . . . . . Used for reproduction of 2-channel stereo reproduction with the front speakers only. At this position, no sound comes from the rear speakers.

4 CH MATRIX . . . . . Used for reproduction of regular and SQ matrix records and FM broadcasts, on a 4-channel basis. This position is also used for matrix reproduction of 2-channel source.

4 CH DISCRETE . . . . . Used for reproduction of discrete 4-channel information (tapes and cartridges).

CHECK (CH 1+CH 3) . . . . . At this position, CH. 1 and CH. 3 sound is mixed and fed to the four speakers. This position is used to check phase and level balance among the channels and to check connections.

## SELECTOR SWITCH

PHONO 1 . . . . . For playing records by a turntable connected to the PHONO 1 jacks.

PHONO 2 . . . . . Same as above, for PHONO 2 jacks.

TUNER . . . . . For radio reception through a tuner.

AUX 1 . . . . . For playing signal source fed to the AUX 1 jacks.

AUX 2 . . . . . Same as above, for AUX 2 jacks.

## MUTING SWITCH

With this switch set to -20 dB position, the output level is attenuated by 20dB at once.

## MATRIX SWITCH

REGULAR . . . . . Used for reproduction of 4-channel records and FM broadcasts via the regular matrix mode.

SQ . . . . . Used for reproduction of 4-channel records and FM broadcasts via the SQ matrix mode.

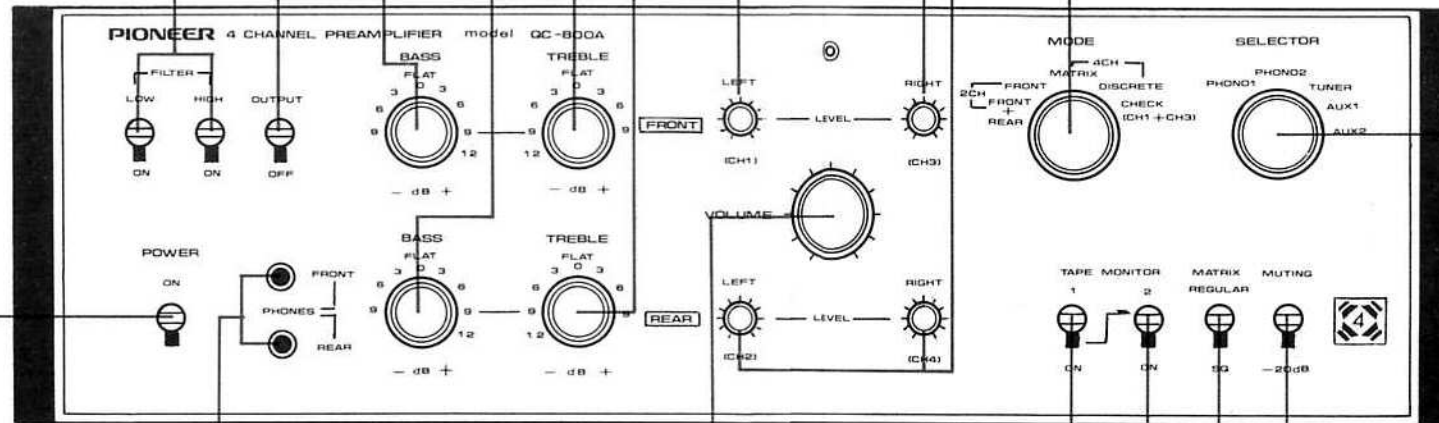
## TAPE MONITOR SWITCHES (1 and 2)

These switches are set to ON for checking the recording conditions or for playback with tape decks.

1. This switch is set to ON for monitoring recording in progress or for playback with a tape deck connected to TAPE 1 MON jacks and TAPE 1 REC jacks.

2. This switch is set to ON for checking the recording conditions or for playback with a tape deck connected to TAPE 2 MON jacks and TAPE 2 REC jacks.

NOTE: For a record playing or radio reception, leave these switches set to OFF. With the switches set to ON, speakers will not operate.





## **CHECK POINTS BEFORE OPERATION**

- **BEFORE SWITCHING THE POWER ON, CHECK THE FOLLOWING ITEMS:**

1. The VOLUME control and LEVEL controls are set at MIN.
2. The MODE switch is set at CHECK.
3. The BASS and TREBLE controls are all set at FLAT.
4. The OUTPUT switch is set at ON.
5. The TAPE MONITOR switches (1, 2) are set at OFF. (The switches should be set at ON for a tape playback only).

