

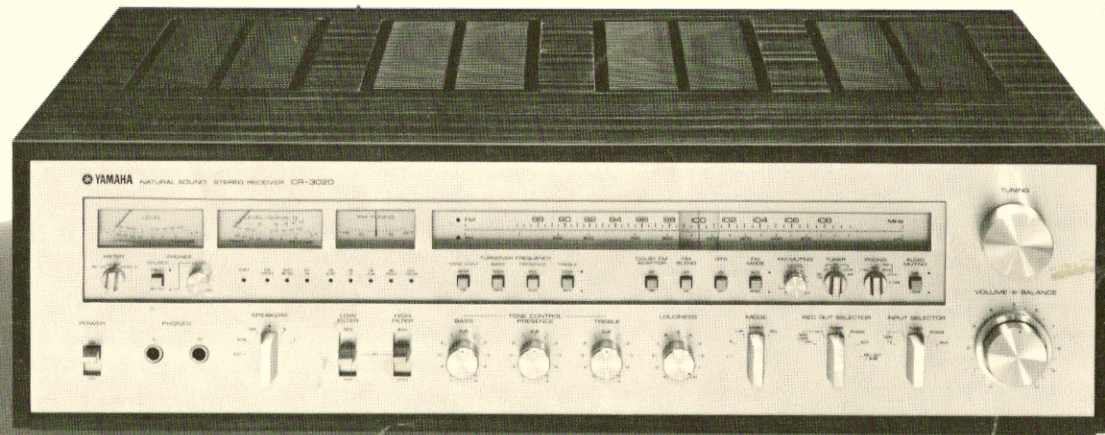


YAMAHA

AM/FM STEREO RECEIVER

CR-3020

OWNER'S MANUAL



U/C

CR-3020

CONTENTS

YAMAHA offers you thanks and congratulations on your choice of the CR-3020 Receiver. Embodying the most up-to-date and useful features, it combines superb broadcast reception with the finest audio quality, and is currently setting new standards for receiver performance in its class.

SPECIAL FEATURES OF THE CR-3020 RECEIVER

1. All-In-One Excellence

Accurately matched performance specifications, functions, and controls, provide an overall performance which fully measures up to Yamaha's high tuner, pre-, and power amp standards.

2. Noise-Distortion Clearance Range

This is the basic concept for the audio section. The CR-3020 offers an extremely wide range of output powers for which both noise and distortion are below the rated value, to ensure a wide dynamic range in actual use.

3. Direct Assessment of Differential Gain

This sophisticated technique enables Yamaha to combine high station-receiving ability, razor-sharp tuning, and ultra-low distortion in the tuner section.

4. Optimum Tuning System

The OTS system will take over from you the fine-tuning needed to obtain minimum distortion and maximum stereo separation, so that all FM stereo programs are heard at their best.

5. Multi-Function Meters

Fast-response wide-level peak meters indicate power output levels from 0.01W to 316W (for

8-ohm speakers), with the right channel meter doubling as signal strength and (on FM) signal quality meter.

6. Super Low-Noise MC Head Amp

This IC unit makes the superior performance of low output moving coil cartridges yours without the cost of a separate step-up transformer or head amplifier.

7. Comprehensive Tone/Filter Controls

Bass, Treble and Presence controls have switched turnover frequencies (with defeat switch). Dual High and Low Filter settings are provided.

8. Continuous Loudness Compensation

This Yamaha 'special' fully compensates for the ears' reduced sensitivity to bass and treble frequencies at low listening levels, whatever your normal maximum listening level.

9. Auto DX Circuit for High Quality Reception

The Auto DX Circuit permits the IF range to be automatically modified according to the quality of the broadcast being received, thereby ensuring high sensitivity and high selectivity in reception.

Caution-Read This Before Operating

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IMPORTANT!

Please record the serial number of your unit in the space below

Model Name **CR-3020**

Serial No. 01399

The serial number is located on the rear of the chassis.

Retain this Owner's Manual in a safe place for future reference.

CR-3020

CAUTION—READ THIS BEFORE OPERATING YOUR CR-3020

The CR-3020 is a high performance AM/FM stereo receiver, with excellent selectivity, sensitivity, and low distortion. This manual is required reading if you are to get the best from its special features and controls.



Do not drop or otherwise jar the CR-3020 which is a precision electronic instrument.



Do not place the CR-3020 where it will be exposed to direct sunlight, excessive heat (for instance over a radiator), cold, moisture, or dust.



The CR-3020 has so heavy weight. When installing, make sure to select a firm and solid base.



Do not use chemical solvents (such as benzene or alcohol) to remove traces of dirt. Wipe only with a soft, slightly damp cloth.



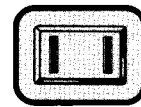
Do not attempt to carry out internal adjustments or repairs. Leave these to your local service representative.



Do not assume your CR-3020 is faulty before checking 'Trouble Shooting' list provided on pages 30 ~ 31.



Operate all switches and knobs in accordance with the instructions. Avoid applying undue force, which should never be necessary, and do not attempt to use intermediate settings.



Do not connect other audio equipment to the spare AC outlet sockets on the rear panel if it will require more power than the outlets are rated to provide.



Keep this manual in a safe place for future reference, and refer to it frequently until you are perfectly familiar with all CR-3020 controls and functions.

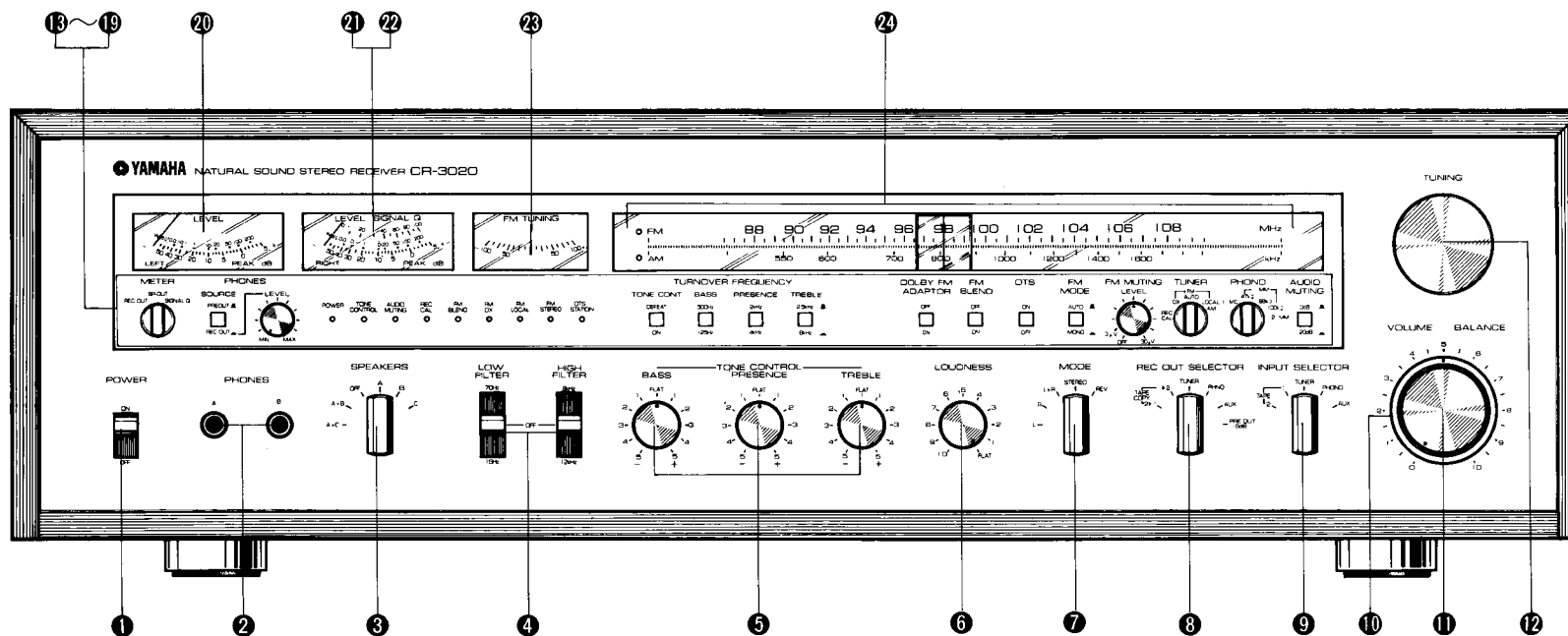
Warning — to prevent fire or shock hazard, do not expose this appliance to rain or moisture.

IMPORTANT:

The maximum audio output power of this appliance having provision for connection of external speakers is not less than 240 watts (R.M.S. 30 volts) per audio output channel at 4 ohms load. To prevent electric shock, be sure to turn off the power before connecting the speaker cable. See page 9, item 5 speaker terminals.

CR-3020

FRONT PANEL AND CONTROLS



1 POWER ON/OFF Switch

Switch ON to connect the main electrical supply. Leave OFF while familiarizing yourself with the controls, and while connecting other audio equipment.

2 PHONES Jacks

Two headphone sockets are provided. Plugging in does not mute the speakers, so use the OFF position on the SPEAKERS switch. The CR-3020 is equipped with an exclusive headphone amplifier

circuit. When using the headphones, operate the PHONES switch and LEVEL control provided above the PHONES jacks to select the source to be monitored and to adjust the volume.

③ SPEAKERS

With this you can select either (A, B, C) or both (A+B, A+C) of three sets of stereo speakers — or switch all off to enjoy headphone listening.

④ LOW and HIGH FILTER Switches

These give a choice of 15 or 70 Hz low frequency steep cut-off filters, and of 8 or 12 kHz for high frequencies.

⑤ BASS, PRESENCE, and TREBLE Controls

In addition to normal bass and treble controls, there is PRESENCE control of the mid-frequencies.

⑥ LOUDNESS Control

This boosts the extreme low and high frequencies to compensate for our ears' reduced sensitivity to these frequencies at low volumes. Set it to the FLAT position while the VOLUME control is set to your normal listening level. Turning it counter-clockwise will reduce the volume but retain the natural balance between low and high frequencies.

⑦ MODE

In addition to normal stereophonic audition you can switch to stereo reverse, monaural (L + R), or to either left- or right-hand channel alone (L or R).

⑧ REC OUT Selector

This selects the program source which will be recorded, just as the INPUT SELECTOR selects which program source will be heard. In the CR-3020 you can listen to one program while recording another (copy a friend's tape while listening to FM, etc.).

⑨ INPUT SELECTOR

This switch is used to select the program source of your choice, whether PHONO, TUNER, one of two TAPE decks, or AUX (for 8-track tape cartridge playback, etc.).

