



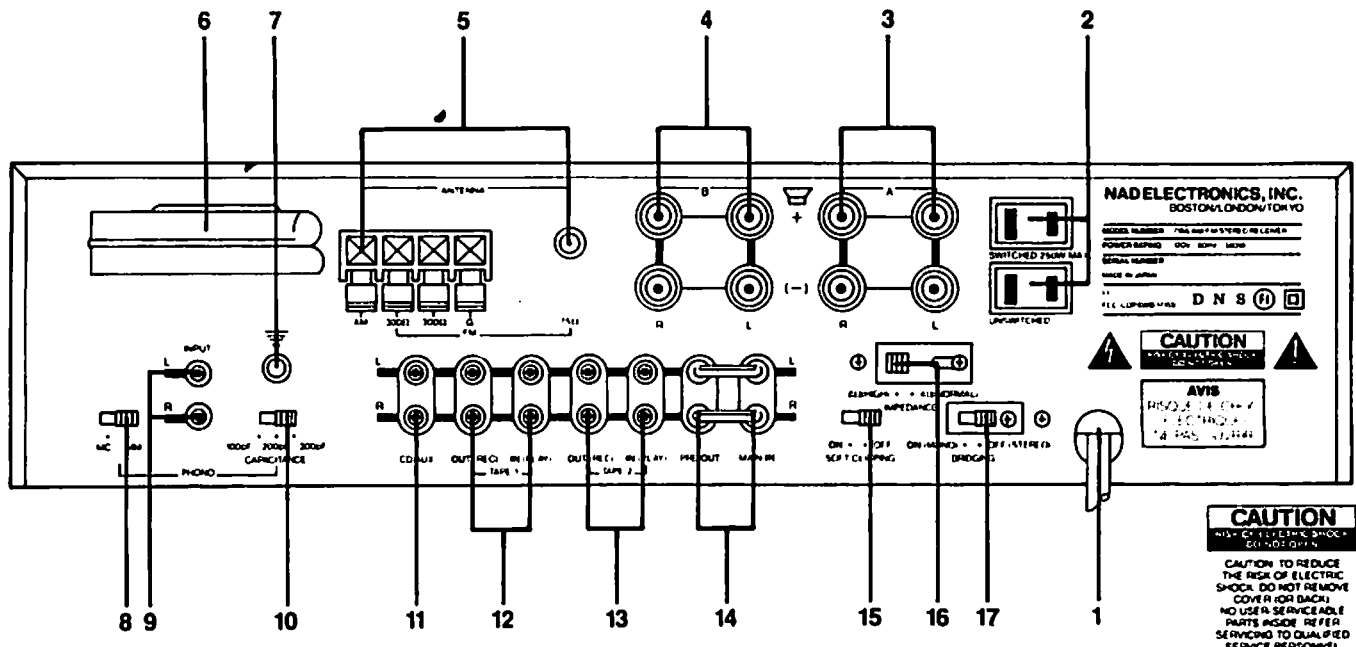
7155

STEREO RECEIVER

**INSTRUCTIONS
FOR INSTALLATION
AND OPERATION**

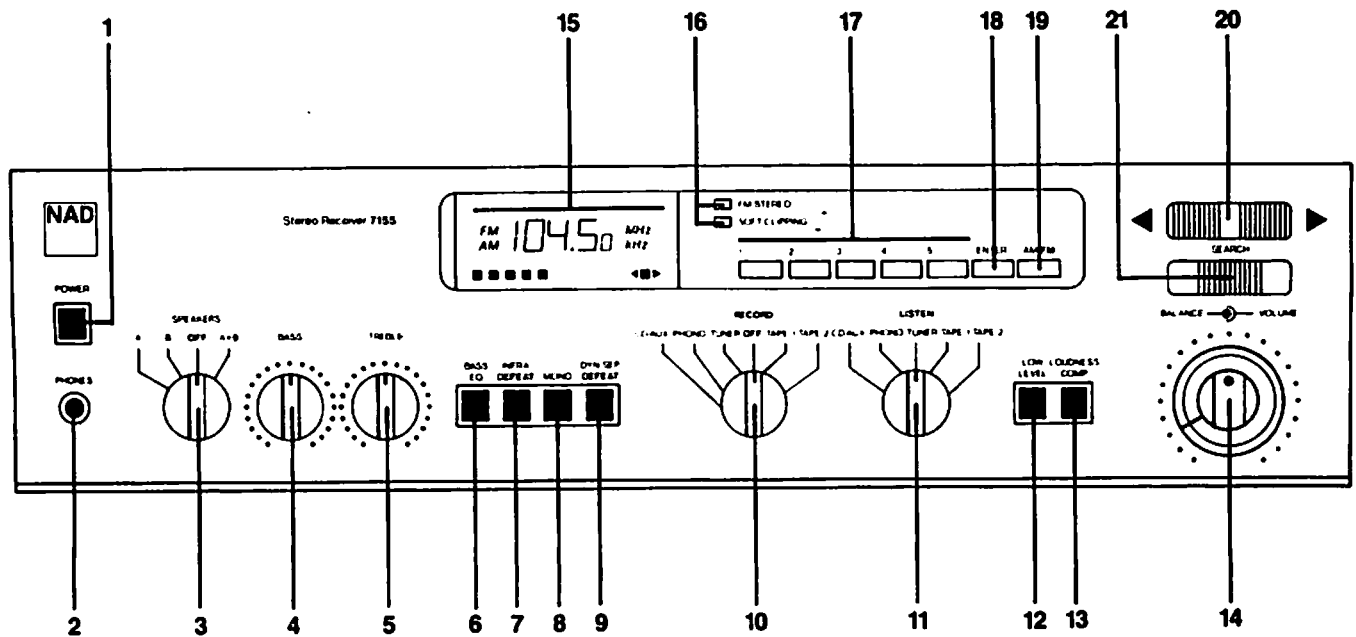
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A NOTE ON INSTALLATION

This unit may be installed on any sturdy, level surface. Since its power transformer generates a magnetic hum field of moderate strength, a turntable (especially one with a moving-coil pickup cartridge) should not be located directly to the left of the amplifier nor directly above it.

The amplifier generates a modest amount of heat and thus requires some ventilation. Do not place it on a rug or other soft surface that it could sink into, obstructing the air inlets on its bottom. And be careful not to obstruct the air outlet grille on the top cover.

CAUTION: To prevent a fire or shock hazard, do not permit liquid or moisture to enter the amplifier. If liquid is accidentally spilled on it, immediately shut off its power and unplug its AC power cord. Allow sufficient time for complete evaporation to occur before operating the amplifier again. (If the liquid is anything but water and/or alcohol, the amplifier should be examined by a service technician before power is applied to it.)

Do not open the amplifier, or attempt to modify or repair it yourself. Refer all servicing to a qualified technician.

REAR PANEL CONNECTIONS

1. AC LINE CORD

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

2. AC CONVENIENCE OUTLETS (not in European models)

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 tuner, equalizer, or other signal processor), and will be switched on and off by the receiver'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.

3. 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.

This amplifier is equipped with special high-current speaker terminals to handle the highest peak power levels that may occur in the "bridged" mode or with low-impedance loudspeakers.

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. Unscrew the red or black cap on the terminal, in order to expose the small opening in the base of the terminal. Insert the bared wire into the hole, and screw the cap down tight until it grasps the wire and holds it securely.

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 "A" group. Check to be sure that no loose strand of wire is touching any adjacent terminal or the amplifier chassis.

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, their phasing can easily be checked. Make the connections to both 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 not to leave any loose strands of wire that might touch the wrong terminal and create a partial short-circuit; 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 red terminal 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.

4. SPEAKERS B

A second pair of loudspeakers may be connected to the amplifier, using the "B" group 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 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 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.

5. ANTENNA TERMINALS

If you are using an external FM antenna with a coaxial cable, it should be connected to the 75-ohm coaxial socket. Other types of antenna wires may be attached to the four antenna terminals.

In order to make connections to the four antenna terminals, remove any connectors that may be fitted on the antenna wires. Strip off 1 cm of insulation from each wire, and in each conductor twist together the exposed wire strands.