- **CHECKING INTERACTION BETWEEN CHANNELS AND SPEAKER SYSTEMS**

Play a record or receive some radio stations, with the four LEVEL controls set at MIN and the VOLUME control turned slightly to the right. First, turn the CH. 1 LEVEL control to the right and confirm that the FRONT LEFT (CH. 1) speaker system is in operation. Then, turn the CH. 2 LEVEL control to the right and confirm that the REAR LEFT (CH. 2) speaker system is in operation. Likewise, confirm the operations of the FRONT RIGHT (CH. 3) and REAR RIGHT (CH. 4) speaker systems by turning the LEVEL controls (CH. 3) and (CH. 4), respectively.

If any other speaker system than the proper one is operating during the above verification test, check the connection of that particular speaker system.

- **LEVEL BALANCE ADJUSTMENT AMONG 4 CHANNELS**

After checking the interaction between channels and speaker systems, return the VOLUME control to MIN, and turn the four LEVEL controls fully clockwise. Then, set the VOLUME control to a normal volume for your listening, and see if the level balance among four channels is complete. If the level of any particular channel is unbalanced, adjust the level balance by turning the LEVEL control of that channel.

## RECORD PLAYING

1. When records are played by the turntable connected to PHONO 1 jacks, set the SELECTOR switch to PHONO 1. Likewise, when records are played by the turntable connected to PHONO 2 jacks, set the SELECTOR switch to PHONO 2.
2. Set the MODE switch to 4 CH MATRIX.
3. Set the matrix switch according to the type of record to be played.  
Regular matrix  
4-channel record . . . . . REGULAR position  
SQ matrix  
4-channel record . . . . . SQ position  
Note that the REGULAR and SQ positions may be used for reproduction of ordinary stereo records, in which a matrix effect will result.
4. Set VOLUME, BASS, and TREBLE controls to desired positions.

- NOTES:
1. To reproduce 2-channel stereo records in the usual manner, set the MODE switch to 2 CH FRONT + REAR or 2 CH FRONT.
  2. A separate adaptor is required to reproduce CD-4 records. In this case, set the MODE switch to 4 CH DISCRETE.

## RADIO RECEPTION WITH TUNER

1. Set the SELECTOR switch to TUNER.
2. Set tuner controls to receive a station of your choice.
3. Set the MODE switch to 4 CH MATRIX. (In the case of AM or FM monophonic reception, set the MODE switch to 2 CH FRONT + REAR or 2 CH FRONT position.)
4. Set the MATRIX switch to the REGULAR or SQ. These steps set up the system for reception of matrix 4-channel FM stereo broadcasts. Note that matrix reproduction (REGULAR or SQ position) may also be used for listening to ordinary 2-channel stereo broadcasts.
5. Set volume and tone controls to desired positions.

## PLAYBACK WITH CARTRIDGE TAPE PLAYER

1. Set the SELECTOR switch to AUX 1 or AUX 2 (whichever accommodates the tape player).
2. In the case of a 4-channel cartridge tape, set the MODE switch to 4 CH DISCRETE. In the case of a 2-channel cartridge tape, set the MODE switch to 4 CH MATRIX. Set the MATRIX switch to REGULAR or SQ.
3. Set the tape player into operation, beginning playback.
4. Set volume and tone controls to desired positions.

- NOTE: Set the MODE switch to 2 CH FRONT + REAR or 2 CH FRONT for reproduction of 2-channel stereo source.

## RECORDING AND PLAYBACK WITH TAPE DECK

### • PLAYBACK

1. Depress the TAPE MONITOR (1 or 2) switch corresponding to the tape deck to be used, that is, to TAPE 1 MON or TAPE 2 MON jacks.
2. If a 4-channel tape is to be reproduced, set the MODE switch to 4 CH DISCRETE. If a 2-channel tape is to be reproduced, set the MODE switch to 4 CH MATRIX and the MATRIX switch to REGULAR or SQ.
3. Set the tape deck into operation, beginning playback.
4. Set volume and tone controls to desired positions.

