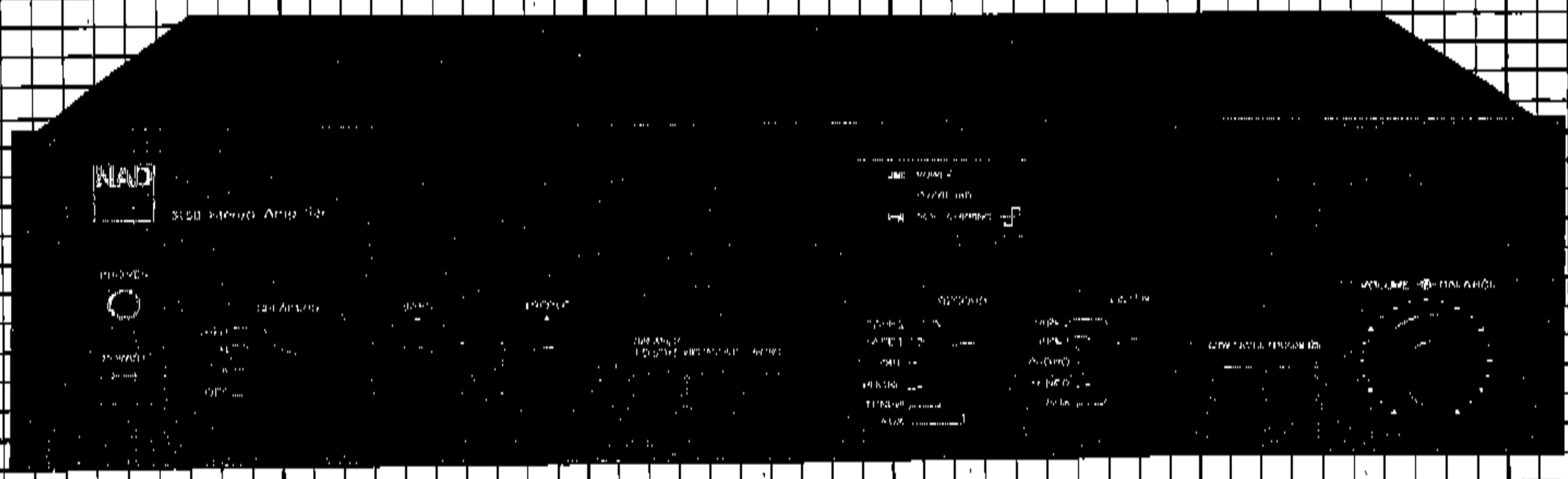
NAD 3150 STEREO INTEGRATED AMPLIFIER

INSTRUCTIONS FOR INSTALLATION AND OPERATION



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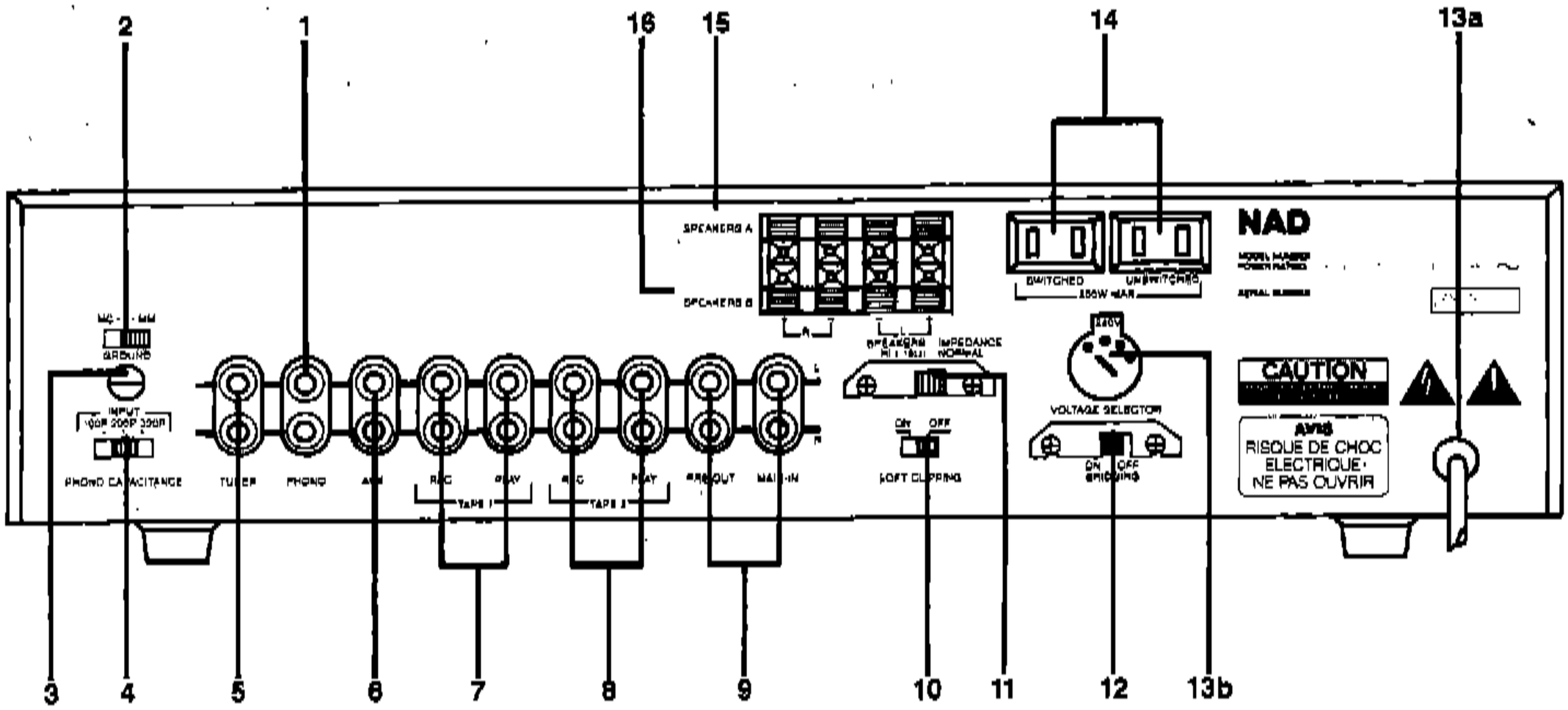

