# NAD 1300

## STEREO PREAMPLIFIER

## MONITOR SERIES

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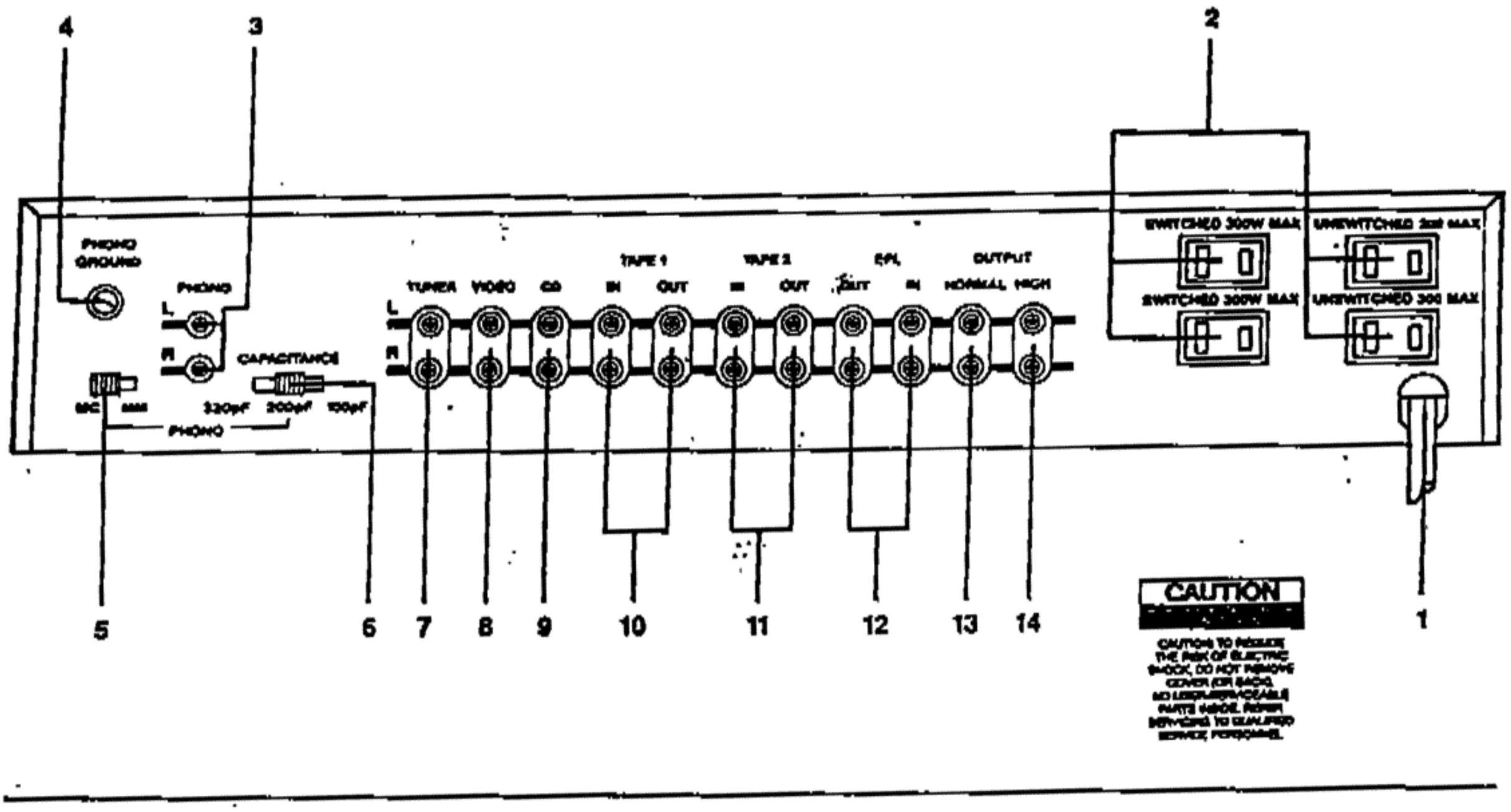


