

YAMAHA CA-1010

Natural Sound Integrated Stereo Amplifier

Ultra-low distortion, switchable class A operation

Completely independent listening and recording

Built-in full-fidelity MC cartridge head amp

Wide-range multi-function level meters



Yamaha: Dedication to Musical Excellence

Today the world's largest manufacturer of musical instruments is also a leader in audio fidelity. For nearly a hundred years Yamaha craftsmen have been designing full, natural sound into our renowned pianos, organs, wind and string instruments—a rich musical tradition that makes us unique in the audio world. Part of the reason is our generations of musical sensitivity. But it's also due to our immense technological and production capabilities—built over decades of supplying fine musical instruments to the world.

The Basics

Audio performance depends upon a wide range of technologies. While Yamaha's computer-controlled circuit design and testing is second to none, our musical instrument experience has given us expertise in many other crucial fields. The Yamaha factories which produce LSIs and semiconductors for our electronic organs were also important in the development of the revolutionary Yamaha vertical FET used in our top-line B-1 power amplifier and C-1 preamp. They are also responsible for our unique vapor deposition production of the world's only pure beryllium dome speaker diaphragms. After years of blending and forming the metals in our brass instruments, we were able to develop the special alloys used in our powerful speaker magnets. Piano frame diecast techniques are behind the ideal weight and acoustic properties of our turntable platters and speaker frames. And Yamaha piano soundboard research and cabinet woodcrafting is reflected in our resonant-free speaker enclosures and beautifully detailed component cabinetry.

In-House

Every crucial part of every Yamaha audio component is Yamaha-made. That's how we set our own quality standards. And that's how we can afford to innovate every step of the way: when a part or material doesn't do justice to the music we simply develop one that does.

The Payoff

When you have musicians and audio engineers speaking the same language the result is full natural sound fidelity, plus innovative features which translate directly into improved tonality or operating convenience. Yamaha's insistence on total music performance, not just isolated specs, is behind a revolutionary new approach to audio component design—one that gives the CA-1010 integrated amplifier (as well as all other models in the line) music fidelity audibly superior to many separate preamp and power amplifier combinations.

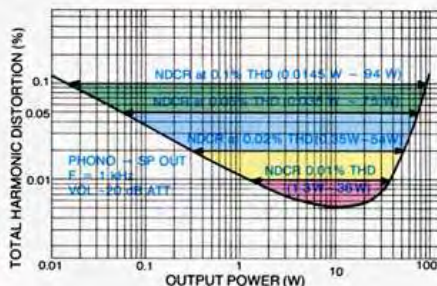
Total-Performance Balanced Design

Instead of putting our development muscle into the power amp section alone, Yamaha engineers paid the same attention to every section, including the phono equalizer and preamp stages. By designing each section to the same high standards we made sure there are no weak links in the CA-1010; at the same time we matched each section from its very first design stages to the others, so they all work together for superb music fidelity. That's why we dare to publish overall performance specifications, from Phono In to Speaker Out.

NDCR: the Big Difference

The CA-1010 was designed with a new aim: superb performance under actual in-home listening conditions. To do so, we developed a new performance standard: Noise-Distortion Clearance Range. NDCR expresses a performance range—the range of output powers from the low point where noise is an unacceptable percentage of the signal, to the high level where distortion rises above rated limits. That tells you more than a single-level measurement.

Just as important: measurements are overall, from Phono In to speaker outputs (instead of using the Aux In jack which bypasses the phono equalizer). And rather than measure at the unlistenable maximum volume (0 db) setting, NDCR is taken at a normal volume level: -20 dB. Some amplifiers show noticeably worse S/N, distortion, and even frequency response characteristics when the volume is turned down to half. The CA-1010's NDCR range is superb: 100 mW to 90 W. This is especially meaningful when you remember that at normal listening levels a pianissimo passage is app. 100 mW, while average power to your speakers is 1-2 watts and brief peaks can reach 90 W. So the CA-1010 gives you the assurance of full, pure fidelity for any selection at any listening level.



In the Great Tradition

Yamaha offers one of the world's most powerful and complete home audio component systems, our famous B-1, B-2 basic amps, C-1, C-2 preamps and CT-7000 tuner. But with the CA-1010's excellent cost performance you get many of the unique features and circuit improvements developed for this series.

THE POWER AMP

Unbelievable 0.03% Distortion!

When Yamaha's first amplifier line appeared with only 0.1% distortion audiophiles were astounded. But now we've bettered that by cutting total harmonic distortion to an incredible 0.03% in the CA-1010 (20 to 20,000 Hz, 8 ohms, both channels driven at rated output). This significant improvement on state-of-the-art performance means even cleaner, purer performance.

Output Power vs. Total Harmonic Distortion (Class B operation, both channels driven)



Output Power vs. Total Harmonic Distortion (Class A operation, both channels driven)



Switchable Class A Operation

Yamaha was the first to offer switchable class A and normal transistor amp class AB operation, and it's yours on the CA-1010 for incredibly low distortion to bring out the best in delicate music passages.

Class A employs the CA-1010 transistors without switching between elements for high-power efficiency. This means none of the notch and crossover distortion present in all class B amplifiers. With class A, the CA-1010 gives you 18 watts per channel (both channels driven into 8 ohms, 20 to 20,000 Hz), with no more than an incredibly low 0.005% total harmonic distortion! That's plenty of power for headphones, efficient speakers and normal listening levels, plus gloriously clean, transparent music response. And if you want more power, just switch to Normal mode and the output figure jumps to 90 watts per channel.

Distortion Waveform for Class A Operation
(Both channels driven into 8 Ω at 15 W)



Distortion: 0.0025%
Vertical sensitivities:
5 V, 50 mV/div.
Horizontal sensitivity:
5 μsec./div.

Wide Range Peak Delay Meters

With their quick 100 μsec. rise time, these meters indicate even the briefest transient bursts. Their wide range lets them show a whisper-quiet 1 mW and a thundering 316 W peak (with 8-ohm speakers)—that means they won't peak out during dynamic passages. Meter calibration is in both watts and decibels (-50 to +5 dB).

Rec Out Too

Just as on our top-line C-1 preamp, the CA-1010 meters can be switched to show the signal level at the Rec Out jacks (indicated in mV). This means no-guesswork setting of tape deck input signals to keep recording levels above the tape noise limit, but within the range of distortion-free performance.

Unique Temperature Protection

The output transistors work full time during class A operation, and to dissipate their heat the CA-1010 uses massive, low thermal capacity heat sinks. In addition, special monitoring circuits constantly check power transistor current in a unique Area of Safe Operation (ASO) system. Input level is reduced as soon as excess current is sensed, or if speaker impedance drops below 4 ohms. This protects the amp and speakers against shorts and misconnection.

Heat Sinks



115 dB Power Amp S/N Ratio

Painstaking computer-assisted circuit design gives the CA-1010 incredibly quiet operation, so even during the soft parts of your most dynamic music selection the signal level is still far above the noise threshold.



THE PREAMP

Pre Out/Main In Plus...

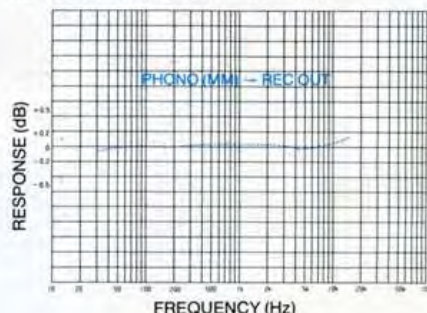
You can feed the CA-1010 preamp signal out to a frequency divider, dbx or Dolby unit, or a frequency equalizer, then back in to the main amp or to another power amp. The rear panel coupler switch has terminals shielded inside the chassis, instead of external jumpers which often pick up interference.

The Pre Out jacks are also live during normal operation, so you can oscilloscope-check the signal or drive another power amp without interrupting your program. Use them for recording and you can "process" the signal to the tape deck using the tone controls and filters.

Super-Quiet Equalizer Amp

Special Yamaha-developed low-noise FETs are incorporated in the CA-1010 equalizer, in perfectly matched pairs (they are even housed in a single package to assure equal temperature effects). These ICs are used in a cascode-bootstrap current mirror circuit similar to the one on our prestigious C-2 preamp. The circuit provides an outstanding 96 dB signal-to-noise ratio (10 mV input, IHF A network, inputs shorted), with less than 0.003% Phono to Rec Out distortion, 20-20,000 Hz! This level is just about the measurable limit for the finest test equipment.

RIAA Deviation (Phono MM to Rec Out)



Built-In High Performance Head Amp

Your present phono cartridge may sound fine today, but once you become accustomed to the subtle beauties of class A performance you may want the improved tonal nuances of a moving coil cartridge. Normal phono inputs cannot handle the MC cartridge's low output level, however, and until now this has required a high-cost head amp unit or the performance limitations of a step-up transformer. The CA-1010 solves the problem. It has a built-in head amp, switchable from the front panel. Incorporating special Yamaha IC circuitry, it provides incredible frequency response for superb music fidelity, a remarkable 84 dB S/N ratio (250 μV input, IHF, A network), and extremely low 0.03% distortion (3 V output) from 20 to 20,000 Hz.

Super Low Noise IC



Switched Phono Impedance

In addition to its MC cartridge setting, the CA-1010 selector has three other Phono 1 settings: 47 kΩ, 68 kΩ and 100 kΩ. This lets you match cartridge impedance characteristics and experiment with the subtle tonal response effects of different settings.