NOTE: For reproduction of 2-channel stereo, set the MODE switch to the 2 CH FRONT + REAR or 2 CH FRONT position.

### • RECORDING

As shown in Fig. 6, a live signal selected by the SELECTOR switch is always appearing at TAPE 1 REC and TAPE 2 REC jacks. Operate the QC-800A as described in RECORD PLAYING and RADIO RECEPTION on page 11.

- NOTES:
1. The MODE switch, MATRIX switch, VOLUME, BASS, TREBLE, controls cannot control the signal appearing at TAPE 1 REC and TAPE 2 REC jacks.
  2. Control the recording level with the controls on the tape deck.
  3. When recording a 2-channel program source as a 4-channel program, or when recording the signal controlled by the controls of the QC-800A, connect the tape deck to OUTPUT jacks.

### • MONITORING

When a three-head tape deck equipped with monitor function is used, recording can be monitored by operating the TAPE MONITOR switch if the recording and playback connections are provided.

### • DUPLICATING OR EDITING RECORDED PROGRAMS WITH TWO TAPE DECKS

You can make your own "Tape Library" by duplicating or editing recorded programs, using two tape decks combined with the QC-800A. For instance, you can record only your favorite music from an FM stereo program recorded on tape.

1. Connect two tape decks as shown in Fig. 7.
2. Set the TAPE MONITOR switch 1 to ON, and reproduce a recorded program by operating the tape deck connected to TAPE 1 MON.
3. Record the playback in the way you want by operating the tape deck connected to TAPE 2 REC (MON). Operating the TAPE MONITOR switch 2 allows you to monitor a recording in progress.

- NOTES:
1. Make sure to set the TAPE MONITOR switch 1 to ON.
  2. Recording with a PAUSE switch-provided tape deck will facilitate duplicating or editing of recorded programs.

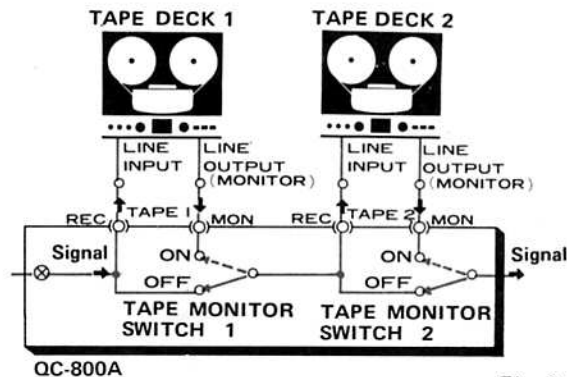


Fig. 6

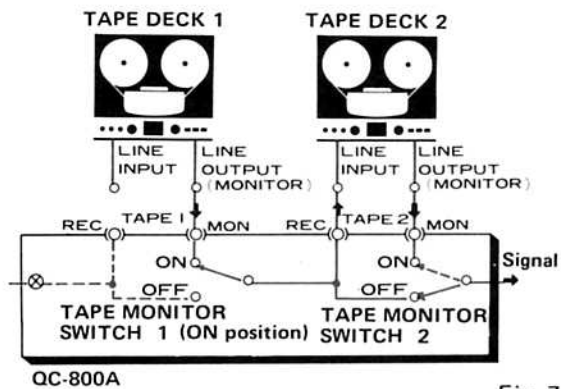


Fig. 7

# MATRIX 4-CHANNEL DECODER

There are two types of matrix 4-channel systems, the regular matrix and the SQ matrix. Source information comes directly from matrix 4-channel records now available on the market or indirectly from FM broadcasts of such records. As these methods are not compatible, two decoders must be added to obtain 4-channel reproduction which exhibits the inherent features of each.

