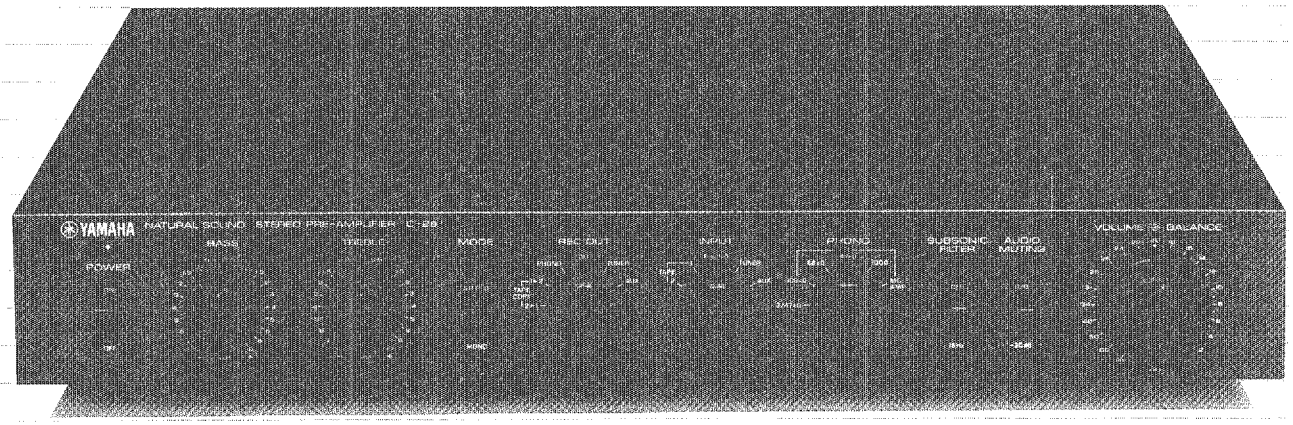
YAMAHA STEREO PRE-AMPLIFIER C-2a

OWNER'S MANUAL



CENTER

U/C

YAMAHA offers you thanks and congratulations on your choice of the Stereo Control Amplifier C-2a.
The C-2a combines in a modern and functional control amplifier the same standards of knowhow that have made available YAMAHA's top-notch control amplifier C-1 with new developments including the improved signal-to-noise ratio at the time of cartridge installation and the continuously variable frequency turnover ability. It further embodies many functional facilities, i.e. REC OUT SELECTOR, CARTRIDGE LOAD CONTROLS as well as the built-in MC amplifier, to make itself a truly talented performer.
In order to make the most of the C-2a's excellent performance ability for its long service life, please read this manual carefully before starting to use it.

FEATURES

- The Equalizer Amplifier adopts a dual FET differential amplifier in the first stage.
  A sufficient dynamic margin of 350mV (1 kHz, 0.01% distortion) and an excellent 92dB SN ratio are available.
  Special about the C-2a is a high SN ratio and a low distortion factor at the time of actual cartridge matching.
  Further, the RIAA deviation within ±0.2dB (20Hz~20kHz) ensures flat frequency response, making possible high-fidelity reproduction of recorded signals to the maximum extent.

- The Head Amplifier for MC cartridge uses a 4-stage symmetrical push-pull circuit. It enables an extensive noise reduction of better than 78dB SN ratio, which more than satisfies MC cartridge requirements.

- The PHONO selector on the C-2a lets you choose between a number of load impedance settings so that you can match the output impedance of various MM cartridges. Among the 47kΩ, 68kΩ, 100kΩ, and 100Ω positions, the 100Ω setting is also appropriate for some high output MC cartridges. This selector gives you the freedom to enjoy a wide variety of phono cartridges without any mismatching problems affecting response.

- Greatly improved S/N ratio and distortion at low volume has been obtained by employing a level crossover system with a 6-ganged variable resistor in the volume control.

- Yamaha's unique REC OUT Selector Switch allows recording another program while it is reproducing one.

- The REC OUT and PRE OUT terminals use a muting relay to prevent noise from turn on and turn off transients.

- All resistors, capacitors, and other parts are selected for high reliability and precision performance. Quality extends all the way to the machined gold-plated input and output jacks.

CONTENTS

IMPORTANT!

Please record the serial number of your unit in the space below

Model Name C-2a

Serial No.

The serial number is located on the rear of the chassis.
Retain this Owner's Manual in a safe place for future reference.

C-2a

CAUTION: READ THIS BEFORE OPERATING YOUR C-2a

1

The C-2a is a high performance pre-amplifier with low distortion and versatile controls. This manual is required reading if you are to get the best from its special features and controls.

2

Do not drop or otherwise jar the C-2a, which is a precision electronic instrument.

3

Do not place the C-2a where it will be exposed to direct sunlight, excessive heat (for instance over a power amp.) cold, moisture, or dust.

4

Do not use chemical solvents (such as benzene or alcohol) to remove traces of dirt. Wipe only with a soft, slightly damp cloth.

5

Do not attempt to carry out internal adjustments or repairs. Leave these to your authorized service representative.

6

Do not assume your C-2a is faulty before checking the Troubleshooting list on page 18 for common operating errors.

7

Operate all switches and knobs in accordance with the instructions. Avoid applying undue force, which should never be necessary, and do not attempt to use intermediate settings.

8

Note that the muting circuit keeps the C-2a silent for several seconds after switching ON, to prevent the pops and clicks that can sometimes occur.

9

Always switch the POWER OFF and disconnect all terminals if the C-2a is to be relocated. When shipment is required, the C-2a should be carefully packed (in its original carton) to protect it against damage.

10

Keep this manual in a safe place for future reference, and refer to it frequently until you are perfectly familiar with all C-2a controls and functions.

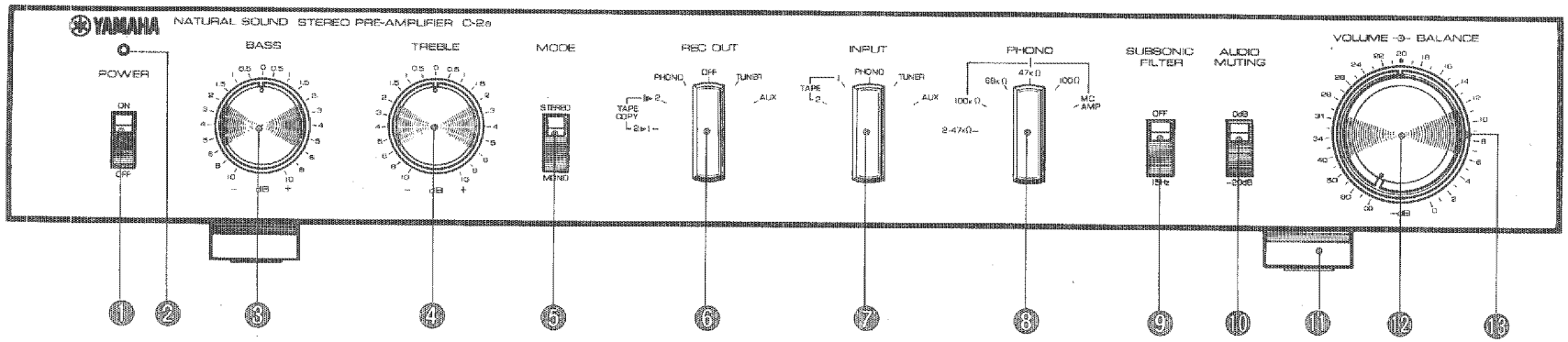
11

Do not connect other audio equipment to the spare AC outlet sockets on the rear panel if they will require more power than the outlets are rated to provide.