⑩ BALANCE Control

This controls the balance between the L and R stereo channels. Set it to the center '5' position, at which there is a click stop, unless you need to emphasize the sound from one of the speakers.

⑪ VOLUME Control

Use this control to give the volume of sound that you require. Always start with it turned fully to the left (counter-clockwise) at the '0' position before turning it up to the volume level you require.

⑫ TUNING Knob

This large tuning knob gives smooth and positive station selection, with precision flywheel mechanism.

⑳ and ㉑ SP OUT Level Meters

These sensitive, wide-range peak meters measure the output power for each channel from 0.01W to 316W. The right-hand meter ㉑ also doubles as the signal strength and quality meter (changing over to this function when the tuning knob is touched).

㉒ SP OUT / SIGNAL Q Meter

This meter indicates the strength of the signal for both AM and FM stations, and indicates FM interference by fluttering, with the amplitude of the variation showing the extent of the interference. It also doubles as an output level meter, see ㉑ and ㉑.

㉓ FM TUNING Meter

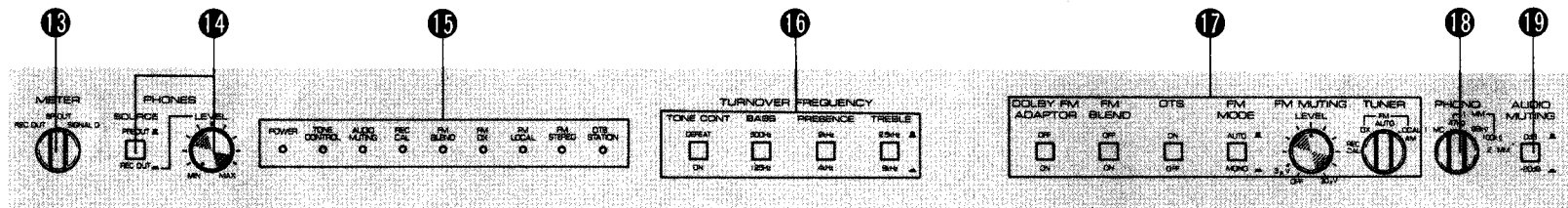
This is used when tuning in FM stations: the indicator points to dead center when the station is perfectly in tune.

㉔ FM / AM Tuning Scale

The upper scale gives FM station frequencies in MHz and the lower scale gives AM frequencies in kHz, with LEDs at the left indicating the scale in use.

▼ 13~19

Selectors, Switches & Indicators



13 METER Selector Switch

The meter provided on the right doubles as either a level meter or a signal meter. When the METER selector switch is set to SP OUT and REC OUT positions, both the right-hand and left-hand meters function as SP OUT level meter and REC OUT level meter. (However, if the TUNING knob is operated during FM or AM reception, the right-hand meter automatically starts functioning as a signal meter).

When the METER selector switch is set to SIGNAL Q position, the right-hand meter functions solely as a signal meter. (In this case, the left-hand meter does not function.)

14 PHONES Control

When the SOURCE switch is set to REC OUT position, the program source selected by REC

OUT SELECTOR can be directly monitored without passing through the Tone, Filter, and Loudness control circuits. When the SOURCE switch is set to PRE OUT position, the program source selected by INPUT SELECTOR can be monitored. In this case, the monitored signals are controlled by the Tone, Filter, and Loudness control. The headphone output level is controlled only by this LEVEL control.

15 LED Indicators

These indicate whether the POWER, AUDIO MUTING, FM BLEND and OTS STATION are on, and the TONE CONTROL and REC CAL are operative. They also indicate whether an FM STEREO station is being received and whether it is in FM DX or FM LOCAL mode.

16 TURNOVER FREQUENCY Switches

Select 125 or 500 Hz turnover frequencies (for bass), 2,5 or 8 kHz (for treble) and 2 or 4 kHz (for presence), or defeat all tone controls with the DEFEAT switch.

17 FM Tuner Section Controls

TUNER Function Switch: This switch has five positions, FM AUTO, FM DX, FM LOCAL, AM and REC CAL, and permits selection of FM or AM reception. Setting the switch to REC CAL position causes a sine wave of 333 Hz to be generated, thus facilitating checking of FM program recording.

FM MUTING Control: By operating this control, the FM muting level can be freely set at any level between 3 μV and 30 μV (300 Ω). In OFF position, FM MUTING is cancelled.

FM MODE Control: When this control is set to AUTO position, FM broadcasts are received automatically in stereo mode. By setting the control to MONO position, the broadcasts can be received in monaural mode, while at the same time the muting circuit is canceled.

OTS ON/OFF: In the ON position, the Optimum Tuning System will correct any slight mis-tuning, to assure optimum reception of FM stations. In the OFF position, accurate manual tuning becomes necessary. Note that even in the ON position, OTS only comes into effect when you have released the tuning knob.

FM BLEND: This switch is used to reduce the hiss noise that affects the weaker FM stereo stations.

DOLBY FM ADAPTOR: Only if you have purchased and fitted an adaptor for FM 'Dolby' broadcasts should this switch be ON: without an adaptor the ON position will turn your FM tuner section off.

18 PHONO Selector Switch

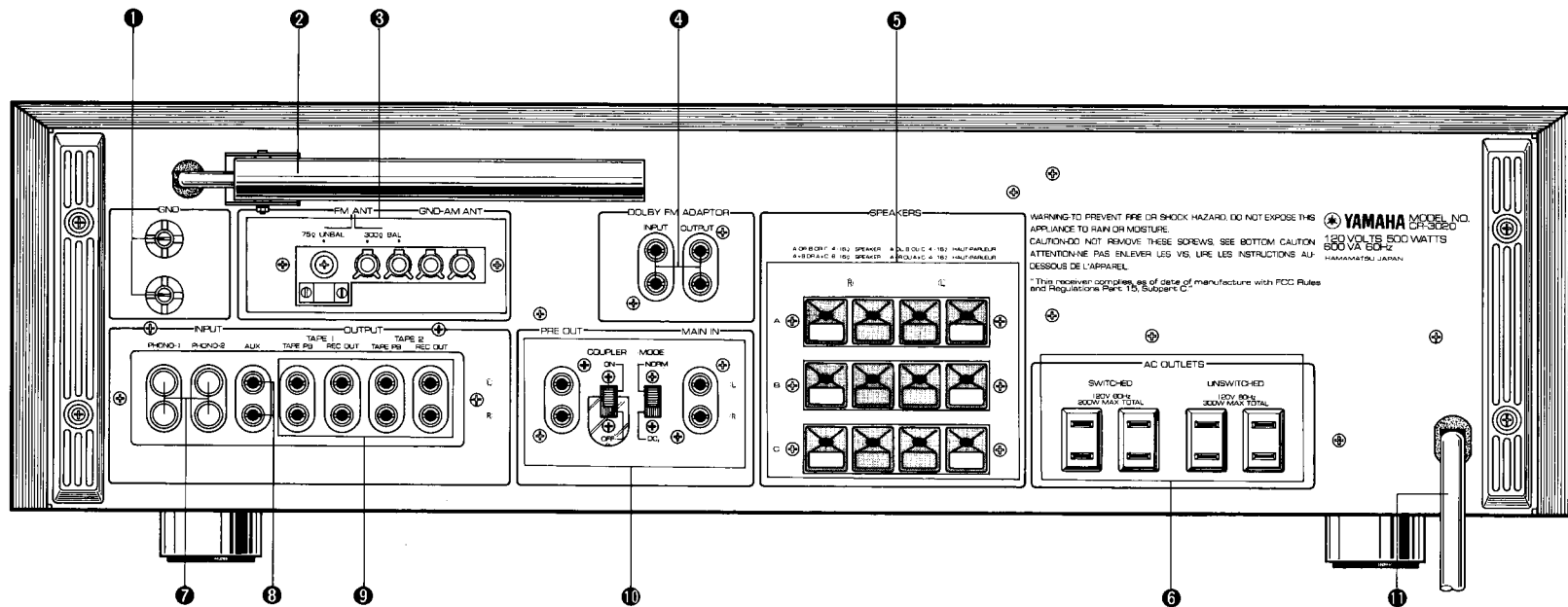
This switch permits selection of an input circuit to match the phono cartridge being used, when the INPUT SELECTOR is set to PHONO position.

19 AUDIO MUTING 0 / -20 dB Switch

This gives a straight 20 dB reduction in listening volume without having to adjust the VOLUME control. Use it whenever operating selector or other switches, and when lowering the phono cartridge onto the record.

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REAR PANEL AND CONNECTIONS



❶ Ground (GND) Terminals

Two ground terminals are provided for grounding turntable units, etc. Please make sure that all such units are firmly grounded: failure to connect the ground leads can result in unpleasant hum.

❷ Bar Antenna for AM Reception

This internal antenna will usually be adequate for satisfactory AM reception. It should be swung away from the rear panel on the hinge provided.

❸ ANTENNA Connections

Detailed instructions on AM and FM reception are given on pages 12 to 16, but a quick check of CR-3020 functions can be carried out by connecting the T-type internal (indoor) antenna provided with the CR-3020 to the terminals marked 300Ω BAL. Pin the two arms of the 'T' at full stretch to the ceiling or walls of your room after finding the best orientation. Note that such a quick check can be carried out with all selector switches vertical and all push switches in the out (non-depressed) positions.

❹ DOLBY FM ADAPTOR Terminals

If you purchase an adaptor designed to enable you to receive Dolby FM broadcasts, it should be connected to these terminals, and the corresponding switch on the front panel should also be depressed during Dolby FM broadcasts.

