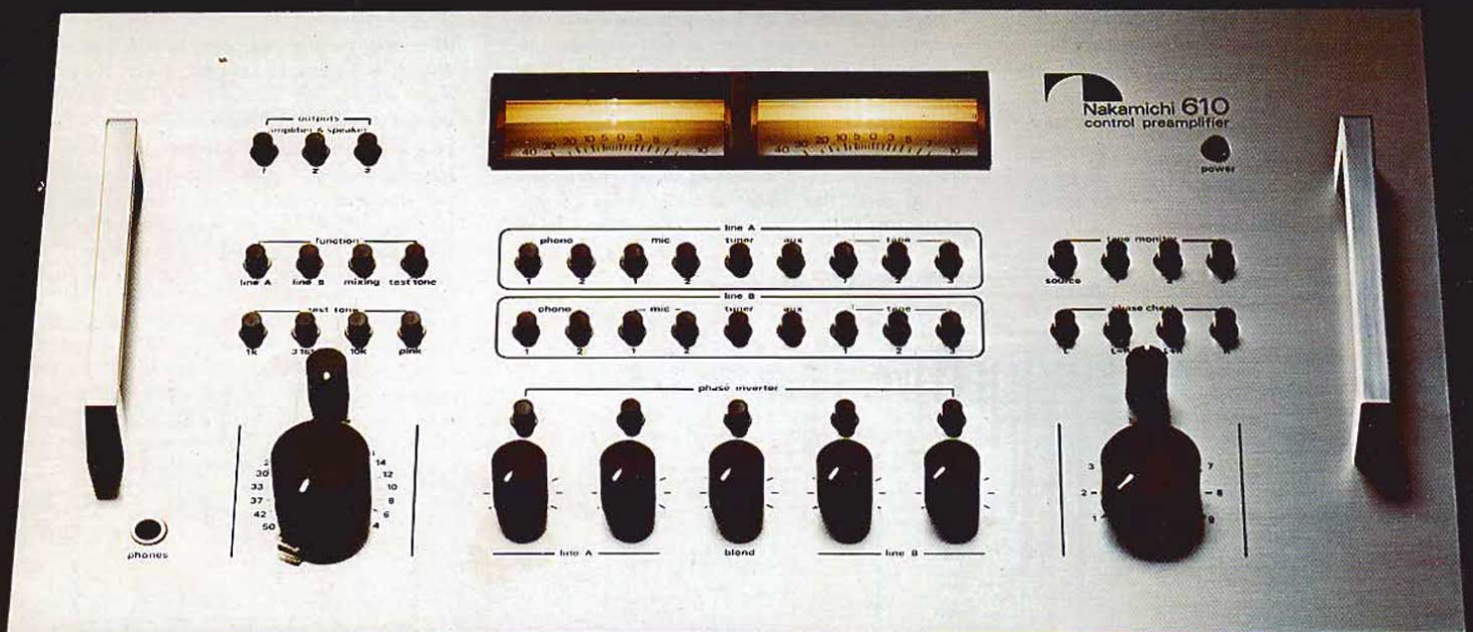




Nakamichi 610

Control Preamplifier



NAKAMICHI'S FIRST ALL-ELECTRONIC PRODUCT SETS NEW STANDARDS FOR USEFUL VERSATILITY WHILE SMASHING ALL EXISTING BARRIERS FOR NOISE AND DISTORTION

The Nakamichi 610 was created to fill an often expressed gap in the consumer audio market. It is a remarkably flexible control center that must be considered truly unique by any standard. Its uniqueness stems not only from its amazing features, but from its even more amazing performance as well – it does, after all, carry the Nakamichi brand name. To some audiophiles, no more need be said. But there is more – much more.

First and foremost, the Nakamichi 610 is a “state-of-the-art” preamplifier. This much overused phrase can certainly be applied to a preamplifier with noise level so close to the theoretical limit and distortion so low that these parameters can barely be measured with today’s best available test equipment. Specifications only begin to tell the story.

Secondly, the Nakamichi 610 is a relatively sophisticated test instrument. Built-in test tone oscillators, pink noise generator, phase checkers and precision dB meters, just to name a few, make the 610 an invaluable tool in the calibration, alignment and evaluation of stereo system components. Special switching features facilitate the A-B comparison of phono cartridges, tape decks, power amplifiers, loudspeakers, etc.

Last, but not least, the Nakamichi 610 is a mixing console. It allows 5-in/2-out mixing of any of 19 different inputs. This includes 5 wide-dynamic-range microphone inputs. One can, for example, mix two tape decks (stereo, of course) plus center channel voice onto a third tape deck, or two phonographs plus voice, or any combination of these sources. Live recording takes on a new dimension with the 610: with two left, two right and one blend microphone inputs the live recordist can produce some very professional results.

The Nakamichi 610, in short, will become a must for the serious audiophile. Even the “audiophile who has everything” will wonder how he ever managed to do without the 610.

