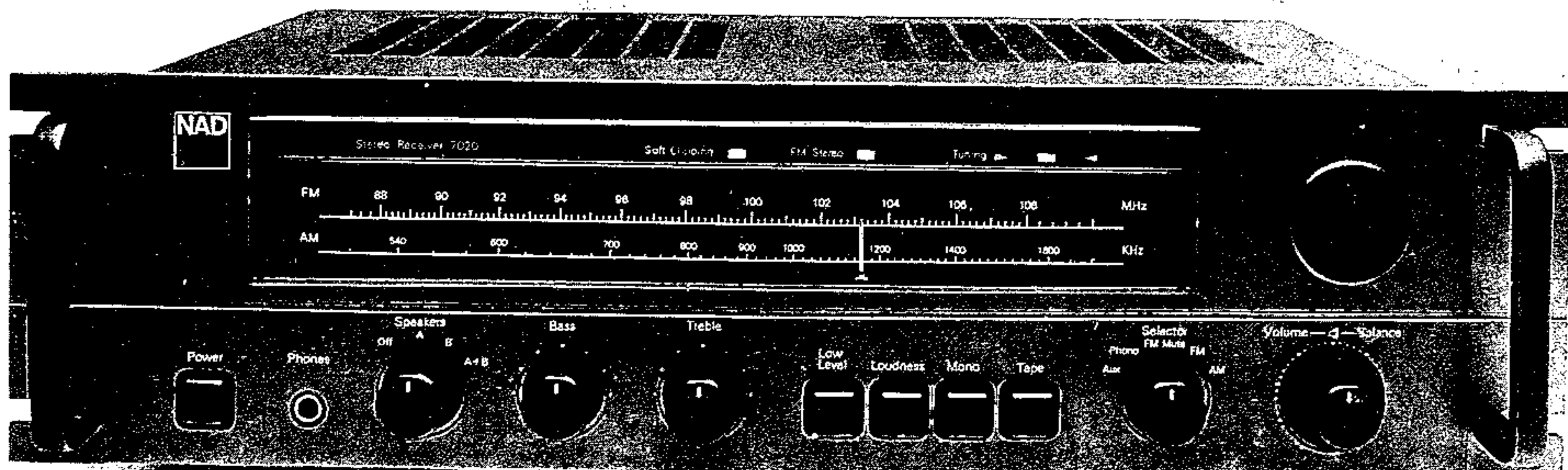


NAD 7020 STEREO RECEIVER INSTRUCTIONS FOR INSTALLATION AND OPERATION

7020 RECEPTEUR STEREO MANUEL D'INSTALLATION ET D'UTILISATION