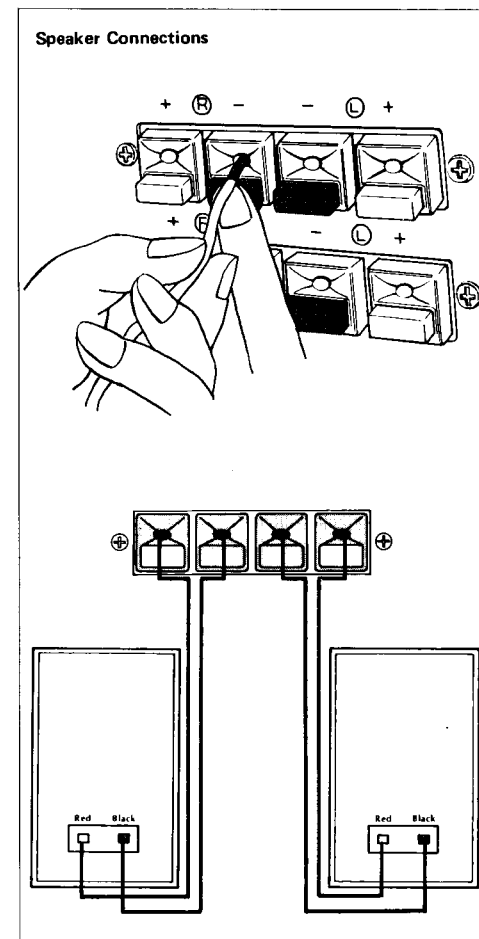
❺ SPEAKERS Terminals

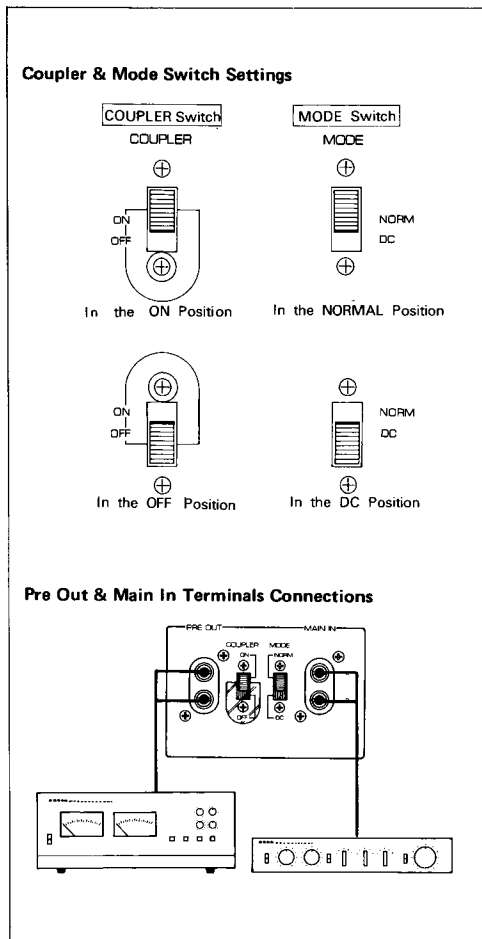
The CR-3020 can handle three sets of speakers (A, B or C), with selection of either (A, B, C), both (A+B, A+C) or OFF, by use of the SPEAK-

ERS selector switch on the front panel. Speakers should have impedances between 4 and 16 ohms, but with two speaker sets being used at the same time, connect only speakers with impedances between 8 ohms and 16 ohms. Use speakers rated to take the full 160 Watts of output power, or set the VOLUME control so that the rated maximum speaker input power is not exceeded. Volume level should be reduced immediately if there is increased distortion or a sense of strain which indicates that the speakers are being overloaded.

Making the Speaker Connections

1. Strip the insulation from the speaker cable 1/2" (10mm), and twist stray ends together. If possible, solder the ends. Push the button beneath the terminal as shown in the illustration, and align the inner and outer terminal holes. Then insert the wire fully home. Release the button, and the wire end will be firmly clamped.
2. Use the upper (A) terminals first. Be careful that the terminals identified by the + and - signs above them are connected with the corresponding + and - terminals on the speakers. A mistake will result in poor bass response and ill-defined stereo image. Also be sure to connect the left-hand speaker to the L speaker terminals, and the right-hand to the R terminals.
3. Repeat this with the B and C terminals if other speakers are to be connected. In all cases make sure that connections are fully and firmly made, or you may not be able to get any sound from one or more speakers.





6 AC OUTLETS

The left-hand outlets are controlled by the CR-3020 POWER switch on the front panel. It has a maximum rated capacity of 200W. The remaining outlets, with a combined capacity of 300W, are unswitched. Do NOT exceed these maximum ratings. Note that spare AC outlets cannot be provided in certain areas.

7 PHONO INPUT Terminals

Connect the plugs from your turntable unit to these terminals. Note that for all the terminals, the upper jacks are for the left-hand channel and the lower jacks are for the right-hand channel. Use the PHONO 1 terminals first, particularly if you may use MC cartridges, keeping the PHONO 2 terminals as spares (only MM cartridges are suitable). Make certain to turn the PHONO Selector switch on the front panel to the corresponding position. With the INPUT SELECTOR set to PHONO position.

8 AUX Terminals

Use these terminals for connecting a second tuner, or another piece of audio equipment. For example, it can be used with a microphone mixing amplifier for live stereo recording if you have a tape deck. Make certain that the INPUT SELECTOR is in the AUX position for this function.

9 TAPE PB and REC OUT Terminals

Two tape decks can be connected to these input

and output terminals. Recordings can be made on both tape decks at the same time, and tapes can be dubbed from one tape deck to the other, in either direction, according to the REC OUT SELECTOR switch, and independent of the source being auditioned.

10 PRE OUT and MAIN IN Terminals and Switch

Leave the COUPLER switch ON for normal operation (the plastic guard is to prevent you from mistakenly putting it OFF). In the OFF position the preamplifier section output is disconnected from the power amplifier section, and an external signal, from another preamplifier or from a frequency divider, etc., may be applied to the MAIN IN terminals. Note that the output from the preamplifier section is always available from the PRE OUT terminals.

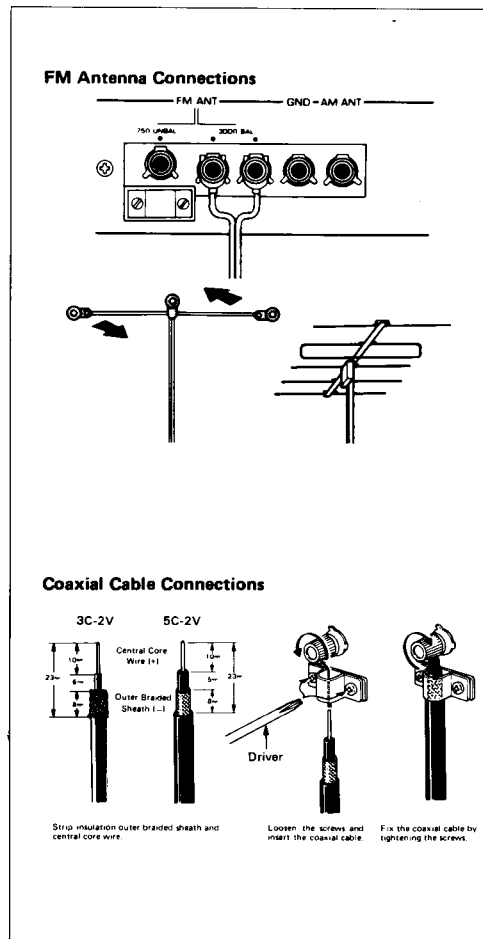
The MODE switch determines whether the full DC response (to zero Hz) of the power amplifier section will be available at the MAIN IN terminals when the COUPLER switch is OFF, or whether a blocking capacitor will be connected to isolate the amplifier from subsonic frequencies. The latter is the NORMAL position, guarding against DC or near-DC signals being amplified and reaching the output terminals, where the protective circuits would operate and interrupt audition.

11 AC Electrical Power Line

Just plug into a main power supply wall outlet socket. Be sure the line is not placed where you might trip over it.

CR-3020

BROADCAST RECEPTION



CONNECTING AN FM ANTENNA

The T-type antenna provided is adequate only in high signal strength areas under favorable conditions. In other cases, an external multi-element FM antenna is needed. If you cannot obtain satisfactory reception with the T-type antenna after trying it in different positions, and orienting it to give the best reception for the weakest station to which you will normally be listening, this is an indication that you need an external FM antenna. To ensure the very best results, a motor-driven antenna assembly with remote control of orientation is best, but the CR-3020 has sufficient sensitivity to operate extremely well with a fixed antenna.

The external antenna should be located as close as convenient to the CR-3020, and as high as possible. It should be oriented to give the highest reading possible for the weakest station to which you will normally be listening. If this direction is not too critical, you can orient the antenna for minimum interference from automobile ignition, etc.

If the antenna is intended for use with the shielded coaxial cable which reduces losses and interference, use the 75Ω UNBAL terminals, and connect the cable as shown. Antennas intended for 300Ω BAL terminals (using feeder wire like that of the internal antenna provided) can also be used with coaxial cable, but a matching transformer is necessary at the antenna. Coaxial cable is advisable where the antenna must be located some distance

from the CR-3020, or where interference from automobile ignition, etc., is troublesome.

CONNECTING COAXIAL CABLE

1. Strip insulation from the outside of the braided sheath, and bend back the metal braiding *outside* the insulation. Expose the projecting central core wire as shown, being careful not to cut through any strands in the process.
2. Slacken the two retaining screws as shown, insert the coaxial cable, and re-tighten the screws so that the clip grips the exposed braided sheath.
3. Connect the central core wire to the 75Ω terminal.
4. Ensure that the braiding does not come into contact with the inner core.

FM BROADCAST RECEPTION

1

Set the INPUT SELECTOR to TUNER, and the TUNER selector switch to FM AUTO. Note that the FM indicator at the left of the tuning scale is lit.

2

All other push-buttons should be fully OUT (i.e. non-depressed).

3

Touch the tuning knob and note that the OTS/STATION light dims. Also the meter in middle will revert to its SIGNAL Q function.

4

When the desired station is tuned in, the SIGNAL Q meter indicator deflects to the extreme right while the FM TUNING meter indicator points to the center position.

5

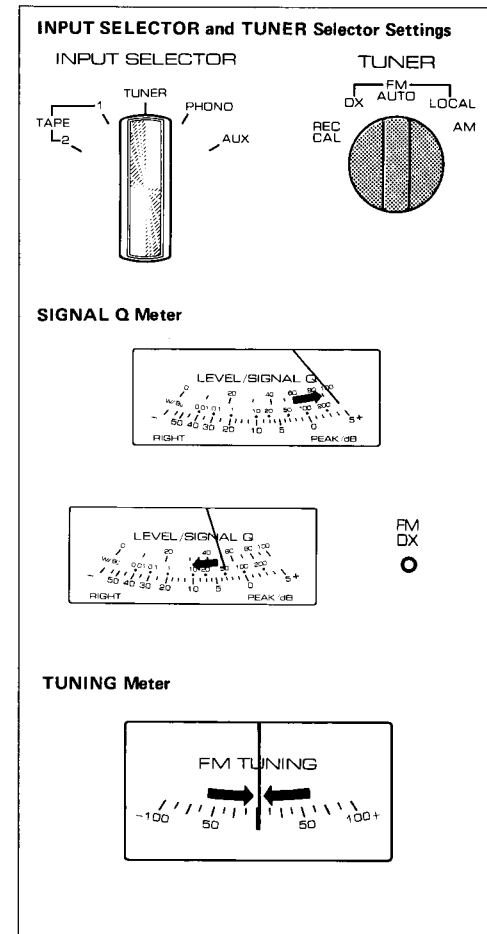
When the indicator of the SIGNAL Q meter points to the right side of the "45" mark, the FM LOCAL indicator provided below the FM TUNING meter lights up. If the indicator fails to go beyond the "45" mark, the FM DX indicator lights up.