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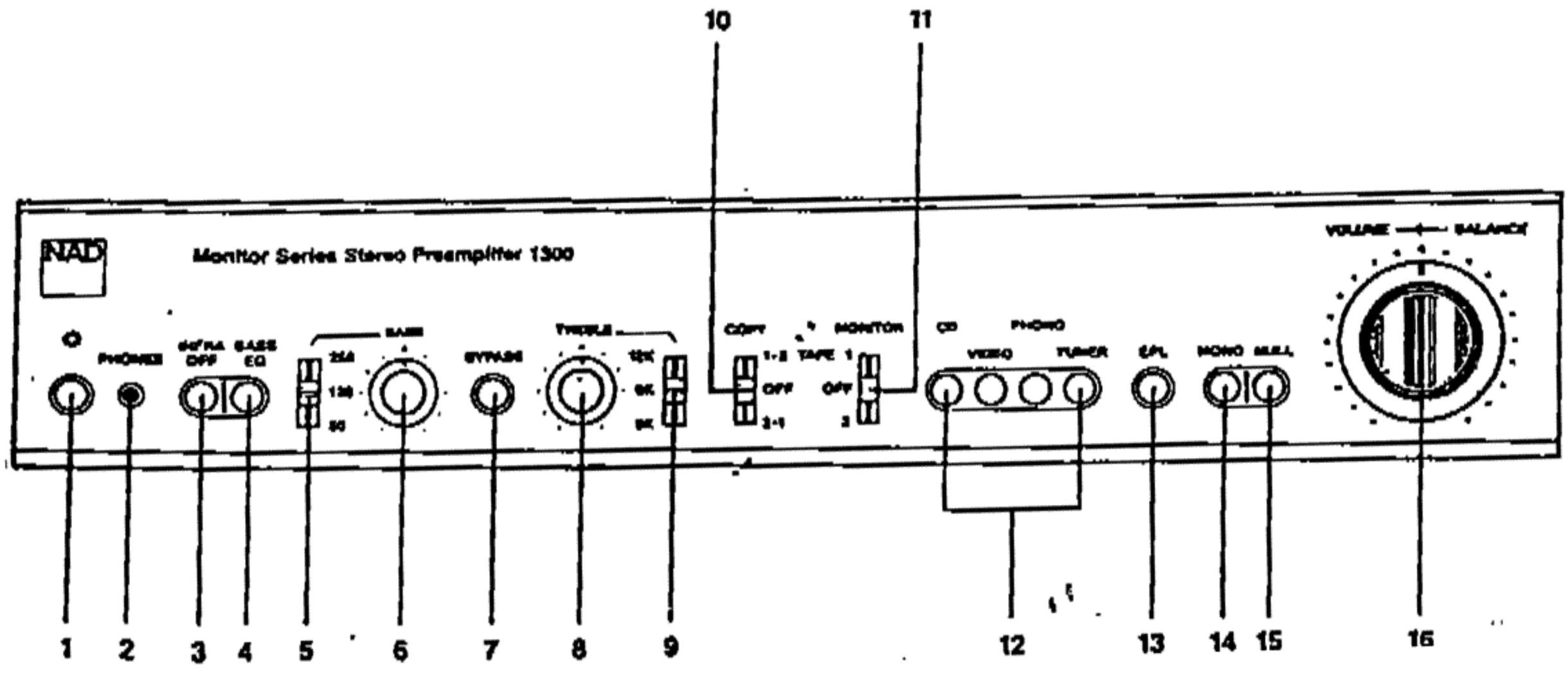

## REAR PANEL CONNECTIONS

**1. AC LINE CORD**

Plug the AC line cord into a "live" wall socket.

**AC OUTLETS (not in U.K. model)**

The AC power line cords of other stereo components may be plugged into these accessory outlets. The SWITCHED outlets are intended for all-electronic products (power amp, tuner, equalizer, or other signal processor), and will be switched on and off by the main POWER button. The UNSWITCHED outlets should be used to power products involving mechanical operations (e.g. a turntable, CD player, or tape deck): such products should be switched on and off with their own power switches.

The UNSWITCHED outlets can also be used to power any device containing a clock timer, or a digital tuner that requires uninterrupted AC power to maintain station tuning information stored in its memory.

The SWITCHED outlets can be used with a power amplifier that has a rated output of 150 watts/channel or less. A larger power amplifier, or one with a three-wire power cord, should be plugged directly into a wall outlet and should be turned on and off via its own Power switch.

**3. PHONO INPUT**

Plug the signal cables from your turntable into these jacks. If the cables or plugs are color-coded, refer to your turntable's instruction manual to learn which cable or plug is for the Left channel (upper jack) and which for the Right (lower jack). Be careful to insert each plug fully into the socket so that the plug's metal skirt fits tightly over the exterior of the socket. If necessary, crimp the plug's metal skirt slightly so as to obtain a tight fit with the socket.

**PHONO GROUND**

If your turntable is equipped with a grounding wire (usually a green wire terminating in a U-shaped spade lug), connect it to this terminal. Turn the thumb-nut counter-clockwise, place the spade lug under the nut, and tighten the thumb-nut clockwise to secure the lug. If the grounding wire has no spade lug, strip off 1 cm of insulation to expose the bare wire, twist the wire strands tightly together, insert the wire through the small hole in the shaft of the Ground terminal, and tighten the thumb-nut to fasten the wire in place.

If you encounter a persistent low-level hum or buzz in the sound, connect a wire from the Ground terminal to a true earth-ground, i.e. a copper-plated rod driven several feet into the earth. A substitute electrical ground may also prove effective: a cold water pipe, a steam radiator, or the third hole of a modern electrical wall socket.