7020 STEREO RECEIVER BEDIENUNGSANLEITUNG

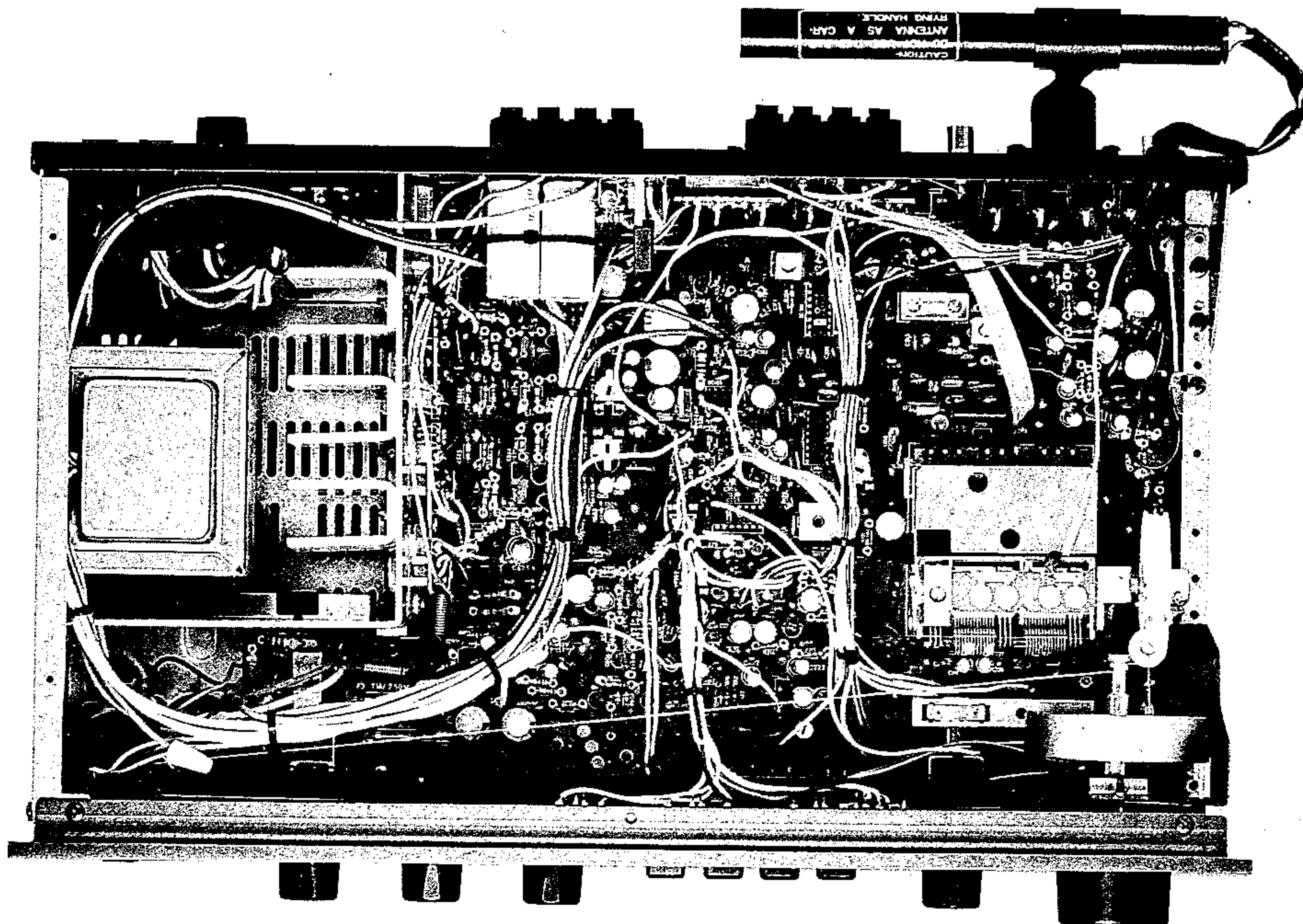


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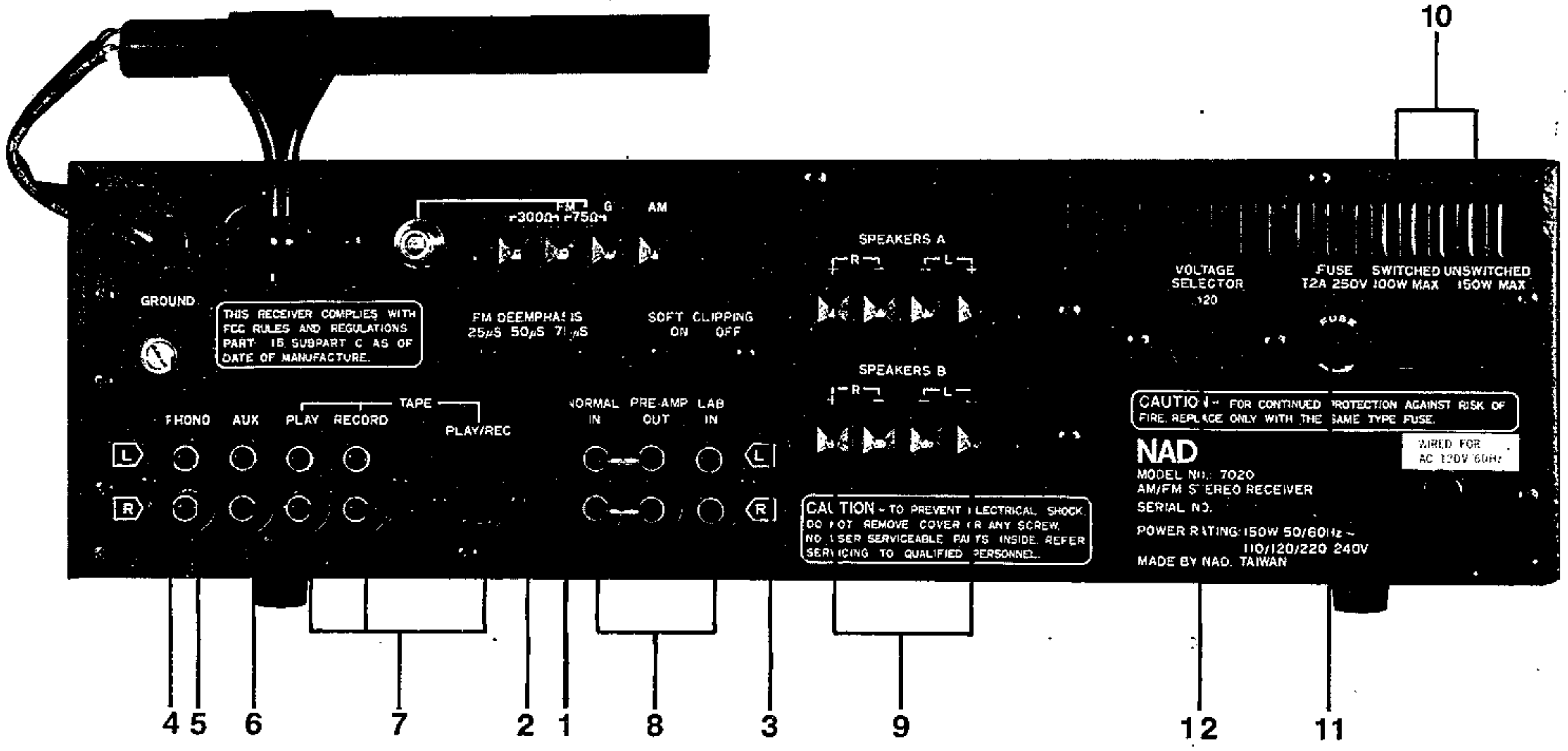