FEATURES

- 1) Ultra low-noise and low-distortion preamplifier circuitry
- 2) 5-in/2-out mixing of any of the following inputs:
 - 2 Stereo Phono (magnetic – RIAA)
 - 1 Stereo Tuner
 - 1 Stereo AUX
 - 3 Stereo Tape Decks (separate source/ tape monitoring)
 - 2 L Channel Mic
 - 2 R Channel Mic
 - 1 Blend Mic (center channel)
- 3) Built-in test tone oscillator providing 1 kHz, 3.16 kHz, 4.16 kHz, 10 kHz, 11 kHz, 13.16 kHz and 14.16 kHz sine wave signals
- 4) Built-in Pink Noise generator
- 5) Phase check and invert capabilities on all mixer inputs
- 6) Built-in 15 dB and 30 dB microphone input attenuators
- 7) Wide range precision peak level indicating dB meters
- 8) Built-in speaker/amplifier switch selects any one of three speaker system pairs or power amplifier connected to the optional remote control box (playback levels can be matched for all three systems by adjusting the individual volume controls on the 610)

THE 610'S INCREDIBLE PHONO SECTION: Better than 80dB Signal-to-noise ratio (IHF-A) referenced to 1mV with Total Harmonic Distortion typically 0.002% at 1KHz (63mV input) – RIAA deviation better than ± 0.3 dB.

Much emphasis has recently been placed on the overload capability of preamplifier phono sections. It has long been an inescapable fact, however, that it is a simple matter to raise the clipping level if one is willing to put up with increased noise. In designing the 610's RIAA equalization amplifiers Nakamichi Research decided to return to some forgotten basics – the phono section would provide the widest possible dynamic range while maintaining the lowest possible noise and distortion. In order to achieve these goals Nakamichi engineers had to create an entirely new kind of solid-state circuitry involving the use of bipolar transistors

in a proprietary manner that the circuit diagrams do not begin to explain. The first stage employs a "triple-transistor" network that largely accounts for the superb signal-to-noise ratio. The driver stage employs current drive for immeasurably low distortion levels. Metal film precision resistors and the highest quality components are used throughout to assure excellent temperature stability and minimal RIAA deviation. The dynamic range is wide enough to accommodate the highest output magnetic cartridges as well as a number of low output moving coil type pickups.

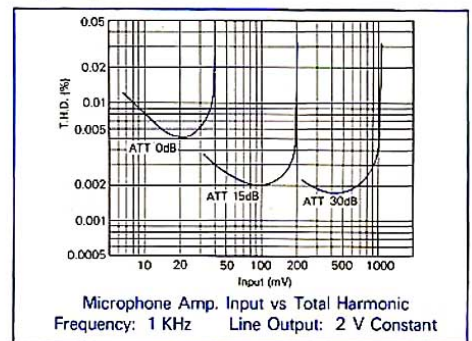
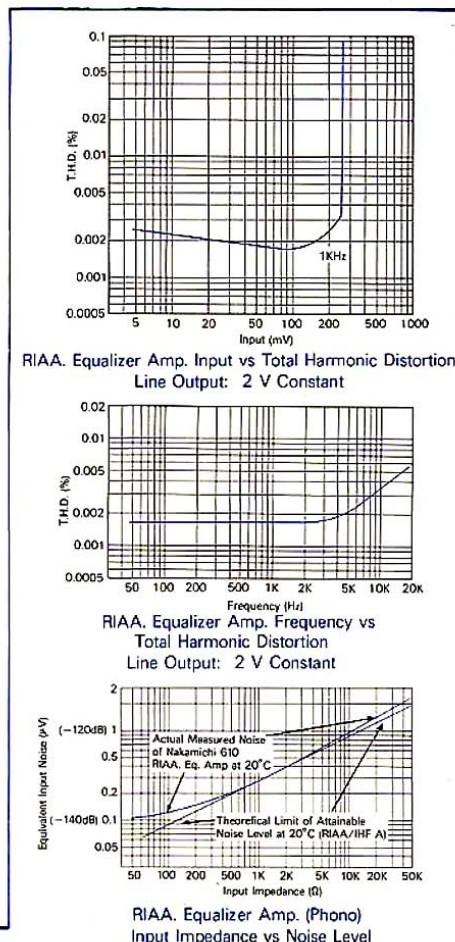
The 610 provides not only two magnetic phono inputs, but two complete stereo magnetic phono preamps. This allows the mixing of two stereo disc sources. It further allows the A-B comparison of phono cartridges with independent level matching (by utilizing the "A" and "B" stereo mixing lines). Each phono preamplifier has switch selectable input im-

pedance: 200, 50K or 100K ohms may be selected.

FIVE STUDIO QUALITY MICROPHONE PREAMPLIFIERS

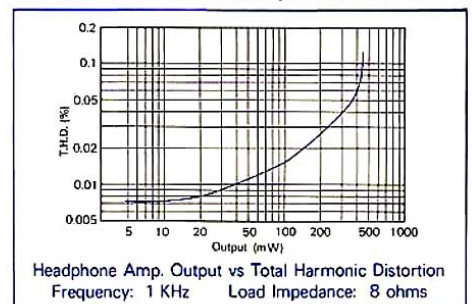
The 5 microphone preamplifiers in the Nakamichi 610 have exceptionally wide dynamic range, low noise and low distortion.