**5. MM/MC SELECTOR**

This switch sets the input sensitivity and gain of the phono preamplifier circuit. Set it according to the output level of your phono cartridge. Set the switch at MM for cartridges of the moving magnet, induced magnet, moving flux, and moving iron (variable reluctance) types, and for "high-output" moving-coil pickups, i.e., those with a rated output of 1.0 mV or greater. If your cartridge is a low-output moving-coil pickup (with a rated output of less than 1.0 mV), set the switch at MC.

Here is another way to determine the preferred setting of the MM/MC switch. Begin by setting it to MM. After you have completed the installation and wiring of the system, play a record. You should obtain a satisfyingly loud volume level with a VOLUME control setting between 9 o'clock and 3 o'clock. If you have to turn up the VOLUME control beyond 3 o'clock to get adequately loud sound, turn the VOLUME back down and re-set the MM/MC switch to MC.

**6. PHONO CAPACITANCE (MM ONLY)**

This switch selects the input capacitance of the phono preamplifier. It enables you to optimise the load capacitance for those cartridges whose frequency response is affected by this parameter.

If you are using a low-inductance pickup (such as a Grado or Micro-Acoustics), or a moving-coil cartridge, then the setting of the CAPACITANCE selector is unimportant. But with many high-inductance magnetic pickups the capacitance setting will audibly alter the sound of the pickup.

In order to select the best value of preamp input capacitance you must first determine the total capacitance recommended for the cartridge. This usually will be included in the maker's specifications, and it may also be mentioned in magazine reviews of the cartridge.

Next, subtract the capacitance of your turntable's tonearm wiring and signal cables. (Check the specifications supplied with the tonearm, or write to the manufacturer of the tonearm, or as a last resort assume a typical value of 150 pF.) After this subtraction, what remains is the desired value of preamp input capacitance. Set the CAPACITANCE selector to the nearest value. It is not necessary to match the computed value exactly; with most phono pickups a variation of 50 pF one way or the other will produce only a very slight change in frequency response.

Example: suppose you are using a Stanton 881S pickup cartridge in a Pioneer turntable. Stanton specifies a recommended load capacitance of 275 pF for the cartridge, and the Pioneer turntable has a cable capacitance of about 100 pF. Subtracting: 275 minus 100 equals 175 pF, so you should set the CAPACITANCE selector to the nearest value, 200 pF.

If you prefer, you may simply set the CAPACITANCE selector by ear while listening to recordings that are strong in high-frequency overtones. Typically, when the capacitance is too low the upper-midrange (the soprano voice range) will be softened and the response at the highest frequencies will be peaky, leading to edgy violin tone and increased surface noise. Too high a value of capacitance will bring the upper-midrange forward while rolling off the extreme highs.

**7. TUNER INPUT**

Connect the audio signal cable from an AM/FM (or video) tuner to this pair of jacks.

**8. VIDEO SOUND INPUT**

Connect a video-related audio signal here, such as the audio output from a video cassette recorder, video disc player, TV monitor/receiver, or stereo television decoder.

Alternatively, any "line-level" audio signal may be connected here, such as the playback from a spare tape deck.

**9. CD INPUT**

Connect the audio signal cables from a digital Compact Disc player to these jacks.

If you don't have a CD player, any other line-level signal source (such as a spare tape deck) may be connected to the CD input.

The lightning flash with arrowhead, within an equilateral triangle, is intended to alert the user of the presence of uninsulated "dangerous voltage" within the product's enclosure; that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user of the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

### 10. TAPE 1 INPUT/OUTPUT

The tape connections may be used with recorders of all types: cassette, micro-cassette, open-reel, digital, etc. To make recordings, connect a stereo patch cord from the amplifier's TAPE 1 output jacks to the recorder's LINE IN jacks (not to its microphone inputs). To play back tapes, connect a stereo patch cord from the recorder's LINE OUT jacks to the amplifier's TAPE 1 input jacks.

### 11. TAPE 2 INPUT/OUTPUT

These jacks allow you to connect a second tape recorder of any type, and the amplifier is wired to permit copying tapes from one recorder to the other. Connect a cable from the TAPE 2 output jacks to the recorder's LINE IN jacks, and another cable from the recorder's LINE OUT jacks to the TAPE 2 input jacks.

The TAPE 2 jacks may be used for a signal-processing accessory instead of a second tape recorder. Examples of such accessories include a dynamic range processor, a dynamic noise filter, or any other device whose operation depends on the setting of a signal threshold. Connect a patch cord from the TAPE 2 output jacks to the processor's inputs, and another patch cord from processor's outputs to the TAPE 2 input jacks.