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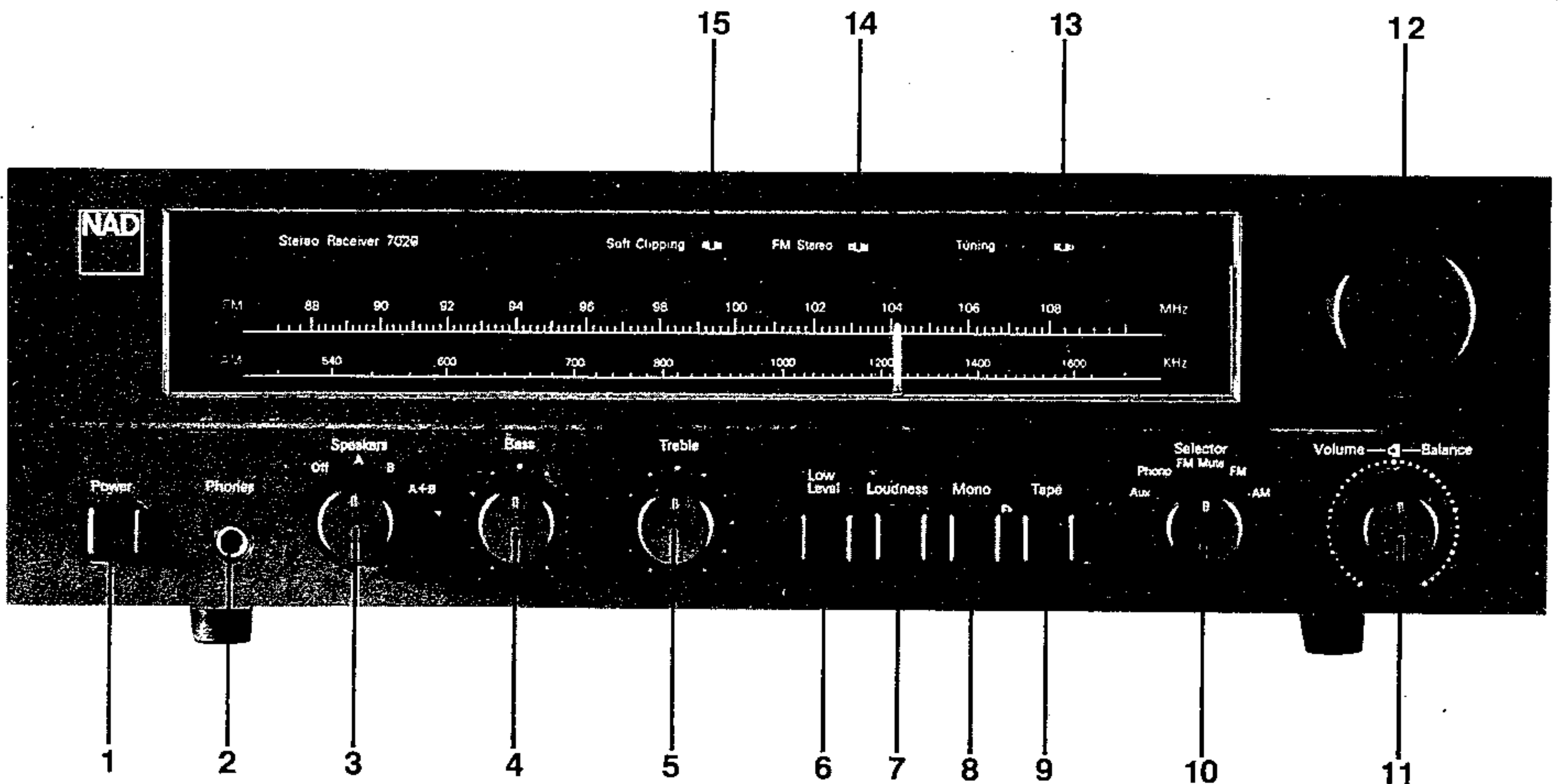
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ENGLISH