## REGULAR MATRIX

As shown in the figure 8, signals  $L_T$  and  $R_T$  from a matrix 4-channel record (or FM broadcast) pass through phase shifters and appear as four separate outputs. This figure also shows that the  $\alpha$  portion of signal  $R_T$  is added to signal  $L_T$  to form front left signal  $L_F$  and that the  $\alpha$  portion of signal  $L_T$  is added to signal  $R_T$  to form front right signal  $R_F$ . The  $\beta$  portion of signal  $R_T$  with phase led  $90^\circ$  ( $+jR_T$ ) is added to signal  $L_T$  with phase lagged  $90^\circ$  ( $-jL_T$ ) to form rear left signal  $L_R$ , while the  $\beta$  portion of the  $-jL_T$  signal is added to the  $+jR_T$  signal to form rear right signal  $R_R$ .

$$\begin{aligned} L_F \text{ (front left, CH. 1):} & L_T + \alpha R_T \\ R_F \text{ (front right, CH. 3):} & R_T + \alpha L_T \\ L_R \text{ (rear left, CH. 2):} & -jL_T + j\beta R_T \\ R_R \text{ (rear right, CH. 4):} & +jR_T - j\beta L_T \end{aligned}$$

$L_T$  and  $R_T$  are signals from a record or FM broadcast. Term  $-j$  denotes that the phase of the signal has been lagged  $90^\circ$  (with a phase shifter), while term  $+j$  denotes that the phase of the signal has been led  $90^\circ$ .

Using this approach, unnatural images are eliminated and at the same time realism is effected. Even if 2-channel stereo records (FM broadcasts) supply the source material, the resultant effect is an improvement over ordinary 2-channel stereo sound.

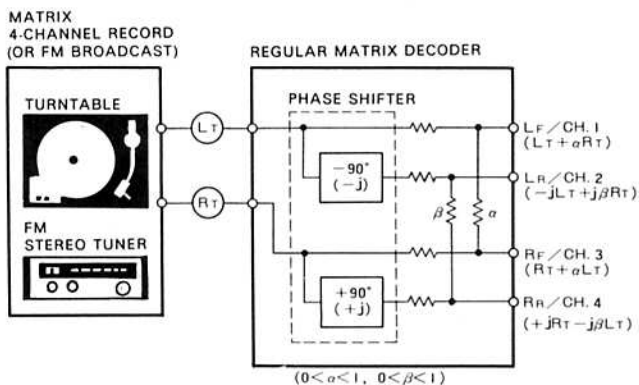


Fig. 8

## SQ MATRIX

As shown in the figure 9, signals  $L_T$  and  $R_T$  from an SQ matrix record (or FM broadcast) pass through phase shifters and appear as four separate outputs. This figure shows that signal  $L_T$  becomes signal  $L_F$  (CH. 1) and that signal  $R_T$  becomes signal  $R_F$  (CH. 3), without any alteration.

A phase shifter lags the phase of signal  $L_T$  by  $90^\circ$ , after which the lagged signal is added to signal  $R_T$ . Level of the resultant signal is dropped by  $1/\sqrt{2} \approx 0.7$  and phase is inverted to form CH. 2 signal  $L_R$  (CH. 2). In the same manner, signal  $L_T$  is added to signal  $R_T$  with phase lagged  $90^\circ$ . The level is reduced by  $1/\sqrt{2}$  to form signal  $R_R$  (CH. 4).

$$\begin{aligned} L_F \text{ (CH. 1):} & L_T \\ R_F \text{ (CH. 3):} & R_T \\ L_R \text{ (CH. 2):} & +j0.7L_T - 0.7R_T \\ R_R \text{ (CH. 4):} & -j0.7R_T + 0.7L_T \end{aligned}$$

Thus, it is seen that separation in the SQ matrix system is better than that in the regular matrix system, that is, separation between  $L_F$  and  $R_F$ . A principal feature of the SQ matrix is the use of logic circuitry, a feature which cancels rear center sound when front center sound exists or vice versa. This arrangement also leads to naturalness in reproduction.

In matrix reproduction of 2-channel records (FM broadcasts), front ( $L_F, R_F$ ) separation theoretically becomes infinite. At the same time, rear signals are  $90^\circ$  out of phase to front ( $L_F, R_F$ ), resulting in a feeling of depth which corresponds to a large hall.