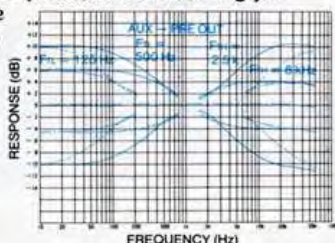
Precision Four-Gang Volume Control

Introduced on our famous C-1 and C-2 preamps, this type of control not only adjusts the volume at the tone control section input side, but also at its output. That means you turn down the preamp residual noise when you reduce the volume, and the system avoids full-gain power amp operation during reduced-volume listening.

Tone Controls & Filters

Tone Controls

The separate controls for bass and treble ranges each have dual turnover frequencies plus a Defeat position: full equalizer-type versatility. They provide range selection and sure, delicate adjustment of the tone color to equalize for room acoustics or irregular speaker response, as well as letting you tailor the music to your mood.



Tone Control Characteristics

Filters

Both of these filters have sharp 12 dB/octave cutoffs, for clean, efficient operation. The 10 kHz high filter can be used to cut record scratch noise, as well as hiss from tapes and weak FM signals. During normal operation leave the 15 Hz subsonic filter on to boost overall power by eliminating the power-robbing subsonic noise generated by warped records or line noise.

Rec Out Selector

With the CA-1010 you can record any source selected by the Rec Out selector, and at the same time listen to that or any other source chosen with the Input selector. Listen to an FM program while taping a record, or copy tapes while listening to a record or tuner program; with two decks connected you can copy tapes in either direction. To avoid possible distortion from stray

capacitance in tape deck cables, set to the special Rec Out Off position when not recording.



Other Important Features

- Terminals for Two Sets of Speakers with Front Panel Switching
- Three-Position Audio Muting: 0 dB / -20 dB / Pre Out Off
- Stereo Headphone Jack
- Large Easy-Use Volume and Balance Controls
- Four Auxiliary AC Outlets

SPECIFICATIONS

MINIMUM RMS OUTPUT POWER PER CHANNEL (CLASS B)

120 Watts (4 ohms) from 20 to 20,000 Hz at no more than 0.03% Total Harmonic Distortion

90 Watts (8 ohms) from 20 to 20,000 Hz at no more than 0.03% Total Harmonic Distortion

MIN. RMS OUTPUT PER CHANNEL (both channels driven)		Treble boost/cut	± 10 dB at 20 kHz (for 2.5 kHz)
Class A (20 to 20 kHz, 8 Ω)		FILTERS	
Class B (1 kHz, 8 Ω)		Subsonic	15 Hz (12 dB/octave)
TOTAL HARMONIC DISTORTION, 20 to 20,000 Hz		High	10 kHz (12 dB/octave)
Phono 1 (MM), 2 to Rec Out		SIGNAL-TO-NOISE RATIO (IHF-A Network)	
Phono 1 (MC) to Rec Out		Phono 1 (MM), 2	96 dB (for 10 mV, shorted)
Tuner, Aux to Pre Out		Phono 1 (MC)	84 dB (50 Ω, shorted)
Main In to Sp Out (8 Ω)		Aux, Tuner	100 dB
Class A: 0.005% at 10 W		Main	115 dB
Class B: 0.01% at 50 W		Residual noise (at Vol. min.)	Less than 0.1 mV
Tuner to Sp Out (8 Ω)		NOISE DISTORTION CLEARANCE RANGE (NDCR) for 0.1% into 8 Ω, 20 Hz to 20 kHz, from 100 mW to 90 watts with Vol. -20 dB (Phono In (MM) to Sp Out)	
IM DISTORTION (Aux to Sp Out)		0.03%, 250 mW to 90 W	
INPUT SENSITIVITY/IMPEDANCE			
Phono 1 (MM)		2 mV/47, 68 or 100 kΩ	
Phono 2 (MM)		2 mV/47 kΩ	
Phono 1 (MC)		50 μV/10 Ω	
Tuner, Aux		120 mV/50 kΩ	
Main In terminals		1 V/25 kΩ	
MAXIMUM INPUT LEVELS (1 kHz, 0.02% THD)			
Phono 1 (MM), 2		310 mV	
Phono 1 (MC)		7.5 mV	
Tuner, Aux		20 V	
OUTPUT LEVEL/IMPEDANCE			
Rec Out terminals		120 mV/600 Ω (rated), 18.6 V (max. 1 kHz)	
Pre Out terminals		1 V/500 Ω (rated), 7 V (max. 1 kHz)	
FREQUENCY RESPONSE			
Phono 1, 2 RIAA deviation		± 0.2 dB	
Tuner to Pre Out		5 Hz to 100 kHz, +0, -1 dB	
Tuner to Sp Out		5 Hz to 50 kHz, +0, -1 dB	
POWER BANDWIDTH (8 Ω, 0.02% distortion)			
Class A		10 Hz to 70 kHz	
Class B		10 Hz to 50 kHz	
TONE CONTROL CHARACTERISTICS			
Bass turnover frequencies		125 and 500 Hz	
Bass boost/cut		± 10 dB at 20 Hz (for 500 Hz)	
Treble turnover frequencies		2.5 and 8 kHz	
DAMPING FACTOR (at 1 kHz)		Better than 45 into 8 Ω	
METERS			
Rise time		100 μsec.	
Decay time		0.95 sec.	
Range		1 mW to 316 W (8 Ω) (-50 dB to +5 dB)	
GENERAL			
SEMICONDUCTORS		108 Transistors, 67 Diodes, 6 FETs, 2 Dual FETs, 1 LED, 2 ICs	
POWER SUPPLIES		U.S.A. and Canada: AC 120 V, 60 Hz Australia: AC 240 V, 50 Hz Other Areas: AC 110/120/130/220/230/ 240 V, switchable; 50/60 Hz	
POWER CONSUMPTION		U.S.A. and Canada: 450 W Other Areas: 900 W	
DIMENSIONS (W x H x D)		461 x 170 x 360 mm (18 1/8" x 6 3/8" x 14 1/4")	
WEIGHT		U.S.A. and Canada: 19 kg (41 lbs., 13 oz.) Other Areas: 20 kg (44 lbs.)	

Specifications subject to change without notice.

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SINCE 1887



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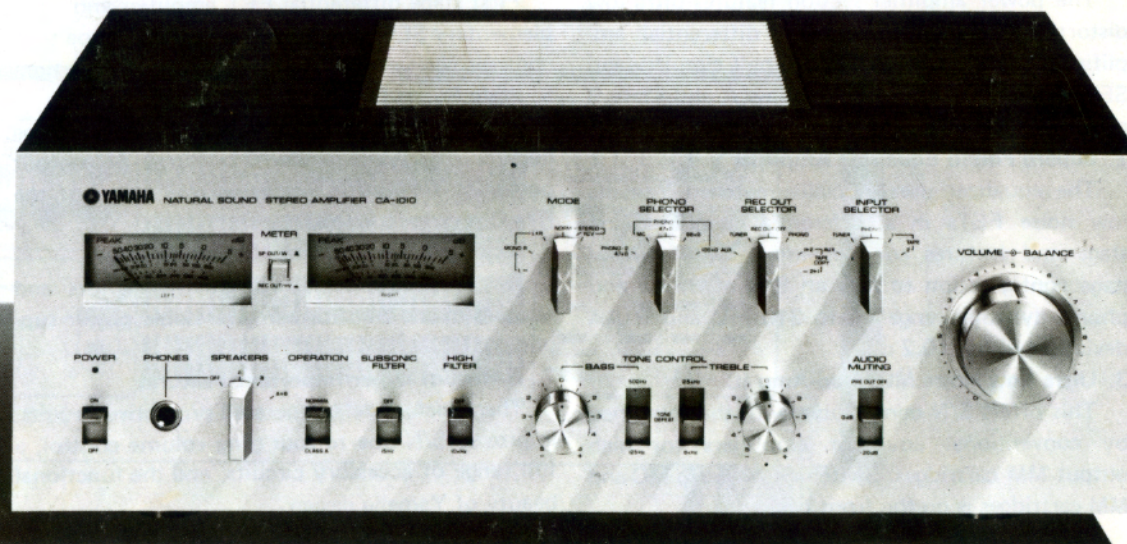
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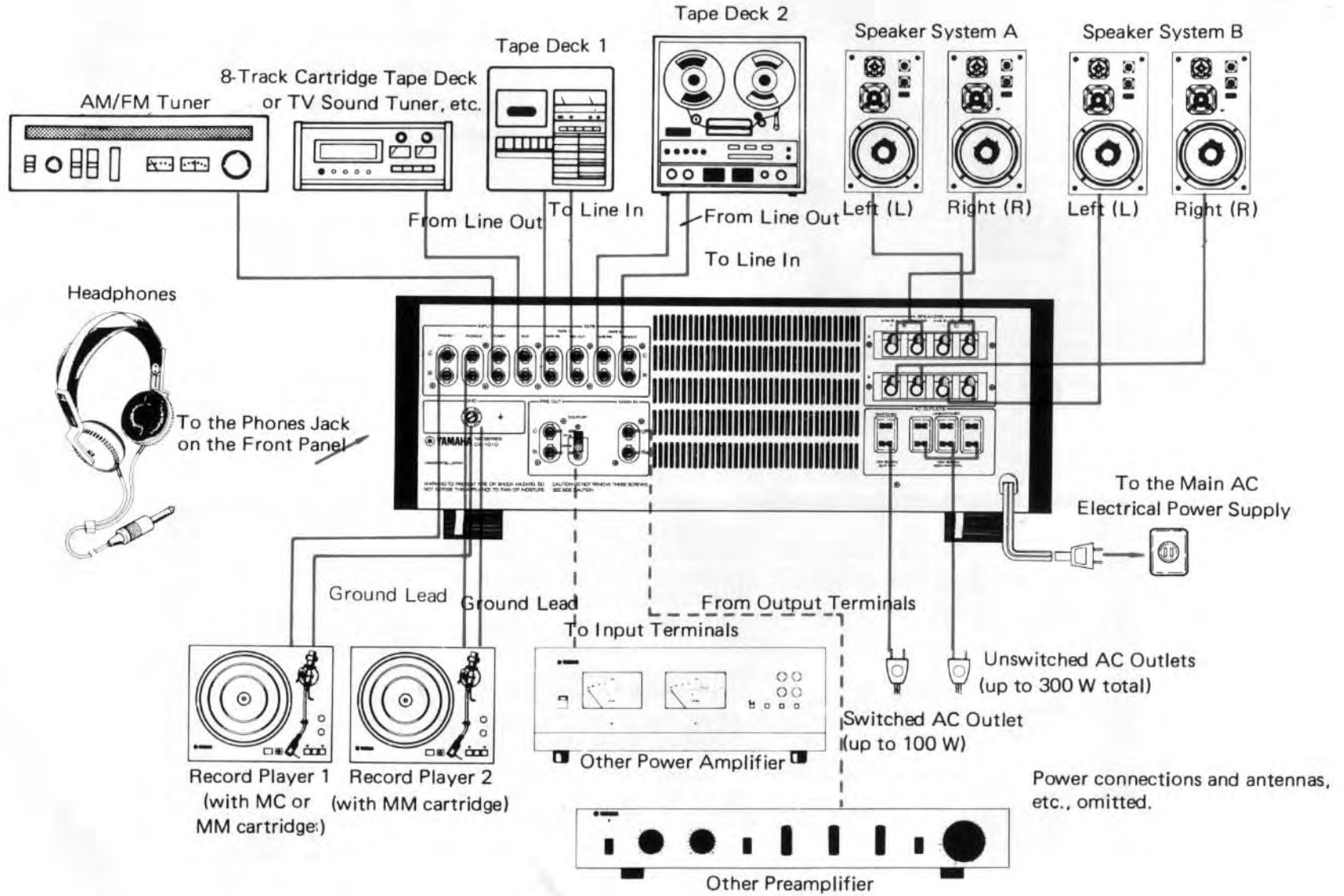
Integrated Stereo Amplifier