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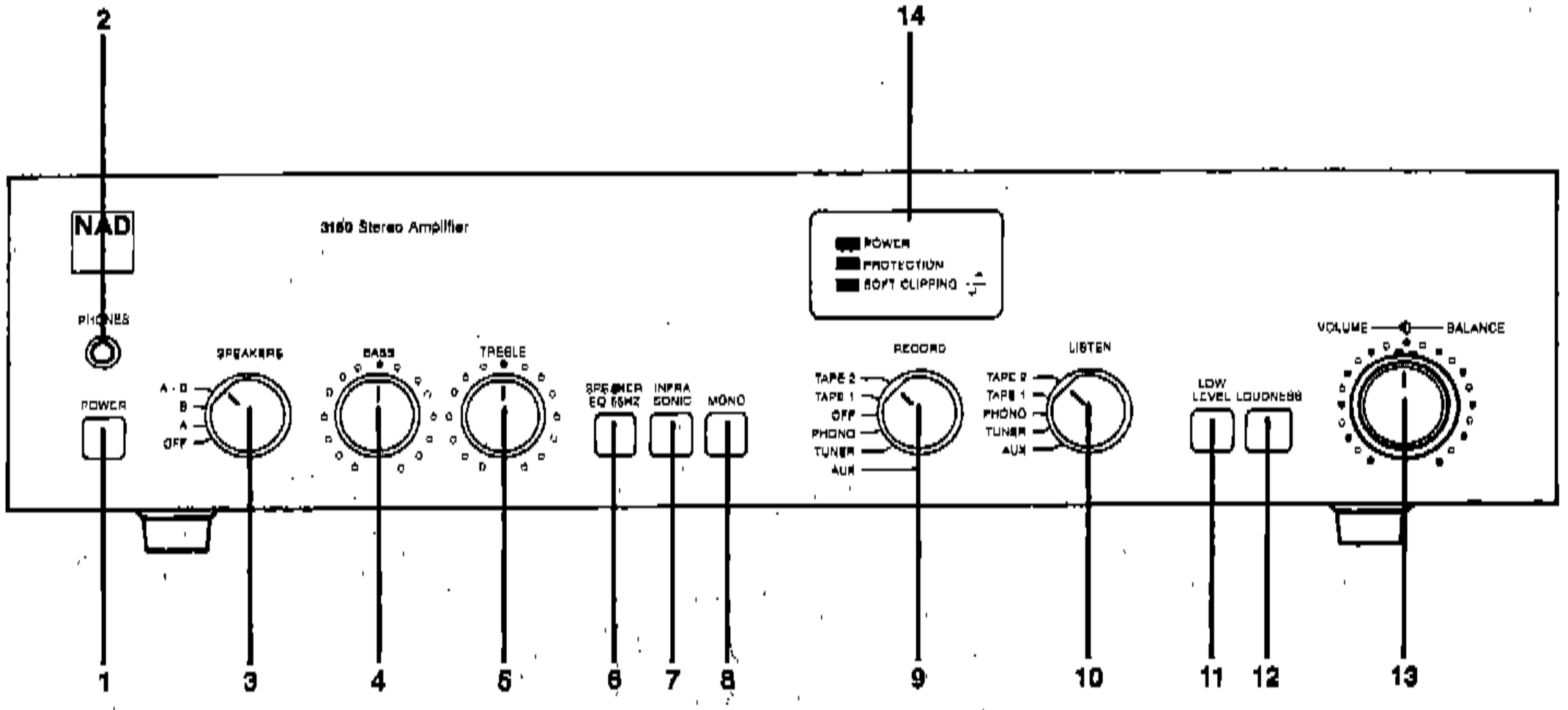