REAR PANEL CONNECTIONS

1. ANTENNA INPUTS

AM. The receiver is equipped with a ferrite-rod aerial which should suffice for reception of local AM stations. It is mounted in a bracket with a ball-and-socket so that it may be swung out from the rear of the receiver and oriented for best reception. Since it has a moderately directional sensitivity pattern, you may find that the preferred antenna orientation varies from one station to the next.

It may be possible to improve reception of weak or distant AM stations by attaching a long-wire antenna to the AM antenna terminal. To connect such a wire, strip off a half-inch of insulation from its end, fully depress the tab below the AM antenna terminal, insert the wire into the small hole in the terminal, and release the tab; as the hole closes it will grasp and hold the wire. 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 (from 2 to 30 meters), mounted parallel to the ground and as high as convenient—high on a wall, in an attic, or stretched from roof to tree outdoors. A long-wire antenna, complete with mounting hardware and insulators, may be purchased from radio parts stores. In some cases the effectiveness of a long-wire AM antenna may be improved by connecting a second wire from the receiver's Ground (G) terminal to a true earth-ground such as a copper 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 terminal of a modern grounded electrical outlet.

FM. An antenna must be connected to the receiver's FM terminals for effective reception of stereo FM broadcasts. Two types of terminals are provided for FM inputs: a type F socket for 75-ohm coaxial cable, and a group of three quick-connect terminals for either 300-ohm twin-lead or 75-ohm cable.

A ribbon-wire "folded dipole" antenna is supplied with the receiver to get you started. When you stretch it out 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 is connected at one end to the center of the crossbar and its other end should be connected to the two 300Ω input terminals. Fully depress the tab below each terminal, insert the bared wire into the hole within the terminal, and release the tab.

In view of the excellent sensitivity and steep quieting curve of this receiver, you may find that the ribbon-wire antenna is all you need for reception of 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 differing directions. So in many cases a better antenna is preferred. The recommended options, in order of increasing cost, are as follows:

(1) A basic "rabbit ears" TV antenna without any auxiliary coils or tuning switches. Stretch each of its two arms to a length of about 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 receiver's 300Ω terminals in place of the ribbon-wire antenna supplied. 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 antenna with a tuning switch. This type of antenna is *not* more sensitive than a simpler unit, so if your problem is that the stations you want to receive are weak or far away, an outdoor antenna is the only effective solution. But in cities and in high-rise apartment buildings where reflected "multipath" signals interfere with good reception, the tuning switch on an elaborate indoor antenna may reduce the interference which is contaminating strong signals. After tuning each station, experiment with antenna orientation and/or antenna switch setting in order to minimize noise and distortion in the sound.

(3) An electrically-tuned indoor antenna (e.g., B.I.C. Beam Box or equivalent). Again, such antennas usually don't provide any weak-signal advantage over a basic and inexpensive "rabbit-ears" unit for suburban or fringe-area listeners; in fact electrically-tuned antennas often are *less* sensitive than simpler antennas. But in urban areas where signals are strong but contaminated by interference, an electronic antenna's tuning controls can effectively reject some of the interference and yield clean reception.

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

A roof-mounted antenna is better for three reasons. First, its large size yields better sensitivity, with a sharper directivity pattern to reject multipath interference. Second, its location on a roof or tall mast places it above many sources of interference—nearby buildings, passing cars and buses, house wiring, etc. Third, the strength of received FM signals is directly proportional to the height of any antenna above the ground.