Warning – to prevent fire or shock hazard, do not expose this appliance to rain or moisture.

C-2a

FRONT PANEL AND CONTROLS



① POWER ON/OFF Switch

Switch ON to connect main electrical supply. The C-2a will remain silent for a few seconds while the muting relay isolates PRE OUT and REC OUT terminals from unwanted transients.

② POWER LED Indicator

This illuminates when the POWER switch is ON and the main supply connected.

③ BASS Tone Control

This 21-position, 20-step control offers extremely precise and delicate control of bass frequency response, with a 350Hz turnover frequency. The figures indicate dB of lift or cut at the 20Hz reference frequency (Refer to P12).

④ TREBLE Tone Control

Similar to the BASS tone control, this control has a 3.5kHz turnover frequency, and the figures indicate dB of lift or cut at the 50kHz reference frequency. The zero ('0') setting for both TREBLE and BASS controls is a full tone-defeat position (Refer to P12).

⑤ MODE Switch

This switch allows you to select a reproduction mode of a program source connected to the input terminal. By switching it to "STEREO", normal stereo reproduction is obtained, and by switching it to "MONO", monaural reproduction.

⑥ REC OUT Selector Switch

This switch selects the signals to be recorded by the tape deck connected.

Since the REC OUT selector is completely independent from the INPUT selector, you can listen to one program source while simultaneously taping another (from the rear panel REC OUT terminals).

*1. Recording is impossible when the switch is in the OFF position.

*2. Please refer to Page 11 for instructions.

⑦ INPUT Selector Switch

This switch is used to select the program source of your choice, whether PHONO, TUNER, one of two TAPE decks, or AUX (mic mixer, or 8-track tape cartridge playback, etc.).

⑧ PHONO Selector Switch

This switch is used to select a turntable connected to the amplifier and also to change load impedance.

- When a turntable connected to PHONO-1 is provided with —

  1. MC (moving coil) type cartridge

  Turn PHONO selector switch to "MC" position. If this cartridge is of low impedance and high output MC type, turn the switch to "100Ω" potition.

  2. MM (IM, MI, etc.) cartridge

  Turn PHONO selector switch to the optimum load impedance value specified by the manufacturer of such a cartridge. To change the frequency characteristics to some extent is also possible by changing load resistance, thus permitting you to produce tonal quality of your taste.

  *For this, please refer to "Cartridge Load" in page 13.

  Avoid turning PHONO selector switch to MC position when a MM type or alike high output cartridge is connected to PHONO-1 terminals.

- To use a turntable with a MM type (IM, MI, etc.) cartridge connected to PHONO-2 terminals, turn PHONO selector switch to "2/47kΩ" position. Load impedance on PHONO-2 is fixed at 47kΩ, in other words, no change of load impedance is possible. Following the above instructions, you can choose and use either PHONO-1 or -2 depending on your need.

⑨ SUBSONIC FILTER (OFF / 15 Hz)

This cuts frequencies below 15HZ at 12 dB/octave. These frequencies can consume power without contributing to the music enjoyment of your system.

⑩ AUDIO MUTING 0 dB / —20 dB

This offers a straight 20dB reduction in signal level without having to adjust the volume control. It should be used whenever raising or lowering the tone arm of your turntable.

⑪ Angled Supporting Feet

The special hinged feet under the C-2a, near the front panel, can be swung out to support the C-2a at a slight angle for easier visibility in certain locations. Please make use of them if you feel them appropriate in your situation. (See page 12.)

⑫ VOLUME Control

Turning this control counter-clockwise from the maximum ('0') position gives the indicated degree of output signal attenuation. Control is continuous, and the degree of attenuation extremely accurate over the whole range.

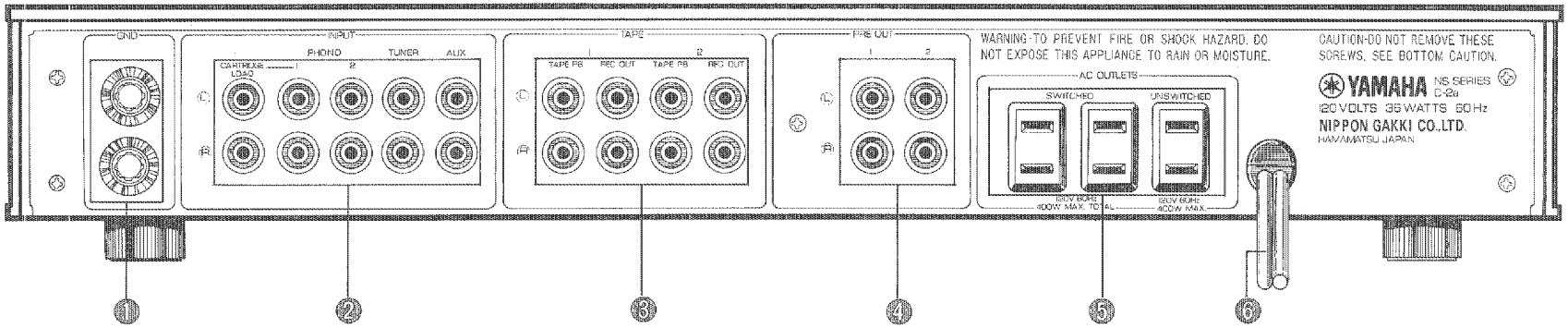
When turning ON the POWER switch, always turn this control fully counterclockwise (∞).

⑬ BALANCE Control

The knurled ring around the VOLUME control is the BALANCE control, which determines the relative volume of L and R channels. Normally set with the indentation beneath the white central dot, it is used to achieve the correct stereo balance between channels.

C-2a

REAR PANEL AND CONNECTIONS



① GND (Ground) Terminals

Two ground terminals are provided for grounding turntable units, etc. Please make sure that all such units are firmly grounded: failure to connect the ground leads can result in unpleasant hum.

② INPUT Terminals

These are the terminals to which the sources selected by the INPUT Selector and PHONO Selector should be connected, including CARTRIDGE LOAD, PHONE 1, 2, TUNER, and AUX. Note that the left channel terminals are on the top row.

③ TAPE 1/2 PB and REC OUT Terminals

Two tape decks can be connected to these input and output terminals. Recordings can be made on both tape decks at the same time, and tapes can be dubbed from one tape deck to the other, in either direction, according to the REC OUT SELECTOR switch , independent of the source being played.

④ PRE OUT 1/2 Terminals

Two pairs of output terminals are provided, for connection to a second power amplifier, or for passage via a frequency dividing network for multi-amplifier configurations or, with the B-2 power amplifier, for level measurement by external meters. The terminals are in parallel, and both carry the same signal.