REAR PANEL CONNECTIONS

1. 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 and which for the Right. 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.

2. 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. Move the switch to the right (to MM) for cartridges of the moving magnet, induced magnet, moving flux, and moving iron (variable reluctance) types, and for "high-output" moving-coil pick-ups (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), move the switch to the left (to 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 amplifier, play a record. With the front-panel LOW LEVEL button OUT 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.

3. 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 terminal lug, strip off a half-inch (1 to 2 cm) of insulation to expose the bare wire, twist the wire stands 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.

4. CAPACITANCE SELECTOR. This switch selects the input capacitance of the phono preamplifier. It enables you to optimize 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 which 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.

5. TUNER INPUT. Connect the signal cable from a radio tuner to this pair of jacks. As with all of the other input/output jacks on this amplifier, the upper jack in each pair is for the Left channel and the lower jack is for the Right channel.

6. AUX INPUT. These auxiliary jacks are for any "line level" signal source, such as a television sound tuner, the audio line output from a videocassette or videodisc player, or the decoded signal from a digital audio disc player.

7. TAPE 1 REC/PLAY. 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 RECord 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 PLAY input jacks.

8. TAPE 2 REC/PLAY. 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 RECord jacks to the tape deck's LINE IN jacks, and another cable from the deck's LINE OUT jacks to the PLAY input jacks on the amplifier.

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, a CX or DBX disc decoder, or any other device whose operation depends on the setting of a signal threshold. Connect a patch cord from the REC jacks to the processor's inputs, and another patch cord from the PLAY jacks to the processor's outputs.

Other signal processing accessories, such as a graphic equalizer or the special equalizer supplied with some loudspeakers (e.g. Bose, Electro-Voice, KLH) may be connected either to the Tape jacks or at the Preamp Out jacks. The choice is a matter of convenience.

9. PREAMP OUT, MAIN IN. Each channel of the amplifier is comprised of two independent sections or stages: the control preamplifier (including the phono preamp and most front-panel controls), and the power amplifier (which provides the power to drive loudspeakers). In normal operation the preamp and power amp are connected together via factory-installed U-shaped metal jumpers that bridge the PREAMP OUT and MAIN IN jacks. Check to be sure that they are fully inserted into the jacks and that nothing is touching them.

By removing the metal jumpers (after first switching OFF the POWER), you can connect various signal-processing accessories in the path between preamp and power amp: an equalizer, a time-delay ambience reproducer, a stereo image enhancer, an electronic crossover, etc. To use a signal processor, connect a stereo patch cord from the PREAMP OUT jacks to the processor's line-level input jacks, and a second patch cord from the processor's output jacks to the amplifier's MAIN IN jacks.

NOTE: any signal processor whose operation depends on the setting of a threshold, such as a dynamic noise filter or CX decoder, should be connected to one of the sets of TAPE REC/PLAY jacks—where the signals are unaffected by the amplifier's volume and tone controls—rather than the PREAMP OUT jacks.

If you remove the metal jumpers, save them in case you may want to disconnect the signal processor and return to normal operation at a later time. If the jumpers should be lost, a conventional stereo patch cord can be used to connect PREAMP OUT to MAIN IN in each channel.

The NAD 3150 can be used as the heart of an elaborate audiophile sound system. The preamp output is capable of driving several power amplifiers simultaneously, or of driving the long signal cables required to connect to power amps which are located near the speakers (or to "powered" active loudspeakers with built-in power amplifiers).

10. SOFT CLIPPING. When an amplifier is overdriven beyond its specified power output it normally produces "hard clipping" of the signal with harsh distortion and power-supply buzz as the output transistors saturate. The NAD Soft Clipping circuit gently limits the output waveform and minimizes audible distortion when the amplifier is overdriven. If your listening involves only relatively low peak power levels, the Soft Clipping may be left OFF. But in general we recommend that it be switched ON, especially when playing music containing high peak levels.