### 12. EXTERNAL PROCESSOR INPUT/OUTPUT

An equalizer or other signal processor may be connected here, leaving the Tape connections free for tape recorders. Connect a stereo patch cord from the preamplifier's External Processor Out jacks to the main input jacks of the processor. Connect a second cable from the main output jacks of the processor to the preamplifier's External Processor In jacks.

The External Processor is "downstream" from the Tape connections, so its processing may be used to alter the sound of the playback from tapes as well as from other sources. But the processing cannot be used to alter signals that are being recorded.

If you want to record the processed sound, connect the processor to Tape 2 instead, and copy the processor's output onto Tape 1 (or vice versa). Or you may simply connect a tape deck to the processor's own Tape In/Out jacks.

The External Processor circuit is identical to the Tape circuits, except that it does not participate in the Copy function. If you connect a tape deck to the External Processor jacks, you may use the External Processor button on the front panel as a tape monitor (to hear the output from that tape deck). Tapes may be copied from Tape 1 or Tape 2 to External Processor, by setting Copy to OFF and Monitor to 1 or 2.

### 13. OUTPUT (NORMAL)

This is the normal output from the preamplifier. Connect a stereo signal cable from these jacks to the main input jacks on your power amplifier.

If you have an equalizer, ambience-reproduction unit, or other signal processor that needs to be installed in the signal path, connect a cable from the NORMAL output jacks to the input of the processor, and a second cable from the output of the processor to the main input of your power amplifier.

The preamp has a low output impedance. It can drive several amplifiers connected in parallel, and it can be used with long signal cables in order to drive power amplifiers that are located near the speakers (or "powered" speakers having built-in power amplifiers).

### 14. OUTPUT (HIGH)

At this special preamp output the signal level is approximately 13 dB higher than at the normal output. You may use these jacks if your power amplifier requires an input level of more than 2 volts to drive it to full output. The High-level output jacks also may be used to drive professional studio equipment; from these jacks the preamp can drive load impedances as low as 600 ohms and can deliver undistorted signals up to 15 volts (+26 dBm) to a high-impedance load.

**NOTE:** The front-panel Phones socket is wired in parallel with the High-level preamp output. When low-impedance headphones are plugged into the front panel, they will reduce the signal level and available headroom at the High-level output.

CAUTION: TO PREVENT ELECTRIC SHOCK DO NOT USE THIS (POLARIZED) PLUG WITH AN EXTENSION CORD, RECEPTACLE OR OTHER OUTLET UNLESS THE BLADES CAN BE FULLY INSERTED TO PREVENT BLADE EXPOSURE.

ATTENTION: POUR PREVENIR LES CHOCS ELECTRIQUES NE PAS UTILISER CETTE FICHE POLARISEE AVEC UN PROLONGATEUR UNE PRISE DE COURANT OU UNE AUTRE SORTIE DE COURANT SAUF SI LES LAMES PEUVENT ETRE INSEREES A FOND SANS LAISSER AUCUNE PARTIE A DECOUVERT.

## FRONT PANEL CONTROLS

### 1. POWER

Depress this button to switch on the pre-amplifier and any equipment plugged into the SWITCHED convenience outlet on the rear panel. To switch the power off, depress the button again and release it.

If you prefer, you may leave the POWER switch permanently engaged and use an external switch (such as a clock timer) to turn the power on and off.

The preamplifier is equpped with a turn-on delay that automatically mutes the preamp outputs for several seconds, until the the preamp's circuits are fully stabilized. This prevents the transmission of turn-on transients to the power amplifier. The same circuit mutes the outputs instantly when the power is switched off.

### 2. PHONES

Plug stereo headphones in here. The circuit will provide proper drive signals for all conventional stereo headphones regardless of their impedance, with just one exception: electrostatic headphones usually are supplied with an adapter unit which must be connected directly to the speaker terminals on your power amplifier.

Insertion of a plug into the PHONES socket automatically mutes the signal at the normal PREAMP OUTPUT jacks, thus shutting off the loudspeakers. In order to resume listening to loudspeakers you must unplug the headphones from the PHONES socket.

You may freely use headphone extension cables. If you want to use a headphone Y-connector to drive two headsets simultaneously, they should be identical models. Connecting together two headphones that differ widely in impedance usually will produce a substantial loss of volume in the headset having the higher impedance (or in both).

### 3. INFRASONIC FILTER OFF

The output from a record player usually contains strong but inaudible impulses at infrasonic frequencies (below 20 Hz) due to disc warps, stylus/tonearm resonance, and vibrations reaching the turntable. If these are amplified at full strength, they may waste amplifier power and produce excessive woofer cone excursions, muddying the sound.

The infrasonic filter attenuates these unwanted signals. The filter is normally in-circuit (with the button OUT), and it is especially desirable to have it in-circuit when a large low-frequency boost is being applied via the BASS control.

If you want to bypass the infrasonic filter, depress the INFRA OFF button. As long as the button is OUT, the filter is active.