⑤ AC OUTLETS

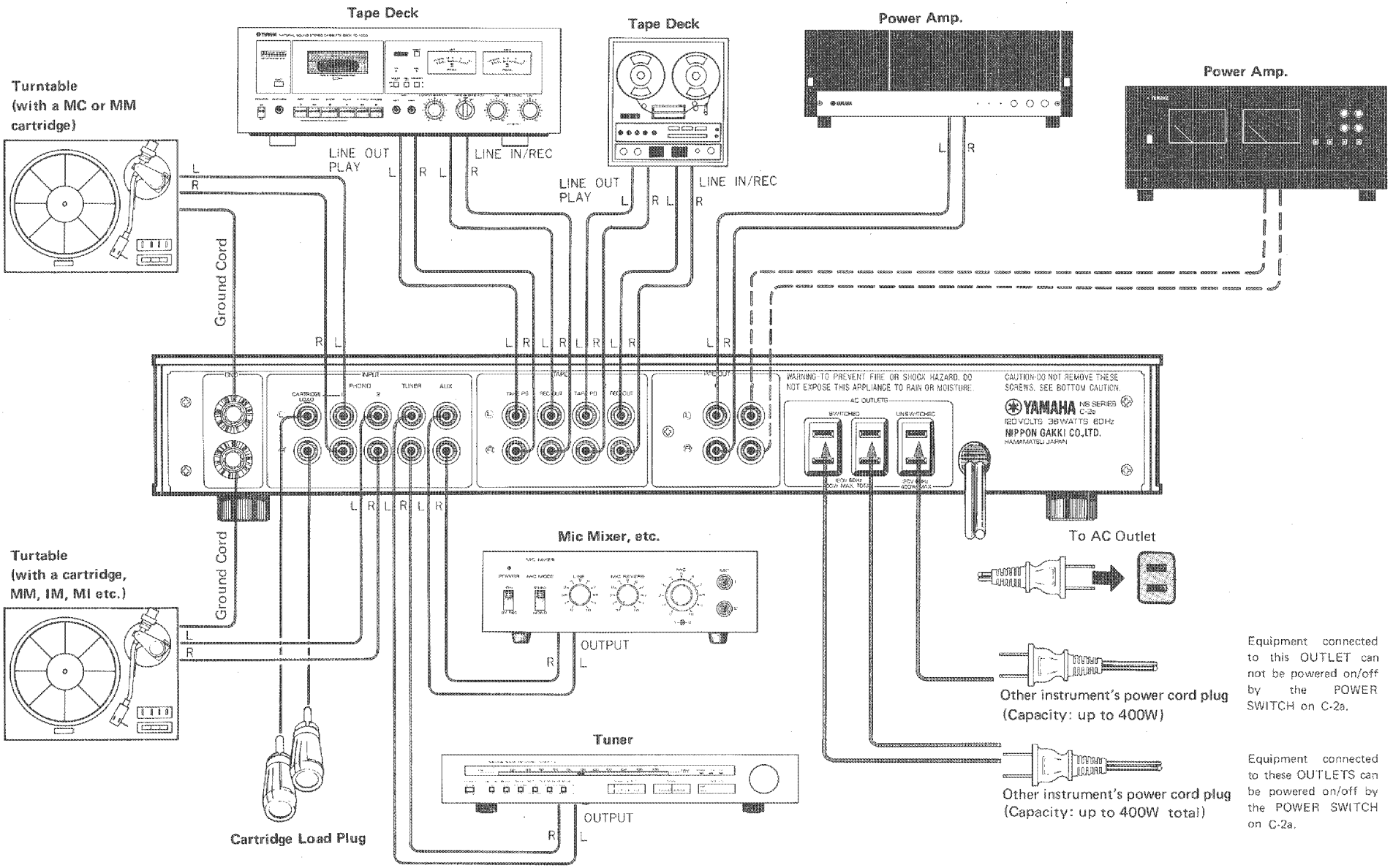
Units with moderate electrical power consumption, such as turntables, tuners, etc., can receive their line power via the spare electrical AC OUTLET sockets at the rear of the C-2a. The two SWITCHED and one UNSWITCHED sockets can only supply a total of 400 Watts, respectively. Do NOT exceed these figures.

⑥ AC Power Cord

The electrical power cord will have been provided with the type of plug used in your area, and your dealer will confirm that the voltage of your local supply is suitable. Just plug in to normal domestic AC outlets or, since power demand is small, to the spare AC outlet on a power amplifier or another piece of audio equipment.

C-2a

CONNECTION DIAGRAM



Note: Make sure that L and R are rightly connected when making

Note: Take care not to bring a speaker cord close to the PHONO

C-2a CONNECTIONS AND HOW TO USE

CONNECTING THE POWER SUPPLY

After making sure the power switch is off, plug the C-2a AC power cord into a wall socket of the correct voltage. When traveling, or otherwise not using the amp for extended periods of time, it is recommended that you unplug the cord from the AC outlet.

CONNECTING A POWER AMPLIFIER

The input terminals on the power amplifier may be connected to the PRE OUT terminals 1 or 2 via standard pin-plug cables. The provision of two sets of output terminals means that two power amplifiers can be connected, although the power amplifier switches will have to be used to select which output is amplified: the C-2a has no output switch.

*When connecting a single unit of power amplifier to a PRE OUT terminal, never insert a short pin or alike to the other PRE OUT terminal.
When you have two power amplifiers connected to the PRE OUT terminals, you should not leave one of the power amps off while using the other one alone. As long as an amp is connected to the PRE OUT terminals, its impedance will affect the performance of another amplifier if one amp is off and the other on. Therefore, to avoid deterioration of sonic quality, make sure to actually use both amps, if you have two amps connected.

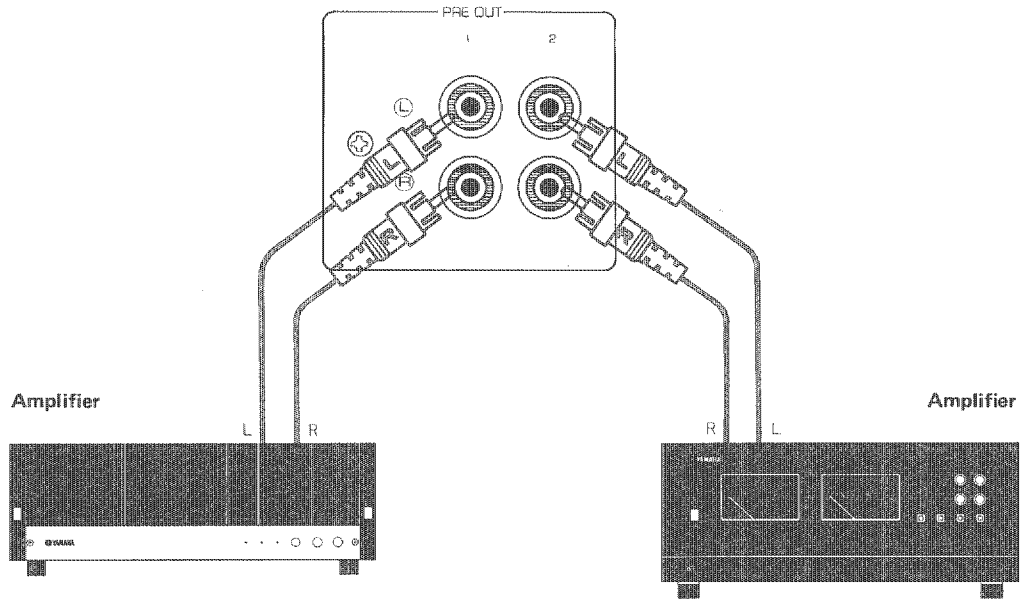
Note CAREFULLY the following points:

1. Connections must always be made with the POWER switch OFF.
2. Care should be taken not to reverse the L and R channel connections.
3. The C-2a GND (ground) terminals must NOT be used to connect the ground (common) terminals for the output of a power amplifier.

CONNECTING AND OPERATING VARIOUS AUDIO COMPONENTS

Where your C-2a is provided with spare rear panel AC outlets, use these to plug in the components to be used. The switched outlets should be used for turntable units and tuners, etc., which are used frequently. In this way you will turn them on and off with the C-2a, with no chance of forgetting to switch off afterwards.