11. SPEAKER IMPEDANCE. The impedance of a loudspeaker varies with frequency, and in many loudspeakers the impedance is lowest at the frequencies where the highest power demands occur in music. In the majority of "8 ohm" loudspeakers this minimum impedance is from 4 to 6 ohms, and in "4 ohm" speakers the minimum is typically 3 ohms. If you connect two sets of speakers to the amplifier, their combined impedance is approximately half the impedance of either. For these reasons, all NAD amplifiers and receivers are designed to produce maximum power output into impedances of 2 to 6 ohms.

If you are not sure of the true impedance of your speakers, or if you are connecting two pairs of speakers, or if you are using the amplifier in the bridged mode, leave the impedance switch at "NORMAL." However, if you are using a single pair of loudspeakers whose impedance is at least 8 ohms at all frequencies, you can re-set the impedance switch to re-optimize the amplifier for maximum power delivery at this higher impedance.

First, switch OFF the POWER. Now, in order to prevent the switch from being re-set accidentally, it is held in place by a bracket. Use a screwdriver to loosen the screws on either side of the impedance switch, until you can slide the bracket up and remove it. (DO NOT REMOVE the screws; they are also used to fasten the switch itself to the rear panel.) Move the switch to the left, to "HI." Then turn the bracket over, slide it under the screw heads to secure the switch in the HI position, and retighten the screws.

If the impedance switch is set to "HI" with speakers whose true impedance is lower than 8 ohms, or with two pairs of speakers connected, the amplifier will tend to overheat and shut down when operated at high output levels. The front-panel "protection" light will illuminate when this occurs. Normally the amplifier will resume normal operation after it cools down. Continued abuse could also cause internal fuses to blow in order to protect the amplifier; in that case you should return the 3150 to your dealer for service.

12. BRIDGING. This switch "bridges" the two power amplifier channels to form a monophonic amplifier with more than double the output power. To convert to bridged operation, the following procedure should be followed.

(1) Switch OFF the POWER.

(2) Be sure that the SPEAKER IMPEDANCE switch is set to "normal." If it is set to "high," re-set it to "normal" and re-install the bracket to prevent the switch from being moved accidentally.

(3) Disconnect the metal jumper or signal cable from the Left-channel Main input to the power amplifier section of the 3150. In the bridged mode the amplifier is driven only through its Right-channel Main input. (If you need stereophonic reproduction, the Left-channel PREAMP OUT signal can be used to drive a second, separate power amplifier. If a NAD 2150 or 3150 in bridged mode is used for the second stereophonic channel, it too will be driven through its "Right-channel" Main input, regardless of whether it is used for the Left or Right speaker.)

(4) Disconnect any speaker wires from both the SPEAKERS A and SPEAKERS B terminals. From the speaker which is to be driven by the bridged 3150, connect its positive lead to the red R+ terminal (the extreme left terminal in the upper row), and its negative lead to the red L+ terminal (the extreme right terminal in the upper row), in the SPEAKERS A group of terminals. DO NOT connect any wires to the black terminals (R− and L−).

If you want to drive two speakers in parallel, connect the second speaker's leads to the red (R+ and L+) terminals in the lower SPEAKERS B group. Do not connect any wires to the black (R− and L−) terminals.

NOTE: in the bridged mode the loudspeaker's impedance is effectively halved as "seen" by the amplifier. An 8-ohm load looks like 4 ohms, a 4-ohm load looks like 2 ohms, and a pair of 4-ohm speakers operated in parallel will look like a 1-ohm load. Driving a pair of such speakers to high levels will cause the amplifier to overheat and shut down. For best results the bridging mode should be used with only a single 4-ohm or 8-ohm speaker in each channel.

CAUTION: In the bridged mode the speaker wires must be "floating" with respect to the circuit ground. Do NOT connect the speaker wires to anything which shares a common ground between stereo channels (such as a speaker switch or an adapter for electrostatic headphones), nor to anything which shares a common ground with the amplifier's inputs (such as a switching comparator or a distortion analyzer).

(5) After the preceding conditions have been satisfied, re-set the bridging switch. It is held in the OFF position by a bracket. Use a screwdriver to loosen the screws at each end of the switch, until you can slide the bracket up and off. DO NOT REMOVE the screws; they are also used to fasten the switch itself to the amplifier's rear panel. After removing the bracket, slide the switch to the left (BRIDGING ON). Then turn the bracket over, slide it under the screw heads to secure the bridging switch in the On position, and re-tighten the screws. Finally, turn the amplifier's power on.