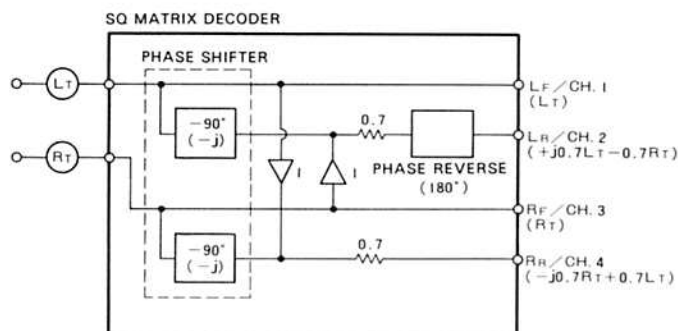


Fig. 9

## CONDITIONS FREQUENTLY MISTAKEN FOR MALFUNCTION

Noise: There are a variety of noises relating to the operation of a hi-fi unit. These are generally divided into two types; (1) the unit is faulty (a resistor or part has deteriorated) and (2) an external source is adding to the unit.

When a hi-fi unit produces an unpleasant noise, it is often assumed that the unit is faulty, but statistical records indicate that the majority of

noises produced in hi-fi acoustic units result from external sources of noise: Due to the inherent high sensitivity and the high fidelity in reproduction, the unit amplifies and reproduces extraneous noises, into definite output noise. If your amplifier produces a noise, check according to the following table and trace out the source of noise for the appropriate corrective action.

TO LOCATE THE CAUSE OF TROUBLES, FOLLOW THE CHART BELOW. CHECK NOT ONLY QC-800A BUT ALSO THE TUNER AND/OR TURNTABLE OF THE SYSTEM.

	SYMPTOM	SUSPECTED SOURCE OF NOISE	DIAGNOSIS AND REMEDY
WHEN LISTENING TO BROADCASTS	Continuous or intermittent noise like jiiiii or zzzzzz.	<ul style="list-style-type: none"> <li>• Static (lighting)</li> <li>• Fluorescent lamp, motor, or thermostat may be in use in house or in the vicinity of the house.</li> </ul>	In many cases, it is very difficult to remove the source of noise. In order to make the radio input larger than the noise level, set up a good outdoor antenna and make a complete grounding.
	When a station is tuned in, hum is mixed in the program.	<ul style="list-style-type: none"> <li>• Poor fluorescent lamp, motor or electric heater may be in use in house or near the house.</li> </ul>	Reversing the line plug may occasionally alleviate this noise problem. Usually it is very difficult to eliminate the noise.
	Static noise (in particular, when automobiles run close to the house).	<ul style="list-style-type: none"> <li>• White noise generated from automobile engines.</li> <li>• High frequency sewing machine or welding machine being used near your house.</li> </ul>	In an area surrounded by hills or high buildings, the FM input signals are very weak. Thus the noise limiter in the circuit loses its function. Set up an FM outdoor antenna having many director elements.
	Reception or FM stereo program contains more noise than FM mono program.	<ul style="list-style-type: none"> <li>• Note that the service area covered by an FM stereo broadcast is about 50% of that of a regular mono broadcast.</li> </ul>	Increasing FM input signal may alleviate this problem. Use an exclusive FM outdoor antenna instead of the indoor T-type antenna.
WHEN PLAYING RECORDS	Hum of buzz. When switched to radio reception, the noise disappears. Treble is not clear.	<ul style="list-style-type: none"> <li>• Poor connection of shielded wire (a)</li> <li>• Jack connection is loose. (b)</li> <li>• Line cord or fluorescent lamp is near the shielded wire. (c)</li> <li>• Poor grounding (d)</li> <li>• HAM transmitting station or TV transmitting station is near your house. (e)</li> </ul>	Correct the conditions stated in (a), (b), (c) or (d). In case of (3), report it to an official activity.
	Output tone quality is poor and mixed with noise.	<ul style="list-style-type: none"> <li>• Stylus wears out. (a)</li> <li>• Record wears out. (b)</li> <li>• Dust adheres to stylus (c)</li> <li>• Stylus is improperly mounted. (d)</li> <li>• Stylus pressure is not proper. (e)</li> <li>• The TREBLE level is too high.</li> </ul>	Check (a) through (e) and correct the condition.

WATCH FOR THE FOLLOWING CONDITIONS; THESE ARE ALSO APT TO BE MISTAKEN FOR MALFUNCTION.