Fig. 1 Amplifier Connection



CONNECTING A TURNTABLE UNIT

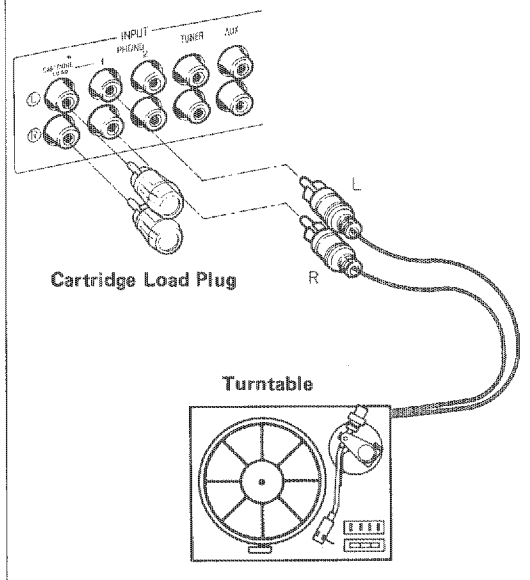
1. Connecting to PHONO-1 terminals
   PHONO-1 terminals allow connection of turntable equipped with either a MM (IM, MI, etc.) type cartridge or a MC type cartridge. PHONO selector switch offers a selection of input impedances to match a cartridge in use on the terminals.
   *Do not fail to switch PHONO selector to the 100Ω position or to the MC position when you use a MC cartridge.

2. PHONO-2 terminals are for connecting a turntable with a MM (IM, MI, etc.) type cartridge. The terminals must not be connected to a turntable equipped with a MC type cartridge because the terminals lack a MC head amplifier.
   *When connecting a turntable to phono-1 or -2 terminals, make sure that the left and right channels are properly connected. (Red is normally right.)

3. CARTRIDGE LOAD terminals
   Plug a cartridge load plug into this CARTRIDGE LOAD terminal and select the optimum input impedance for a turntable with a MM type cartridge connected to PHONO-1 terminals. (Fig. 2)
   *Refer to "Cartridge Load" in page 13 .

Fig. 2 Turntable Connection

Note: Load capacity is rated at 220pF, without a cartridge load plug in.



Do not forget to connect the turntable ground cord to the GND post.

RECORD REPRODUCTION

Turn the POWER switch ON and note that the power indicator lamp illuminates. The BASS, TREBLE and BALANCE controls should be in the mid-position, and the VOLUME at minimum (— ∞). Turn the INPUT SELECTOR switch to the PHONO position. And the PHONO SELECTOR to the appropriate position corresponding to the input terminals to which the turntable unit has been connected. Lower the cartridge stylus onto the record, and gradually increase the VOLUME.
The MODE switch will enable you to hear a stereophonic recording monaurally. Make use of the MUTING switch to cut the volume instantly by 20dB while changing records, without having to turn down the VOLUME each time.

LISTENING TO A TUNER

Connect the tuner output to the TUNER input terminals with a standard pin-plug to pin-plug connecting cable. If more than one tuner is to be connected, the AUX terminals can be used. Level adjustment should be made, if the tuner has an output level control, so that there are no sudden changes in volume when switching from PHONO to TUNER or vice versa.

C-2a

TAPE DECK CONNECTION

TAPE DECK CONNECTION/ PLAYBACK

The cords provided with the Tape Deck are used to connect the deck's LINEOUT terminals to the TAPE PB terminals. Use the TAPE 1 terminals for your main deck. Use the TAPE 2 terminals for a second deck or as a spare pair. Set the INPUT selector switch to TAPE 1 to play back tapes (or to TAPE 2 if you are using the TAPE 2 terminals, of course).

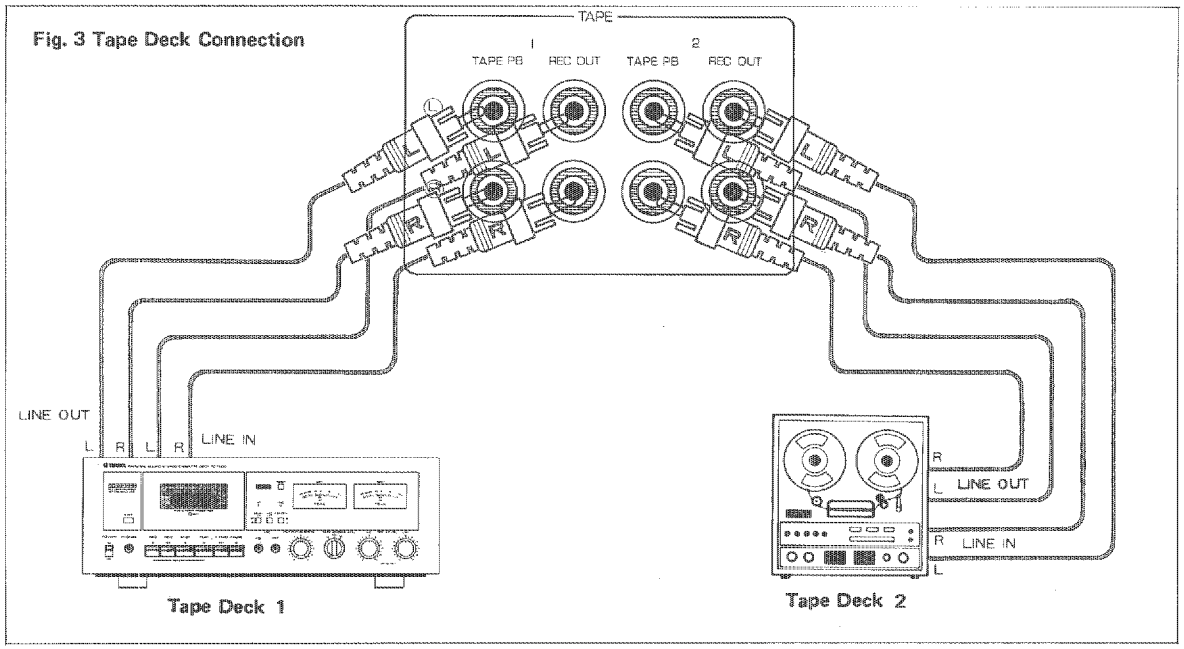
RECORDING

The cords provided with the tape deck are used to connect the deck LINE IN terminals to the REC OUT terminals. Again, you should use the TAPE 1 terminals for your main deck, keeping the TAPE 2 terminals for a second or spare pair.
Note that the INPUT selector switch setting has *no effect* upon the signal which will be recorded via these terminals. The REC OUT terminals: signal is decided by the REC OUT selector switch.

TAPE DUBBING (TAPE COPY)

The C-2a provides for dubbing from tape to tape with the tape decks 1 and 2 connected to the TAPE-1 and -2 terminals respectively. To dub from the tape deck 1 to the tape deck 2, place the REC OUT selector switch in the TAPE COPY 1 ▶ 2 position as shown in Fig. 4 , and operate the tape deck 1 in the playback mode and the tape deck 2 in the recording mode.
To dub from the TAPE-2 to the TAPE-1, place the REC OUT selector switch in the TAPE COPY 2 ▶ 1 position, and operate the tape decks 1 and 2 in the recording and playback modes respectively.