(6) To return the amplifier to normal stereo operation at a later date, first turn off the power. Re-set the BRIDGING switch to OFF, re-install the bracket to prevent the switch from being moved accidentally, restore the connection from PREAMP OUT to MAIN IN in the Left channel, and connect loudspeaker wires to the appropriate terminals as described below under SPEAKERS A and SPEAKERS B.

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

If your amplifier is equipped with a Voltage Selector, adjust it (using a small coin or screwdriver) to match the AC power line voltage in your area. Normally this will be done by the NAD distributor before the amplifier is delivered to your retailer. If you travel, you can re-set the Voltage Selector for each country. The amplifier will operate with an AC line frequency of either 50 or 60 Hz.

14. AC CONVENIENCE OUTLETS. (Not in U.K. model.) The AC power line cords of other stereo components may be plugged into these accessory outlets. The SWITCHED outlet is intended for all-electronic products

(e.g. a radio tuner, equalizer, or other signal processor), and will be switched on and off by the amplifier's main POWER button. The UNSWITCHED outlet should be used to power products involving mechanical operations (e.g. a turntable or tape deck); such products should be switched on and off with their own power switches. The UNSWITCHED outlet can also be used to power any device containing a clock timer, or a digital tuner which requires uninterrupted AC power to maintain station tuning information stored in its memory.

15. SPEAKERS A. If the wiring to each loudspeaker will not be longer than about 6 meters (20 feet), then connections should be made using 18-gauge wire such as common lamp cord ("zip" cord), available from hardware and electrical-supply stores in either white, black, or brown insulation. If the wiring to the speakers will be longer than about 6 meters, heavier 16-gauge or 14-gauge wire is preferred. Heavy-duty wiring is especially desirable if you are using speakers of low impedance or two pairs of speakers wired in parallel.

To make connections, separate the two conductors of the cord, strip off about a half-inch (1 cm) of insulation from each, and in each conductor twist together the exposed wire strands. Fully depress the colored tab above each SPEAKERS terminal in order to open up the small hole in the terminal, insert the bared wire into the hole, and release the tab; the terminal will grasp the wire and hold it in place. Repeat for each conductor, connecting the wires from the left-channel speaker to the (L+) and (L–) terminals and the wires from the right-channel speaker to the (R+) and (R–) terminals in the SPEAKERS A group (the upper row of terminals). Check to be sure that no loose strand of wire is touching any adjacent terminal in the SPEAKERS A group, nor any of the terminals in the SPEAKERS B group (the lower row).

PHASING. Stereo speakers should operate in phase with each other in order to yield a good stereo image and to reinforce rather than cancel each other's output at low frequencies. If your speakers are easily moved, phasing can easily be checked. Make the connections to the speakers, place the speakers face-to-face only a few inches apart, play some music, and listen. Then swap the connection of the two wires at the back of ONE of the speakers, and listen again. The connection which produces the fullest, boomiest bass output is the correct one. Connect the wires securely to the speaker terminals, being careful to avoid leaving loose strands of wire which might touch the wrong terminal and create a partial short-circuit, and then move the speakers to their intended locations.

If the speakers cannot easily be set face-to-face, then phasing must rely on the "polarity" of the connecting wires. Note that the SPEAKERS terminals on the amplifier are color-coded: in each channel the terminal with the red tab has positive "+" polarity and the black terminal is negative "–". The terminals at the rear of the speakers are also marked for polarity, either via red and black connectors or by labels: "+", 1, or 8 ohms for positive, "–", 0, or G for negative. As a general rule the positive (red) terminal on the amplifier is to be connected to the positive terminal of the speaker, in each channel.

To facilitate this, the two conductors comprising the speaker wire in each channel are different, either in the color of the wire itself (copper vs. silver) or in the presence of a small ridge or rib pattern on the insulation of one conductor. Use this pattern to establish consistent wiring to both speakers of a stereo pair. Thus if you connect the copper-colored wire (or ribbed insulation) to the red amplifier terminal in the Left channel, do the same in the Right channel. At the other end of the wire, if you connect the copper-colored wire (or the ribbed insulation) to the red or positive terminal on the left-channel speaker, do the same at the right-channel speaker.

16. SPEAKERS B. A second pair of loudspeakers may be connected to the amplifier, using the lower row of terminals, in the same manner as the connections made to the SPEAKERS A terminals.

If the second pair of speakers is located near the first pair in the same room and will be played simultaneously, then they must be correctly phased with respect to the first pair as well as with each other. But if the second pair of speakers is located away from the first pair (in another room, for example) or will not be played at the same time as the first pair, then their phasing need not match that of the first pair. Of course, as with any stereo speakers, the second pair still must be in phase with each other.