You may be able to use a splitter to extract FM signals from an apartment building's master TV antenna; this approach is sometimes successful but usually not, because many master antenna systems have "traps" to stop FM signals. You may be able to use a splitter to extract FM signals from your own outdoor TV antenna; with many antennas this will work well enough to provide a major improvement over indoor FM antennas. But TV antennas vary greatly in their suitability for FM use because some are deliberately designed to reject FM on the grounds that strong FM signals could interfere with reception of TV channel 6. The optimum choice is a directional FM-only antenna such as those made by Finco, Wineguard, Jerrold, et al., mounted no closer than eight feet (2½ meters) either horizontally or vertically from the nearest TV antenna on the same roof. In most locations a shielded lead-in cable (either shielded 300-ohm balanced cable or 75-ohm coaxial cable) is recommended rather than plain twin-lead wire, in order to minimize interference and preserve strong signals during years of weathering. If desired stations are located in differing directions (more than 90 degrees apart), an antenna rotor will let you aim the antenna for best reception of each station in turn.

If you use a coaxial cable which terminates in the standard type F connector, simply plug it into the matching screw-in socket, and disconnect any other FM antenna attached to the 300 or 75 ohm terminals. If the coaxial cable does not have a type F plug, you can connect the cable's shield wire to the ground(G) terminal and the cable's copper center conductor to the 75Ω terminal (second from left in the set of four antenna terminals).

2. FM DE-EMPHASIS. This three-position switch affects the high-frequency tonal balance in FM reception. You may, if you wish, use this switch as an auxiliary tone control to alter FM sound. For accurate reception, set it as follows:

75 μS: For North American broadcasts.

50 μS: For European broadcasts.

25 μS: For reception of Dolby®* FM broadcasts, if you are using a calibrated Dolby noise reduction unit to decode the broadcast. (If you are listening to Dolby-encoded FM signals without the aid of a Dolby noise reduction decoder, leave the de-emphasis switch in its normal setting as above.)

3. SOFT CLIPPING!™ This switch activates the unique NAD soft clipping circuit to reduce distortion when the amplifier is overdriven beyond its rated power. It may be left OFF for testing or for extended low-level listening. But in general we recommend that it be switched ON, especially when playing music with high peak levels.

4. GROUND. If your turntable is equipped with a separate grounding wire, connect it here as follows. Turn the thumb-nut counter-clockwise. If the grounding wire is terminated in a U-shaped spade lug, place it under the thumb-nut and tighten the nut

*TM Dolby Laboratories.

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 strands tightly together, insert the wire through the small hole in the shaft of the Ground terminal, and tighten the thumb-nut.

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

The impedance of the phono input is 47,000 ohms resistance and 47 picofarads capacitance, which (when considered together with the cable capacitance of a typical turntable) is suitable for the majority of phono pickup cartridges.

6. AUX. The auxiliary input jacks enable you to connect any "line level" signal source to the system—such as an eight-track tape player, a television sound tuner, a child's record player with ceramic pickup cartridge, or the playback signal from a second tape deck.

7. TAPE PLAY/RECORD. Two types of connectors are provided for use with a stereo tape recorder: separate pairs of RECORD and PLAY phono jacks, and a five-pin DIN socket. If your recorder has only DIN-type plugs, use the DIN connector. If your recorder has both a DIN plug and pairs of phono plugs, it is preferable to use the phono plug connections. (Do not use both the phono plugs and the DIN plug simultaneously.)

The tape connections may be used with tape recorders of all kinds: cassette, open-reel, eight-track, Elcaset, digital, etc. To make recordings, connect a stereo patch cord from the RECORD jacks to the LINE or RADIO input jacks on the recorder (not to its microphone inputs). To play back tapes, connect a stereo patch cord from the recorder's LINE output jacks to the receiver's PLAY inputs.

8. PRE-AMP OUT, NORMAL IN, LAB 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 U-shaped metal jumpers; check to be sure that they are fully inserted into the jacks and that nothing is touching them.

Two sets of power amp inputs are provided. The LAB inputs have wideband frequency response extending uniformly from low infrasonic to high ultrasonic frequencies, and may be used for laboratory tests and special applications. The NORMAL inputs are equipped with infrasonic and ultrasonic filters to reject interference occurring outside of the audible frequency range, minimizing intermodulation distortion and preserving the amplifier's power for music.

For conventional operation the PRE-AMP OUT jacks are connected to the NORMAL IN jacks by means of the metal jumpers. Removal of the jumpers (*with the POWER switched OFF*) enables various signal-processing accessories to be connected in the signal path between preamp and power amp: a special speaker equalizer (such as that supplied with certain Bose and Electro-Voice speakers), a graphic equalizer, a dynamic-range expander, a time-delay ambience reproduction system, etc. To use a signal processor, connect a stereo patch cord from the PRE-AMP OUT jacks to the processor's line-level input jacks, and connect a second patch cord from the processor's line-level outputs to the NORMAL IN jacks. (Note: any signal processor whose operation depends on the setting of a threshold, such as a dynamic noise filter or DBX decoder, should be connected to the TAPE RECORD/PLAY jacks—where the signal levels are unaffected by volume and tone controls—rather than to the PRE-AMP OUT jacks.)