A second infrasonic filter is included in the BASS EQ circuit and is automatically engaged when the bass equalization is used. It is not affected by the INFRA OFF button.

### 4. BASS EQ

This circuit boosts the lowest bass frequencies, those below 60 Hz. In virtually all loudspeakers the useful output rolls off at frequencies below the woofer/cabinet resonance (which typically occurs between 40 and 70 Hz). The BASS EQ circuit compensates for this rolloff, extending the useful response of the speakers significantly lower in frequency.

If your loudspeakers already have extended and powerful deep-bass response, the BASS EQ provides other benefits:

- It helps to correct the rolled-off bass in some recordings.
- It provides effective "loudness compensation" to restore subjectively correct tonal balance at low volume levels.
- It helps to compensate for listening-room acoustics. ("Standing waves" in the room tend to weaken the low bass and reinforce the mid-bass at typical listening positions.)

Of course very low frequencies are not found in all music, nor in all recordings, so the effect of the BASS EQ often won't be obvious. Sometimes you may find that switching it in and out does not produce any apparent change in the sound, simply because the recording contains no energy at very low frequencies. But usually the BASS EQ will provide an audible (and occasionally a dramatic) strengthening of the deepest bass.

The BASS EQ circuit also includes an infrasonic filter that rolls off the response below 25 Hz to prevent inappropriate amplification of non-musical signals below the audio range.

CAUTION: Be prepared to switch off the equalization when playing recordings (especially digitally mastered discs) that contain unusually powerful recorded bass. The combination of a high playback volume level, the BASS EQ, and a bass-heavy input signal could overdrive the amplifier into clipping and—more important—overdrive your woofers beyond their safe excursion limits, causing the voice-coils to clatter against the magnet back-plates. (This risk is particularly serious with small woofers, those smaller than six inches in diameter, which usually are not designed to accept high power levels at the lowest frequencies.) As long as a speaker sounds good it probably is OK; but distorted or unmusical sounds, such as clattering or buzzing, signal distress in a woofer.

Be alert, also, for signs of acoustic feedback (in which the low-frequency vibrations from the speakers are picked up by the record-playing stylus and are re-amplified). If you encounter a sustained low-frequency roar, or frequent groove-jumping, immediately turn down the Volume and switch off the BASS EQ until a more nearly vibration-free mounting for the turntable is found.

### 5. BASS RANGE

The "semi-parametric" Bass control provides a precisely determined boost or cut over a frequency range that is two octaves wide at the -3 dB points and is centered at the frequency chosen by the Bass Range selector. The amount of boost or cut is determined by the rotation of the Bass control.

A boost or cut that is centered at 50 Hz (and therefore spans the two-octave range from 25 Hz to 120 Hz) can dramatically change the amount of bass energy in the signal without altering the timbre of the musical midrange. For example, a bass reduction centered at 50 Hz can remove hum or rumble from a poor recording without making the sound objectionably thin.

A boost centered at 120 Hz can increase the skin-thumping impact of rock music without overdriving the woofer at very low frequencies. But to emphasize the solid foundation of large-scale orchestral or pipe-organ sound, choose a boost centered at 50 Hz. For a massive augmentation of the deepest bass, combine Bass EQ with a moderate Bass boost at the 50 Hz setting.

Room standing waves and boundary reflections (off walls and floor) often thicken the mid-bass sound around 120 Hz. A slight bass reduction centered at 120 Hz may dramatically improve the clarity and definition of mid-bass sound, while the Bass EQ circuit keeps the deep bass strong.

At the low-frequency settings of the Bass Range selector, the Bass control alters the strength of the low bass without changing the timbre of the musically important midrange. The 250 Hz setting, on the other hand, alters the overall tonal balance of recordings. Use a slight boost at 250 Hz to add warmth and body to a thin recording. If a recording is thick and congested in the lower midrange (a common fault with closely-miked male vocals), a reduction centered at 250 Hz may improve the clarity and definition of the sound.

### 6. BASS

The Bass control adjusts the relative level of the low frequencies in the sound. The electrical response of the amplifier is flattest when the control is set in the detent at the 12 o'clock position. Rotation of the knob to the right (clockwise) increases the level of low-frequency sounds, and rotation counter-clockwise decreases their level. Adjust the Bass control to achieve the tonal balance that sounds most natural to you.

The effect of the Bass control depends on the setting of the Bass Range selector.

The Bass control has no effect if the Bypass button is engaged.

### 7. TONE CONTROL BYPASS

When this button is pressed the Bass and Treble circuits are completely bypassed, providing a direct signal path from the Volume control to the input of the power amplifier.

The Bass EQ and the Infrasonic filter are not affected by the Bypass switch.