Press down the plastic tab below the appropriate terminal. Insert the bared wire into the small hole in the terminal, and pull the tab up. The terminal will grasp the wire and hold it in place.

AM Antenna. Since the tuner is equipped with a ferrite rod antenna, no external antenna will be needed for satisfactory reception of most local broadcasting stations. But if you wish to improve reception of distant AM stations, attach a long-wire outdoor antenna to the AM terminal. As its name implies, a "long-wire" antenna is a simple, straight wire whose length may be anything from a few feet up to about 100 feet (30 meters), mounted parallel to the earth and as high as is convenient.

In some cases the effectiveness of a long-wire antenna will be improved by connecting a second wire from the Ground (G) 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.

FM Antennas. An antenna must be connected to the tuner for effective reception of stereo FM broadcasts. A ribbon-wire "folded dipole" antenna is included to get you started. When you stretch out the ribbon-wire antenna you will note that it is in the form of a T. The "crossbar" portion of the T should be stretched out horizontally and tacked in place—on a wall, on the back of a cabinet, or on the floor. The "vertical" section of the T goes to the tuner's antenna terminals. Connect its two wires to the two 300 Ω input terminals.

In view of the exceptional sensitivity of NAD tuner circuits, you may find that the ribbon-wire dipole antenna is all you need for reception of strong local stations. But it is not very efficient at rejecting "multipath" and other forms of FM interference, and it cannot easily be rotated to optimize its pickup pattern for best reception of stations in different directions. Therefore, in most cases you should use a better antenna. The recommended options, in order of increasing cost, are as follows:

(1) A basic "rabbit-ears" indoor TV antenna without auxiliary coils or tuning switches. Electrically, such an antenna is just another dipole (similar to the ribbon-wire antenna) with its tuned elements made of solid metal, but with the advantage that it can be rotated. Stretch out each of its two arms to a length of 30 inches (75 cm), and orient them horizontally or at a shallow angle less than 45 degrees upward. The ribbon wire emerging from the antenna's base should be connected to the tuner's two 300 Ω terminals in place of the supplied ribbon-wire antenna. Now, for each station in turn, after you tune the station you can rotate the antenna for best reception.

(2) A more elaborate rabbit-ears indoor TV antenna with a tuning switch. This type of antenna does NOT have greater sensitivity than the simpler rabbit-ears unit, so if your problem is that the signals you want to receive are weak (as shown on the signal-strength meter), then an outdoor antenna is the only effective solution. But in cities and in large buildings where signals are strong but are contaminated by reflected "multipath" signals that interfere with good recep-

tion, the tuning switch on an elaborate indoor antenna may improve reception by reducing the interference.

(3) An electrically tuned indoor antenna, such as the Technics Wing or B.I.C. Beam Box. Again, such antennas usually do not provide any advantage over the simplest type of "rabbit-ears" unit for receiving weak signals. But where strong signals are contaminated with interference, the antenna's aiming and tuning controls can reject the interference and yield cleaner reception.

(4) An outdoor antenna. Even the finest indoor antenna, no matter how elaborate, cannot fully exploit the capabilities of a good FM tuner. For the lowest noise, minimum distortion, and largest choice of well-received broadcasts, an outdoor antenna is the best complement to a fine tuner.

A roof-mounted antenna has three fundamental advantages. First, its large size yields better sensitivity (pulling in a stronger signal from the desired station) and a narrower directional pattern for more effective rejection of multipath reflections arriving from other directions. Second, its location on a roof or tall mast places it above many sources of interference—passing cars and buses, other buildings, etc. Third, the strength of received FM signals is directly proportional to the height of any antenna above the ground.

If you already have an outdoor television antenna, using a splitter to extract FM signals from it may produce excellent results. However, many TV antennas are deliberately designed to be relatively weak at FM frequencies in order to minimize potential interference with TV signals at nearby frequencies (Channel 6 in the U.S.). You may be able to use a splitter to extract FM signals from an apartment building's master TV antenna system, but usually this yields poor results because many master antenna systems have "traps" to stop FM signals.