Save the metal jumpers 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-AMP OUT to either NORMAL IN or LAB IN.

The NAD 7020 can be used as the heart of an elaborate audiophile sound system. For example the PRE-AMP OUT jacks may be connected via a stereo patch cord to any high-quality separate power amplifier. To use a separate high-power amplifier for your main stereo speakers while contiguating to use the NAD 7020's built-in power amp for headphones or extension speakers, simply install Y-connector adapters to split the signal from the PRE-AMP OUT jacks. The preamp stage is capable of driving several power amplifiers in parallel, or the long signal cables required to connect to power amps which are located near the speakers, or to "powered" loudspeakers with built-in power amps. The preamp output can be used to drive a time-delay ambience system, with the 7020's built-in power amp used to drive either the main stereo speakers or the time-delayed secondary speakers. And in an elaborate bi-amplified system the preamp output would be fed to the input of an electronic crossover while the high-frequency output of the crossover unit is fed to the NORMAL IN or LAB IN jacks and the speaker's tweeters are connected directly to the SPEAKER terminals.

9. SPEAKERS. There are two sets of speaker connection terminals on the 7020: the upper set of four terminals (SPEAKERS A) is intended for connection to your main pair of stereo speakers, while the lower set of four terminals (SPEAKERS B) enables the connection of a secondary pair of speakers such as a remote pair in another room. Either set of terminals may also be connected to an adapter unit for electrostatic headphones.

If the wiring to each speaker will be no longer than about 20 feet (6 meters), 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, brown, or black insulation. The smaller-diameter 20- or 22-gauge wire sold in some shops is *not* recommended, even though it may be identified as "speaker wire." If the wiring to the speakers will be longer than about 20 feet, heavier 16-gauge zip cord is preferred. The use of adequately heavy-duty wiring is especially important 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 the exposed wire strands together. Fully depress the colored tab below the connecting 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. Then check to be sure that no loose strand of wire is touching any adjacent terminal.

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, depress the receiver's MONO button to blend the two channels together, 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. Release the MONO button to return to normal stereo operation.

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: "+", 8Ω, or 1 for positive, "-", G, or 0 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. And 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.

If you have a second pair of speakers located near the first pair in the same room and operating in parallel with them, 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 (e.g., in another room), then their phasing need not be consistent with that of the first pair. (Of course, as with any stereo pair of speakers, they still must be in phase with each other.)

AMBIENT STEREO. Normally the wiring of the SPEAKERS B terminals will be similar to that for SPEAKERS A, as it should be if the second set of speakers is used to provide stereo sound to another room for instance. However there is an alternate method of wiring in which a second pair of speakers receive the "L-minus-R" or "difference" portion of the composite stereo signal—the portion of the signal which makes stereo sound different from, and more spacious than, monophonic sound. If the secondary speakers are located in the same room as the main speakers, but are mounted high on the side walls or in the rear corners (perhaps aimed upward to spray their sound off the ceiling), then operating the main and secondary speakers simultaneously yields "ambient stereo" with a sound field that is notably more spacious than conventional stereo. This approach is most appropriate with classical music, or with any music recorded in a large concert hall rather than a small studio. The secondary speakers need not be identical to, or as elaborate as, your main stereo speakers; any compact speaker with smooth midrange response will serve.

The connection for ambient stereo involves three wires: one wire from the red (positive) SPEAKERS B terminal in each channel to the corresponding positive terminal on the left and right secondary speakers, and a third wire which simply connects the negative terminals of the two secondary speakers together. No connection is made to the black SPEAKERS B terminals. (A convenient way to accomplish this wiring arrangement using ordinary two-conductor speaker wire is to begin by fully wiring the secondary speakers in normal fashion for normal stereo operation, and phase them with each other and with the main stereo speakers; then disconnect the negative-polarity wires from the two black SPEAKERS B terminals, twist them together, and wrap the floating connection with tape.)

A final hint: you may find it desirable to add a means of adjusting the volume level of the secondary speakers, so as to minimize any tendency to hear wandering stereo images or elevated distortion from the ambient sound (especially if the rear speakers are located closer to your chair than your main stereo speakers are). Simply add a monophonic Speaker Level Control (such as a 2-watt 25-ohm potentiometer) in the wiring path between the negative-polarity terminals of the rear speakers.