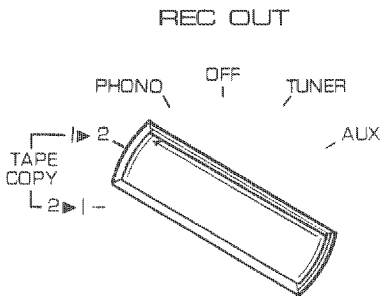
Fig. 3 Tape Deck Connection



Tape Deck 1

Tape Deck 2

Fig. 4 Rec Out Selector Setting



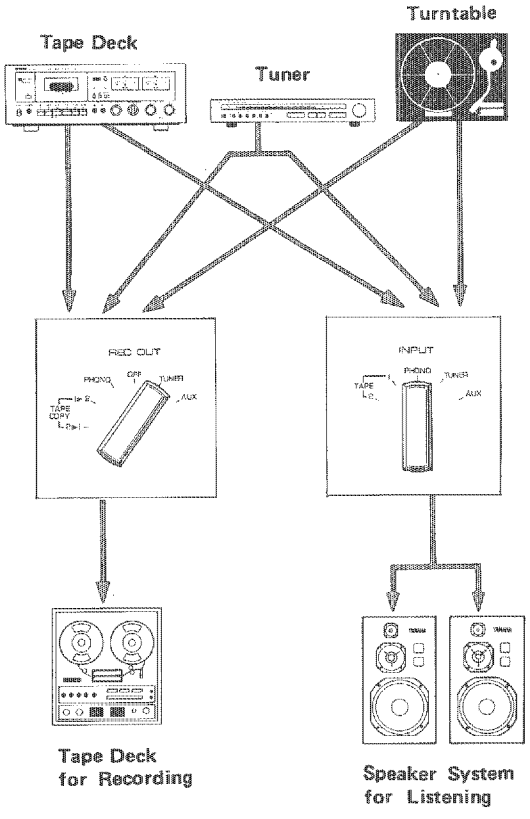
REC OUT SELECTOR

A program source from the REC OUT terminal can be recorded irrelevant to the program selected by the INPUT selector switch. For example, you can record an FM broadcast by placing the REC OUT selector switch in the TUNER position (Fig. 5) or dub a tape while listening to a disc through the speakers.

By matching other positions of the REC OUT and INPUT switches, you can enjoy various other program sources.
With the REC OUT selector switch in the OFF position, the C-2a is completely disconnected from the recording output terminals. Thus, when you are not recording, the C-2a will be protected from any adverse effects of unused tape deck input circuit impedances. Use this position when not recording.

Fig. 5

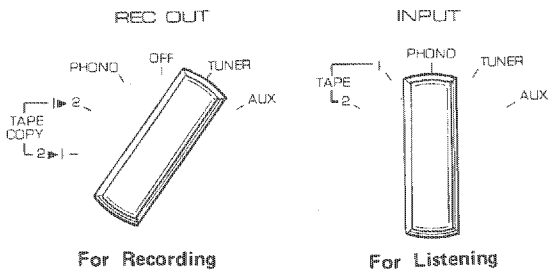
Recording One Program Source While Listening to Another



Typical examples:

INPUT Selector Switch	REC OUT Selector Switch	Speakers
PHONO	TUNER	You can record an FM or AM broadcast while listening to a disc through speakers.
TUNER	TUNER	You can record an FM or AM broadcast while listening to it.
PHONO	PHONO	You can listen to a disc through speakers while recording it.
TUNER	PHONO	You can record a disc while listening to an FM or AM broadcast.

Fig. 6 Rec Out Selector & Input Selector Setting

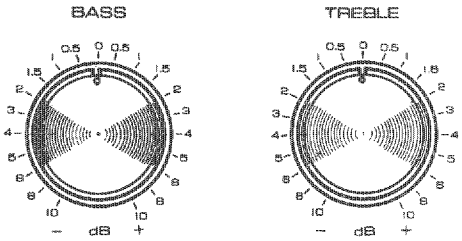


ADDITIONAL FUNCTIONS

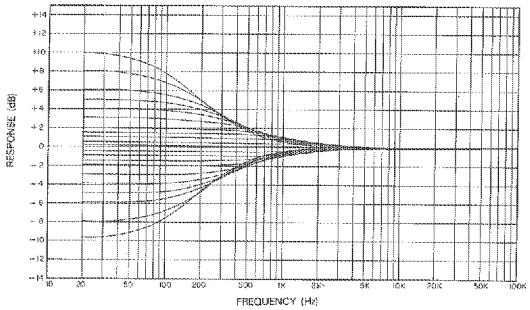
TONE CONTROLS

No separate tone defeat switch is provided in the C-2a out the zero ('0') center position on BASS and TREBLE tone controls has the same effect: with both controls in this position the C-2a functions as a flat amplifier. The provision of the extremely fine gradations of tone control (±0.5, ±1, and ±1.5dB) in addition to the more usual broader settings is useful in giving subtle compensation for individual phono cartridge characteristics, functioning to lift or depress response by exactly the amount selected, and effectively shifting the RIAA compensation curve.

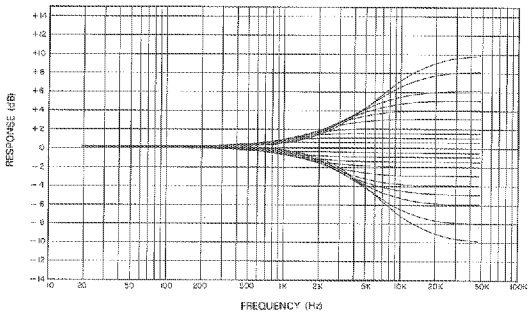
Fig. 7 Tone Controls



● **BASS Control Characteristics**



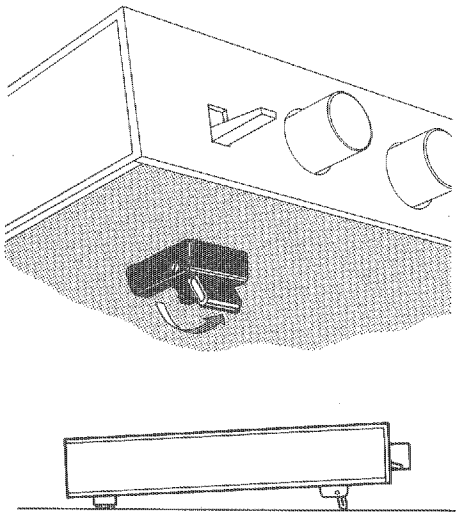
● **TREBLE Control Characteristics**



ANGLED SUPPORTING FEET

In certain locations it is convenient to be able to angle the control facia panel of the C-2as lightly upwards for greater accessibility and visibility. The special hinged feet under the C-2a near the front panel (see the illustration below), can be swung out to supoort the C-2a at a slight angle. Note that nothing should be placed on top of the C-2a when it is in the tilted position, particularly not a power amplifier.