The best choice is a directional FM-only antenna, mounted as high above ground as is practical, and separated by at least two meters (7 feet) from other antennas, vertically and horizontally. If desired stations are located in different directions (more than 90 degrees apart), the antenna should be mounted on a rotor for aiming. Brand names of good FM antennas in the U.S. include Jerrold, Finco, Wineguard, Antennacraft, and Archer (Radio Shack).

Use shielded lead-in cable rather than plain "twin-lead" wire, both to minimize interference and to preserve strong signals during years of weathering. The cable may be either 75-ohm coaxial or a shielded 300-ohm type. Disconnect any indoor antenna before connecting the cable from the outdoor antenna.

If you are using a 75-ohm coaxial antenna cable that lacks a connector, you may attach its center conductor to either 300 Ω antenna terminal and connect the cable shield to the ground (G) antenna terminal. This unbalanced connection provides the required 75 Ω impedance for the cable. But the 300 Ω antenna terminals are connected to the FM tuner circuit through an internal "balun" transformer. The 75 Ω coaxial socket is wired directly to the tuner circuit, bypassing the balun transformer, so to obtain the best possible sensitivity, the coaxial cable should be connected to the 75 Ω socket.

If you install an outdoor antenna yourself, observe these important CAUTIONS:

1. Do not mount the antenna close to electric power lines. Plan the installation so that the antenna mast cannot accidentally touch power lines, either while you are installing it or later.

2. Include a lightning arrester in the installation, to protect both yourself and the tuner circuit from potential danger during electrical storms.

6. AM ROD ANTENNA

The ferrite rod antenna provides effective reception of

local medium-wavelength AM radio stations. The rod is mounted on a pivot. For best reception, swing it away from the metal chassis of the receiver.

7. 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. In some cases reversing the orientation of the AC power plug in the wall socket may yield a reduction in hum level.

8. MM/MC

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. 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.

9. 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.

10. PHONO CAPACITANCE

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.

11. CD/AUX INPUT

Connect the audio signal cables from a digital Compact Disc player to these jacks. The input signal will be fed to the Volume control before reaching any active circuitry, so the amplifier's circuits cannot be overloaded by high-level signals from the digital player.

If you don't have a CD player, any other "line-level" signal source may be connected here, such as a spare tape deck, the audio line output from a videocassette or videodisc player, or a television sound tuner.

On this product the upper jack in each pair is for the Left channel, and the lower jack is for the Right channel.

12. 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 (REC) 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 (PLAY) jacks.

13. 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 (REC) jacks to the recorder's LINE IN jacks, and another cable from the recorder's LINE OUT jacks to the TAPE 2 input (PLAY) 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, a DBX disc decoder, or any other device whose operation depends on the setting of a signal threshold. Connect a patch cord from the TAPE 2 output (REC) jacks to the processor's inputs, and another patch cord from processor's outputs to the TAPE 2 input (PLAY) jacks.

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 PRE-OUT jacks. The choice is a matter of convenience.

14. PREAMP OUT, MAIN IN

Each channel of the amplifier includes 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 PRE-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 PRE-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, should be connected to TAPE REC/PLAY jacks—where the signals are unaffected by the amplifier's volume and tone controls—rather than to the PRE-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 PRE-OUT to MAIN-IN in each channel.

This receiver 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).

15. 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 moderate peak power levels, the Soft Clipping may be left OFF. But we recommend that it be switched ON when playing music at very high levels that might exceed the amplifier's power capacity.

16. 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 many "8Ω" loudspeakers this minimum impedance is from 4 to 6 ohms, and in "4Ω" 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 at the 4Ω (NORMAL) setting of the Impedance selector. If you are not sure of the true impedance of your speakers, or if you are connecting two pairs of speakers, leave the Impedance switch at 4Ω (NORMAL).

If you are using a single pair of loudspeakers whose true impedance is above 6 ohms at all frequencies, you can

optimise the amplifier for maximum power delivery at this higher impedance by re-setting the switch to 8Ω (HIGH).

To prevent accidental re-setting, the Impedance switch is held by a slotted bracket which is fastened by a screw next to the switch. Use a small screwdriver to loosen the bracket screw, turning it about a half-turn counter-clockwise, and then slide the switch to the 8Ω (HIGH) position. The bracket will move with the switch. Tighten the screw to secure the switch in its new position.