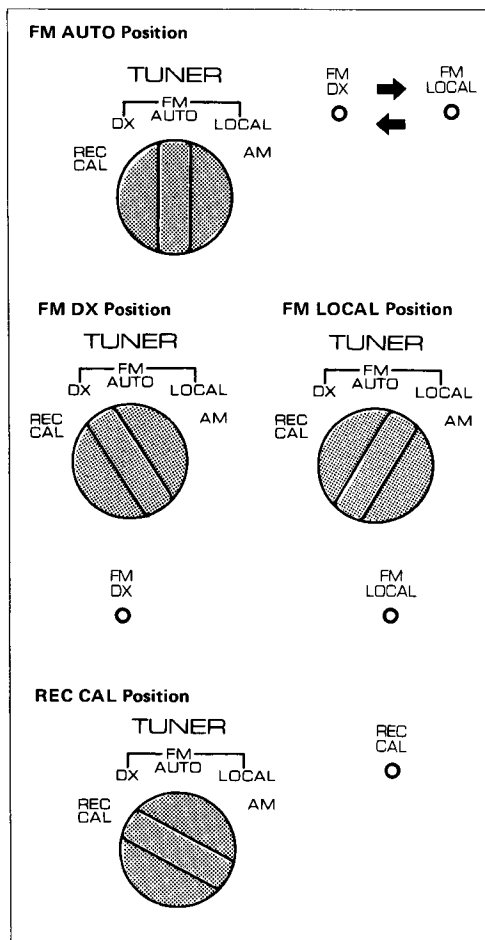
6

As soon as you release the TUNING knob after tuning in a station, the OTS/STATION indicator lights to indicate that the station is correctly tuned.

7

The CR-3020 incorporates an AUTO DX circuit, FM MUTING, FM MODE, OTS and FM BLEND functions to ensure optimum reception with every type of broadcast and variations in quality. Their functions are described in the following paragraphs. Read them carefully to obtain the maximum performance from your CR-3020.





FM AUTO DX LOCAL/TUNER SWITCH

FM AUTO Position

For normal FM reception, set the switch to FM AUTO position. Setting the switch to this position permits the following operations to be performed.

During tuning:

High sensitivity and high selectivity is ensured in DX mode. The FM DX indicator lights.

After tuning:

- In the case of strong signal and low interference, the mode is automatically changed to LOCAL mode, permitting low-distortion and wide frequency range reception. (FM LOCAL indicator lights up.)
- In case of weak station signal and strong interference: As with tuning, high-sensitivity reception is maintained, thus reducing interference. (FM DX indicator lights up.)

FM DX Position

Set the switch to DX position when tuning in a remote station (when the SIGNAL Q meter indicator can not deflect beyond the "45" mark) or if there is crosstalk and interference. This ensures high-sensitivity and high-selectivity reception free from strong interference.

FM LOCAL Position

If the station signal is strong with no crosstalk or interference, set the switch to LOCAL position. Low-distortion and wide frequency range reception is then ensured.

REC CAL/TUNER SWITCH

In this position, instead of broadcast reception, the CR-3020 output will consist of a 333 Hz signal, the level of which corresponds to 50% modulation of the FM signal. When using a tape deck to record from the CR-3020, whether via an amplifier or by direct connection with the CR-3020, set the OUTPUT LEVEL control and the tape recorder input level controls to give a reading of -6 VU on the tape deck level meters. This can be increased slightly, depending on the tape deck and the brand and type of tape being used, but should not normally exceed -2 VU. The best signal-to-noise level in your recordings will be obtained when the setting is as high as possible without producing unacceptable distortion during very loud passages.

Once you have determined the ideal setting for your combination of deck and tape, the REC CAL position enables you to find it again quickly and conveniently. Note that continuous signals such as the 333 Hz tone provided can cause damage to speakers if played back at high levels, not to mention considerable annoyance to neighbors, so turn amplifier volume well down while carrying out tests.

FM MUTING

The FM MUTING is used to eliminate annoying inter-station noise when tuning in FM broadcasting stations.

The muting level can be set at any level between $3\ \mu\text{V}$ and $30\ \mu\text{V}$ (300Ω).

Use of the FM Muting LEVEL Control

- During normal operation, set the control to the center position.
- When tuning in strong broadcast signal stations, set the control to the $30\ \mu\text{V}$ position. Inter-station noise can thus be completely eliminated.
- If no sound is heard even when the SIGNAL Q meter indicator is deflecting, turn the control to the $3\ \mu\text{V}$ position. In some cases, stations which have been cut off by the muting circuit can be tuned in.

OTS ON/OFF SWITCH

This push-button switch should normally be left in the ON (non-depressed) position. If pushed into the OFF position, it will over-ride the OTS circuits, allowing full manual tuning, but preventing the automatic correction of slight mis-tuning and any undue influence of changes in temperature and humidity. Use the OFF position to tune in weak stations near strong local stations which might otherwise be 'pulled in' by OTS.

FM MODE SWITCH

During normal operation, set this switch to AUTO position. When receiving monaural broadcasts or tuning in a remote station for stereo reception (in this case, satisfactory stereo reproduction is practically impossible), set the FM MODE switch to MONO position.

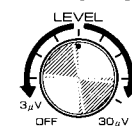
FM BLEND

When you are listening to a weak FM station in stereo, there can be unpleasant high frequency noise (a kind of 'hiss'). If this hiss noise is bothering you, push the FM BLEND switch in to the ON position. At a slight sacrifice of the high frequency inter-channel stereo separation, noise will be considerably reduced. Note that the FM BLEND indicator will light.

FM DOLBY ADAPTOR

If you purchase a suitable 'FM DOLBY' adaptor designed to make the best of DOLBY-type broadcasts, it should be plugged into the appropriate pin-jacks on the rear panel, and the switch on the front panel should be pushed in. Leave it OFF (out) if you do not have an adaptor: mistakenly pushing it ON will prevent normal audition of FM programs.

FM MUTING



OTS ON/OFF Switch

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OTS /
STATION

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FM MODE Switch

FM

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FM
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FM BLEND Switch

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FM DOLBY ADAPTOR

DOLBY FM

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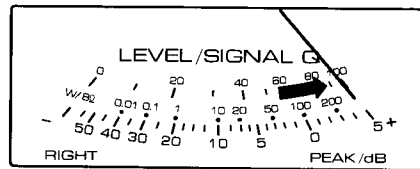
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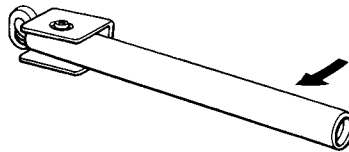
ON

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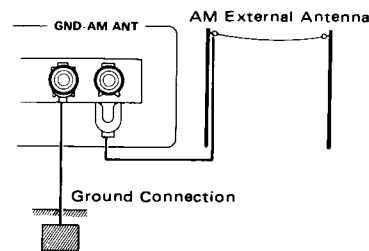
SIGNAL Q Meter



AM Bar Antenna



External AM Antenna Connection



AM RECEPTION

1. Set the tuning indicator to the station frequency.
2. Adjust the tuning knob to give the maximum SIGNAL meter reading.
3. Note that the FM TUNING meter does not work for AM stations.

AM Bar or External Antenna

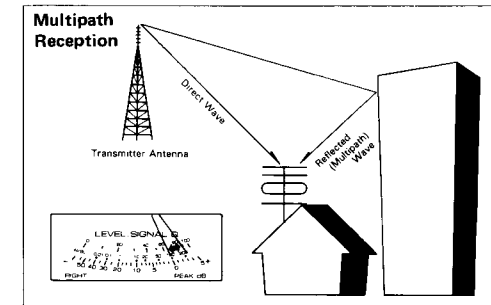
The high efficiency ferrite bar antenna provided with the CR-3020 is all that is required for satisfactory reception except in low signal strength areas, so that usually no external AM antenna will be needed. The bar antenna is hinged to the rear panel so that it can swing out: try swinging it while watching the SIGNAL Q meter (remember to set the METER switch to the SIGNAL Q position so that you can remove your hand from the tuning knob). Set it at the angle giving the maximum reading for the weakest station to which you will normally be listening.

If satisfactory reception cannot be obtained, try connecting an external AM antenna to the AM ANT terminal. Even better results will be obtained if, at the same time, a good ground (or 'earth') connection can be made. A good connection can sometimes be made to a water pipe. However, NEVER attempt to make a ground connection to a gas pipe. Your dealer will advise you.

SIGNAL QUALITY

So-called 'multipath' waves, reflected from nearby hills or tall buildings, can seriously degrade tonal quality in FM reception. In addition to the obvious deterioration in tonal quality, the SIGNAL Q meter can also give you a clear visual indication of the presence of this and other kinds of interference. The indication will fluctuate, in serious cases quite considerably. Since the signal strength indication is fairly linear, there is a very wide range of signal strengths for which this indication is available.

If you notice variations in the SIGNAL Q reading, first switch the METER Function Switch to SIGNAL Q, so that the meter continually indicates signal strength, without you needing to touch the tuning knob. Then try different antenna orientations. You will generally enjoy better tonal quality if you orient the antenna to give a steady reading, even if this level is a little lower than the maximum when the indication is fluctuating.



CR-3020

LISTENING TO RECORDS

CONNECTING A TURNTABLE UNIT

The main AC supply plug of your turntable unit may conveniently be inserted into any AC mains outlet socket, or into one of the spare sockets on the rear panel of the CR-3020 if these have been provided. The output lead from the turntable unit should be connected to the PHONO 1 terminals, especially if you intend to use moving coil cartridges, keeping the PHONO 2 terminals as spares. Check that the L and R pin plugs have been connected inserted. Do not forget to connect the turntable ground line to the GND terminal on the CR-3020.

Switch on the POWER switch, and set the INPUT SELECTOR to PHONO, then select the appropriate position of the PHONO selector: MC if you use a moving coil cartridge, and 47 k Ω if you use a moving magnet cartridge. The 47 k Ω is best with many MM cartridges, but some will sound better if you use the 68 or 100 k Ω . Follow the cartridge-maker's recommendations, or in the absence of these, see which setting gives the best tonal balance. The differences are quite subtle. Note that the PHONO 2 terminals can only be used with MM cartridges suitable for 47 k Ω impedance.

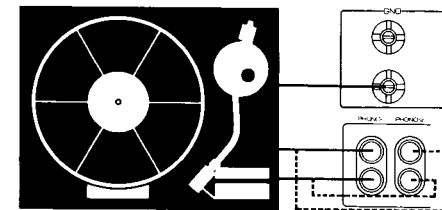
Note that PHONO input plugs should never be connected or disconnected while the POWER switch is ON.