Fig. 8 Angled Supporting Feet Setting



CARTRIDGE LOAD

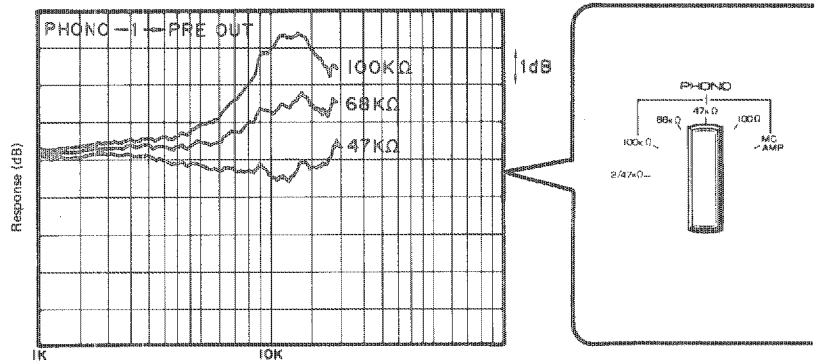
If PHONO terminal's input impedance fails to match a load resistance value specific to a cartridge in use, it will cause an inferior sound reproduction. The C-2a is provided with a PHONO switch which allows three different selections of input impedance – 47kΩ, 68kΩ and 100kΩ – to match a magnetic cartridge, such as a MM type. The frequency response can vary with the switched position as shown in Fig. 9. It also varies when a cartridge load plug is inserted into CARTRIDGE LOAD terminal, as in Fig. 9.

Some cartridges require other than a standard 220pF capacitive load. Two sets of cartridge loading plugs have been furnished to provide a phono input capacitance of 330pF or 470pF. If 220pF is desired do not plug any load into the provided terminals. If other than the described capacitance is desired, it can be calculated with the following formula:

Required load capacity(pF)=desired load capacity(pF)–220 (pF)

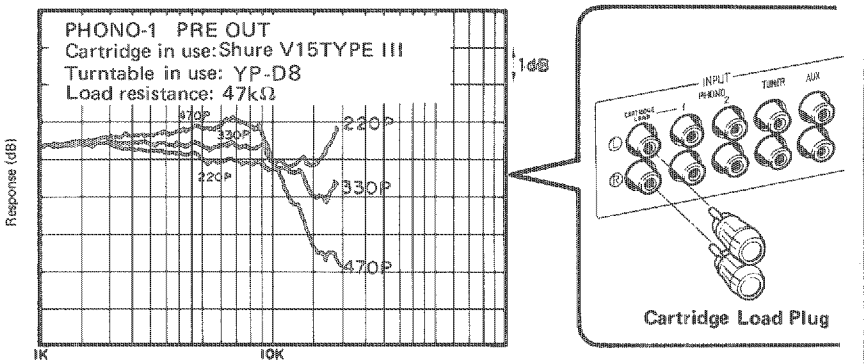
Fig. 9 Cartridge Load Plug

● Impedance Change & Cartridge Frequency Response ■ Change-over of Load Resistance



*The 100Ω position is for a low impedance high output MC cartridge

● Capacity Change & Cartridge Frequency Response ■ Change-over of Load Capacity



*Load capacity of PHONO-1, without a cartridge load plug in use, is rated at 220pF.

C-2a SPECIFICATIONS

Input Sensitivity/Impedance (at 1kHz)	
PHONO-1 (MM)	2.5mV/100Ω, 47kΩ, 68kΩ, 100kΩ
PHONO-1 (MC)	100μV/50Ω
PHONO-2	2.5mV/47kΩ
AUX, TUNER, TAPE-1, 2	150mV/47kΩ
Maximum Input Level	
PHONO-1, 2 (MM)	350mV at 1kHz 0.01% T. H· D
PHONO-1 (MC)	10mV at 20kHz 0.03% T·H·D
AUX, TUNER, TAPE-1, 2	1V at 20Hz to 20kHz 0.01% T·H·D
Ouptput Level/Impedance (at 1kHz)	
PRE OUT-1, 2	2.0V/250Ω
REC OUT-1, 2	150mV/100Ω
Maximum Output Level (20 to 20,000Hz)	
PRE OUT-1, 2	15V/0.01% T·H·D
REC OUT-1, 2	18V/0.01% T·H·D
Total Harmonic Distortion Ratio (20 to 20,000Hz)	
PHONO-1, 2 (MM) to REC OUT-1, 2	less than 0.003% (10V output)
PHONO-1 (MC) to REC OUT-1, 2	less than 0.01% (1V output)
AUX, TUNER, TAPE-1, 2 to PRE OUT-1, 2	less than 0.003% (10V output)

Total Harmonic Distortion Ratio by HP-IB Audio Analizer	
PHONO 1, 2 (MM) to REC OUT (20 to 20,000Hz)	less than 0.0007% (1.5V output)
AUX, TUNER to PRE OUT (20 to 20,000Hz)	less than 0.0007% (2V output)
RIAA Deviation	
PHONO-1, 2	20 to 20,000Hz±0.2dB
PHONO-1 (MC)	20 to 20,000Hz±0.3dB
Frequency Response	
AUX, TUNER, TAPE-1, 2	10Hz to 100kHz±0.2dB
Tone Control Characteristics	
BASS Turnover Frequency	350Hz
BASS Boost/Cut	±10dB at 20Hz
TREBLE Turnover Frequency	3.5kHz
TREBLE Boost/Cut	±10dB at 50kHz
Subsonic Filter Characteristics	15Hz, 12dB/oct
Audio Muting	−20dB
Signal-to-Noise Ratio (IHF A-Network)	
PHONO-1, 2	better than 92dB
PHONO-1 (MC)	better than 78dB
AUX, TUNER, TAPE-1, 2	better than 105dB
Residual Noise	less than 0.03μV (Vol min.)

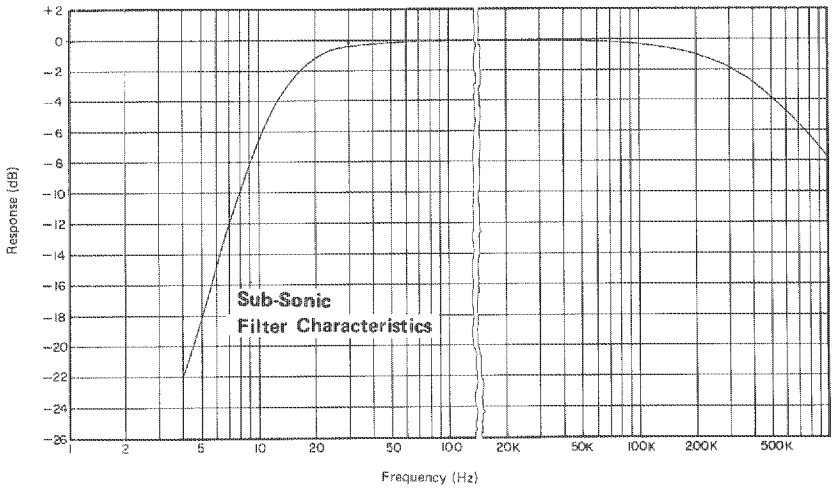
Channel Separation	
PHONO-1, 2 (MM) to PRE OUT-1, 2	90dB(Vol.max.1kHz 0Ω shorted)
PHONO-1 (MC) to PRE OUT-1, 2	60dB(Vol.max.1kHz 0Ω shorted)
AUX, TUNER, TAPE-1, 2 to PRE OUT-1, 2	90dB(Vol.max.1kHz 1kΩ shorted)
Power Supply	120V AC, 60Hz
Power Consumption	36W
AC Outlet	SWITCHED x2 Total 400W max. UNSWITCHED x1 Total 400W max.
Dimensions (WxHxD)	435x72x320mm (17"x2-5/6"x12-19/32")
Weight	7.9kg (17 lbs 6 oz)

Specifications subject to change without notice.