The SPEAKERS B terminals may also be used to connect an adapter unit for electrostatic headphones. The black "–" terminals in each channel share a common ground.

Another useful option for the SPEAKERS B terminals is to connect a second pair of speakers wired for "ambience recovery," enhancing the apparent spaciousness of stereo recordings. Locate a pair of small loudspeakers along the side walls of the listening area, slightly behind the main listening area and as far as possible to the left and right. (Often it is useful to aim such speakers upward or toward the rear, so that their sound reflects randomly off the walls before reaching you.) Connect a wire from the (L+) terminal to the positive terminal of the left-rear speaker, and a second wire from the (R+) terminal to the positive terminal of the right-rear speaker. Make no connection to the (L–) and (R–) terminals on the amplifier; instead, connect a wire from the negative terminal of the left-rear speaker to the negative terminal of the right-rear speaker. Thus wired, these rear speakers receive the left-minus-right "difference" portion of the composite stereo signal.

FRONT PANEL CONTROLS

1. POWER. Depress this button to switch on the amplifier and any other 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 amplifier's POWER switch permanently engaged and use an external switch (such as a clock timer) to turn the power on and 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 the rear panel.

Before plugging conventional headphones into the PHONES jack, turn down the VOLUME control for safety. And when you are not listening to the headphones it is wise to unplug them from the PHONES jack. Otherwise, when listening to loudspeakers you might turn up the volume to a level which would feed excessively strong signals to the headphones and damage them.

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 which differ widely in impedance usually will produce a substantial loss of volume in the headset having the higher impedance (or in both).

3. SPEAKER SELECTOR. When this switch is set to "A", sound is heard only from the loudspeakers connected

to the SPEAKERS A terminals on the rear panel. When the switch is set to "B" the SPEAKERS A terminals are shut off and sound is heard only from the loudspeakers connected to the SPEAKERS B terminals. At the "A + B" setting the amplifier's output power is fed to both sets of speakers; they are wired in parallel by the switch. At the "OFF" setting both sets of speakers are silenced.

Thus if you have your main stereo speakers wired to the "A" terminals and a set of extension speakers wired to the "B" terminals, you can choose to hear only the main speakers (A), only the extension speakers (B), or both (A + B).

The amplifier's output signal is present at the PHONES jack at all settings of the SPEAKERS selector switch. When using headphones it normally is advisable to switch OFF the loudspeakers. Then the VOLUME control may freely be used to adjust the loudness level in the headphones with no fear of overdriving the speakers or disturbing neighbors.

If you have connected an adapter unit for electrostatic headphones to the SPEAKERS B terminals, you can use the SPEAKERS selector to switch between your main stereo speakers (A) and the headphones (B).

If you have connected speakers wired for "ambience recovery" to the SPEAKERS B terminals, you can use the SPEAKERS selector to listen to conventional stereo (A), to switch off the main speakers and listen only to the stereo L-minus-R "difference" signal in the rear speakers (B), or to listen to spatially enhanced stereo (A + B). You will find that the stereo difference signal is usually lacking in bass. If the difference signal is very weak, the recording lacks stereo separation.

4. 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 it to achieve the tonal balance which sounds most natural to you.

You will note that at moderate rotations away from center the effect of the Bass control tends to be subtle because its action is confined to the lowest audible frequencies where significant energy is seldom found in recordings. Only at large rotations away from center is there a substantial boost or cut at the mid-bass frequencies which are common in music.

5. 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 knob to the right (clockwise) increases the level of high-frequency sounds, and rotation counter-clockwise decreases their level. Adjust it to achieve the tonal balance which sounds most natural to you.

You will note that 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.

6. SPEAKERS EQ. When this button is depressed it engages an equalization circuit that provides a 12 dB/octave bass boost below 55 Hz. Since all closed-box (acoustic suspension and infinite baffle) loudspeaker systems roll off in response at 12 dB/octave below the woofer/cabinet resonance, the SPEAKER EQ circuit compensates this rolloff and extends the useful response of the speaker a full octave lower in frequency.

NOTE: while the SPEAKER EQ can be used with "vented" speakers (bass-reflex, tuned port, auxillary bass radiator, et al.), these designs usually exhibit a much more rapid rolloff (typically either 18 or 24 dB/octave) below the system's planned cutoff. Consequently, in most cases the SPEAKER EQ will not produce the same dramatic benefit with these designs as it does with acoustic-suspension systems.

If your loudspeakers already have extended deep-bass response, the SPEAKER EQ will still be useful to compensate for the bass rolloffs in many recordings. The equalization also provides psychoacoustically effective "loudness" compensation when you listen to music at low volume levels.