Use the AUDIO MUTING push-button switch to cut the volume instantly by 20 dB while changing records or altering the PHONO switch, etc., with-

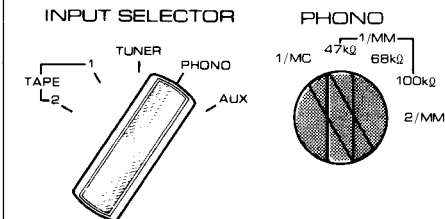
out having to turn down the volume each time. Do not use the MC phono setting with MM cartridges: you will overload the head amplifier and produce quite unacceptable levels of distortion.

If you play monaural records, the signal-to-noise ratio will be improved if you turn the MODE selector switch to the monaural (L + R) position. Use either the 15 Hz or 70 Hz LOW filter to cut out any low frequency rumble, and use BASS, TREBLE and PRESENCE controls to give the best tonal balance. Use the LOUDNESS volume control to reduce listening levels below your normal maximum, not the main volume control.

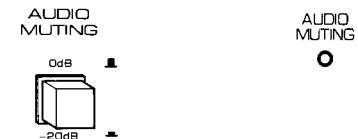
Turntable Connection



INPUT SELECTOR and PHONO Selector Settings



AUDIO MUTING Switch

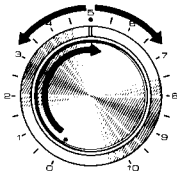


CR-3020

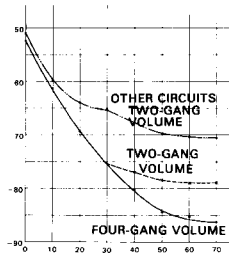
VOLUME, BALANCE, LOUDNESS CONTROLS AND AUDIO MUTING SWITCH

VOLUME and BALANCE Controls

VOLUME — BALANCE



4-Gang Volume Characteristics



AUDIO MUTING

AUDIO MUTING

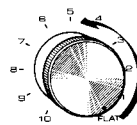


AUDIO MUTING



LOUDNESS Control

LOUDNESS



THE SPECIAL 4-GANG VOLUME CONTROL

The CR-3020 features ganged volume controls in positions both before and after the tone-control circuits, in both channels, a total of four precision ganged volume controls in all. This gives a considerable gain in signal-to-noise ratio at normal listening levels, as shown in the graph. The vertical arrows show the gain over conventional volume controls. The control is continuous, and the stereo balance extremely precise, with an attenuation curve that gives gently graduated volume changes at all listening levels. Always start listening to a new program source with the volume turned well down, and turn up as necessary.

THE CONTINUOUS LOUDNESS CONTROL

The CR-3020 is unusual in providing a separate volume control for continuous loudness compensation. Most receivers and amplifiers feature a loudness switch designed to compensate for the reduced sensitivities of our ears to high and low frequencies at low listening levels. However, the CR-3020 improves on such on/off switches, which can only offer a certain fixed degree of compensation at any given volume level, by enabling a degree of loudness compensation which can be matched to the listening situation — and listening level — of the user. The graph on page 24 shows the different degrees of compensation given at different settings.

THE AUDIO MUTING SWITCH

This offers an instant reduction of 20 dB in level without needing to touch the volume control. It should be used whenever switching between different program sources, when raising and lowering the cartridge stylus in record audition, and when the level must be cut to answer the telephone, etc. Take great care *not* to release the AUDIO MUTING switch to the 0 dB position without reducing the volume: a sudden increase of 20 dB above normal listening levels might be enough to damage your speakers. The indicator LED for AUDIO MUTING is a visual reminder when this is ON.

BALANCE CONTROL

The BALANCE CONTROL adjusts the balance between the left-hand and the right-hand stereo channels. With the control set at the central "5" position, the sound should appear to be balanced centrally between the two (left and right) speakers. When the control is rotated clockwise, it will emphasize the sound from the right-hand speaker, and when it is rotated counterclockwise, it will emphasize the sound from the left-hand speaker.

CR-3020

METERS AND HEADPHONES

ACCURATE, WIDE-LEVEL PEAK METERS

The peak meters used in the CR-3020 have a very fast response, enabling them to follow instantaneous variations in signal level rapidly and accurately. They also have an extremely wide measurement range, going from -50 dB to $+5$ dB on a single (unswitched) scale, with 0 dB corresponding to 100 Watts output into 8-ohm speakers. The calibration in Watts runs from 0.01 to 316 Watts. Note that these readings should be doubled for 4-ohm speakers, and halved for 16-ohm speakers.

Meter Function Switch

This switch, immediately above the power switch, should normally be in the SP OUT position. Under these circumstances the left-hand and center meters will normally indicate the levels of the left and right hand channels outputs respectively. When the METER switch is set from SP OUT into the REC OUT position, the meters will instead read the output levels applied to the REC OUT terminals. However, as soon as the tuning knob is touched, the meter in middle reverts to the SIGNAL Q function described in the section on FM broadcast reception, and the left-hand meter ceases to read.

When this switch is set to the SIGNAL Q, the meter on the left will not register, and the meter in middle will permanently indicate signal strength and signal quality. It should therefore only be used when you need to see these readings without having to touch the tuning knob, for instance

when watching for the antenna orientation which gives the best signal strength or the greatest freedom from the fluctuation that indicates interference waveforms.

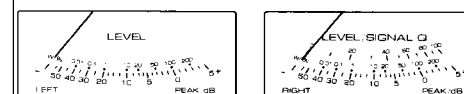
HEADPHONES

First, remove the plastic phone jack guard. Two pairs of stereo headphones may be connected to the CR-3020 simultaneously, but inserting the headphone jack plug does not switch off the speakers, which must be switched off by using the OFF position of the SPEAKERS selector switch.

The push-button switch provided above the PHONES jack is the SOURCE switch. Set this switch to PRE OUT position when listening, for example, to soft music at night time. To directly monitor the program source, set the switch to the REC OUT position.

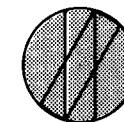
With the switch set to PRE OUT, sounds adjusted by the TONE controls, LOUDNESS control or filters etc., can be heard. When set to REC OUT, direct sounds from the PHONO or TUNER terminals can be heard through the headphones. The LEVEL control for the headphones, is provided on the right side of this switch. The CR-3020 incorporates an exclusive main-amplifier for the headphones. Use the LEVEL control to adjust the output of the headphone main-amplifier. The LEVEL control knob is operated in the same way as the VOLUME control knob.

Peak Level Meter and Switch

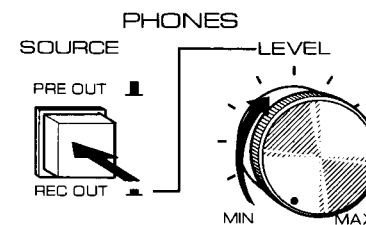


METER

REC OUT SP-OUT SIGNAL Q



Headphone Switch and Level Control



CR-3020

FILTERS AND MODE SWITCH

COMPREHENSIVE FILTERING

The filter circuits of the CR-3020 offer an unusually wide range of filter functions, combining a choice of two frequencies each for high and low cut-off, with very steep cut-off attenuation slopes (a full 12 dB/octave). This sharp slope is achieved with extremely low distortion, so that unwanted high and low frequencies can be eliminated with the minimum degradation of tonal quality in the important frequencies which carry most of the musical signal.

Low Filter

The two frequencies available are 15 Hz and 70 Hz, at which frequencies the cut-off attenuation has already reached 3 dB (a small but readily detectable difference), and below which the cut-off is very sharp. The frequency response of the CR-3020 is so flat, well into subsonic frequencies, that the ultra-low signals arising from warped or eccentric records can be amplified and fed to the speakers at quite high levels. These signals can give rise to cross-modulation distortion (a general 'muddiness' and lack of clarity), and in severe cases can seriously overload the speakers. If the LOW filter is set at 15 Hz, these non-musical signals can be safely eliminated at virtually no sacrifice in tonal quality due to the low distortion circuitry used.

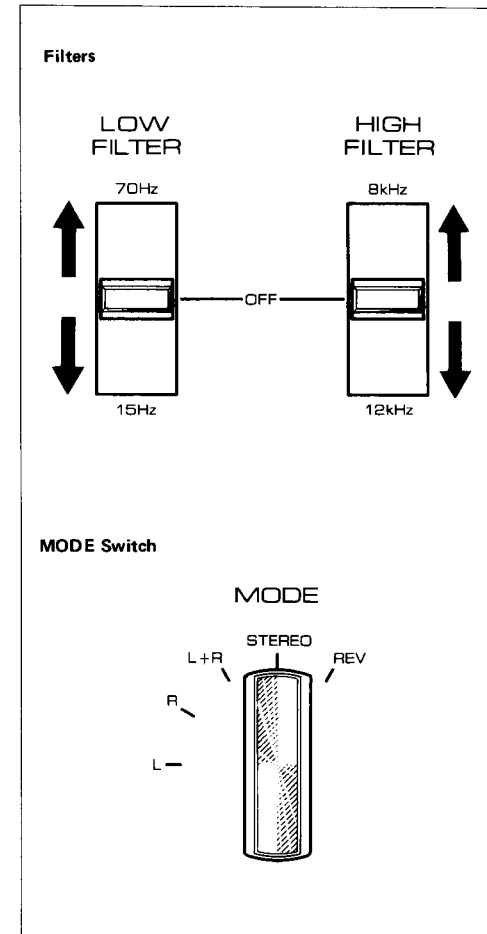
For the audible rumble that an aging (or not very high quality) turntable can give, the higher frequency of 70 Hz should be used, but there will also be some loss of lower frequency signals (drums and basses, etc.).

High Filter

The two HIGH frequency filters commence their very rapid cut-off at 8 kHz or 12 kHz. They can be used to cut out unwanted tape hiss or record scratch (which becomes more obtrusive at higher frequencies). The use of the 8 kHz filter involves considerable sacrifice of the brilliant upper harmonics which add character to brass and stringed instruments. This is also true, but to a lesser extent, with the 12 kHz filter. Only you can decide whether the program source is more enjoyable with – or preferably without – these filters.