- A) The mic preamplifiers provide 2 left, 2 right and 1 blend channels in the mixing mode. They are very sensitive: a 0.2 mV input will provide a 0 dB level with all input level controls at maximum. This is more than enough for most dynamic microphones.
- B) Although 15 dB and 30 dB attenuators can be switched in for any of the mic inputs, the mic preamplifier provides an additional 50 dB of dynamic range above and beyond the 0.2 mV level without the use of attenuators. This allows the use of high output condenser microphones without fear of non-linearity or clipping.
- C) The mic inputs are standard phone jack unbalanced types. The acceptable impedance range is 200–1000 ohms, and the sensitivity range is -74 dB ± 10 dB (ref: 1 μ bar per meter = 0 dB)

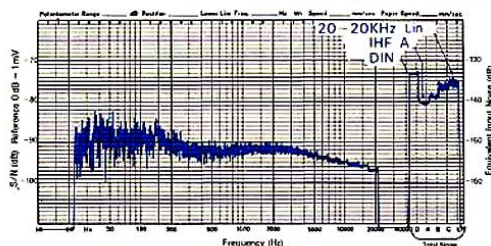


HIGH OUTPUT HEADPHONE AMPLIFIER FOR "LIVE" MONITORING

The 610 provides a high accuracy stereo headphone amplifier for on-location monitoring or home headphone listening. It employs a differential amplifier input stage and pure complementary OTL (transformerless) output stages. At 1 kHz, 0 dB and with the Monitor Volume control at maximum, the headphone amplifier will deliver 40 milliwatts per channel into 8



RIAA. Equalizer Amp. (Phono) Noise Characteristics Frequency vs Noise Level



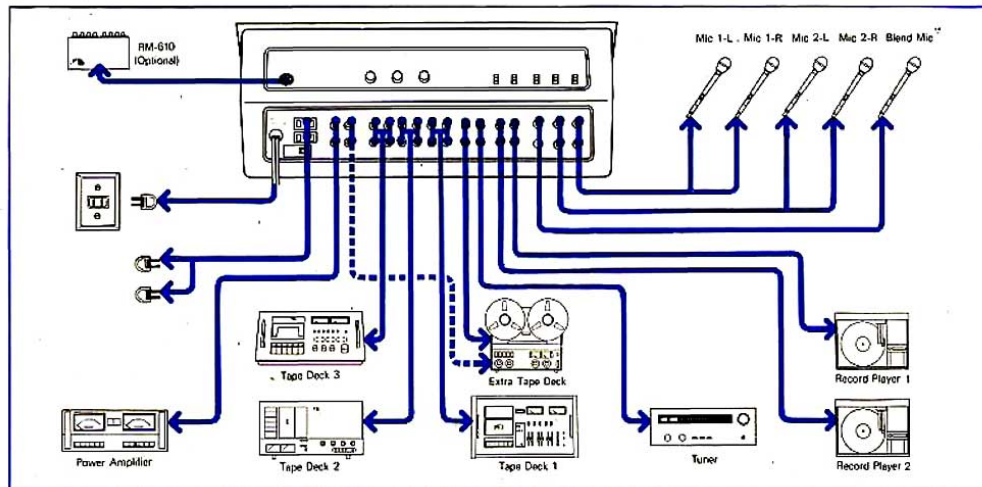
ohm loads. The headphone amplifier is capable of a maximum of 300 milliwatts per channel into 8 ohms. This is ample power for monitoring with moderate to high efficiency headphones (such as the Nakamichi HP-100 Monitoring Headphones) within an impedance range of 8 to 200 ohms. The monitoring volume on the 610 can be altered without affecting the record levels on tape decks connected to the 610.

HIGHLY FLEXIBLE SOURCE/TAPE CONTROL CIRCUITRY

There are a total of 19 different inputs to the 610. Six of these are three complete stereo tape deck control circuits with monitoring capabilities. As the illustration clearly suggests, the possibilities are numerous. Here are some examples of the ways in which the 610 can function:

- live recording with up to five microphones on as many as three tape decks simultaneously with independent monitoring capability
- combined live and pre-recorded source mixing, such as 3 microphones plus a tape deck or phonograph; or one microphone (center channel) plus two phonographs or two tape decks (or one of each)
- mixing of any two stereo sources, such as two tape decks, two phonographs, a tuner and a tape deck, or any combination of these sources
- A-B comparison of any two sources, such as two phono cartridges, a disc and tape, disc and FM, etc., with independent level matching

All of the necessary interconnections for the above examples, as well as for any other combination that may arise in actual use, are managed by the push of a few buttons and without any juggling of connecting cables. It is impossible to make "wrong" connections. There is even a feature that eliminates the possibility of feedback "howl" by automatically blocking the inputs to a tape deck that is being used as a program source for the mixer section of the 610.