10. AC CONVENIENCE OUTLETS. (Where applicable.) The AC line cords of other stereo components may be plugged into these outlets. The SWITCHED outlet is intended for an all-electronic product (e.g., a radio tuner, equalizer, or other signal processor), and it will be turned on and off by the main POWER button on the front of the receiver. The UNSWITCHED outlet is intended to power any product involving mechanical operation (e.g., a turntable or tape deck); such devices should be switched on and off with their own power switches.

11. FUSE. This fuse protects the receiver from damage in case of internal component failure. If it blows there will be no sound and the front-panel lights will not illuminate. Unscrew the fuse holder cap and replace the two-ampere fuse, Buss AGC 2 or equivalent. (In 240V or 220V European models, use a one-ampere fuse.) If the fuse blows repeatedly, return the receiver for service.

12. AC LINE VOLTAGE SELECTOR. Use the blade of a screwdriver to set this switch to match your AC line voltage—normally 120V in North America and 220V in Europe. It is not important if power line frequency is 50 or 60 Hz. In some areas of the U.S.A. or when peak power demand is heavy, the line voltage may drop to 110V.

Caution: If you leave switch set at 110V or 120V and plug AC power cord into a 220V socket (in Europe, for example), you may cause internal damage to the receiver. However, the opposite error is not harmful. If you set the switch to 220V or 240V and plug into a 120V socket the amplifier will perform with increased distortion and the tuner may not function; but resetting the voltage selector to correct position will restore normal operation.

FRONT PANEL CONTROLS

1. POWER. Depress to switch on the receiver and any other equipment plugged into the SWITCHED convenience outlets on the rear panel. To switch off the power, depress the button again and release it.

If you prefer you may leave the receiver's POWER switch permanently engaged and use an external switch (such as a 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 box which must be connected directly to the speaker terminals at the rear.

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.

3. SPEAKERS. Loudspeaker Selector Switch. In position A the receiver's output signals are fed to the speakers which are connected to the SPEAKERS A terminals. In position B the signal is disconnected from SPEAKERS A and fed to the SPEAKERS B terminals. A+B activates both sets of speakers simultaneously.

The receiver's output signals are present at the PHONES jack at all settings of the SPEAKERS selector. When using headphones plugged into the PHONES jack you can switch the SPEAKERS selector to OFF, silencing all speaker outputs; then the VOLUME control may freely be used to adjust the loudness level of the music in the headphones with no fear of overdriving the speakers or disturbing neighbors.

If you have connected your stereo speakers to the SPEAKERS A terminals and an adapter for electrostatic headphones to SPEAKERS B, simply set the SPEAKERS switch to A for speaker listening and to B to cut off the speakers and activate the electrostatic headphones.

If you have connected your main stereo speakers to the SPEAKERS A terminals and a pair of secondary speakers wired for "ambient stereo" to the SPEAKERS B terminals, then you can set the SPEAKERS switch to A for normal stereo, A+B for ambient stereo, and to B to cut off the main speakers and evaluate the "L-R" signal in the rear speakers.

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 the effect of the Bass control usually is subtle because its action is confined to the lowest audible frequencies. Only at large rotations away from center is there a substantial boost or cut at the mid-bass frequencies which are prevalent in music.

5. TREBLE. The Treble control adjusts the relative level of the high 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 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. Cutting the treble makes the sound mellower and suppresses hiss and record surface noise, but too much Treble cut will make the sound dull.

6. LOW LEVEL. Pressing this button reduces the volume of the amplified sound by approximately 20 decibels (but has no effect on the signal fed to the RECORD jacks for taping). It has several practical uses:

- It extends the useful range of the Volume control.

With high-output signal sources, with some sensitive medium-impedance headphones, or with efficient loudspeakers, 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. The use of the LOW LEVEL button makes the full range of the Volume control available to you for normal listening.

- It provides optimum signal/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 button minimizes the already-low residual noise of the preamp and tone control circuits, ensuring that it will never be heard.

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

7. 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 high-frequency details by environmental noise. The LOUDNESS function should be disengaged when you are listening to music at life-like volume levels. And at low levels a more accurate, if less convenient, loudness compensation may be obtained by boosting the Bass control.

8. MONO. Pressing this button blends the two channels together to produce monophonic sound. This will reduce surface noise and rumble when playing old monophonic records. It also switches the FM tuner into mono, useful to reduce the noise and distortion in very weakly received stereo FM broadcasts.

9. TAPE. When this button is disengaged (out), the input signal chosen by the SELECTOR switch (aux, phono, tuner) is fed to the controls and to the power amplifier for listening. When the TAPE button is engaged, the output signal from a tape recorder (or any signal processor connected to the rear-panel PLAY jacks) is heard.