Owner's Manual

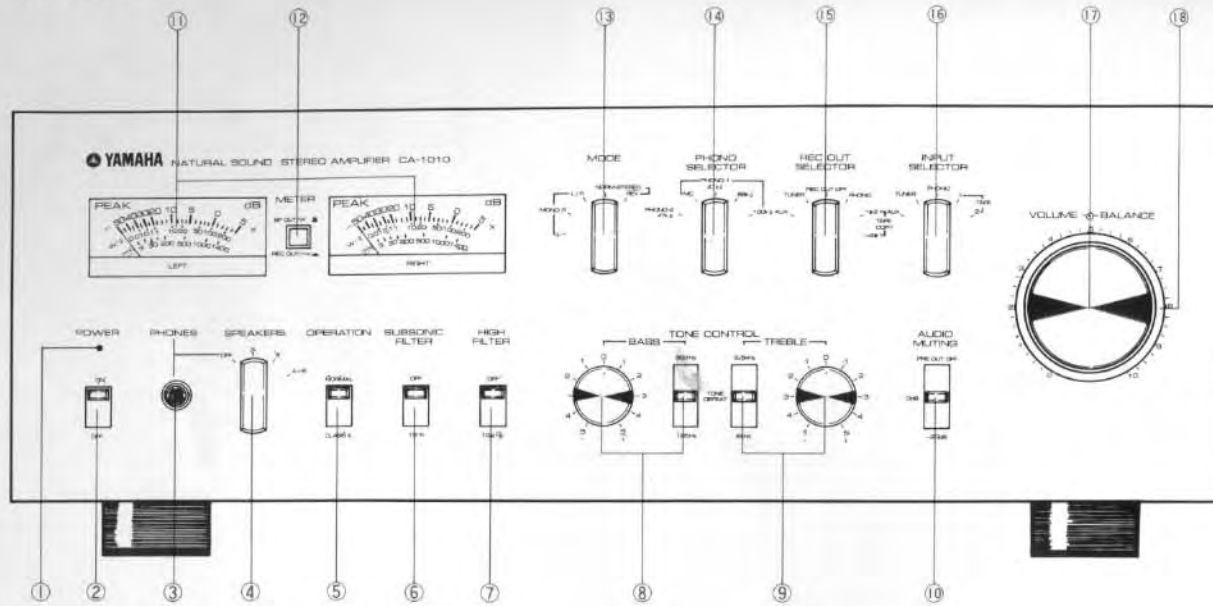


CA-1010

CONNECTION DIAGRAM

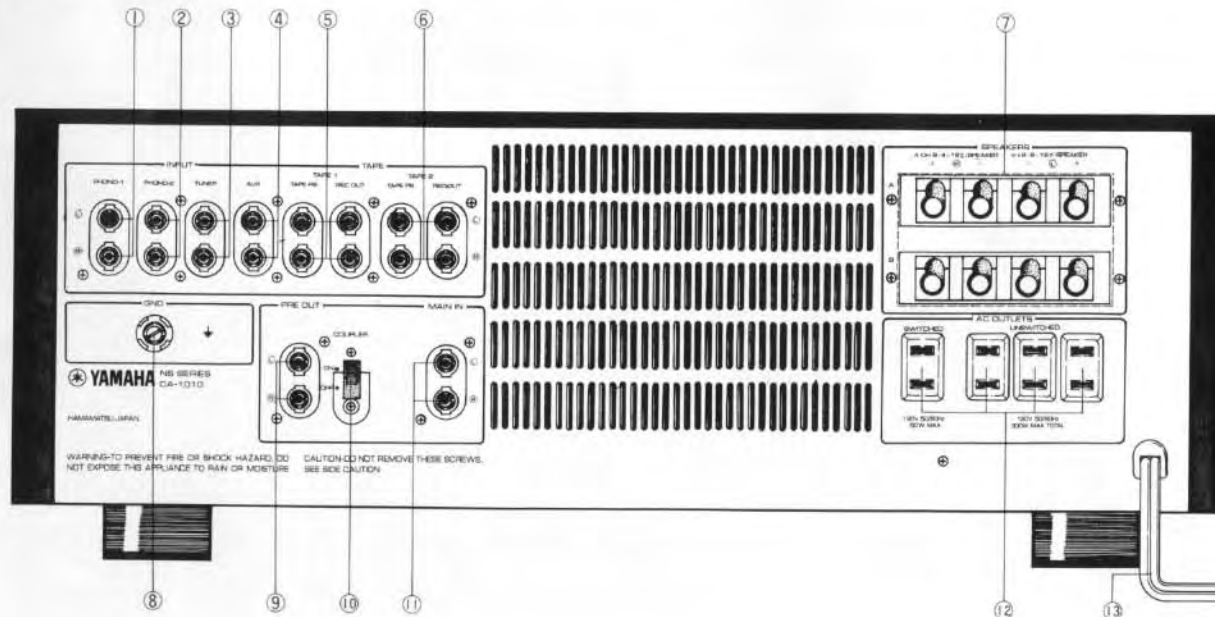


FRONT AND REAR PANELS



The front panel numbers are explained on pages 6 – 7.

The rear panel numbers are explained on pages 8 – 9.



CA-1010

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YAMAHA offers you thanks and congratulations on your choice of the CA-1010 integrated stereo amplifier. Embodying novel and useful features, it combines the very highest audio quality with the greatest convenience in use, and is currently setting new standards for integrated amplifier performance.

SPECIAL FEATURES OF THE CA-1010 AMPLIFIER

1. Switchable for Class A and Class B Operation

The power amplifier section features ultra low distortion first stage transistor differential amplifier design, with parallel push-pull circuitry and SEPP output, with choice of Class A and Class B operation at equivalent volume levels.

2. Superb Phono Equalizer Amplifier

The equalizer uses specially matched Yamaha low noise FETs in a differential amplifier first stage and features complementary SEPP output stage configuration to give an S/N of 96 dB and phono dynamic range up to 310 mV and RIAA deviation within ± 0.2 dB.

3. Ultra Low Noise MC Head-Amp IC

This offers S/N comparable with that obtained by conventional equalizer amplifiers for high output MM cartridges. Switching between MC and MM cartridges is on the front panel.

4. Low Noise, Low Distortion Tone Control Amp

First stage differential FET amplifier and complementary SEPP output stage in the NF-type tone controls gives extremely low noise and distortion.

5. Wide Range Peak-Level Meters

In addition to their calibration in dB, these meters offer independent readings of output power in Watts (for 8-ohm speakers) and of the Rec Out output (in mV).

6. Extremely Stable Power Supply Section

Two, 18,000 μ F electrolytic capacitors and massive mains transformer give stable power supplies.

7. A Host of Other Important Features

These include relay-operated protective circuits, improved S/N due to four-gang volume control, a full range of accessory circuits, and the functional beauty of Yamaha design.

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Warning: to prevent fire or shock hazard, do not expose this set to rain or moisture.

CA-1010

CAUTIONS-READ THIS BEFORE OPERATING YOUR CA-1010

1

The CA-1010 is a high performance integrated amplifier with low distortion and high output power. 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 CA-1010, which is a precision electronic instrument.

3

Do not place the CA-1010 where it will be exposed to direct sunlight, excessive heat (for instance over a radiator), 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 local service representative.

6

Do not assume your CA-1010 is faulty before checking the Trouble Shooting list on page 21 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 CA-1010 silent for several seconds after switching ON, to prevent the pops and clicks that can occur.