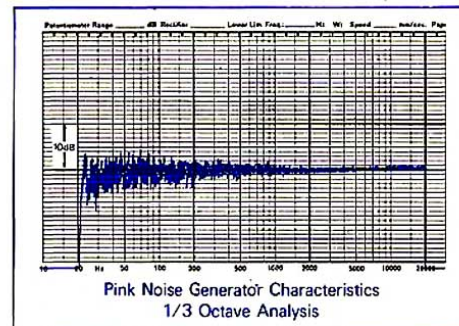


BUILT-IN TEST TONE OSCILLATOR AND PINK NOISE GENERATOR

The Nakamichi 610 has built-in test tones and Pink Noise that together with the peak level meters facilitate the routine alignments and calibration of tape recorders as well as a number of other performance checking functions for many music system components.

The built-in tones are 1 kHz, 3.16 kHz and 10 kHz. Since, however, these tones are additive, they may be used in combinations to provide other frequencies, such as 11 kHz or 14.16 kHz (a total of 7 frequencies).

The Pink Noise Generator (constant energy per octave band) is particularly useful for detecting coloration in components.



PEAK LEVEL METERS

The peak indicating dB meters on the 610 provide an exceptionally wide dynamic range of 50 dB (-40 to +10 dB). They are, furthermore, of the true peak reading type. The metering circuitry employs a log amplifier with an extremely fast attack time of 120 milliseconds combined with a slow decay time of 1.5 seconds. This combination makes the meters very accurate indicators of program peaks and unusually easy to read. The peak level meters, furthermore, respond equally to all frequencies giving them the widest possible range of applications.

PHASE CHECK AND INVERT CAPABILITIES

If one loudspeaker in a stereo system is connected out-of-phase with respect to the other loudspeaker, the audible result is usually a cancellation of low frequencies as well as near complete loss of proper stereo imaging. These same effects can be caused by out-of-phase inputs, especially microphones. Since there is no industry-wide standard for microphone phasing, using microphones of different manufacturers for a recording can result in mis-phasing. The Nakamichi 610 provides the capability to check and, if necessary, invert phase on each of its five mixer inputs.

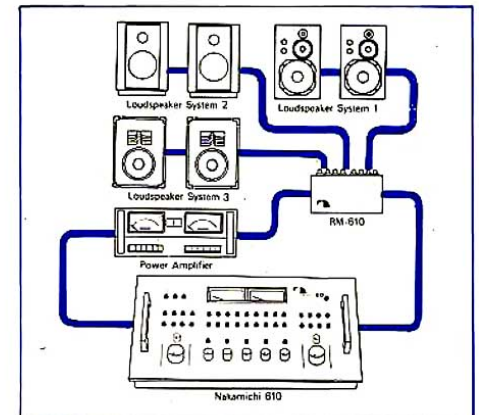
The phase check circuitry provides four modes:

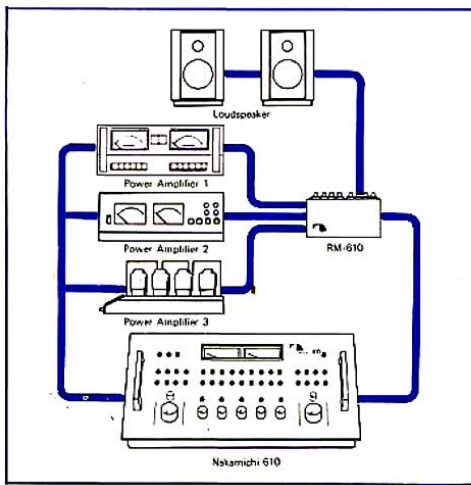
- 1) L: Monaural left
- 2) L-R: The difference of the L and R channels (one channel is inverted in phase and then added to the other)
- 3) L+R: The sum of both L and R channels (both channels are added in phase)
- 4) R: Monaural right

The phase check is functional only through the headphone and monitor outputs so that its operation cannot affect a recording in progress. By using the phase check modes above, the recordist can detect and correct for poor stereo imaging and low frequency cancellation problems arising from mis-phasing.

REMOTE SWITCHING OF UP TO 3 LOUDSPEAKER PAIRS OR POWER AMPLIFIERS WITH THE OPTIONAL RM-610

With the output switches on the Nakamichi 610, it is possible to remotely select any one of three speaker system pairs or power amplifiers connection to an optional remote control unit (the RM-610). By pre-setting levels with the individual output level controls, furthermore, the efficiencies/gains of the three speaker systems/amplifiers may be compensated to allow the fairest possible A-B-C comparisons. The pre-set output levels have no effect on record levels.