The Bypass switch provides a convenient way to evaluate various settings of the Bass and Treble controls (and their respective Range selectors). By adjusting the tone controls and then switching them in and out of the signal path, you can easily evaluate their effect on the musical sound.

### 8. TREBLE

The Treble control adjusts the relative level of the high frequencies in the sound. The response of the amplifier is flattest when the control is set in the detent at the 12 o'clock position. Rotation of the Treble control to the right (clockwise) increases the level of high-frequency sounds, and rotation counter-clockwise decreases their level. Adjust the Treble control to achieve the tonal balance that sounds most natural to you.

Boosting the Treble increases the brilliance and clarity of details in the sound, but also makes any noise more prominent. Turning down the Treble makes the sound mellower while suppressing hiss and record surface noise; but too much Treble roll-off will make the sound dull.

The effect of the Treble control depends on the setting of the Treble Range selector.

The Treble control has no effect if the Bypass button is engaged.

### 9. TREBLE RANGE

The "semi-parametric" Treble control provides a precisely determined boost or cut over a frequency range that is two octaves wide at the -3 dB points and is centered at the frequency chosen by the Treble Range selector. The amount of boost or cut is determined by the rotation of the Treble control.

A boost or cut that is centered at 12 kHz (and therefore spans the two-octave range from 6 kHz to 24 kHz) can dramatically alter the amount of high-frequency energy in the signal without altering the basic midrange timbre. For example, a boost centered at 12 kHz can increase the "air" in a recording without making the sound excessively bright, while a rolloff can reduce annoying hiss or distortion without making the sound too dull.

The apparent brightness or dullness of the sound is influenced by the strength of musical overtones in the 6 kHz r[illegible]e. Use a treble boost with a center frequency of 6 kHz to [illegible]ten a dull recording, or a slight treble cut at 6 kHz to smooth the sound of a recording that is too bright or strident.

The frequency range around 3 kHz is called the "presence" range. A boost centered at this frequency can emphasize a melodic line or improve the articulation of a vocal. With a slight reduction at 3 kHz you can smooth a too-forward vocal or increase the apparent distance and depth of recordings that sound too close and flat.

A slight Treble reduction (11 o'clock) at 3 kHz, combined with a slight Bass boost (1 o'clock) at 250 Hz, can give hard-sounding CDs the warm, mellow tonality of an LP.

### 10. TAPE COPY

The Copy switch selects the signal that is fed to the Tape Out jacks for recording or signal processing. It has three settings.

**OFF.** When the Copy switch is OFF, the signal chosen by the Input Selector (CD, Phono, et al) is fed to both Tape Out jacks. If you have two tape recorders, the selected input signal may be recorded on either recorder, or simultaneously on both. Use the Monitor switch to listen to the signal going through either recorder (Tape 1 or Tape 2), or to hear the input signal (Monitor OFF).

If you have connected a tape recorder to Tape 1 and a signal processor to Tape 2, the selected input signal may be recorded on Tape 1 and will also be fed to the signal processor. Use the Monitor switch to check the signal being recorded (Tape 1), or to hear the output of the signal processor (Tape 2).

**1>2.** When the Copy switch is set at 1>2, the playback signal from Tape 1 is fed to Tape 2 Out. This permits recordings to be copied from Tape 1 to Tape 2.

Use the Monitor switch to hear either the source (Tape 1) or the copying recorder (Tape 2). If you switch the Monitor OFF you may listen to any other signal source (CD, Phono, et al) while the copying proceeds. Changes in the setting of the Monitor switch do not affect the tape copying process.

If you have connected a signal-processing accessory to Tape 2, then the playback signal from Tape 1 will be fed to the processor. Use the Monitor switch to hear the processed playback signal (Tape 2) or the direct tape playback (Tape 1).

**2>1.** When the Copy switch is set at 2>1, the direction of copying is reversed: the playback signal from Tape 2 is fed to Tape 1 Out. This permits recordings to be copied from Tape 2 to Tape 1.

If you have connected a signal-processing accessory to the Tape 2 input/output jacks, you can use it to alter the sound being recorded on Tape 1. When the Copy switch is set at 2>1, the selected input signal (CD, Phono, et al) is fed to Tape 2 (the signal processor); then the output of the processor is fed to Tape 1. Use the Monitor switch to hear the unprocessed input signal (OFF), the processed signal (Tape 2), or the recording of the processed signal (Tape 1).

**NOTICE:** Tape copying is a convenience intended for personal use. If you copy commercially-produced recordings and sell or give away the copies, you may be violating the copyright or the property rights of the producer of the recording.

### 11. TAPE MONITOR

The Monitor switch lets you hear the output signal from tape decks (or signal processors) connected to the Tape 1 and Tape 2 jacks.

The normal setting of this switch is OFF, to let you hear the signal chosen by the Input Selector. When the Monitor switch is engaged, it over-rides the Input Selector and lets you hear the playback signal from Tape 1 or Tape 2.