9

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. (This explanation is not concerned with Australian models.)

10

Always check the main VOLUME setting before returning the AUDIO MUTING switch to the 0 dB position. The sudden increase in level is enough to damage most speakers with the high output power which the CA-1010 provides if the original level was too high.

11

Keep this manual in a safe place for future reference, and refer to it frequently until you are perfectly familiar with all CA-1010 controls and functions.

12

To avoid burning out the fuse, be sure to check its rating before turning on the power.

CA-1010

FRONT PANEL AND CONTROLS

① POWER ON Indicator

This LED lights when power is being supplied to the amplifier.

② POWER ON/OFF Switch

Switch ON to connect the main electrical supply. Leave OFF while familiarizing yourself with the controls, and while connecting other audio equipment.

③ PHONES Jack

One headphone jack is provided. Plugging the headphone in does not mute the speakers, so use the OFF position on the SPEAKERS switch.

④ SPEAKERS

With this control, you can select either or both of two pairs of stereo speakers, or switch them all off so that you can enjoy headphone listening.

⑤ OPERATION

This control allows you to switch from normal Class B amplification to Class A

amplification, which provides lower distortion by eliminating notch and switching distortion, but has a maximum power output capability of 18 watts.

⑥ SUBSONIC FILTER

This switch enables you to cut out low frequency rumble which sometimes arises from warped records. In general, since this control has almost no effect on audible frequencies above 25 Hz, it can be left in the ON position permanently with virtually no adverse effects on the normal sound output quality.

⑦ HIGH FILTER

This switch allows you to utilize a high frequency, steep cut-off filter which takes effect at 10 kHz.

⑧ TONE CONTROL-BASS

This BASS tone control is provided so that you can emphasize low frequency sounds, or to reduce them, depending on the tonal balance that you require. The three-position switch located next to the bass control knob

provides a DEFEAT position which permits you to listen to the sound output either with or without the effect of the tone control. In addition, this switch allows you to choose between a turnover frequency of 125 Hz or 500 Hz.

⑨ TONE CONTROL-TREBLE

This TREBLE tone control functions for the high frequencies as the BASS tone control does for the low frequencies. It also has a three-position switch permitting DEFEAT and turnover frequency selection. In this case, the turnover frequencies available are 2.5 kHz and 8 kHz.

⑩ AUDIO MUTING Switch

When this three-position switch is in the middle, 0 dB position, the amplifier functions normally. When the switch is placed in the -20 dB position, a straight 20 dB reduction in listening volume is achieved without any need to vary the VOLUME control setting. This is used whenever operating switches and when lowering the phono cartridge onto the record. Setting the switch to the PRE OUT OFF position completely isolates the main amplifier from all inputs, thus allowing you to make and break various connections to this stereo amplifier without risking damage to the speakers by very large transient outputs.

11 PEAK Meters

These meters provide two different types of readout. The first is the power output for the individual channels, which is read directly in Watts (for 8 ohm speakers), or in dB on the -50 dB to +5 dB scale. The other readout is taken from the scale calibrated in millivolts in order to measure the output voltage provided for external tape-recording decks. This readout is not possible when the REC OUT SELECTOR is in the OFF position.

12 METER Switch

This switch allows you to choose between the SP OUT measurement in Watts, and the REC OUT measurement in mV.

13 MODE Switch

In addition to normal stereophonic audition, you can use this switch to listen to either the left-hand or the right-hand channel alone (L or R positions) or to both together in the monaural mode. Also, you can use this switch to reverse the stereo outputs.

14 PHONO SELECTOR

In the PHONO 1 group of options, it is possible to select the use of a Moving Coil

(MC) cartridge. With the switch in this position, the internal Head Amplifier IC is operational. Also provided are three impedance positions for the normal Moving Magnet (MM) cartridges: the standard 47 k Ω and also 68 k Ω and 100 k Ω . The PHONO 2 position allows the use of a standard 47 k Ω MM cartridge.

Special precautions taken with the head amplifier IC circuitry make it possible for the low level 50 μ V input to the MC phono input terminals to be switched, which is normally very difficult to accomplish without hum and switching noise. Therefore, it is possible to substitute an MC cartridge for an MM cartridge in a record player and to still use the same jack connections on the back panel of this amplifier, by using the PHONO SELECTOR on the front panel.

15 REC OUT SELECTOR

This switch selects which of the programs connected to the CA-1010 will be recorded. It works quite independently of the INPUT SELECTOR control, so that you can listen to any one program while recording any other. Alternatively, you can record directly from one tape deck to another. In the REC OUT OFF position the CA-1010 is completely disconnected electrically from the tape recording terminals.

16 INPUT SELECTOR

This switch is used to select the program source of your choice for audition. Switch positions are available for Phono, Tuner, Aux., and two tape decks. Remember, the INPUT SELECTOR switch selects which program input you can listen to on the speakers or on the headphones, while the REC OUT SELECTOR selects which program source you will record.

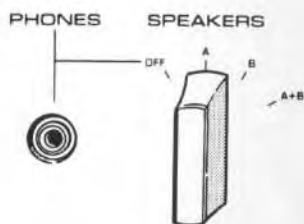
17 VOLUME Control

Use this control to give the volume of sound that you require. Always start with the knob turned fully to the left (counter-clockwise) at the "0" position, before turning it up to the full volume level that you want to hear. If you wish to maintain the same volume level after pausing to change records or to answer a telephone, use the AUDIO MUTING switch to mute the sound temporarily, and then switch back to the level that you have set with the VOLUME control.

18 BALANCE Control

This control adjusts the balance between the left and the right stereo channels. Set it to the center "5" position, at which there is a click stop, unless you wish to emphasize the sound from one speaker in contrast to that of the other speaker.

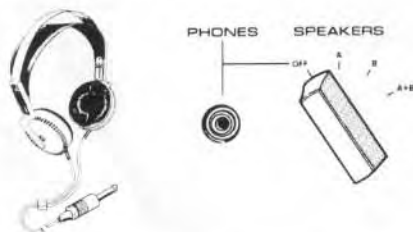
The Speaker Switch



Making Speaker Connections



Headphone Connection



1,2 PHONO INPUT Terminals

Connect the plugs from your turntable unit to these terminals. Note that for all the terminals, the upper jacks are for the left-hand channel and the lower jacks are for the right-hand channel. Use the PHONO 1 terminals first, particularly if you may use MC cartridges, keeping the PHONO 2 terminals as spares (only MM cartridges are suitable). Make certain to turn the PHONO SELECTOR switch on the front panel to the corresponding position.

3 TUNER Terminals

Connect your FM or other tuner to these terminals. If the tuner has an adjustable output level, adjust this level so that the volume does not change suddenly when switching from PHONO to TUNER. Make certain that the INPUT SELECTOR on the front panel is in the TUNER position for audition.

4 AUX Terminals

Use these terminals for connecting a second tuner, or another piece of audio equipment. For example, it can be used with a micro-

phone mixing amplifier for live stereo recording if you have a tape deck. Make certain that the INPUT SELECTOR is in the AUX position for this function.

5,6 TAPE 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, and independent of the source being auditioned.

7 SPEAKERS Terminals

Two sets of speaker terminals are provided on the rear panel, for A and B speaker systems. Either, both, or neither can be selected via the front panel SPEAKERS switch. Only use speakers with impedances of 8 ohms or more if you listen to A and B systems together. Use the OFF position when listening with headphones.

- (1) First fully slacken the A speaker terminal knobs by rotating fully to the left. Strip about one half-inch of insulation from the speaker leads and twist them together to eliminate stray ends (preferably soldering them together). Then insert into the hole, and screw the terminal knob tight.
- (2) Make sure that you connect the + terminal on the CA-1010 to the + terminal on the speaker, and the - terminal on the CA-1010 to the - terminal on the speaker. A mistake here will result in poor bass response and ill-defined stereo image. Also make sure that you connect the left-hand speaker (viewed from the listening position) to the left-hand channel, and the right-hand speaker similarly to the right-hand channel.
- (3) Repeat with the B terminals if you wish to connect a second pair of speakers. In all cases check for a firm grip. Without good connections one or more speakers may fail to operate.

8 GND (Ground) Terminal

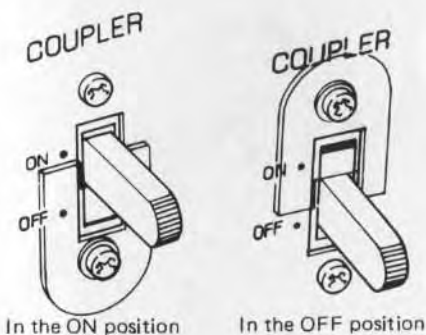
The GND terminal is provided for grounding auxiliary units such as turntables. Make certain that all such units are firmly grounded; failure to connect the ground leads can result in unpleasant hum.

9, 10, 11 PRE OUT and MAIN IN Terminals and Switch

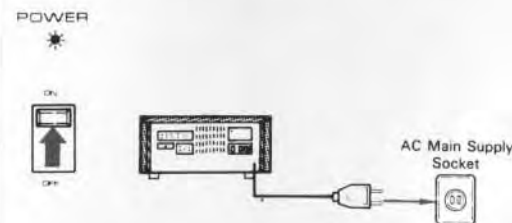
When this switch is ON, the output from the preamplifier section is connected to the power amplifier section for normal operation. The preamplifier output is also always available for connection to external power amplifiers, oscilloscopes, frequency dividers, etc., from these terminals.

When this switch is OFF, the preamplifier output is disconnected from the power amplifier section, and an external signal (from another preamplifier or from a frequency divider, etc.) may be applied to the MAIN IN terminals. The plastic guard is to prevent you from mistakenly putting this switch OFF.