	SYMPTOM	SUSPECTED SOURCE OF NOISE	DIAGNOSIS AND REMEDY
	Power is not turned on although the power switch is set to ON.	<ul style="list-style-type: none"> <li>• Fuse blows. (a)</li> <li>• Line plug is loose. (b)</li> </ul>	Check (a) and (b) and correct the condition.
	In playing a record, increasing the volume causes howling.	Distance between the turntable and the speakers is too short. The place on which the turntable or speakers are set is unstable.	Change the distance or rearrange the installation increase of the unit and speakers. (Installing the turntable on a firm, solid stand may alleviate this problem.) Do not enhance the BASS sound level excessively.



# SPECIFICATIONS

## SEMICONDUCTORS

FET(s) . . . . .	4
Transistors . . . . .	48
Diodes . . . . .	9

## PREAMPLIFIER SECTION

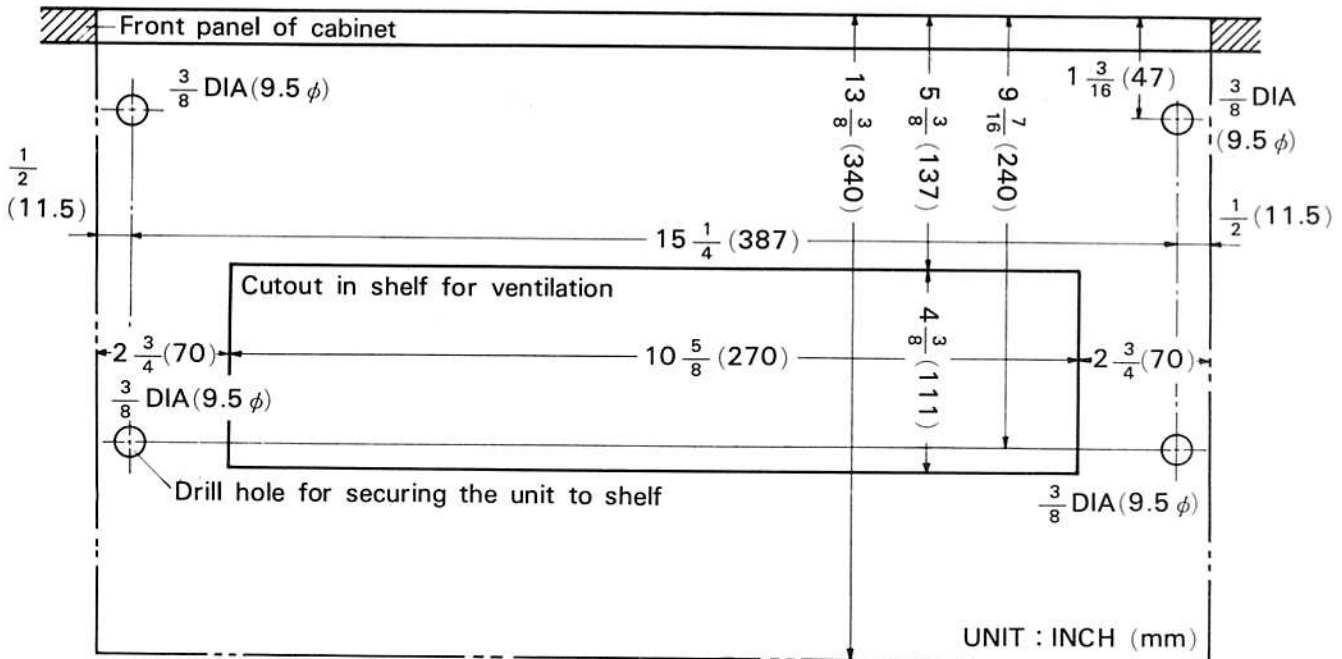
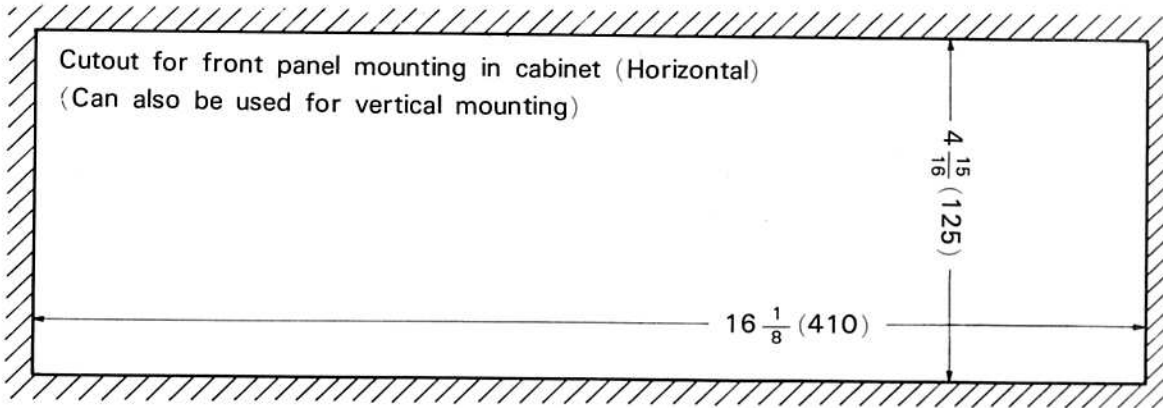
Output Voltage	2.5V ( rated output), 4V (max.)	
Harmonic Distortion	Less than 0.05% ( at rated output)	
Frequency Response	10Hz to 70kHz, $\pm 1$ dB	
Input Sensitivity/Impedance (1kHz, for rated output)	PHONO 1 MAG	2.5mV/50k $\Omega$
	PHONO 2 MAG	2.5mV/50k $\Omega$
	TUNER	150mV/180k $\Omega$ (4-CH.)
	AUX 1, 2	150mV/180k $\Omega$ (4-CH.)
	TAPE MONITOR 1, 2	150mV/220k $\Omega$ (4-CH.)
Recording Output	TAPE REC 1, 2 (pin jack) 150mV(4-CH.)	
BASS Control	-9dB, +12dB/100Hz (3dB step)	
TREBLE Control	-12dB, +9dB/10kHz (3dB step)	
LOW Filter	-8dB/50Hz (6dB/oct.)	
HIGH Filter	-8dB/10kHz (6dB/oct.)	
Equalization Curve	PHONO: RIAA S.T.D.	
Muting	-20dB	
Hum and Noise (IHF short circuit, A network)	PHONO	More than 80dB
	TUNER, AUX	More than 100dB
Output Jacks	Output 1, 2 (4-CH.)	
Output Impedance	Less than 50 $\Omega$	
Load Impedance	More than 10k $\Omega$	
Headphone Jacks	Front and Rear	