Specifications

Power Source	100-120/220-240V AC 50/60 Hz
Power Consumption	20 VA
Input Sensitivity/Impedance	
mic	0.2 mV/1 K ohms (attenuators: 15, 30 dB)
phone	1 mV/200, 50K, 100K ohms
aux, tuner	75 mV/25K ohms
tape PB	230 mV/75K ohms
tape monitor	316 mV/75K ohms
Maximum Input Levels	
mic	1 V (+74 dB) ... Att: 30 dB
phono	250 mV (+48 dB)
aux, tuner, tape PB	50 V
Output Levels (@ 0 dB)/Output impedance/min. load impedance	
monitor out	1V/100 ohms/1 K ohms
line out	316 mV/600 ohms/10K ohms
rec out	316 mV/2.2K ohms/50K ohms
headphone	40 mW/8 ohms/8-200 ohms
Maximum Output at Clipping	
monitor out	5V into 1 K ohms
line out	5V into 10K ohms
rec out	5V into 50K ohms
headphone	300 mW into 8 ohms
Frequency Response	
mic	30-100,000 Hz +0, -1.5 dB
phono	30-15,000 Hz ±0.3 dB
aux, tuner	20-100,000 Hz +0, -1.5 dB
tape PB	10-50,000 Hz ±0.3 dB
monitor out	5-150,000 Hz +0, -1.5 dB
Signal-to-Noise Ratio (IHF A) - (ref. level)/equivalent input noise	
mic	better than 53 dB (0 dB)/-127 dB (65 dB; Att: 15 dB)
phono	better than 80 dB (1 mV)/-140 dB (90 dB @ 3mV)
aux, tuner, tape PB	better than 85 dB (Master @ max) better than 93 dB (Master @ min)
Residual Noise Level (IHF A)	
headphone (8 ohms)	4 microvolts or less
line out	7 microvolts or less (Master @ min) 15 microvolts or less (Master @ -30 dB)
Distortion (Master Vol. @ -20 dB, Level Vol. @ max, line out @ 2V)	
mic	less than 0.01% at all freq. up to 10 KHz
phono	less than 0.005% at all freq. up to 10 KHz
aux, tuner, tape PB	less than 0.005%
Test Tones	
sine wave oscillator	1K, 3.16K, 4.16K, 10K, 11K, 13.16K, 14.16K Hz (all possible combinations)
pink noise generator	50-15,000 Hz ±2 dB (1/3 octave analysis)
sine wave distortion	1 KHz - 14.16 KHz less than 0.2%
Peak Level Meters (2)	
range	-40 dB to +10 dB
accuracy	-20 dB to +10 dB ±1 dB -40 dB to -20 dB ±2 dB
frequency response	50-20,000 Hz +0, -1 dB (-30~+10 dB)
Semiconductor Complement	
FET's	2
transistors	134
diodes	27
zener diodes	5
integrated circuits	2
Miscellaneous	
AC outlets	2, switched, 350 VA max.
dimensions	15.75 (W) x 6.70 (H) x 9.33 (D) inches 400 (W) x 170 (H) x 237 (D) mm
weight	15-1/2 lbs. (7 kg)