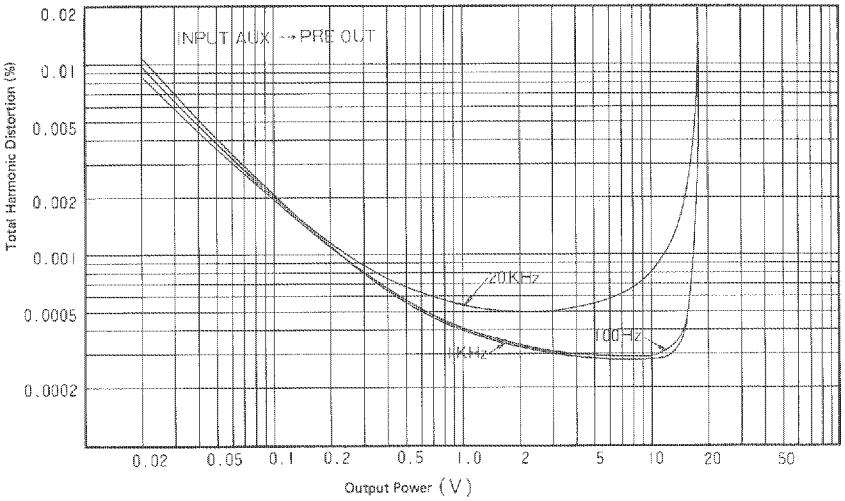
C-2a

PERFORMANCE GRAPHS

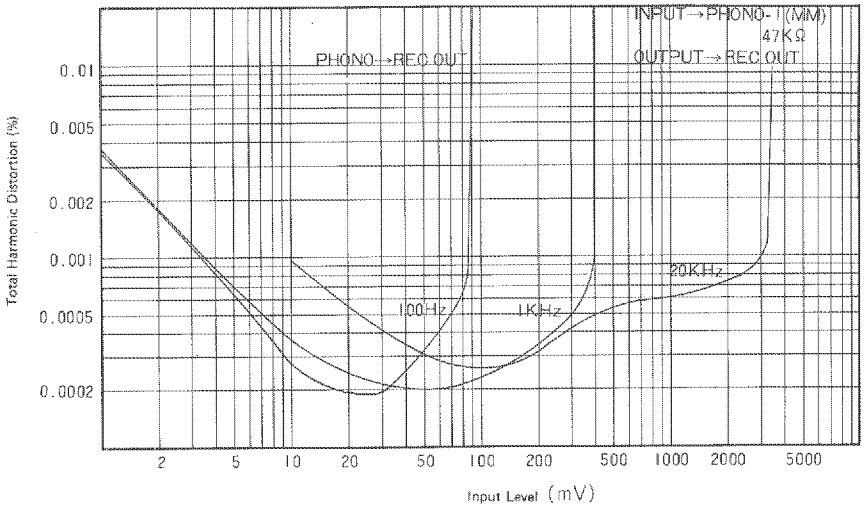
Frequency Response and Sub-sonic Filter Characteristics



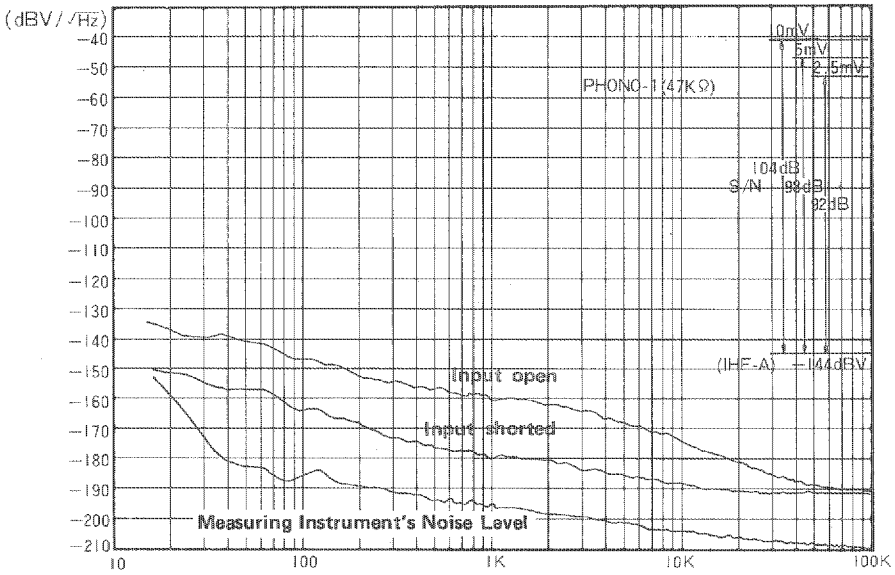
Output Power vs. Total Harmonic Distortion