## MISCELLANEOUS

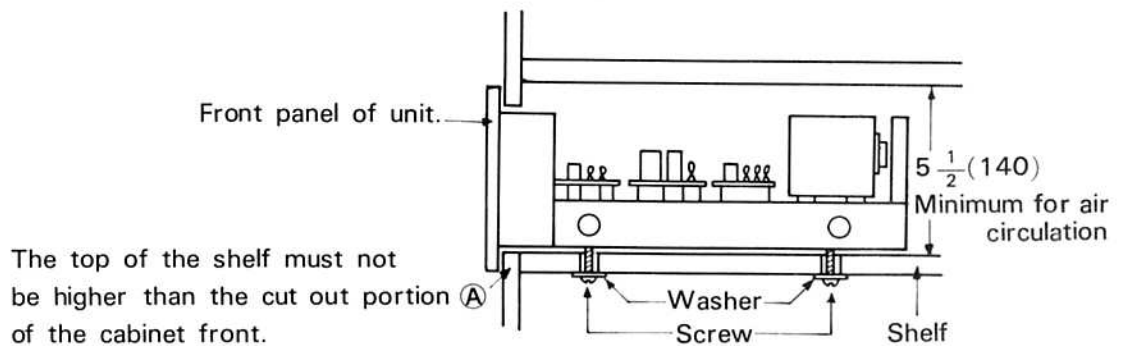
Power Requirements	110V, 120V, 130V, 220V and 240V (Switchable) 50-60Hz	
Power Consumption	5W (Max.)	
AC Outlets	Switched 2, unswitched 2	
Dimensions (overall)	16-15/16in./430mm (width)	
	5-7/16in./138mm (height)	
	13-1/4in./337mm (depth)	
Weight	Without package	16 lb 12oz/7.6 kg
	With package	21 lb 2oz/9.6 kg
Furnished Parts	Pin plugs	4
	Polishing cloth	1
	Connection cords	2
	Operating instructions	1

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

# MOUNTING TEMPLATE



Remove the four feet on the bottom plate of the unit.



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