OTHER SPECIAL FEATURES

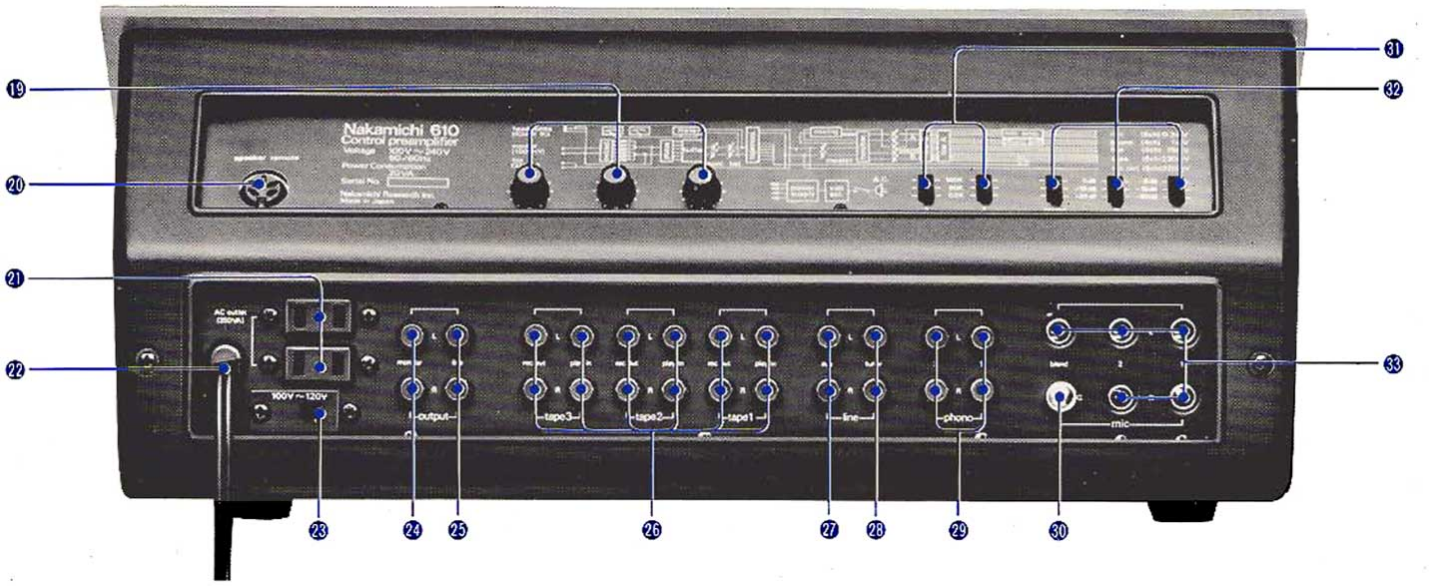
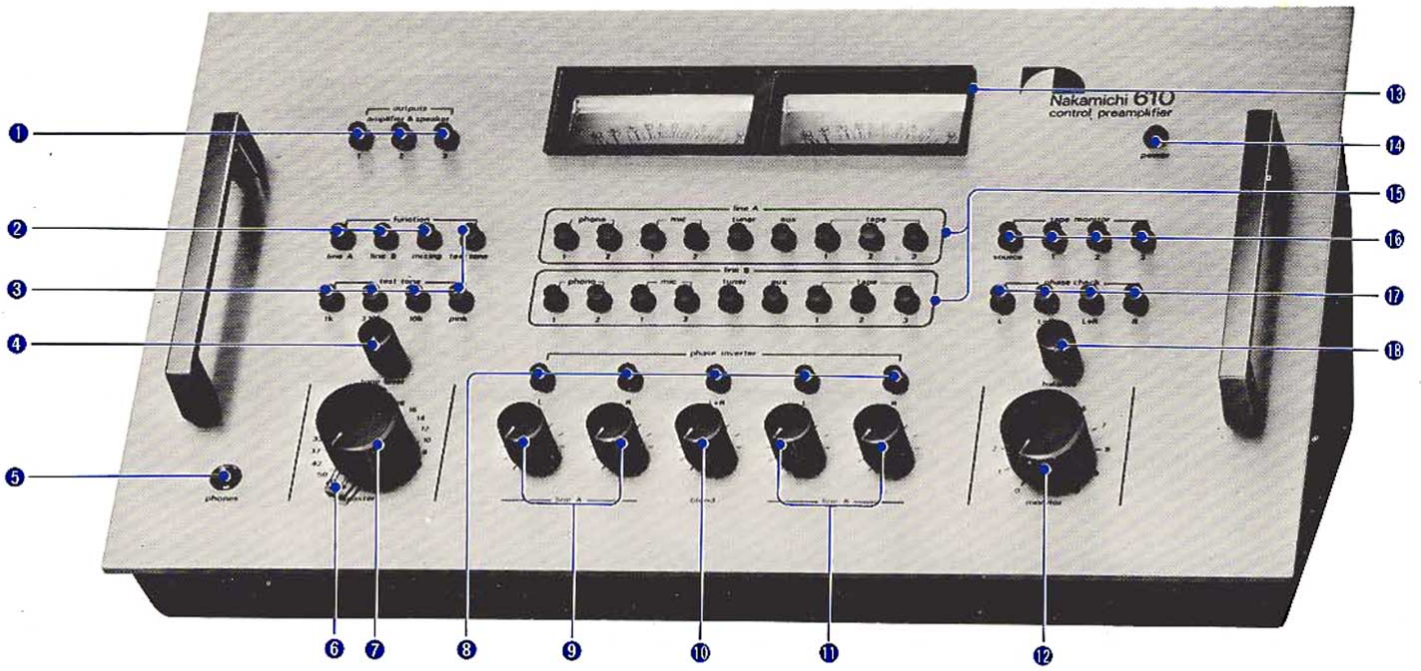
- 1) Rear panel power supply primary voltage selection: A two position switch selects either 100-120 volts AC or 220-240 volts AC. Thanks to a wide range voltage regulator, a two position selector does the job where four or more positions are usually required.
- 2) The 610 provides two switched AC auxiliary outlets (max. 350 VA).
- 3) The 610 provides a special "line out" unaffected by the Monitor Volume control, the balance control, or the phase check circuitry. At 1 kHz, 0 dB, the "line out" voltage is 0.3V. It is an output designed for special high performance applications where a minimum of signal processing is desired.
- 4) The Monitor output of the 610 provides a high level, low coloration preamplifier output with which to drive the monitor power amplifier. The Monitor Volume control, balance control and phase check functions are all operational through the Monitor output.
- 5) The Master record level control is a high precision metal film resistor attenuator calibrated in "click stop" dB steps. After the individual mixing levels have been set with the "A" and "B" line and blend mic input level controls, the overall record level is set with the Master control. The control is of such precision, furthermore, that slow fade-in and fade-out effects can be performed without the left/right image shifting characteristic of most master record level controls (left/right matching is within ±0.5 dB regardless of setting).
- 6) The 610 employs a specially designed toroidal power transformer for the lowest possible flux leakage. The contribution of the power transformer to the overall noise level is so low that the use of an external power supply would not yield improved results.