MODE SWITCH

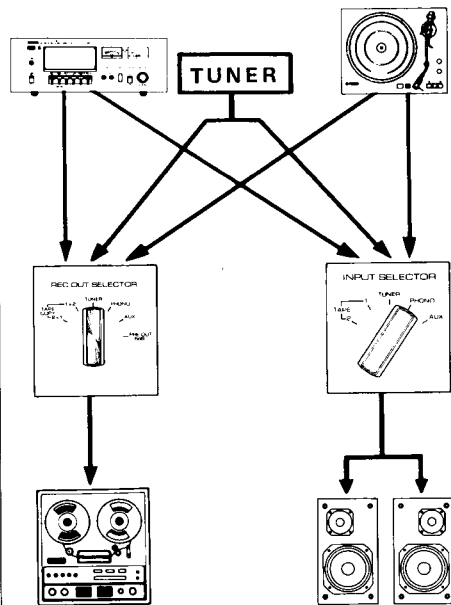
Use this to check the output from left and right-hand channels independently, or to listen in monaural instead of stereo. You can also correct for a mistake in connecting L and R terminals by reversing the stereo reproduction although it is better to correct the connections.



CR-3020

TAPE PLAYBACK AND RECORDING

Recording One Program Source While
Listening to Another



REC OUT SELECTOR SWITCH

Do not confuse the REC OUT SELECTOR and the INPUT SELECTOR switches. The INPUT SELECTOR switch decides which program source you hear. The REC OUT switch decides which one you record. Yamaha amplifiers are at present unique in offering independent choice of audition and recording. Thus you can listen to a record while tape recording direct from an AM/FM tuner, or while dubbing from one tape recorder to another (set the INPUT switch to PHONO and the REC OUT to TUNER, TAPE 1 ► 2, or TAPE 2 ► 1 positions). Alternatively you can tape record a disc while listening to FM broadcast or a music tape played back on a second tape deck (be careful not to infringe copyright laws in tape recording proprietary material). Just set the REC OUT switch to PHONO and the INPUT switch to TUNER or TAPE (1 or 2) respectively.

When the switch is set to PRE OUT/−6 dB position, the signals pass through all the circuits in the pre-amplifier section to the REC OUT terminals. Therefore, when a tape deck is connected to these terminals, signals adjusted by the CR-3020 control functions can be recorded. In this case, the signal level at the REC OUT terminals is −6 dB compared with when the switch is set to other positions. In addition, due to the adoption of the special 2-gang plus 6-gang volume control system, the output level is kept constant regardless of the volume control operation. To adjust the recording level, operate the tape deck as when

setting the selector switch to TUNER or PHONO position.

Remember that when the REC OUT selector switch is set to PRE OUT/−6 dB position, the signal level is lower by 6 dB compared with when the switch is set to other positions.

TAPE PLAYBACK

The output leads provided with the tape deck are used to connect the LINE output terminals to the CR-3020 TAPE PB terminals. Use the TAPE 1 terminals for your main deck. Use the TAPE 2 terminals for a second deck or as a spare pair. Set the INPUT SELECTOR to TAPE 1 to play back tapes (or to TAPE 2 if you are using the TAPE 2 terminals, of course). Use the output level controls on the deck or decks to adjust the playback level so that there is no great change in volume level when switching between TUNER and TAPE 1 or 2 inputs.

TAPE DECK CONNECTION/RECORDING

The tape-deck leads provided are used to connect the deck LINE input terminals to the REC OUT terminals. Again, you should use the TAPE 1 terminals for your main deck, keeping the TAPE

2 terminals for a second or spare pair. Note that the INPUT SELECTOR switch setting has *no effect whatever* upon the signal which will be recorded via these terminals. The REC OUT terminals' signal is decided by the REC OUT selector switch. If you refer to the description of the REC OUT function you will see that recording of any of the program sources connected to the CR-3020 is possible: just set the REC OUT switch to TUNER, PHONO, or AUX, respectively.

Recording of any of these sources can proceed while that source, or any other, is selected for audition by the INPUT SELECTOR switch. Monitoring of the recording while it is in progress can be carried out, if you are using a three-head deck designed for monitoring, by setting the INPUT SELECTOR switch to the TAPE position, 1 or 2, via which you are recording. (Note: most cassette tape decks have only two heads, and monitoring is impossible; most open-reel decks do have three heads, with one for monitoring.)

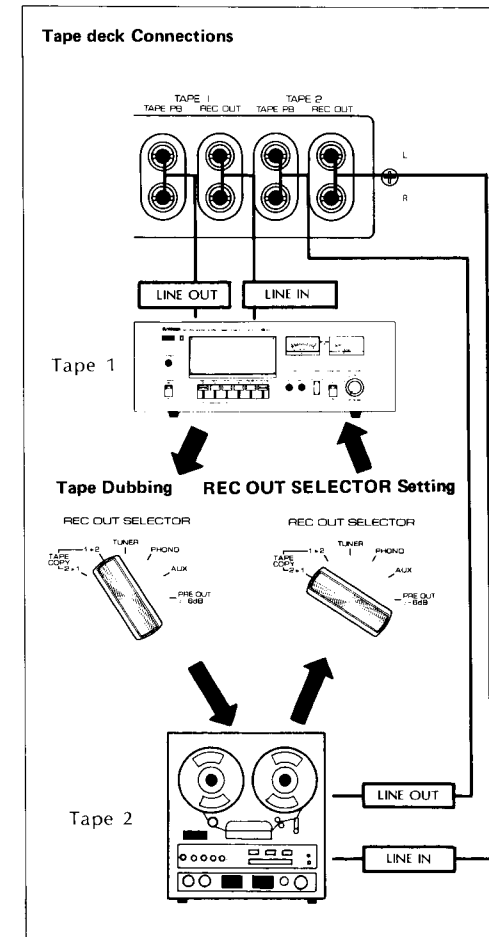
The level at which a recording is made is very important (see the instruction manual provided with your tape recorder). Adjustments in level should normally be made with the input level controls on the tape deck.

Tone, level, and other controls have no effect on the signals being recorded via REC OUT terminals. Tonal corrections must be made during playback. However, if you attach the LINE input terminals of the tape deck to the PRE OUT terminals on the rear panel, instead of the normal REC OUT terminals, you gain the convenience

of being able to set levels, and alter the tonal balance of the recording, using filters, etc., but you are limited to the program source selected by the INPUT SELECTOR switch. You will also be unable to monitor recordings. This, and the fact that tone and filter controls inevitably introduce some extra distortion (although very little in the CR-3020), means that you should normally record via the REC OUT terminals provided for TAPE 1 or TAPE 2, using the PRE OUT terminals only when it is necessary, for instance when level adjustment is essential to prevent distortion.

TAPE TO TAPE DUBBING

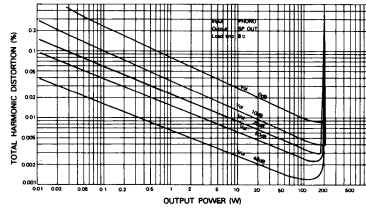
For this you will need two decks. Check carefully that the L (left) and R (right) channel pin-jacks are correctly connected before commencing recording. To copy a tape from TAPE 1 to TAPE 2 terminals, use the TAPE 1 ► 2 setting on the REC OUT selector switch. Similarly, to copy from TAPE 2 to TAPE 1, use the TAPE 2 ► 1 setting. In both cases you can compare the original recording and the copy by switching the INPUT SELECTOR between the TAPE 1 and TAPE 2 settings (provided that you have decks which allow you to monitor). Once you are satisfied that the recording is proceeding satisfactorily, you can turn the INPUT SELECTOR switch to any other program source you wish to enjoy, and the recording will not be affected.



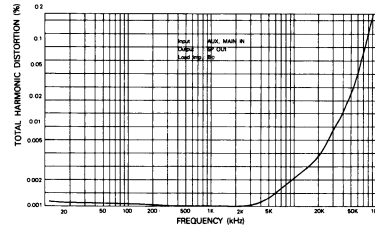
CR-3020

PERFORMANCE GRAPHS

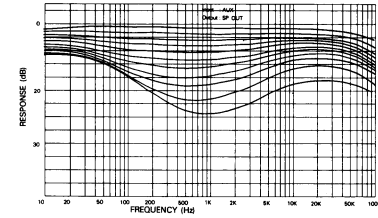
Noise and Distortion Clearance Range



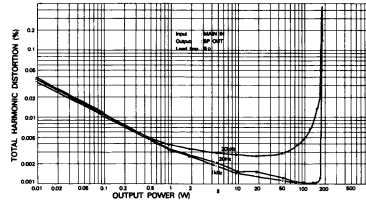
Total Harmonic Distortion V.S. Frequency



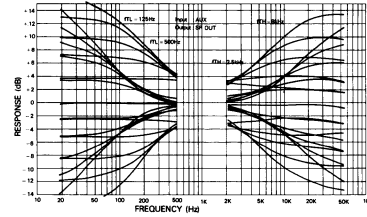
Loudness Control Characteristics



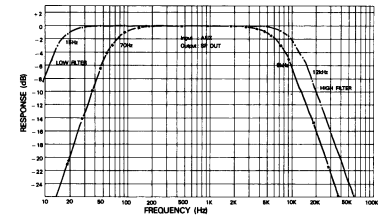
Total Harmonic Distortion V. S. Output Power



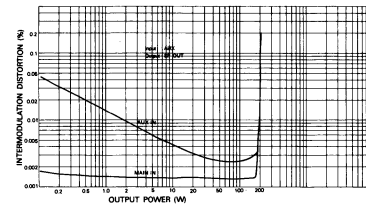
Tone Control Characteristics. BASS & TREBLE



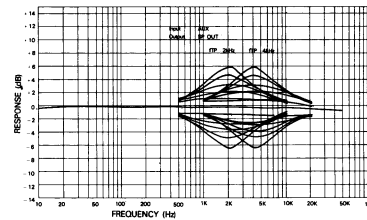
Filter Characteristics



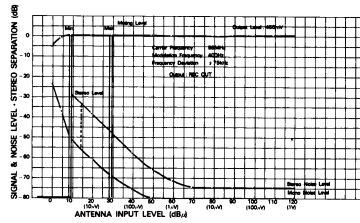
IM Distortion V.S. Output Power. 70Hz : 7kHz = 4 : 1



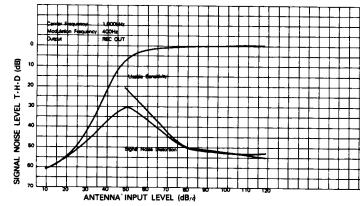
Tone Control Characteristics. PRESENCE



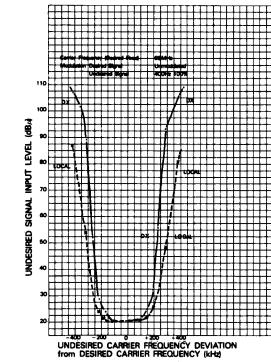
FM Antenna Input V.S. Signal & Noise Level Stereo Separation