CAUTION: If the impedance switch is set to 8Ω (HIGH) with loudspeakers whose true impedance is lower than 6 ohms, or with two pairs of speakers connected in parallel, the amplifier will tend to overheat and shut down when operated at high output levels. The amplifier will resume normal operation after it cools; but such abuse could also cause internal fuses to blow in order to protect the amplifier. If this occurs, return the amplifier to your dealer for service.

17. 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 IMPEDANCE switch is set to 4Ω (NORMAL). If it is at 8Ω (HIGH), re-set it to 4Ω (NORMAL) and secure the bracket to prevent the Impedance switch from being moved accidentally.

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 pairs of 4-ohm speakers operated in parallel will look like a 1-ohm load. Driving paralleled low-impedance speakers to high levels will cause the amplifier to overheat and shut down, or may cause internal fuses to blow in order to protect the amplifier. For best results the bridging mode should be used with a single 4-ohm or 8-ohm speaker in each channel.

(3) Disconnect the metal jumper or signal cable from the Left-channel Main input to the power amplifier section of the amplifier. Leave the Right-channel jumper in place from PRE-OUT to MAIN-IN. In the bridged mode the amplifier is driven only through its Right-channel Main input. (For stereo, the Left-channel PRE-OUT signal must be used to drive a second, separate power amplifier.)

When two bridged amplifiers are used for stereo, this NAD amplifier drives the "Right" speaker. The other amp is connected to the "Left" speaker. If another NAD amplifier in bridged mode is used for the second stereophonic channel, it too will be driven through its "Right" Main input, even though it is connected to the Left speaker.

(4) Disconnect any speaker wires from both the SPEAKERS A and SPEAKERS B terminals. Separate the conductors in the cable from the speaker that is to be driven by this bridged amplifier. Connect the "positive" conductor to the R+ terminal and the "negative" conductor to the L+ terminal (i.e. to the two red terminals in the "A" group). 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 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.

the "B" group. Do not connect any wires to the black (R- and L-) terminals.

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 that 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 place by a plastic bracket and a screw in a slot. Use a small screwdriver to

loosen the bracket screw, turning it about a half-turn counter-clockwise; then slide the switch to ON (MONO). The bracket will move with the switch. Re-tighten the screw to secure the switch in its new position. Finally, turn the power on.

(6) To return the amplifier to normal stereo operation at a later date, first turn off the power. Loosen the bracket screw, re-set the Bridging switch to OFF (STEREO), and tighten the bracket screw to prevent the switch from being moved accidentally. Restore the connection from PRE-OUT to MAIN-IN in the Left channel, and re-connect loudspeaker wires to the speaker terminals as described under SPEAKERS A and SPEAKERS B.

FRONT PANEL CONTROLS

1. POWER

Depress this button to switch on the receiver and any other equipment plugged into the SWITCHED convenience outlet on the rear panel. The frequency display will illuminate when the power is on. 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.

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 any headphones in, 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 not wearing the phones you might inadvertently turn up the volume to a high level and feed dangerously strong signals to the headphones.

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).

NOTE: The PHONES jack is intended for use only in the normal stereo mode of the amplifier. In the "bridged" monophonic mode the PHONES jack will receive only an out-of-phase mono signal.

3. SPEAKERS

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 in parallel. 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 the Bass control to achieve the tonal balance that sounds most natural to you.

At moderate rotations away from center the effect of the Bass control is 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 that 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 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 mellow while suppressing hiss and record surface noise; but too much Treble roll-off will make the sound dull.

6. 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.

7. INFRASONIC FILTER DEFEAT

The output from a record player usually contains strong but inaudible impulses at infrasonic frequencies (below 20 Hz) due to disc warps, stylus/tonerarm 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 amplifier contains an infrasonic filter to attenuate 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 DEFEAT 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 DEFEAT button.

8. 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.

The MONO button also disables the stereo FM circuits in the tuner. Normally the tuner receives monophonic transmissions in mono and automatically switches on its multiplex decoding circuits when a stereo FM broadcast is received (as shown by the FM STEREO indicator). But when a very weak FM stereo signal is received, it may be excessively noisy because of the multiplex encoding technique used for stereo broadcasting. In that case, depress the MONO button to lock the tuner in the mono mode, in order to obtain consistently quieter and cleaner sound.