● Specifications and appearance design are subject to change for further improvement without notice.



Nakamichi 610

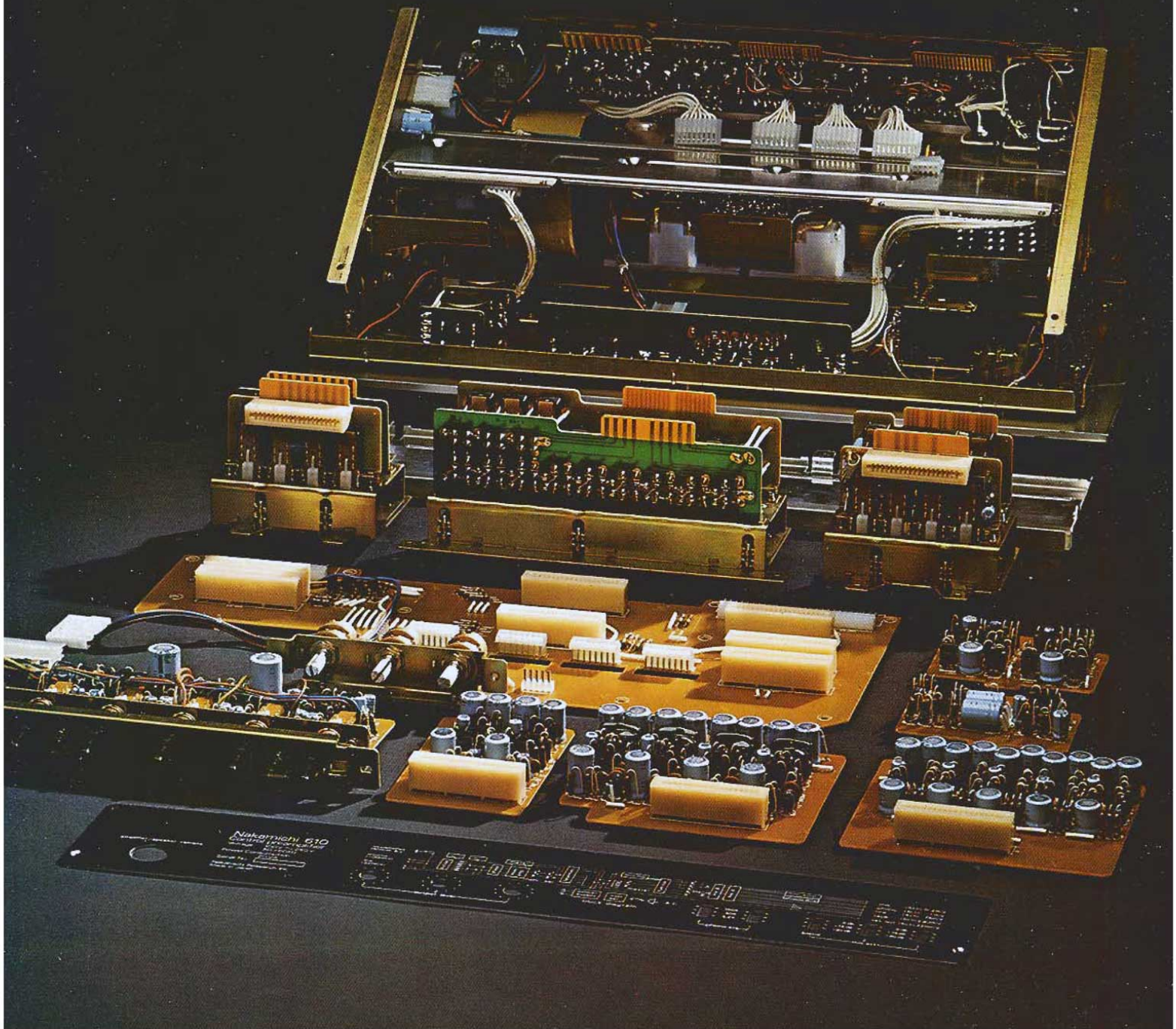
Control Preamplifier



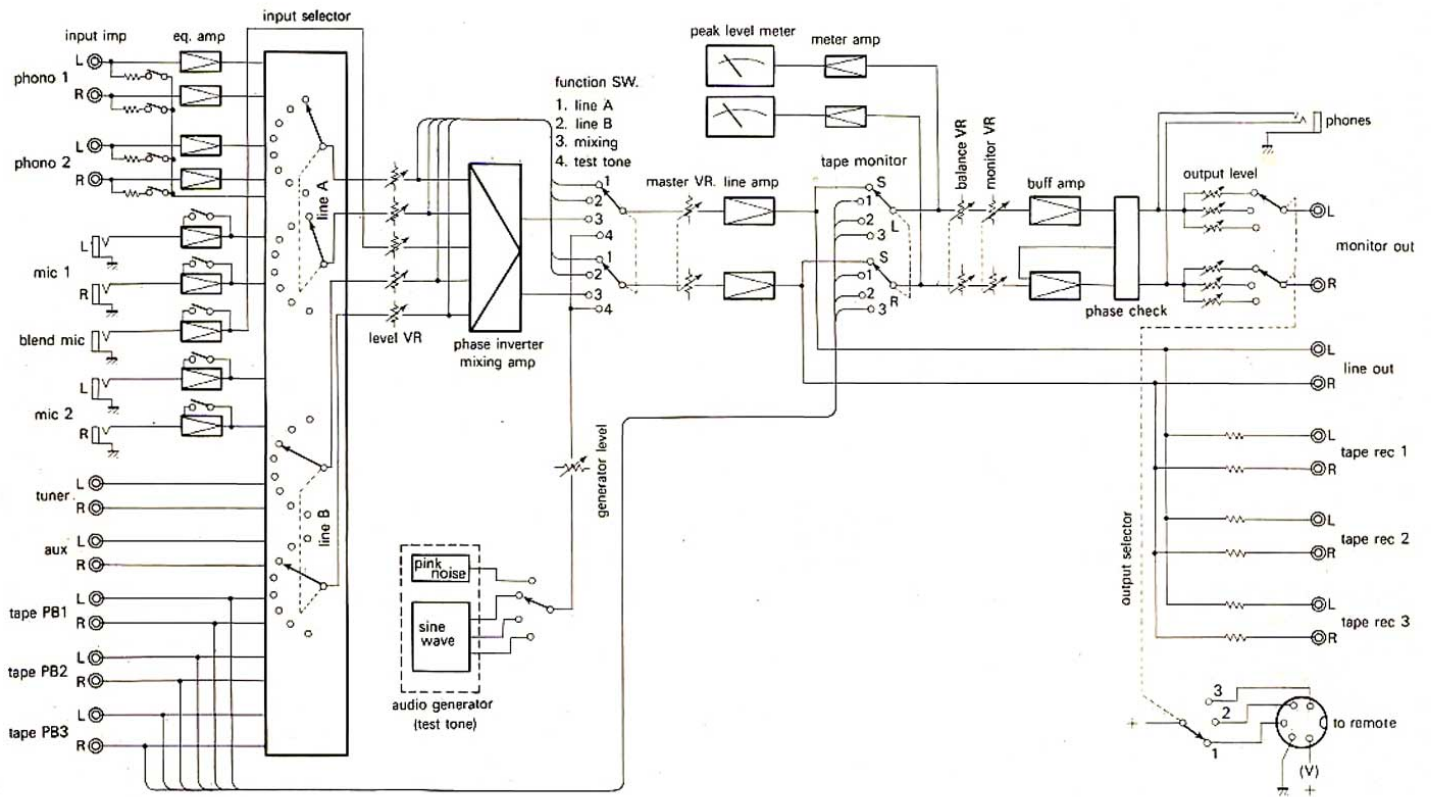
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| <ul style="list-style-type: none"> ① Output Selector ② Function Selector ③ Test Tone Selector ④ Test Tone Level Control ⑤ Stereo Headphone Jack ⑥ Preset Marker ⑦ Master Level Control ⑧ Phase Inverter Switches ⑨ Line A Level Controls ⑩ Blend Mic Level Control ⑪ Line B Level Controls ⑫ Monitor Volume Control | <ul style="list-style-type: none"> ⑬ Peak Level Meters ⑭ Power Switch ⑮ Line A Input Selector ⑯ Line B Input Selector ⑰ Tape Monitor Selector ⑱ Phase Check Selector ⑲ Balance Control ⑲ Level Matching Controls ⑳ Remote Control Socket ㉑ AC Outlets (Switched) ㉒ AC Power Cord ㉓ Line Voltage