Three CAUTIONS should be observed when using the SPEAKER EQ:

(1) This circuit is intended for use with loudspeakers having woofers eight inches (20 cm) or larger in diameter, preferably those with "long-throw" voice-coils and acoustic-suspension enclosures. It is not recommended for use with small "mini" speakers having woofers smaller than six inches; in most cases they are not designed to accept high power input at low frequencies and will only distort or suffer damage as a result.

(2) Be prepared to switch off the equalization when playing recordings (especially digitally mastered discs) that contain unusually potent recorded bass. The SPEAKER EQ boosts deep bass levels by 12 dB (i.e. by a factor of 16 in power). With this boost, a bass-heavy input signal may 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 backplates. As long as the speaker sounds good it probably is OK; but distorted or unmusical sounds, such as clattering noises, are a sign of distress in a woofer.

(3) We recommend that you use the Infrasonic filter in order to avoid amplifying inaudible frequencies below 20 Hz, thus preserving the amplifier's power and the woofer's excursion capacity for the genuine bass energy in the music.

7. INFRASONIC FILTER. The signal from a record player usually contains strong infrasonic energy (due to disc warps, stylus/tonearm resonance, and vibrations reaching the turntable) which, if amplified at full strength, will waste amplifier power and produce excessive woofer cone excursions, muddying the sound. Depress the INFRASONIC filter button to attenuate these unwanted signals below 20 Hz, especially when using the BASS control or SPEAKER EQ to boost the musical bass.

8. MONO. Engaging this button combines the two stereo channels together to produce monophonic sound, minimizing vertical rumble and surface noise when listening to old monophonic recordings. The button must be OUT for normal stereo listening.

9. RECORDING SELECTOR. This rotary switch selects which input signal will be fed out to the rear-panel RECord jacks for tape recording. The selected signal is fed to both TAPE 1 and TAPE 2 and may be recorded simultaneously on two tape machines. The RECORDing selector operates independently of the LISTENing selector; thus you can record from one program source while listening to a completely separate signal source. You can record from the TUNER input while listening to PHONO, or copy recordings from TAPE 1 onto TAPE 2 while listening to PHONO or TUNER.

When not making a recording you should set the RECORDing selector to OFF, thus isolating the tape recording outputs from the main signal path through the amplifier. This ensures that the non-linear input impedance, which

some tape recorders exhibit when turned off, will not affect the quality of the signal that you are listening to.

In order to dub (copy) tapes from TAPE 1 onto TAPE 2, simply set the RECORDing selector to TAPE 1. The playback signal from the TAPE 1 recorder will be fed to the TAPE 2 REC jacks for recording. Then you can set the LISTENing selector to TAPE 1 (to hear the source tape), or to TAPE 2 (in order to monitor the output of the copying recorder), or to PHONO, TUNER, or AUX if you want to listen to something else while the copying proceeds. Changing the setting of the LISTENing selector has no effect on the signal fed to the tape recorder by the RECORDing selector switch.

Similarly, tapes can be copied from TAPE 2 back to TAPE 1 simply by setting the RECORDing selector to TAPE 2. I.e., as always, you set the RECORDing selector to the program source that you want to record *from*.

If you have a signal processor such as an equalizer or a DBX processor connected to the TAPE 2 jacks, you can use it to process the playback signal from the TAPE 1 recorder by setting the RECORD selector to TAPE 1. Then set the LISTENing selector to TAPE 1 to hear the unprocessed signal, or to TAPE 2 to hear the processed signal.

If you have a DBX or CX decoder connected to the TAPE 2 jacks, you can use it to decode DBX- or CX-encoded records by setting the RECORDing selector to PHONO. This will feed the preamplified phono signal to the decoder via the RECord jacks. Then set the LISTENing selector to TAPE 2 to hear the decoded signal.

Similarly, if you have an equalizer or any other signal processor connected to the TAPE 2 jacks, you can use it to process any input signal by setting the RECORDing selector to the program source that you want to listen to, so that the desired signal will be fed to the processor via the RECORD jacks. Then set the LISTENing selector to TAPE 2 to hear the processed signal.

If you want to use an equalizer, DBX encoder, or other signal processor to process a signal *before* recording it, you must disconnect the tape recorder from the 3150's RECord and PLAY jacks. Connect the processor to the 3150's REC/PLAY jacks, and then connect the tape recorder to the processor's own TAPE record/play jacks.