Remember to disengage the MONO button when you re-tune to a stronger signal. As long as the MONO button is engaged, no broadcasts can be received in stereo.

9. DYN SEP DEFEAT

The tuner contains a "dynamic separation" circuit that reduces noise in weak FM stereo signals by selectively reducing the high-frequency stereo separation at times when there is no significant high-frequency stereo information in the signal (especially during the quiet moments and pauses in the music, when any background noise would be most obtrusive). Wide stereo separation is restored instantly in the tuner whenever significant stereo separation occurs in the broadcast signal, and whenever the music is loud enough to "mask" the unwanted background hiss.

The dynamic separation circuit operates only on those weak stereo FM signals that would be noisy without it. It does not affect the reception of strong signals.

If you wish to turn off the dynamic separation circuit, depress the DYN SEP DEFEAT button. Normally you will not hear an obvious difference when this button is pressed, since most broadcast signals are strong enough to disengage the circuit automatically.

10. RECORD

This switch selects the input signal that will be fed out to the RECord jacks on the rear panel for tape recording or signal processing. The selected signal is fed to both TAPE 1 and TAPE 2 and may be recorded simultaneously on two tape machines.

The RECORD selector operates independently of the LISTEN selector; thus you can record from one program source while listening to a different signal source. You can record from the TUNER input while listening to PHONO (or vice-versa), or you can copy recordings from one tape deck onto a second recorder while listening to either tape machine or any other input.

The general rule is that you should always set the RECORD selector to the program source that you want to record from, while setting the LISTEN selector to the input that you want to hear.

In order to dub (copy) tapes from TAPE 1 onto TAPE 2, simply set the RECORD 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 LISTEN selector to TAPE 1 (to hear the source tape), or to TAPE 2 (in order to monitor the output of the copying recorder). Or you can set the LISTEN selector to PHONO, TUNER, or another input if you want to listen to something else while the copying proceeds. Changing the setting of the LISTEN selector has no effect on the signal fed to the tape recorder by the RECORD selector switch.

Similarly, tapes can be copied from TAPE 2 back to TAPE 1 simply by setting the RECORD selector to TAPE 2. Then set the LISTEN selector to TAPE 2 to hear the original tape, or to TAPE 1 to monitor the output of the copying recorder.

Using a signal processor. If you have a signal processor (such as an equalizer or a DBX unit) connected to the TAPE 2 REC/PLAY jacks, you can use it to process the playback signal from any program source by setting the RECORD selector to the program source that you want to hear. Then set the LISTEN selector to the same input to hear the unprocessed signal, or to TAPE 2 to hear the processed signal.

For example, if you have a DBX decoder connected to the TAPE 2 jacks, you can use it to decode DBX-encoded records by setting the RECORD selector to PHONO. This will feed the preamplified phono signal through the decoder via the TAPE 2 REC/PLAY jacks. Then set the LISTEN selector to TAPE 2 to hear the decoded signal.

If you want to use an equalizer, DBX encoder, or other device to process a signal *before* recording it, you must disconnect the tape recorder from the amplifier's REC/PLAY jacks. Connect only the processor to the amplifier's REC/PLAY jacks (either TAPE 1 or TAPE 2), and connect the tape recorder to the processor's own TAPE record/play jacks.

11. LISTEN

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 RECORD 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 RECORD 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.

12. LOW LEVEL

This button reduces the volume of the amplified sound by approximately 20 decibels. It has no effect on the signal fed to the TAPE OUT (REC) jacks for taping or processing. 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, so that you are restricted to using only settings near the lower end of the control range. In this case, engaging the Low Level switch to reduce the output level will allow you to 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.

13. LOUDNESS COMPENSATION

This button engages a "loudness compensation" circuit which, at low-to-medium settings of the Volume control, boosts the bass response of the amplifier in order to compensate for the human ear's diminished sensitivity to low-frequency sounds at low loudness levels. The circuit also provides a slight treble boost to overcome the "masking" of subtle high-frequency details by background noise.