The Coupler Switch



Power Supply Connections



Voltage Selector (General Model only)



This must be set to your local AC mains voltage. Failure to do so will result in seriously impaired performance or even severe damage to your CA-1010. If your precise voltage is not covered, use the next setting immediately above your AC mains voltage.

12 AC OUTLETS

The left-hand outlet is controlled by the CA-1010 POWER switch on the front panel. It has a maximum rated capacity of 90 W. The remaining three outlets, with a combined capacity of 300 W, are unswitched. Do NOT exceed these maximum ratings. Make the main power supply connection as shown.

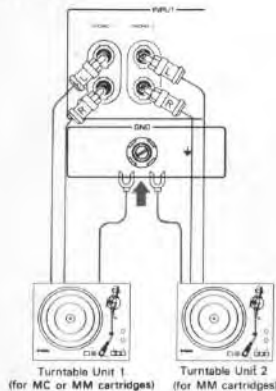
(Australian Models are not Provided.)

13 AC Mains Cord

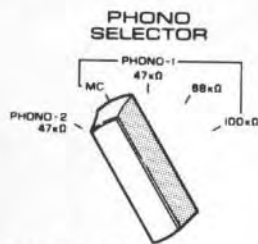
CA-1010

LISTENING TO RECORDS

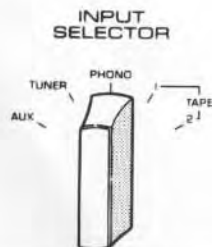
Record Player Connection



PHONO SELECTOR Switch (in the MC position)



INPUT SELECTOR Switch



CONNECTING A TURNTABLE UNIT

The main AC supply plug of your turntable unit may conveniently be inserted into the spare AC outlet socket controlled by the CA-1010 POWER switch. The output lead from the turntable unit should be connected to the PHONO 1 terminals, especially if you intend to use moving coil cartridges, keeping the PHONO 2 terminals as spares. Check that the L and R pin plugs have been correctly inserted. Do not forget to connect the turntable ground line to the GND terminal on the CA-1010.

Switch on the POWER switch, and set the INPUT SELECTOR to PHONO, then select the appropriate position of the PHONO selector: MC if you use a moving coil cartridge, and 47 k Ω if you use a moving magnet cartridge. The 47 k Ω is best with many MM cartridges, but some will sound better if you use the 68 or 100 k Ω . Follow the cartridge-maker's recommendations, or in the absence of these, see which setting gives the best tonal balance. The differences are quite subtle.

Note that the PHONO 2 terminals can only be used with MM cartridges suitable for 47 k Ω impedance.

Also note that PHONO input plugs should *never* be connected or disconnected without either switching the MUTING switch to PRE OUT OFF, or the POWER switch OFF.

Use the -20dB position of the AUDIO MUTING switch to cut the volume instantly by 20 dB while changing records or altering the PHONO switch, without having to turn down the volume each time.

Do not use the MC phono setting with MM cartridges: you will overload the head amplifier and produce quite unacceptable levels of distortion.

If you play monaural records, the signal-to-noise ratio will be improved if you turn the MODE selector switch to the monaural (L + R) position.

Do not lower the cartridge at normal or high volumes, or you may damage your speakers. Use the FILTERS to remove rumble and/or scratch noise, and the BASS and TREBLE controls to give the best tonal balance.

CA-1010

TUNER AND AUX

TUNER CONNECTIONS

Connect the tuner output terminals to the CA-1010 TUNER input jacks on the rear panel, using the pin-plug cable provided. Make sure to confirm that the left-hand and the right-hand outputs are connected to the proper input sockets.

To enjoy your tuner, turn the INPUT SELECTOR switch to the TUNER position, and operate the tuner to receive the desired AM or FM signal. If your tuner generates unpleasant inter-station noise, use the AUDIO MUTING switch on the front panel of the CA-1010 to reduce this while you are tuning.

If your tuner is provided with an output level adjustment control, locate the proper position of the control to ensure that there is no significant change in the listening volume when you switch between the TUNER position and the PHONO position with the INPUT SELECTOR.

If you wish to record directly from your FM tuner onto an auxiliary tape deck, attach the tape recorder to the REC OUT jacks on the rear panel of the CA-1010, and turn the REC OUT SELECTOR to the TUNER position. Remember, while you are recording, you can listen to a different music source by using the INPUT SELECTOR control.

AUXILIARY INPUT CONNECTIONS

This is a spare input for any sound source you wish to connect to the CA-1010. When connecting a stereo source to these terminals, insure the left-hand and the right-hand plugs are inserted in the proper jacks.

This input has a sensitivity of 120 mV, and can be used for such inputs as Television Sound, Eight Track Stereo Cartridge Tapes, Shortwave Radio reception, and for high output level PHONO cartridges (ceramic or other types: ask your dealer's advice when using these cartridges).

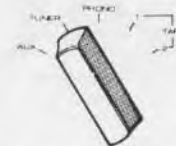
It can also be used with a microphone mixing amplifier for live stereo recordings if you have suitable equipment. In using these auxiliary units, make sure that they are compatible with the input impedance of 50 k Ω for these terminals.

To listen to these auxiliary sound sources, set the INPUT SELECTOR to the AUX position, and to record them set the REC OUT SELECTOR to the AUX position. Remember, when using a monaural input signal, the MODE selector switch should be set appropriately to MONO L, MONO R, or MONO L + R.

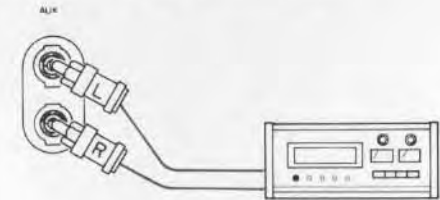
Tuner Connections



INPUT SELECTOR

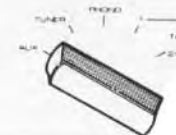


Connections to the AUX Terminals

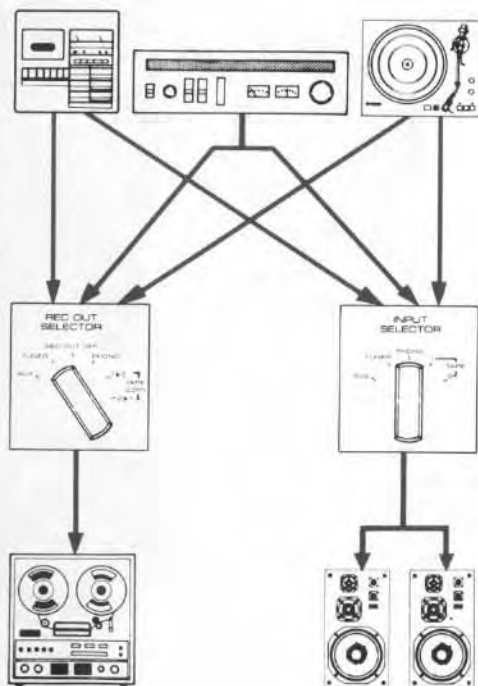


8-Track Cartridge Player,
TV Sound Tuner, etc.

INPUT SELECTOR



Recording One Program Source While Listening to Another



REC OUT SELECTOR SWITCH

Do not confuse the REC OUT SELECTOR and the INPUT SELECTOR switches. The INPUT SELECTOR switch decides which program source you hear. The REC OUT switch decides which one you record. Yamaha amplifiers are at present unique in offering independent choice of audition and recording. Thus you can listen to a record while tape recording direct from an AM/FM tuner, or while dubbing from one tape recorder to another (set the INPUT switch to PHONO and the REC OUT to TUNER, TAPE 1▶2, or TAPE 2▶1 positions). Alternatively you can tape record a disc while listening to FM broadcast or a music tape played back on a second tape deck (be careful not to infringe copyright laws in tape recording proprietary material). Just set the REC OUT switch to PHONO and the INPUT switch to TUNER or TAPE (1 or 2) respectively.

With the REC OUT SELECTOR in the OFF position, the CA-1010 is completely disconnected from the recording output terminals. Thus, when you are not recording, the CA-1010 will be protected from any adverse effects of unused tape deck input circuit impedances. Use this position when not recording.

TAPE PLAYBACK

The output leads provided with the tape deck are used to connect the LINE output terminals to

the CA-1010 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 to TAPE 1 to play back tapes (or to TAPE 2 if you are using the TAPE 2 terminals, of course). Use the output level controls on the deck or decks to adjust the playback level so that there is no great change in volume level when switching between TUNER and TAPE 1 or 2 inputs.

TAPE DECK CONNECTION/RECORDING

The tape-deck leads provided are used to connect the deck LINE input 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 whatever* upon the signal which will be recorded via these terminals. The REC OUT terminals' signal is decided by the REC OUT selector switch. If you refer to the description of the REC OUT function you will see that recording of any of the program sources connected to the CA-1010 is possible: just set the REC OUT switch to TUNER, PHONO, or AUX, respectively.

Recording of any of these sources can proceed while that source, or any other, is selected for audition by the INPUT SELECTOR switch. Monitoring of the recording while it is in progress can be carried out, if you are using a three-head deck

designed for monitoring, by setting the INPUT SELECTOR switch to the TAPE position, 1 or 2, via which you are recording. (Note: most cassette tape decks have only two heads, and monitoring is impossible; most open-reel decks do have three heads, with one for monitoring.)

The level at which a recording is made is very important (see the instruction manual provided with your tape recorder). Adjustments in level should normally be made with the input level controls on the tape deck.