The signal to be recorded on tape is chosen exclusively by the SELECTOR switch, and is not affected by the VOLUME or any other control.

When you are making a tape recording, engaging the TAPE switch enables you to hear the signal as it passes through the tape machine's electronics and recording-level controls. However, engaging and disengaging the TAPE button may slightly alter the

signal levels fed out to a tape recorder; therefore, the button should be kept engaged during the entire duration of a recording.

With a three-head recorder equipped for off-the-tape monitoring, the TAPE switch permits you to hear the playback signal from the tape immediately after the recording is made, in order to check its quality. In this case use the tape source switch on the recorder for switching between the original and recorded signal.

If you have connected a signal processor such as a graphic equalizer or dynamic-range expander to the RECORD/PLAY jacks, the TAPE button must be depressed in order to hear the effects of the processor. Normally the processor will have its own RECORD/PLAY jacks and tape monitor switch for use with a tape recorder.

10. SELECTOR. Selects the input signal for listening and recording.

FM broadcasts may be heard at either of two SELECTOR positions, FM and FM Mute. The FM Mute position is suggested as the normal setting for FM listening; it activates a muting circuit which suppresses inter-station noise and also prevents the reception of broadcasts which are too weak to produce acceptably quiet and distortion-free sound. On those occasions when you wish to listen to extremely weak signals, select the "FM" position in order to disengage the muting function. Weak signals which are monophonic can produce excellent sound, thanks to the excellent sensitivity of the 7020's tuning circuitry; but because of the way FM stereo broadcasting works, weak stereo signals may be rather noisy. If this is a problem, simply press the MONO button to lock the receiver in the monophonic mode, suppressing stereo noise.

11. VOLUME/BALANCE. These controls are concentric. The protruding VOLUME knob adjusts the overall loudness level of the sound, in conjunction with the Low Level button. Both stereo channels are varied up and down together; the control is designed for accurate tracking of the two channels, so that the stereo balance will not shift as the VOLUME control setting is varied.

The outer BALANCE ring 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 to the right (clockwise) decreases the level of the left channel so that only the right channel is heard; rotation toward the left causes only the left channel to be heard.

Ideally the detented center position of the BALANCE control will be the normal setting. But several common circumstances may cause unequal balance, requiring an 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, differing acoustical environments around the two stereo speakers, or simply a listening position which 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) producing a phantom image apparently centered midway between them.

12. TUNING KNOB. Tunes both FM and AM broadcasts. The knob is flywheel-weighted so that a quick twist can move the indicator smoothly down the dial.

13. TUNING METER. The simple but precise tuning indicator consists of three LEDs, two amber and one green. The middle (green) LED illuminates when an FM station is optimally tuned (within 0.025 MHz of the center of the broadcast channel), guaranteeing that the lowest stereo distortion is obtained. The amber LEDs illuminate when an FM station is mis-tuned and indicate the direction of the tuning error: e.g., when the right-hand amber LED illuminates you are tuned too high in frequency and should turn the tuning knob slightly to the left.

The green Tuning LED also indicates signal strength in proportion to its brightness, in both FM and AM reception. If it is very dim, the signal is too weak for optimum reception.

14. FM STEREO. This green LED illuminates when the multiplex circuits are operating to decode a stereo FM broadcast.

15. SOFT CLIPPING!™ This green LED illuminates when the Soft Clipping circuit is switched on (via the rear-panel switch). The Soft Clipping feature significantly reduces the audible harshness which normally arises when amplifiers are overdriven; thus it permits the 7020 to be played at unusually high volume levels before audible distortion is encountered.

A note on protection. Because the 7020 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 it can safely and cleanly drive a 2-ohm impedance with wide-range musical signals whose peak level is several tens of watts and whose average level is much lower; but it will overheat if called upon to deliver high power *continuously* into a low impedance.

There are thermostatic circuit breakers in the output stage which are activated if the output transistors become dangerously hot. When this occurs in either channel the output stage automatically shuts down to protect itself.

Thus if one or both channels of sound go silent while the front-panel LEDs remain illuminated (indicating that the main power-supply fuses and operating voltages are still normal), the thermostatic circuit breakers may have been activated. To resume operation simply turn down the volume and wait a minute or so for the output stage to cool and the circuit breakers to automatically re-set. If the protective circuit breakers interrupt the sound repeatedly, examine the speaker wiring for a possible loose strand of wire causing a partial short-circuit, or reduce the volume level slightly.