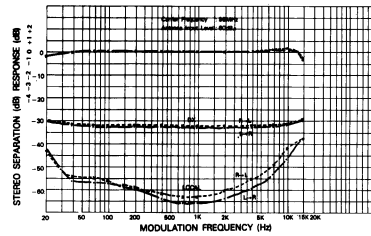
AM Antenna Input V.S. Signal & Noise Level. T.H.D



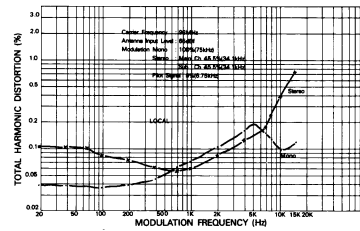
FM Alternative Selectivity



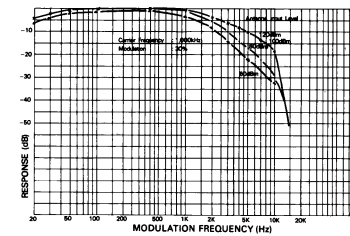
FM Frequency Response, Stereo Separation V. S. Modulation Frequency



FM Distortion V. S. Modulation Frequency

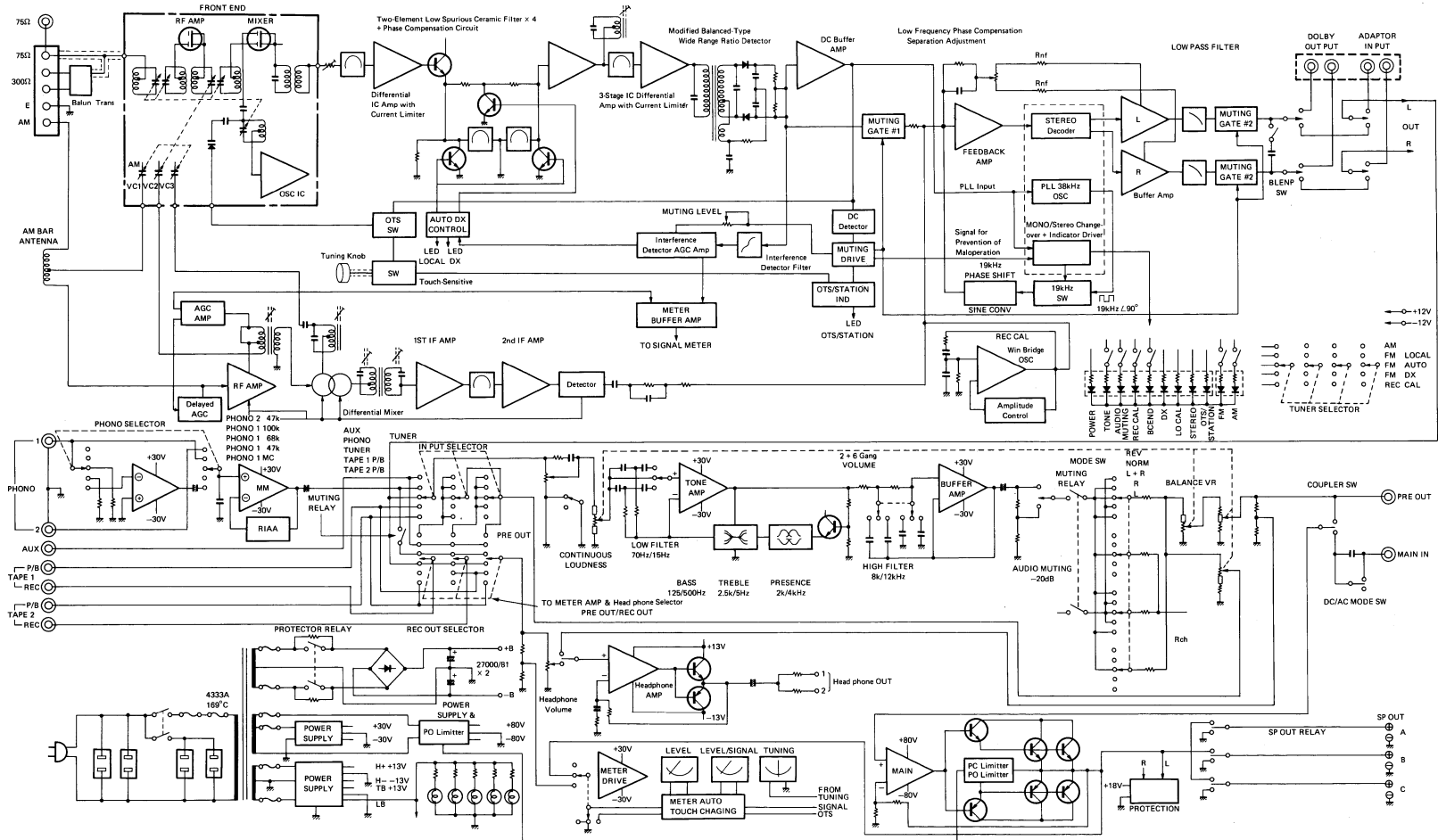


AM Frequency Response



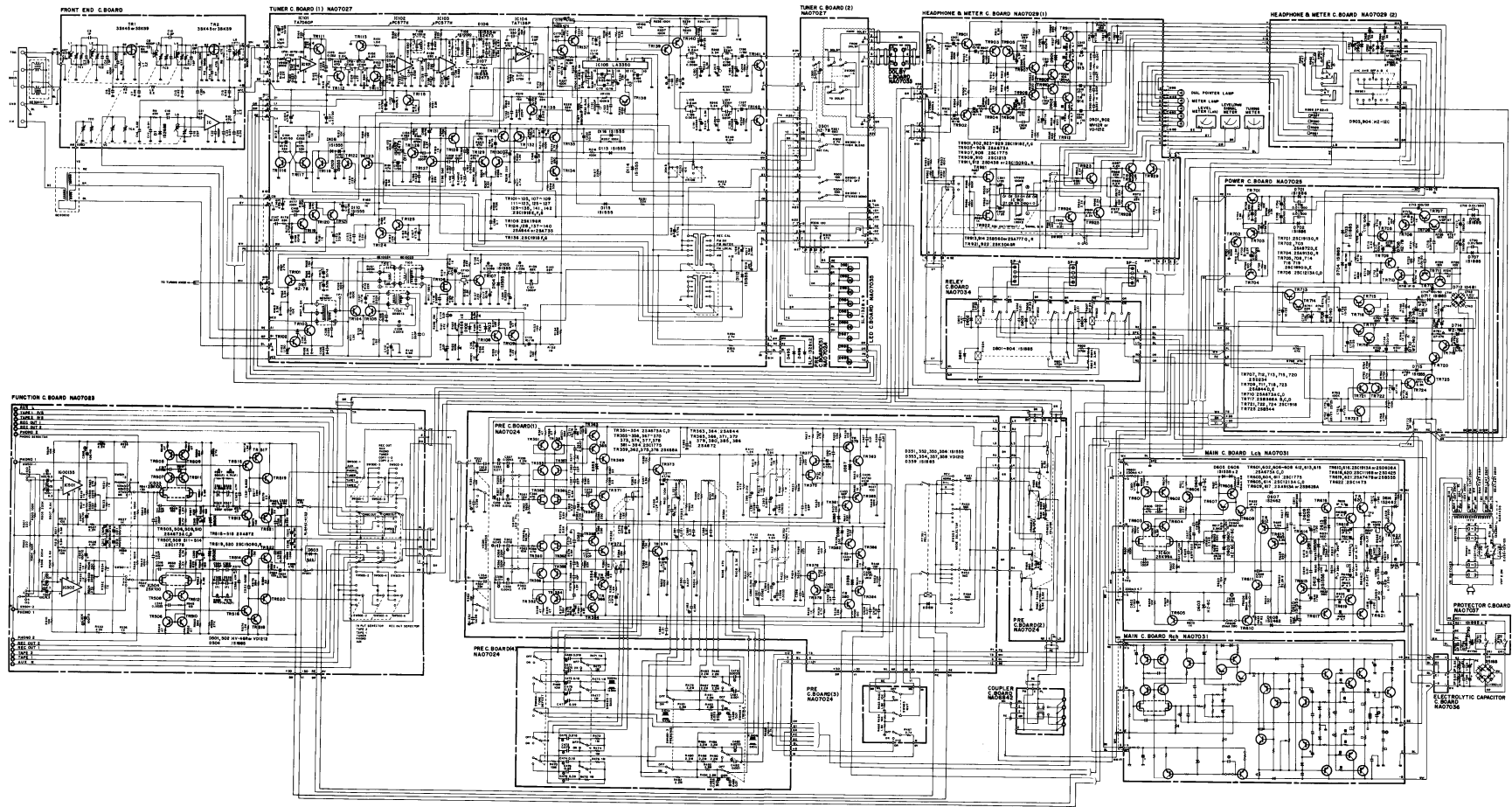
CR-3020

BLOCK DIAGRAM



CR-3020

SCHEMATIC DIAGRAM



CR-3020

SPECIFICATIONS

AUDIO SECTION

Minimum RMS Output Power per Channel

160 Watts (8 ohms) from 20 to 20,000 Hz at no more than 0.03% Total Harmonic Distortion

170 Watts (8 ohms) at 1 kHz at no more than 0.03% Total Harmonic Distortion

200 Watts (4 ohms) from 20 to 20,000 Hz at no more than 0.05% Total Harmonic Distortion (General & Australian Models)

Input Sensitivity/Impedance	
Phono 1 (MM)	2 mV/47, 68, 100 k Ω
Phono 1 (MC)	50 μ V/10 Ω
Phono 2 (MM)	2 mV/47 k Ω
Aux, Tape 1, 2	120 mV/50 k Ω
Main In terminals	1,000 mV/50 k Ω
Maximum Input Levels	
Phono 1, 2 (MM)	310 mV (at 1 kHz, T.H.D. = 0.02%)
Phono 1 (MC)	7.5 mV (at 1 kHz)
Aux, Tape 1, 2	20V
Output Level/Impedance	
Rec Out terminals (Phono)	120 mV/600 Ω (rated) 18.6V (max. 1 kHz, 0.02%)
(Tuner)	120 mV/4.7 k Ω
Pre Out terminals (rated)	1,000 mV/0 – 1.5 k Ω (13 V max. 1 kHz 0.02%)
Frequency Response	
Phono 1, 2 (MM, MC) RIAA deviation	\pm 0.2 dB
Aux, Tape 1, 2 to Sp Out	5 Hz to 100 kHz \pm 2.5 dB
Main In to Sp Out	5 Hz to 100 kHz \pm 2.5 dB
Tone Control Characteristics	
Bass turnover frequencies	125 and 500 Hz
Bass boost/cut	\pm 13 dB at 20 Hz, \pm 15 dB at 50 Hz
Treble turnover frequencies	2.5 and 8 kHz
Treble boost/cut	\pm 12 dB at 20 kHz, \pm 8 dB at 20 kHz
Presence turnover frequencies	2 and 4 kHz (center)
Presence boost/cut	\pm 6 dB at 2 kHz, \pm 6 dB at 4 kHz
Filters and Loudness Control Characteristics	
Low	15 and 70 Hz (12 dB/octave)