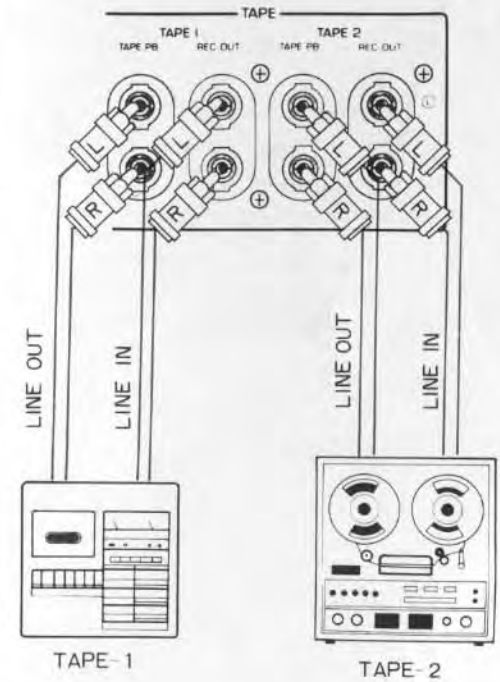
Tone, level, and other controls have no effect on the signals being recorded via REC OUT terminals. Tonal corrections must be made during playback. However, if you attach the LINE input terminals of the tape deck to the PRE OUT terminals on the rear panel, instead of the normal REC OUT terminals, you gain the convenience of being able to set levels, and alter the tonal balance of the recording, using filters, etc., but you are limited to the program source selected by the INPUT SELECTOR switch. You will also be unable to monitor recordings. This, and the fact that tone and filter controls inevitably introduce some extra distortion (although very little in the CA-

1010!), means that you should normally record via the REC OUT terminals provided for TAPE 1 or TAPE 2, using the PRE OUT terminals only when it is necessary, for instance when level adjustment is essential to prevent distortion.

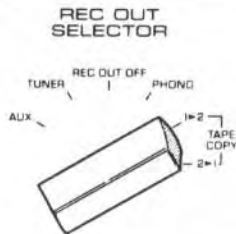
TAPE TO TAPE DUBBING

For this you will need two decks. Check carefully that the L (left) and R (right) channel pin-jacks are correctly connected before commencing recording. To copy a tape from TAPE 1 to TAPE 2 terminals, use the TAPE 1▶2 setting on the REC OUT selector switch. Similarly, to copy from TAPE 2 to TAPE 1, use the TAPE 2▶1 setting. In both cases you can compare the original recording and the copy by switching the INPUT SELECTOR between the TAPE 1 and TAPE 2 settings (provided that you have decks which allow you to monitor). Once you are satisfied that the recording is proceeding satisfactorily, you can turn the INPUT SELECTOR switch to any other program source you wish to enjoy, and the recording will not be affected.

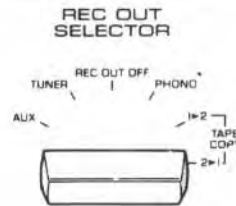
Tape Deck Connections



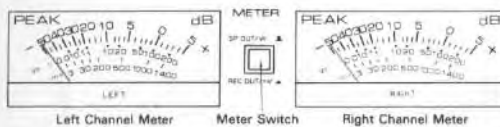
Tape Dubbing (1▶2)



Tape Dubbing (2▶1)



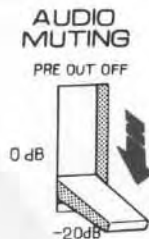
The Peak Level Meters and the Meter Switch



VOLUME (the Inner Knob) and BALANCE (the Outer Ring) Controls



AUDIO MUTING Switch



METERS

The peak meters used in the CA-1010 have a very fast response, enabling them to follow instantaneous variations in signal level rapidly and accurately. They also have an extremely wide measurement range, going from -50 dB to $+5$ dB on a single scale, with 0 dB corresponding to 100 Watts output into 8-ohm speakers. The calibration in Watts runs from 0.001 (1 mW) up to 316 Watts. Note that these readings should be doubled for 4-ohm speakers, and halved for 16-ohm speakers.

When the METER switch is pushed from SP OUT/W into the REC OUT/mV position, the meters will instead read the output levels applied to the REC OUT terminals, with 0 dB corresponding to 1,000 mV. Likely, $+5$ dB corresponding to 1.8 V and -50 dB, 3.16 mV. The maximum reading is 1,400 mV, and readings go down to 3 mV. This feature is extremely useful in setting tape deck recording levels accurately.

Note that when the REC OUT SELECTOR switch is in the REC OUT OFF position, the meters will not give a reading when switched to REC OUT/mV.

VOLUME, BALANCE AND MUTING

Use the VOLUME control to provide the volume of sound output that you require. When switching on your CA-1010, always set the VOLUME control at the "0" position by rotating the knob fully counter-clockwise. Then increase the volume as required. The BALANCE CONTROL adjusts the balance between the left-hand and the right-hand stereo channels. With the control set at the central "5" position, the sound should appear to be balanced centrally between the two speakers. When the control is rotated clockwise, it will emphasize the sound from the right-hand speaker, and when it is rotated counter-clockwise, it will emphasize the sound from the left-hand speaker.

The AUDIO MUTING control can be used to introduce a straight 20 dB reduction in signal level (a drop to one-tenth the unswitched power) without having to use the VOLUME control. This is used when switching between different program sources, and lowering the phono cartridge onto the record. There is also a PRE OUT OFF position which isolates the main amplifier completely from the output of the preamplifier. This is useful when inserting or removing plugs into the rear panel with power applied to the CA-1010.

CA-1010

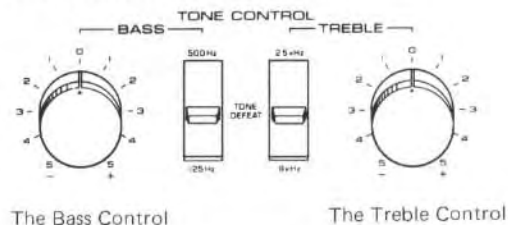
TONE AND FILTER CONTROLS

TONE CONTROLS

Both treble and bass tone controls on the CA-1010 are provided with twin turnover frequencies and an intermediate DEFEAT position. In this position, the signal passes through the amplifier without being affected by the tone controls at all. It provides an instant comparison between the effect with, and without, the control setting you have chosen.

Turnover frequencies are either 125 or 500 Hz for the bass control and either 2.5 or 8 kHz for the treble. Start with the 125 Hz and 8 kHz positions. If adequate control cannot be obtained with these settings, try the 500 Hz and 2.5 kHz positions, which extend the effect of the tone controls well into the important central frequency range as shown in the graphs. If you listen at very low volumes, you may find that you need quite high degrees of bass and treble boost to give a natural tonal balance.

The TONE CONTROLS



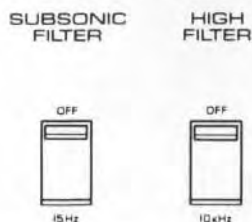
FILTERS

The filter circuits of the CA-1010 offer a choice of SUBSONIC and HIGH filters. Both provide very steep attenuation curves with a slope of 12 dB/octave. This sharp slope is achieved with extremely low distortion so that there is minimum degradation of tonal quality in the important mid-range frequencies.

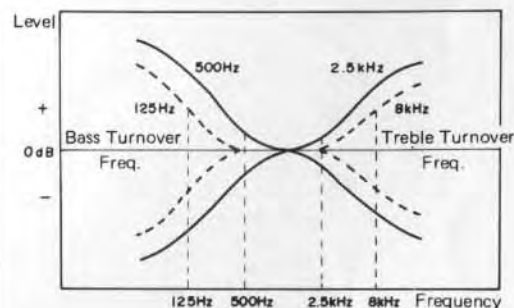
The SUBSONIC FILTER operating below 15 Hz prevents the amplification of ultra low frequency signals, arising from warped or eccentric records, from giving rise to cross-modulation distortion (general lack of clarity), and protects the speakers from overloads. Since the filter has virtually no effect on audible frequencies above 25 Hz, it can be left ON permanently with no effect on normal audition.

The HIGH FILTER operates at frequencies above 10 kHz, and is used to cut out unwanted tape hiss and record scratch. It should not be used unnecessarily.

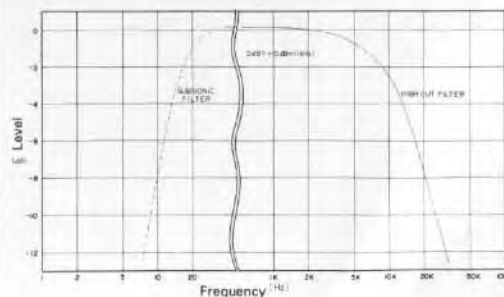
The SUBSONIC and HIGH Filters



Tone Response Characteristics

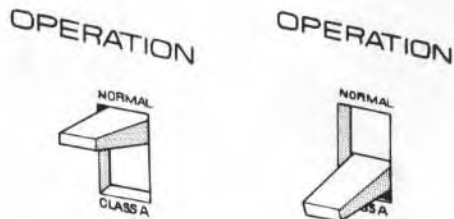


Response Characteristics for the Filters



OPERATION AND MODE CONTROLS

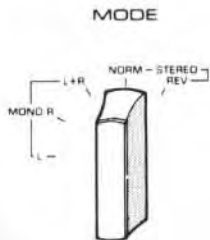
OPERATION Switch



Shown for Normal (Class B) Operation

Shown for Class A (Low Power/Distortion) Operation

MODE Switch



OPERATION CONTROL

The OPERATION switch selects whether the CA-1010 operates in Class A or in Class B. When large output powers are required, Class B should be used, particularly if rather inefficient bookshelf type speakers are being used. Class A is more suitable for listening at low volumes, or when using very efficient speakers, when the advantages of lower distortion and clearer tonal quality are more important than the loss of output power from 90 Watts to only 18 Watts per channel (for 8-ohm speakers).