Instead of using this button, you may prefer to use the tone controls and BASS EQ to obtain the tonal balance that sounds most natural to you, at any volume level.

14. 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 REcording jacks.

15. TUNING DISPLAY

This display is in three parts: frequency, signal strength, and tuning.

Frequency. The display shows the tuning band and the frequency to which the tuner is set, for example "FM 103.70 MHz" or "AM 1290 kHz." The fifth digit of the FM frequency display is reduced in size and brightness. In Europe and elsewhere the fifth digit will be either 0 or 5 since the tuning increment is 0.05 MHz.

Signal Strength. The signal strength meter is a series of five bars. The number of illuminated bars increases with the strength of the received signal. If only one or two bars illuminate, the signal is too weak for noise-free reception in stereo, but reception may be satisfactory in mono. Strong signals are indicated by four or five illuminated bars. If fewer than four bars are illuminated when you are correctly tuned to a station, then you are not getting all of the noisequieting in stereo that the tuner is capable of, and a better antenna (or a re-aiming of your present antenna) is needed in order to pull in a stronger signal.

Tuning. The center-tuning indicator (FM only) consists of an illuminated rectangular bar (like those in the signal strength meter) flanked on either side by a triangular pointer. The triangular pointers illuminate to indicate that the tuning is within an FM station's channel but not at the center of that channel. The pointer shows the direction that the tuning must be shifted in order to tune the station correctly. When you are accurately center-tuned the triangular pointer fades out and only the middle bar is illuminated.

On the AM band, tune for maximum signal strength.

16. STATUS INDICATORS

The FM STEREO indicator illuminates when a stereo FM broadcast is received and decoded. Note that if the MONO button is engaged, all broadcasts will be received in mono.

If an FM station is broadcasting only in mono, or if a stereo broadcast signal is too weak for reasonably noise-free reception in stereo, then the tuner will automatically switch into the mono mode, and the FM STEREO light will not illuminate. Also, if you have mis-tuned away from the center of a station's broadcast channel, the stereo decoding circuits may not lock onto the signal and it may be received only in mono.

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

17. STATION PRESETS

You can store the frequencies of ten favorite stations (5 FM and 5 AM) in these pre-sets, using the ENTER button. Then, to tune those stations from day to day, just press the appropriate pre-set button.

The pre-sets preserve their frequency assignments when the power is switched off, or when the AC line cord is unplugged, for a period of at least two weeks. Thus you can re-arrange your stereo system, or move the equipment from room to room, without losing the pre-set frequencies. But if you leave the power off for a month or more, you may have to re-program the tuning pre-sets.

18. MEMORY ENTER

This button engages the Memory Enter mode. Use this mode to enter the frequencies of your favorite stations in the ten pre-sets (five pre-sets on the FM band and another group of five pre-sets on AM). The procedure is as follows.

(1) Decide which station you want to assign to each pre-set. On each band you may arrange the stations in any order that you find convenient to use or easy to remember: alphabetical (1 = WABC, 2 = WCBS, 3 = WNYC . . .), numerical (1 = BBC1, 2 = BBC2 . . .), or in order of increasing frequency (1 = 89.7, 2 = 90.9, 3 = 95.3, etc). If you are not certain of the frequencies of the stations, check the station/frequency directory in a local newspaper or broadcasting guide.

(2) Select the FM or AM band, as appropriate. Using the Up/Down Tuning control, manually tune to the first station on your list. Check the signal-strength display (AM) or center-tune indicator (FM) to be sure that you have tuned precisely to the center of the station's broadcast channel. Press the ENTER button, then press Pre-set #1 to store the first station in the tuner's memory. (NOTE: After you press ENTER, you will have approximately ten seconds to store a station in one of the pre-sets. After that interval, the ENTER mode will automatically de-activate.)

(3) Tune to the second station on your list. Press the ENTER button and, within ten seconds, press Pre-set #2 to store the second station.

(4) Tune to the third station on your list, press ENTER, and press Pre-set #3 to store the station. Continue in this manner with any other stations that you want to store in the remaining pre-sets. Then switch to the other tuning band (FM or AM) and repeat the process for the second set of five pre-sets.