**NOTE:** When not listening to tapes, remember to switch the Monitor OFF so that other inputs (CD, Phono, et al) can be heard. If the Monitor switch is engaged with no tape deck connected, or with a tape machine connected but not running, you will hear only silence—regardless of the settings of any other amplifier controls.

The standard purpose of the Monitor switch is to allow you to listen to recorded tapes, and also to check on your own tape recordings as they are being made. If you have a three-head audio recorder that allows for off-the-tape monitoring, then by engaging the Monitor switches on both the amplifier and the recorder, you can hear the playback signal from the tape immediately after it is recorded, to monitor its quality.

With two-head audio recorders, HiFi VCRs, and most digital recorders, the "monitor" signal heard while recording is not from the tape but is merely the signal passing through the recorder's electronics (including its Recording Level controls). In this case the Monitor switch allows you to check the left/right balance of the signal as it is recorded.

The Monitor switch selects only the playback signal from tape recorders (or from signal processors); it has no effect on the signals that are being recorded. Selection of a signal for recording is controlled only by the Input Selector and the Copy switch.

If you have connected a signal-processing accessory (such as a graphic equalizer) to Tape 2, set the Monitor switch to Tape 2 when you want to hear the processed signal. Return the Monitor to the OFF position when you want to bypass the processor and hear the original, unprocessed signal.

### 12. INPUT SELECTOR (CD, VIDEO, PHONO, TUNER)

These buttons select the input signal for the preamplifier.

If the Copy switch is OFF, the selected input signal is fed to the Tape circuits for recording.

If the Monitor and EPL switches are OFF, the selected input signal is fed to the power amplifier. (If the Monitor is set to Tape 1 or 2, it overrides the Input Selector. If the External Processor is engaged, it overrides both the Input Selector and the Tape Monitor.)

### 13. EXTERNAL PROCESSOR

Press this button to hear the output of any signal-processing accessory connected to the EPL jacks. For example, if the processor is a special equalizer used with your loudspeakers, press this button IN when you want to hear the equalized signal, and leave this button OUT when the equalization is not wanted (i.e. when using headphones or extension speakers).

If you engage the External Processor button when no processor is connected (or when a processor is connected but turned off), you will hear only silence—regardless of any other control setting.

If you use the EPL connections for an extra tape recorder, press this button to hear the output signal from the recorder. Leave the button OUT to hear the signal chosen by the input selector and Tape Monitor.

### 14. MONO

This button blends the two stereo channels together to produce monophonic sound. This blend minimizes rumble and surface noise in old monophonic records. The button must be OUT for normal stereo listening.

### 15. NULL (L – R) MODE

When the Null button is engaged, the normal stereo output is replaced by the stereo "difference" signal (L minus R). If the two channels are identical in level and phase, the difference is zero (null).

This test mode has several uses, as follows. (NOTE: For these tests, the preamplifier's Mono button must be OUT. In mono the L – R stereo difference signal is cancelled.)

**(1) Antenna aiming.** In stereo FM, and in the North American MTS system for stereo television sound, the mono (L + R) portion of the sound is transmitted as the "base-band" signal, while the stereo (L – R) portion is broadcast as a subcarrier. This subcarrier becomes noisy when the signal is weak, and distorted when reception is affected by multi-path interference.

When you tune a stereo broadcast, press the Null button to hear its L – R subcarrier signal. Adjust the location and aiming of your antenna to achieve the loudest and clearest sound; then disengage the Null button to resume normal stereo listening. This procedure optimizes the stereo reception for that station. If the L – R signal from your favorite station is still noisy or distorted, you may need a better antenna.

**(2) Checking stereo separation.** Observe the reduction in loudness when the Null button is pressed. If the volume drops only slightly, the stereo separation is extreme, with little mono energy in the center of the image.

If the volume drops substantially in the Null mode, the sound has only a moderate amount of stereo separation. Sometimes this is deliberate; recordings of classical music, for example, often have strongly shared information in the two channels in order to present a stable image of the instrument(s) between the loudspeakers. In many recordings the low-bass frequencies are recorded monophonically, so the L – R signal tends to be bass-shy.

If the volume drops almost to zero in the Null mode, then the signal is monophonic. FM and TV broadcasts are sometimes found to be in mono, even though the transmitter's stereo pilot generator remains on, activating the Stereo indicator in your tuner.

In popular music the lead solo is often recorded in mono and will be substantially cancelled in the Null mode. But reverberation may be recorded out-of-phase in the two channels, appearing strongly in the L – R signal. In some recordings you may find that certain instruments or voices have been recorded out-of-phase for a spacious effect. Similarly, in Dolby Stereo movie soundtracks, on-screen dialog is usually recorded in mono and will be substantially cancelled in the Null mode. But the L – R signal includes any Dolby Surround information as well as left/right sound effects.