Low output power is one disadvantage of Class A operation, but it is also much less efficient, taking much more electrical power, and getting much hotter in the process, than Class B. You should be particularly careful to avoid hot locations and poor ventilation when using Class A.

Note: DO NOT switch from Class B to Class A operation when the meters indicate outputs of over 20 Watts. The advantages of Class A are only retained to 20 Watts maximum.

MODE CONTROL

This switch offers control of the mode in which the signal applied to the input terminals is reproduced. It cannot, of course, turn a monaural signal into stereo, but it does offer considerable flexibility. The monaural positions are:

- MONO L For reproduction of the left channel only.
- R For reproduction of the right channel only.
- L + R For reproduction of the monaural sum of both left and right-hand channels.

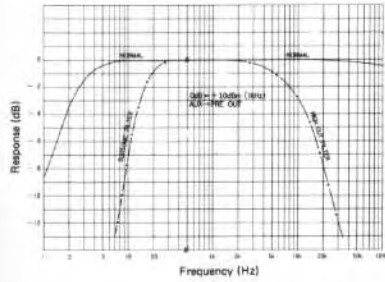
The stereo positions are:

- STEREO NORM For normal reproduction of stereo sources.
- REV For reproduction with left and right-hand channels reversed.

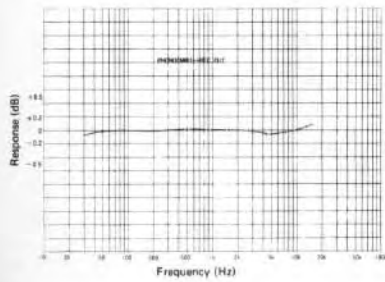
The MONO L + R position is best for the reproduction of monaural records and radio programs from your tuner. The L and R positions may be used to check the individual channels of a stereo source.

The REV stereo position may be used temporarily to correct reproduction where connecting errors have resulted in reverse reproduction, until the wiring is corrected.

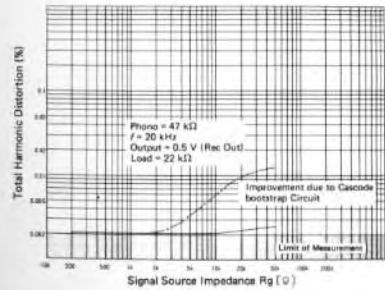
Filter Frequency Response (AUX to PRE OUT)



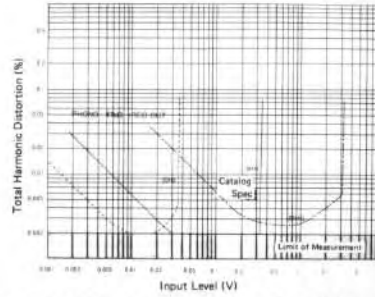
RIAA Deviation (PHONO MM to REC OUT)



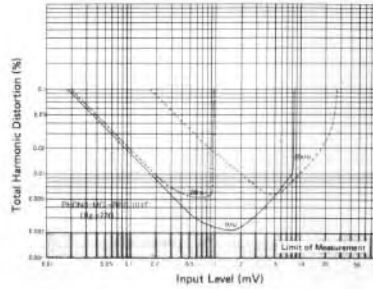
Improvement in Distortion with Cascode-Bootstrap Circuit



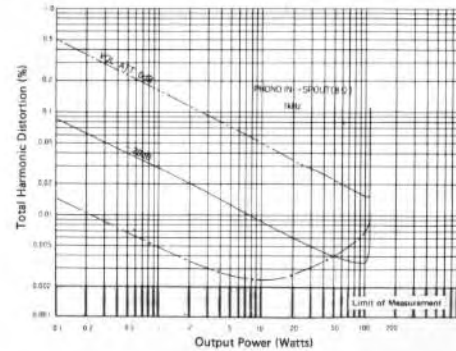
Input Level vs. Total Harmonic Distortion (PHONO 47kΩ to REC OUT)



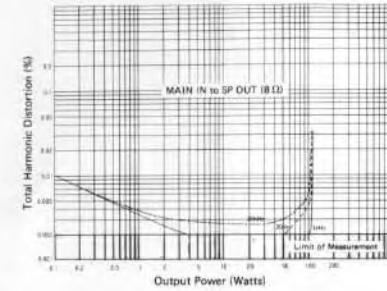
Total Harmonic Distortion vs. Input Level for the MC Head Amplifier (PHONO MC to REC OUT)



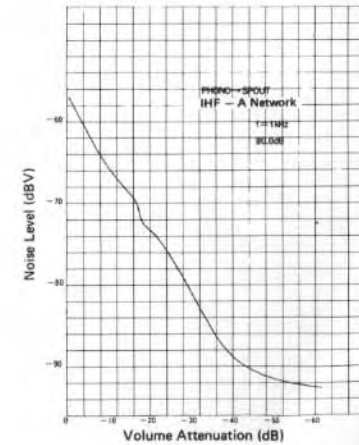
Total Harmonic Distortion from PHONO to SP OUT (1kHz into 8 Ω)



Output Power vs. Total Harmonic Distortion (Class B operation, both channels driven)

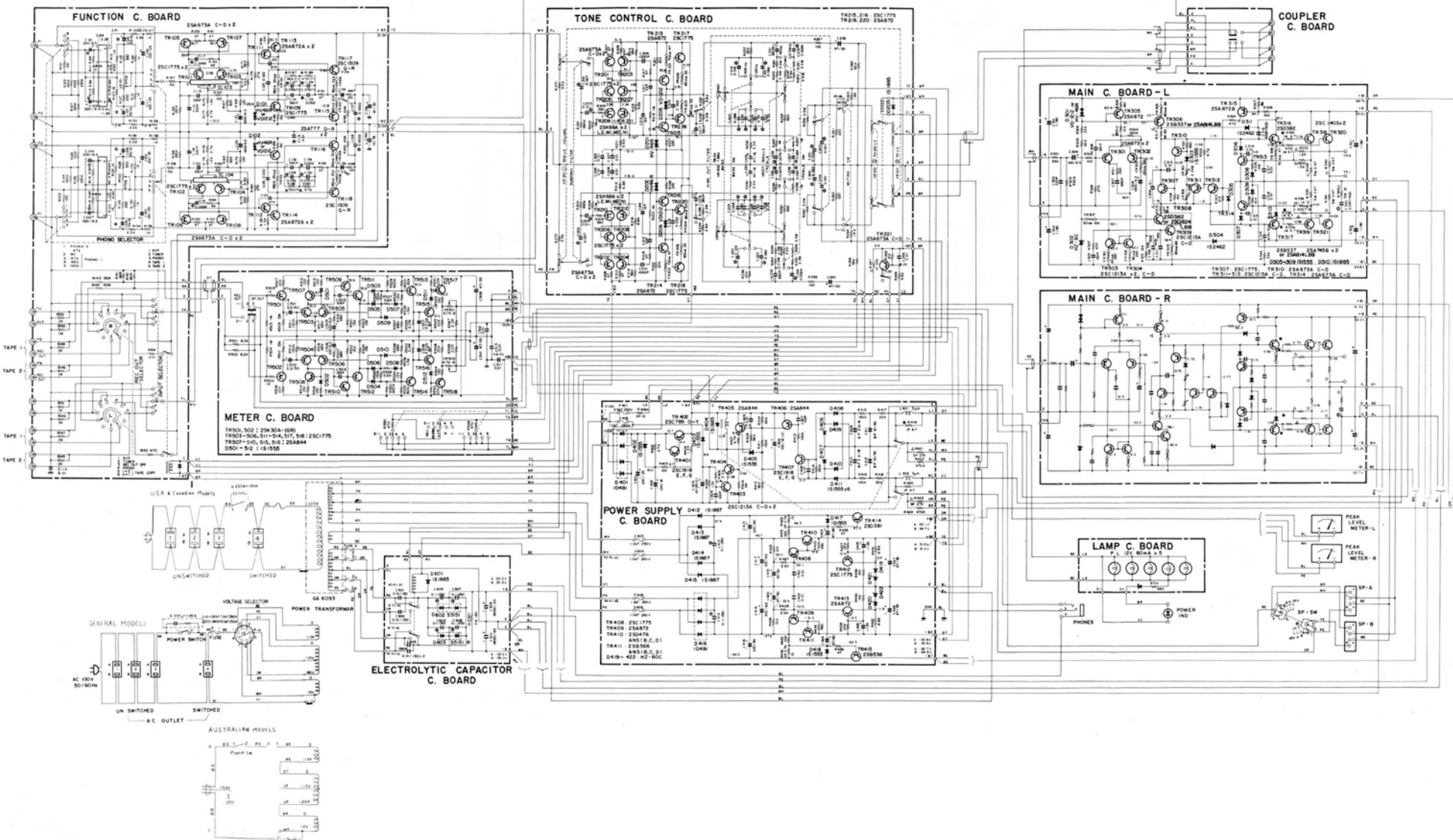


Noise Level and Volume Attenuation from PHONO to SP OUT (1 kHz, IHF-A Network)