Incidentally, if you make a mistake or change your mind, it is not necessary to re-program all five pre-sets in sequence. You can re-program any pre-set simply by tuning to the desired frequency, pressing ENTER, and pressing the pre-set that you want to re-program.

After you finish programming the pre-sets, you may wish to post your list of stations and associated pre-set numbers nearby for reference.

CAUTION: In day-to-day operation, be careful not to press the ENTER button by accident. Doing so will activate the ENTER mode, and if you then press any of the pre-set buttons you will unintentionally re-program that pre-set.

You would then have to manually re-tune to the station you wanted, and re-ENTER it into the pre-set.

If you press ENTER accidentally, you may wait ten seconds for the ENTER mode to disengage. Or you can immediately force the tuner out of the ENTER mode, in either of two ways: switch to the other tuning band (e.g., from FM to AM and back), or tap the Up/Down Tuning rocker to change the tuned frequency.

19. FM/AM

This button switches between the two tuning bands: FM or medium-wave AM. The digital tuning display shows the tuned frequency in MHz (for FM) or kHz (for AM).

The tuning circuit has a "last station selected" memory. When you switch between tuning bands, the circuit automatically re-tunes the last station that you were tuned to when you previously used that band.

20. UP/DOWN TUNING

The Up/Down Tuning control is a "rocker" switch that allows you to tune up and down the AM or FM radio spectrum. Press the right-hand section of the rocker to tune toward higher frequencies, or the left-hand section to tune toward lower frequencies.

When the Tuning rocker is pressed momentarily, the tuned frequency shifts up or down by one step, unless the SEARCH mode has been engaged. (If SEARCH is engaged the tuner will scan in a station-by-station mode rather than in small tuning steps.)

In North America the size of the minimum tuning step is 10 kHz on the AM band. In Europe and elsewhere the tuning step is 9 kHz on AM. Each time the Tuning rocker is tapped, the tuned frequency will shift up or down by this increment, as shown on the digital frequency display.

If the Tuning rocker is held down with continuous pressure rather than just being tapped, the circuit pauses briefly and then scans rapidly up or down in frequency.

To tune a broadcast signal, press continuously on either side of the Tuning rocker until the tuned frequency is close to the desired broadcast frequency. Then fine-tune in small increments by tapping the Tuning rocker. If you know the exact frequency of the broadcast station, simply tune to that frequency. If you don't know the exact frequency, tune to the vicinity of the correct frequency and then observe the Signal Strength and Tuning indicators while fine-tuning. For AM broadcasts, fine-tune to obtain maximum signal strength. On FM, fine-tune until the center-tune indicator is illuminated.

21. SEARCH MODE

When the SEARCH button is engaged, the tuner scans in a station-by-station mode rather than in small frequency increments. When the Up/Down Tuning rocker is tapped, the tuner scans rapidly up or down in frequency and automatically stops at the next station whose signal is strong enough for good reception. A muting circuit automatically silences the output during the scan, until the tuning circuits lock onto a station.

The manual tuning mode (with the SEARCH button OUT) partially over-rides the scan muting. In this mode all stations (and the inter-station noise) remain audible at a reduced volume level while the tuning is being scanned up or down in frequency.

A NOTE ON OVERLOAD PROTECTION

Because NAD amplifiers sound so clean and musical when driven beyond their nominal power ratings and when used to drive low-impedance loudspeakers, you may be tempted to stress this amplifier beyond its design capacity. It can safely and cleanly drive impedances as low as 2 ohms with wide-range musical signals whose peak level

is 100 watts or more, but it may overheat if called upon to deliver high power continuously into a low impedance.

Thus you may play music at volume levels which cause the brief transient peaks and climaxes in music to exceed the amplifier's rated power by a considerable margin (and with 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. If the output transistors become dangerously hot, a thermal circuit breaker will automatically shut off the amplifier to protect them.

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, and the circuit breaker will re-set automatically. In most cases a very slight reduction in volume level will prevent further interruptions in the sound.

If the protective circuit breaker interrupts the sound often, several likely causes should be considered: papers or a cloth obstructing the ventilation grille in the amplifier's cover, or 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 8 ohms, or continuous high-power operation into low-impedance loads in the Bridged mode.