10. LISTEN SELECTOR. This rotary switch selects the signal that you will hear.

If you have a three-head tape recorder and wish to monitor its playback output while a recording is being made, use the RECORDing selector to select the desired input signal and feed it to the recorder. Then set the LISTEN selector to TAPE 1 or TAPE 2 (as appropriate) to hear the monitor output from the recorder.

Similarly, if you have a signal processor connected to the TAPE 2 jacks and want to hear the processed signal, first use the RECORDing selector to choose the desired input signal and feed it to the processor. Then set the LISTEN selector to TAPE 2 to hear the processed signal.

11. LOW LEVEL. Engaging this button reduces the volume of the amplified signal by approximately 20 decibels (but has no effect on the signal fed to the RECord jacks for taping). The LOW LEVEL switch has several practical uses:

■ It extends the useful range of the VOLUME control. With high-output signal sources, with efficient loudspeakers, or with sensitive headphones, you may find that the sound is too loud over most of the range of the VOLUME control—i.e. you are restricted to using only settings near the lower end of the control range. By engaging the LOW LEVEL switch you can use the full range of the Volume control for normal listening.

■ It provides optimum signal-to-noise ratio for low-level listening. In quiet environments. For example, if you are listening to soft music late at night when the surroundings are quiet, the LOW LEVEL switch minimizes the already-low residual noise of the preamplifier and tone-control circuits, ensuring noise-free listening.

■ It provides a convenient temporary cut in volume, to be used while answering the telephone for instance. When the button is pressed again and released, it restores the volume precisely to the pre-set level.

12. LOUDNESS. Pressing this button engages a "loudness compensation" circuit which, at low-to-medium settings of the Volume control, boosts the bass and treble response of the amplifier. This is to compensate for the human ear's reduced sensitivity to low-frequency sounds at low loudness levels, and for the "masking" of subtle high-frequency details by environmental noise.

Instead of using the LOUDNESS switch, you may prefer to use the SPEAKER EQ and BASS controls to custom-tailor a loudness compensation that sounds most natural to you.

13. VOLUME/BALANCE. These controls are concentric. The protruding knob is the VOLUME control. The outer ring is the BALANCE control.

The VOLUME control adjusts the overall loudness level of the sound, together with the LOW LEVEL button. It has no effect on the level of the signals fed to the tape RECording jacks. The control is designed for accurate tracking of its two channels, so that the stereo balance will not shift noticeably as the VOLUME control setting is varied.

The BALANCE control adjusts the *relative* levels of the left and right channels. (Like the Volume control, it has no effect on recordings being made.) A detent at the 12 o'clock position marks the point of equal balance. Rotation of the ring 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 ring to the left shifts the sonic image toward the left speaker.

Ideally the detented center position of the BALANCE control will be the normal setting. But several common circumstances may cause unequal balance, requiring a compensatory off-center BALANCE setting to restore the most uniform spread of stereo sound between the speakers. These 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.

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 them.

14. STATUS INDICATORS. These three light-emitting diodes provide information on the status of the amplifier.

The red **POWER** indicator illuminates when the amplifier is on.

The red **PROTECTION** indicator illuminates when the output transistors overheat as a result of prolonged high-power operation at excessively high output levels or into very low impedances.

The green **SOFT CLIPPING** indicator illuminates when the Soft Clipping switch (on the rear panel) is engaged.

A Note on Overload Protection. Because the NAD 3150 sounds so clean and musical when driven beyond its nominal power rating and when used to drive low-impedance loudspeakers, you may be tempted to stress it beyond its design capacity. For example the amplifier can safely and cleanly drive a 2-ohm impedance with wide-range musical signals whose peak level is 100 watts or more, but it will

overheat if called upon to deliver high power *continuously into a low impedance*.

Thus it is permissible to play music at volume levels which cause the transient peaks and climaxes to exceed the amplifier's rated power (and if you use Soft Clipping the music will continue to sound good at those high peak levels). But if you overdrive the amplifier continuously rather than only on peaks, the output transistors may overheat. There are thermal circuit breakers in the amplifier which are activated if the output transistors become dangerously hot. When this occurs in either channel the amplifier automatically shuts down to protect itself.

Thus if both channels of sound go silent while the POWER indicator remains illuminated (indicating that the power-supply fuses are intact), the thermal circuit breaker may have been activated. To resume operation, simply turn off the amplifier and wait a minute or two for the output stage to cool; the circuit breaker will re-set automatically. If the protective circuit breaker interrupts the sound frequently, several likely causes should be considered: a loose strand of wire causing a partial short-circuit between speaker terminals, or an attempt to drive low-impedance speakers with the Impedance switch set to "high", or continued high-power operation into low-impedance loads in the bridged mode.