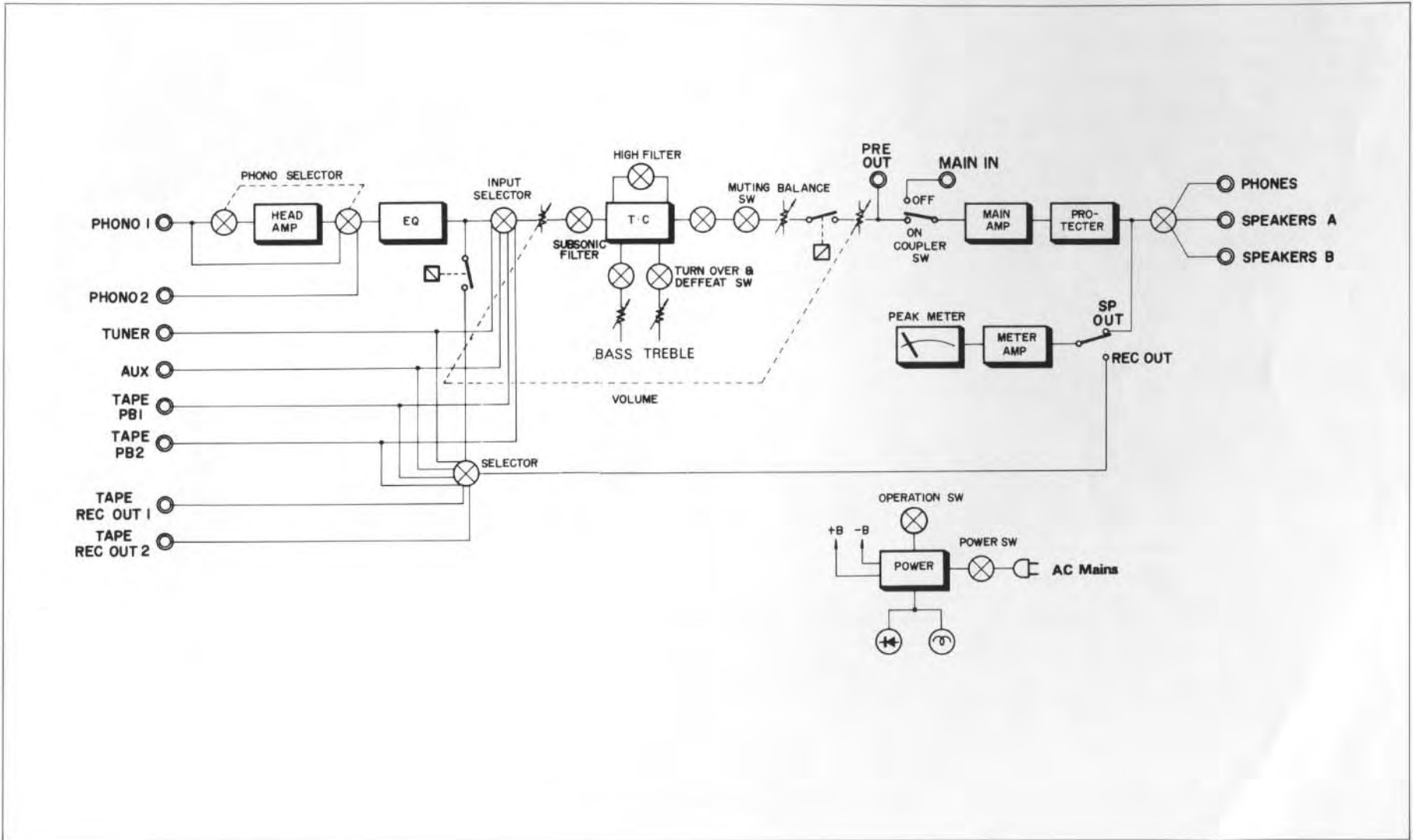
CA-1010

CIRCUIT DIAGRAM



CA-1010

BLOCK DIAGRAM



CA-1010

SPECIFICATIONS

Minimum output power

Continuous RMS power (both channels driven at rated 0.02% total harmonic distortion)

20 to 20,000 Hz	90 + 90 Watts into 8 ohms (Class B)
	120 + 120 Watts into 4 ohms (Class B)
	18 + 18 Watts into 8 ohms (Class A)
at 1,000 Hz	90 + 90 Watts into 8 ohms (Class B)
	140 + 140 Watts into 4 ohms (Class B)

Input sensitivity/impedance

Phono 1	2 mV/47, 68 or 100k Ω (MM) 50 μ V/10 Ω (MC)
Phono 2	2 mV/47 k Ω
Tuner, Aux	120 mV/50 k Ω
Main in terminals	1 V/25 k Ω

Maximum input levels

Phono 1 (MM), 2	310 mV (at 1 kHz, 0.02% distortion)
Phono 1 (MC)	7.5 mV (at 1 kHz, 0.02% distortion)
Tuner, Aux	20 V (at 1 kHz, 0.02% distortion)

Filters

Subsonic	$f_c = 15$ Hz, 12 dB/octave
High	$f_c = 10$ kHz, 12 dB/octave

Signal-to-noise ratio (IHF-A network)

Phono 1 (MM), 2	96 dB (for 10mV, shorted)
Phono 1 (MC)	68 dB (50 Ω short)
Tuner, Aux	100 dB
Main	115 dB
Residual noise	Less than 0.1 mV

Output level/impedance

Rec Out terminals	120 mV/600 Ω (rated) 18.6 V (maximum, at 1 kHz, 0.02% distortion)
Pre Out terminals	1 V/500 Ω (rated) 7 V (maximum, at 1 kHz, 0.02% distortion)

Frequency response

Phono 1, 2 RIAA deviation	± 0.2 dB (MM/MC)
Tuner to Pre Out terminals	5 Hz to 100 kHz, +0, -1 dB
Tuner to SP Out terminals	5 Hz to 50 kHz, +0, -1 dB (8 Ω load)

Power bandwidth into 8 Ω , 0.02% distortion

Class A operation	10 Hz to 70 kHz
Class B operation	10 Hz to 50 kHz

Tone control characteristics

Bass turnover frequencies	125 Hz and 500 Hz
Bass boost/cut	± 10 dB at 20 Hz (for 500 Hz)
Treble turnover frequencies	2.5 kHz and 8 kHz
Treble boost/cut	± 10 dB at 20 kHz (for 2.5 kHz)

Distortion 20 Hz to 20 kHz

Phono 1 (MM), 2 to Rec Out	Less than 0.003%, 5 V output
Phono 1 (MC) to Rec Out	Less than 0.03%, 3 V output
Tuner, Aux to Pre Out	Less than 0.005%, 3 V output
Main in to Sp Out (Class A)	Less than 0.005% into 8 Ω at 10 W
	(Class B) Less than 0.01% into 8 Ω at 50 W
Tuner to Sp Out (Class B)	Less than 0.01% into 8 Ω at 50 W

Noise-Distortion Clearance Range (NDCR) for 0.1% THD into 8 Ω

Phono to Sp Out	0.1 W to 90 W (Vol at -20 dB) 4 mW to 90 W (Vol at -40 dB)
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Damping factor at 1 kHz Better than 45 into 8 Ω

Meters

Rise time	100 μ s
Decay time	0.95 sec
Meter range	-50 dB to +5 dB (1 mW to 316 W into 8 Ω)

General

Power supplies	120 V, 60 Hz (U.S.A. and Canada) 110/120/220/240 V AC, 50/60 Hz (Other Areas)
Power consumption (nominal)	450 W, 550 VA (U.S.A. and Canada), 900 W (Other Areas)
Dimensions (W x H x D)	461 x 170 x 360mm 18-1/8" x 6-11/16" x 14-3/16"
Weight	U.S.A. and Canada 19 kg (41 lb 13 oz) Other areas 20 kg (44 lbs.)

CA-1010

TROUBLE SHOOTING

Before assuming that your CA-1010 is faulty, check the following trouble-shooting list, which details many steps you can take yourself without having to call a service representative.

Fault	Cause	Cure
No power although POWER switch is ON (POWER LED unlit)	AC power line not plugged into supply socket. AC main fuse has blown.	Plug firmly into the supply socket. Contact your service representative for a replacement.
No sound although power is connected.	Volume too low. INPUT SELECTOR in wrong position. Input pin plugs incorrectly inserted, loose, or disconnected. Speaker connections faulty. SPEAKERS switch OFF. PRE OUT/MAIN IN COUPLER switch in OFF position. The AUDIO MUTING switch is at PRE OUT OFF.	Turn up volume. Check and change as necessary. Check and insert fully in the correct positions. Check and make good. Set to correct position. Switch back to ON. Switch back to 0 dB or -20 dB.
Sound comes only, or mainly, from either L or R speaker	Speaker connections faulty. Input connections faulty. BALANCE control not properly adjusted.	Check and make good. Check and make good. Set to give correct stereo balance.
Sound suddenly ceases during audition.	The protective circuit has gone into operation. AC main fuse has blown.	Check for incorrect (too low) speaker impedances or short circuits and correct. If the fault persists, switch off and wait briefly before switching on again. Contact your service representative for a replacement.
Poor bass response and badly defined stereo image.	Speaker + and - connections are incorrect.	Reverse the connections to one speaker, not both.
A loud 'humming' is heard with, or instead of, the record when attempting PHONO audition.	Either the pin-plugs from the phono cartridge are not firmly plugged into the input sockets, or the braided shielding wire is defective.	Plug in firmly, replacing the defective shielding if necessary. Check and make good the GND (ground) wire connection.
The volume control cannot be raised during record audition without a loud 'booming' noise.	This is caused by acoustic feedback from the speakers to the phono cartridge stylus, and is called 'howling.'	Increase the separation between turntable unit and speakers, avoiding locations directly in line with the speakers.
Your tape recorder does not record the program you are monitoring.	The REC OUT selector is not set to the required program source.	Turn to the required setting.

Note: The hexagonal wrench accessory may be used to re-position or remove any selector switch knob.



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