**(3) Phono cartridge set-up.** In an LP record groove, side-to-side stylus motion corresponds to mono L + R information, while vertical motion produces the L – R difference signal. The L – R signal from LPs is particularly bass-shy. This is because record-cutting systems use low-frequency blend to minimize the cutting and playback problems that can arise from excessively large vertical modulations.

When installing a phono cartridge, play a mono record or the L + R lateral band of a test record, and engage the Null button. If the loudness remains essentially constant rather than dropping nearly to zero, one of the channels is wired out of phase. Check the connections at the cartridge terminals.

For minimum distortion of the stereo signal, the vertical tracking angle (VTA) of the playback cartridge must match the VTA of the disc cutter (nominally 15 degrees). This is especially important with a line-contact or Van den Hul stylus. When installing a pickup cartridge, play several well-made records with the Null button engaged. Adjust the VTA, by shimming the cartridge or by adjusting the height of the tonearm, to obtain the clearest L – R sound. Also, use the Null mode to evaluate the effect of changes in tracking force.

**NOTE:** If the input signal is mono and is identical in both channels, the L – R signal is zero (null). If the two channels differ in level by 1 dB, the volume will drop by only 40 dB when the Null button is pressed; the L – R output can still be heard. Reducing the imbalance to 0.1 dB will drop the L – R output to –60 dB. The channels must be balanced within 0.01 dB to achieve a –80 dB null. Thus with a mono input the Null test is a sensitive indicator of very small differences.

For this reason, when using the Null test with a mono signal, adjust the Balance control to minimize the L – R output. This will correct for tiny balance errors in, for example, the Volume control. (Even the finest laser-trimmed volume control has tracking errors of 0.5 dB at some settings of the control.) To make this easy, the Balance control has been designed so that significant knob rotations away from center produce subtle shifts in balance.

### 16. VOLUME/BALANCE

The knurled outer ring of this two-section knob is the Volume control, which adjusts the overall loudness of the sound. The control is designed for accurate tracking of the two channels, so that the stereo balance will not shift noticeably as the Volume control setting is varied.

The center section of the dual knob is the Balance control, which adjusts the relative levels of the left and right channels. A detent at the 12 o'clock position marks the point of equal balance. Rotation of the knob to the right (clockwise) decreases the level of the left channel so that only the right channel is heard, thus shifting the sonic image to the right. Rotation of the knob to the left shifts the sonic image toward the left speaker.

Adjust the Balance control to produce a natural spread of sound across the space between the speakers, with any monophonic sound (such as a radio announcer's voice) appearing as a phantom image centered midway between the speakers.

Ideally the detented center position of the Balance control would be its normal setting. But several common circumstances may cause an unequal balance between the channels, requiring a compensatory off-center setting of the Balance control to restore the most uniform spread of stereo sound between the speakers. Examples include unequal output from the two channels of the phono cartridge, different acoustical environments around the two loudspeakers, or simply a listening position that is closer to one speaker than to the other.

These controls do not affect the signals fed to the TAPE OUT jacks.

## IN CASE OF DIFFICULTY: A TROUBLE-SHOOTING GUIDE

| SYMPTOM | POSSIBLE CAUSE |
|---|---|
| **No sound.** | Power not on. |
| | Line cord unplugged. |
| | Tuner selected but tuned to a blank frequency between stations. |
| | Video input selected with no video (or other) auxiliary source playing. |
| | Tape Monitor engaged with no tape playing. |
| | Headphone plug in PHONES socket. (Sound will appear in headphones and high output only. Unplug phones to restore sound via normal output.) |
| **No sound in one channel.** | Balance control turned full-left or full-right. |
| | Connecting cable pulled loose or making poor contact in socket. Rotate plugs in sockets to restore contact. |
| | Broken wire in a connecting cable. Wiggle all cables, especially where they enter plugs. |
| | Dirty contact in a switch. Exercise all front-panel switches to restore clean wiping contact. |
| | Power amplifier turned off. |
| **No sound in one channel.** (continued) | External Processor (EPL) button engaged with no processor connnected or operating. |
| **Low-frequency hum in phono.** | Turntable grounding wire not connected. |
| | Ground-loop hum. Install polarized AC plugs properly in polarized wall sockets (in which one slot is longer than the other). Try reversing any non-polarized plugs in their sockets, to find the orientation that yields the least hum. |
| | Turntable located too close to the amplifier (especially to its left). Locate the turntable to the right of the amplifier. |
| | Phono cables routed too close to the amplifier's power transformer (at left-rear). |
| | Phono plugs making poor contact in socket. (Also check any phono plugs in the turntable base.) |
| **Hum in tape playback.** | Tape deck located too close to amplifier (directly above or below). |
| | Tape deck located too close to television set. |
| | Plugs making poor contact in sockets. |