PHONO Input Level vs. Total Harmonic Distortion

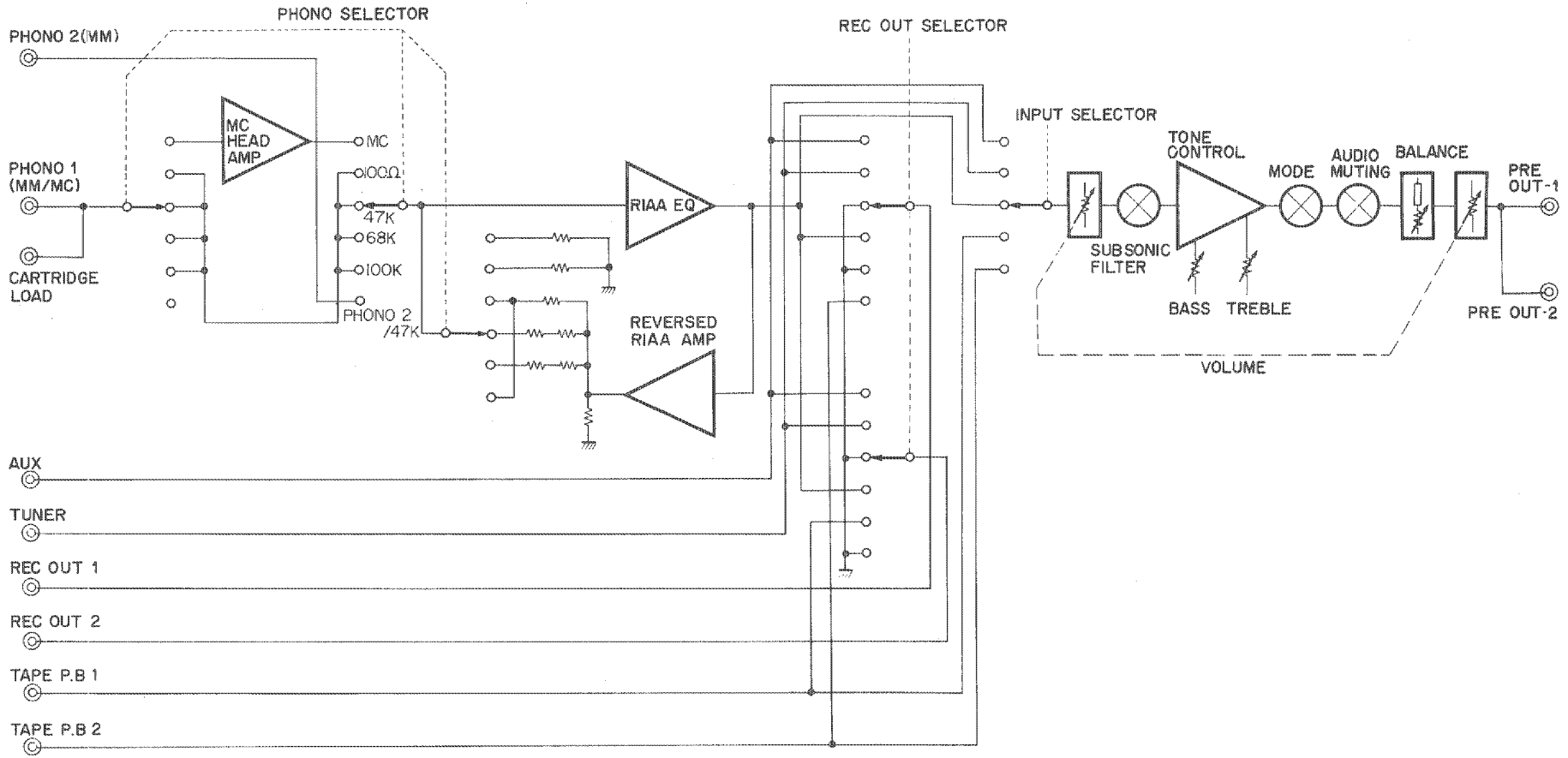


Input-Equivalent Noise



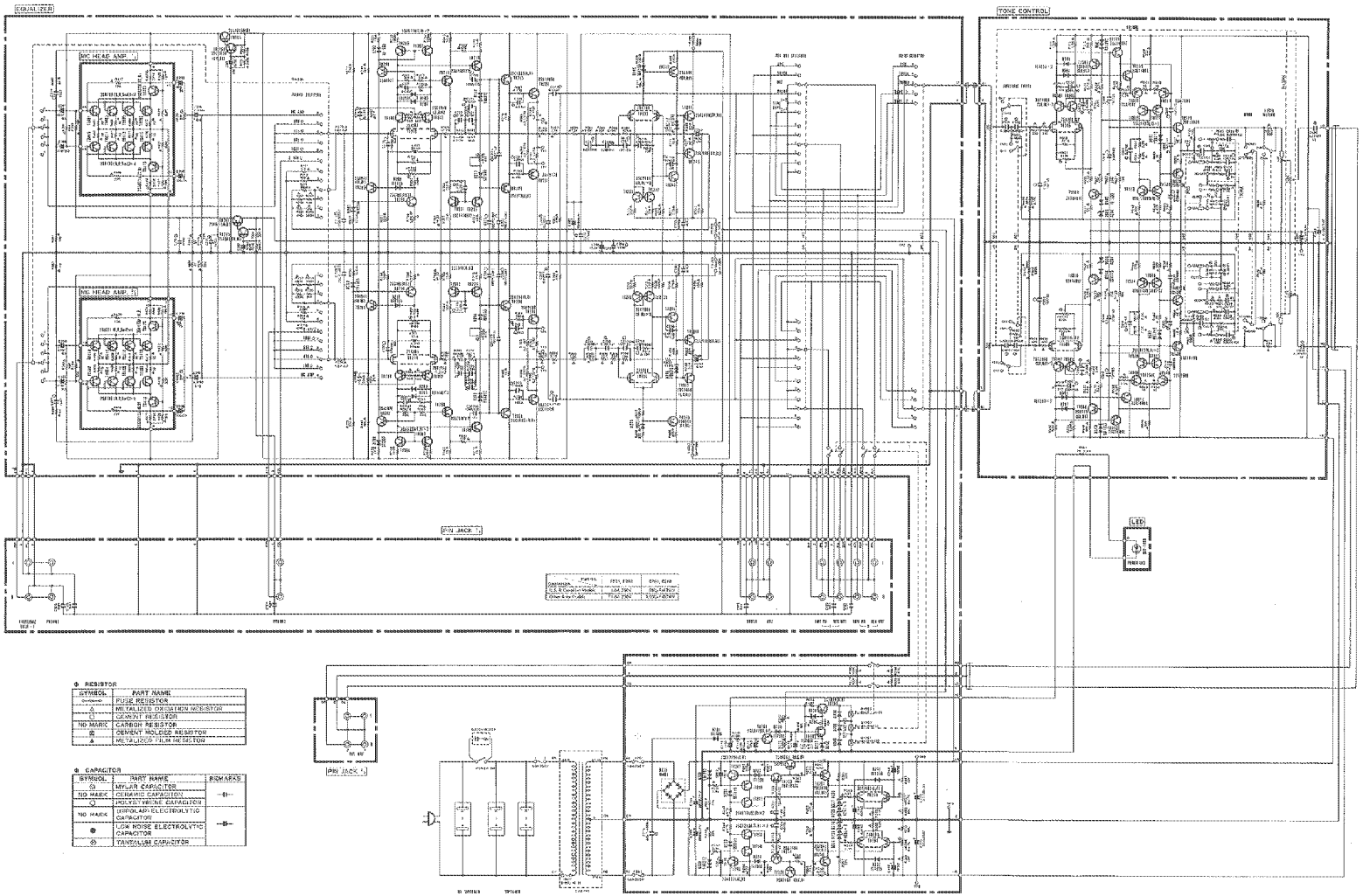
C-2a

BLOCK DIAGRAM



C-2a

SCHEMATIC DIAGRAM



◆ RESISTOR

SYMBOL	PART NAME
	FUSE RESISTOR
△	METALIZED OXIDATION NOISISTOR
○	CEMENT RESISTOR
NO MARK	CARBON RESISTOR
⊕	CEMENT MOLDED RESISTOR
▲	METALIZED FILM RESISTOR

◆ CAPACITOR

SYMBOL	PART NAME	REMARKS
◇	MYLAR CAPACITOR	—‖—
NO MARK	CERAMIC CAPACITOR	
○	POLYSTYRENE CAPACITOR	
NO MARK	BIPOLAR ELECTROLYTIC CAPACITOR	—|—
⊕	LOW NOISE ELECTROLYTIC CAPACITOR	
◎	TANTALUM CAPACITOR	

C-2a

TROUBLESHOOTING

Fault	Cause	Cure
No power although POWER switch is ON.	AC power cord not plugged into supply socket.	Plug it firmly into the supply socket.
	Power remains off despite of AC supply through firm connection.	Contact your nearest authorized service representative.
No sound although INPUT selector switch is ON.	INPUT selector switch in wrong position.	Check and change as necessary.
	VOLUME too low.	Turn up VOLUME.
	INPUT pin plug incorrectly inserted.	Check and insert it fully in correct position.
	OUTPUT cord's defective connection.	Check and make correct connection.
No sound from both speakers, or sound only from either L or R speaker.	Defective connections between control- and power-amplifiers, or between power amp. and speakers.	Perform correct connections, or check operations.
	Balance control not properly adjusted.	Set it for correct stereo balance.
Poor bass response and inferior stereo image.	Adversely connected phase polarity (+,—) between power amp. and speakers.	Make correct connections.
Sufficient volume unobtainable through VOLUME control.	AUDIO MUTING switch remains ON.	Switch if OFF and readjust VOLUME.
Loud 'humming' occurs during record audition.	Defective connection of pin plug.	Plug it in firmly.
	Turntable's ground cord not connected to amp.'s GND terminal.	Connect ground cord to GND terminal on rear panel.
Reception of amateur or private station mixed with desired reception.	Such stations located in vicinity.	Consult with your authorized service representative or such stations.
Loud 'howling' noise when raising VOLUME during record audition.	Speakers and turntable are positioned closely.	Give a proper space between speakers and turntable.
MC cartridge delivers low sound volume.	MC cartridge output cord connected to PHONO-2 terminals.	Connect it to PHONO-1 terminals, and set PHONO selector switch to MC position.

SINCE 1887

YAMAHA

NIPPON GAKKI CO., LTD. HAMAMATSU, JAPAN