High	8 and 12 kHz (12 dB/octave)
Loudness control	Level-related equalization
Signal-to-Noise Ratio (IHF-A Network)	
Phono 1, 2 (MM)	82 dB (for 2 mV, shorted)
	96 dB (for 10mV)
Phono 1 (MC)	71 dB (for 50 μ V 50 Ω shorted)
	85 dB (for 250 μ V)
Aux, Tape	100 dB (short)
Main	118 dB (short)
Residual noise (at Vol Min)	0.05 mV
Distortion 20 Hz to 20 kHz	
Phono 1, 2 (MM) to Rec Out	0.003% 5V output
Phono 1 (MC) to Rec Out	0.03% 3V output
Aux, Tape to Sp Out (8 Ω)	0.02% at 80W/8 Ω
Main In to Sp Out (8 Ω)	0.01% at 80W/8 Ω
Intermodulation Distortion Ratio (70 Hz : 7 kHz = 4 : 1)	
Sp Out	0.02% 80W/8 Ω
	0.03% 0.25 – 160W/8 Ω
Noise-Distortion Clearance Range (NDCR) for 0.1% into 8 Ω at 1 kHz	
From 100 mW to 160 Watts with Vol –20 dB (Phono Input (MM) to Sp Out)	
Power Bandwidth (IHF)	10 Hz to 50 kHz (8 Ω , 0.03%)
Damping Factor (at 1 kHz)	70 into 8 Ω , 1 kHz
Headphone Amplifier	
Output Power	120 mW (8 Ω , max.)
	10 mW (150 Ω , rated)
	240 mW (150 Ω max.)
Distortion Ratio	0.1%
Output Impedance	47 Ω
Frequency Response	20 Hz to 20 kHz –2 \pm 1.0 dB (8 Ω)
Residual noise	0.025 mV (8 Ω , Headphone Volume Min.)
Meter Range	1 mW to 316W (–50 dB to +5 dB)
FM SECTION	
Tuning range	87.6 to 108 MHz
Usable Sensitivity (IHF Mono 98 MHz)	
300 Ω	2.0 μ V/11.2 dBf
75 Ω	1.0 μ V/11.2 dBf
50 dB Quieting Sensitivity	
Mono	3.2 μ V/15.3 dBf

Stereo	40 μ V/37.2 dBf
Signal to Noise Ratio	
Mono (65 dBf)	80 dB
	74 dB (DIN 40 kHz dev.)
Stereo (75 dBf)	75 dB
	69 dB (DIN 40 kHz dev.)
Image Response Ratio (98 MHz)	110 dB
IF Response Ratio (98 MHz)	120 dB
Spurious Response Ratio (98 MHz)	110 dB
AM Suppression Ratio (IHF)	60 dB
Capture Ratio (at 65 dBf)	
DX	1.5 dB
Local	1.0 dB
Alternate Channel Selectivity	
DX	85 dB (\pm 400 kHz 100% Mod.)
	65 dB (\pm 300 kHz 100% Mod.)
Local	60 dB (\pm 400 kHz 100% Mod.)
	35 dB (\pm 300 kHz 100% Mod.)
Distortion (at 65 dBf)	
Mono 100 Hz	DX 0.1%
	Local 0.07%
1 kHz	DX 0.2%
	Local 0.07%
6 kHz	DX 0.5%
	Local 0.2%
Stereo 100 Hz	DX 0.6%
	Local 0.09%
1 kHz	DX 0.6%
	Local 0.07%
6 kHz	DX 0.6%
	Local 0.2%
Intermodulation Distortion (IHF)	
Mono	DX 0.3%
	Local 0.05%
Stereo	DX 0.6%
	Local 0.1%
Stereo Separation	
50 Hz	DX 30 dB

	Local	45 dB
1 kHz	DX	30 dB
	Local	52 dB
10 kHz	DX	30 dB
	Local	45 dB
Subcarrier Product Ratio		70 dB
Frequency Response		
50 Hz to 10 kHz		\pm 0.3 dB
30 Hz to 15 kHz		\pm 0.5 dB
10 Hz to 18 kHz		+0.5 –3.0 dB
Muting threshold (\pm22.5 kHz dev.)		
DX		3 μ V (14.8 dBf) – 30 μ V (34.8 dBf)
Local		5 μ V (19.2 dBf) – 30 μ V (34.8 dBf)
AM SECTION		
Tuning Range		525 to 1,605 kHz
Sensitivity (IHF, bar antenna)		300 μ V/m (49 dB/m)
Selectivity (1,000 kHz)		45 dB (\pm 10 kHz), 35 dB (\pm 9 kHz)
Signal-to-Noise Ratio		50 dB (at 80 dB/m)
Image Response Ratio (1,000 kHz)		75 dB
IF Response Ratio (1,000 kHz)		75 dB
Spurious Response Ratio (1,000 kHz)		75 dB
Distortion		0.4% (at 80 dB/m, 120 dB/m)
Tuner Section Output Level/Impedance		
FM (100% mod. at Rec Out)		450 mV/1 k Ω
AM (30% mod. at Rec Out)		120 mV/1 k Ω
GENERAL		
Semiconductors		178 Transistors, 9 ICs, 14 FETs, 64 Diodes, 14 Zener Diodes, 11 LEDs, 5 Ceramic Filters.
Power Supplies		U.S.A. and Canada AC 120V, 60 Hz
Power Consumption		500W (Canada 700W 880VA)
Dimensions (W x H x D)		632 x 191 x 494.5 mm (24-3/4" x 7-1/2" x 19-1/2")
Weight		35 kg (77 lbs 3 oz)

Specification subject to change without notice.

CR-3020

TROUBLE SHOOTING

Before assuming that your CR-3020 is faulty, check the following trouble-shooting list, which details many steps you can take yourself, without having to call a service representative.

AUDIO SECTION

Fault	Cause	Cure
No power although POWER switch is ON (POWER LED unlit)	AC power line not plugged into supply socket.	Plug firmly into the supply socket.
	AC main fuse has blown.	Contact your service rep. for a replacement.
No sound although power is connected.	Volume too low.	Turn up volume.
	INPUT SELECTOR in wrong position.	Check and change as necessary.
	Input pin plugs incorrectly inserted, loose, or disconnected.	Check and insert fully in the correct positions.
	Speaker connections faulty.	Check and make good.
	SPEAKERS switch OFF.	Set to correct position.
	PRE OUT/MAIN IN COUPLER switch in OFF position.	Switch back to ON.
Sound comes only, or mainly, from either L or R speaker	Speaker connections faulty.	Check and make good.
	Input connections faulty.	Check and make good.
	BALANCE control not properly adjusted.	Set to give correct stereo balance.
Sound suddenly ceases during audition.	The protective circuit has gone into operation.	Check for incorrect (too low) speaker impedances or short-circuits and correct. If the fault persists, switch off and wait briefly before switching on again.
	AC main fuse has blown.	Contact your service rep. for replacement.
Poor bass response and badly defined stereo image.	Speaker + and - connections are incorrect.	Reverse the connections to one speaker, not both.
A loud 'humming' is heard with, or instead of, the record when attempting PHONO audition.	Either the pin-plugs from the phono cartridge are not firmly plugged into the input sockets, or the braided shielding wire is defective.	Plug in firmly, replacing the defective shielding if necessary. Check and make good the GND (ground) wire connection.
The volume control cannot be raised during record audition without a loud 'booming' noise.	This is caused by acoustic feedback from the speakers to the phono cartridge stylus.	Increase the separation between turntable unit and speakers, avoiding locations directly in line with the speakers.
The volume is inadequate even when fully raised.	The AUDIO MUTING switch is on.	Reduce the volume first, then switch the AUDIO MUTING off.
The tone controls have no effect.	The DEFEAT switch is operative.	Push into the ON position.
Bass and treble frequencies are unnaturally exaggerated.	The LOUDNESS volume control is set too low.	Turn to the FLAT position (fully clockwise) and re-set main and LOUDNESS volume controls according to the instructions.
Your tape recorder does not record the program you are monitoring.	The REC OUT selector is not set to the required program source.	Turn to the required setting.

TUNER SECTION

Fault	Cause	Cure
A persistent hum occurs when an AM station is tuned.	This modulation hum can affect whole areas where conditions are unfavorable.	Sometimes changing the position of the CR-3020 will give an improvement.
Intermittent crackling or continuous background 'roaring' on AM.	Atmospheric electricity or electrical storms; possibly fluorescent lighting or other electrical equipment.	Difficult to eliminate, an external antenna and good ground connection will give considerable improvement.
High pitched whistles, etc., particularly at night, on AM.	Signals from adjacent stations are interfering with reception.	Nothing can be done to cut out this interference, but try the 8 kHz filter.
The desired station cannot be received at the correct frequency on the dial.	The CR-3020 is being operated near a TV set.	Increase the distance between the TV and the CR-3020.
A stereo station is heard in mono.	The station strength is low, and the MUTING circuit is preventing audition.	Turn from 30 μ V to 3 μ V, or from 3 μ V to off.
	The amplifier MODE switch is on L + R.	Switch to STEREO.
	The FM MUTING switch is on OFF/FM MONO.	Switch to ON.
Occasional crackling interference (particularly with remote, weak signal stations).	Electrical noise from automobiles, etc., or from other electrical equipment.	Set up an external FM antenna, as high and as far from the road as convenient, using coaxial cable; fit an interference suppressor to the offending equipment.
Disturbing degree of 'hiss' noise when on FM stereo stations.	FM stereo broadcasts are inherently more liable to this at remote, low signal strength locations.	Set up an external FM antenna; if you are already using one, orient it towards the station or replace with a more sensitive array.
		Alternatively or additionally, listen at FM BLEND or FM MONO positions.
Local stations suffer from unclear, distorted sound.	Signal input from the antenna for these stations is too strong.	Connect an attenuator between the AM antenna and the CR-3020, or turn the antenna away from the strongest (closest) station.
During stereo test transmissions, sounds which should come from only one channel can be heard faintly over the other.	This is known as crosstalk, and normally occurs to some extent.	Provided the sound level is very faint compared with the normal level for that channel, no fault is indicated.
No FM broadcasts can be received.	The FM DOLBY adaptor switch is ON although you have no adaptor.	Switch it off.

SINCE 1887  **YAMAHA**
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