Selector | <ul style="list-style-type: none"> ㉔ Monitor Output Jacks ㉕ Line Output Jacks ㉖ Tape Play-in/Rec-out Jacks ㉗ Auxiliary Input Jacks ㉘ Tuner Input Jacks ㉙ Phono Input Jacks ㉚ Ground Terminal ㉛ Phono Input Impedance Switches ㉜ Mic Attenuator Switches ㉝ Mic Input Jacks |
|---|--|---|

MODULAR CONSTRUCTION

It is no simple matter to house the maze of complex circuits inside the Nakamichi 610 in a manner such that these circuits do not interfere with each other. Thanks to the use of individual plug-in modules, the 610 is neat, compact and free from inter-circuit interference. The 610's modular construction has virtually eliminated wiring. The result is remarkable performance stability and reliability.

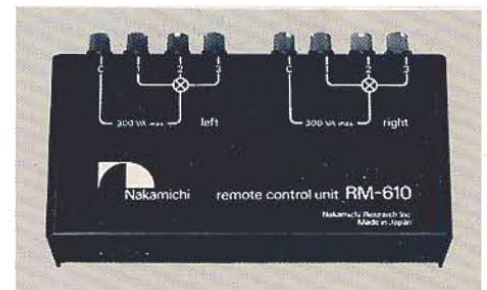


Block Diagram



OPTIONAL ACCESSORY

RM-610 Remote Control Unit



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