

Technics
by Panasonic

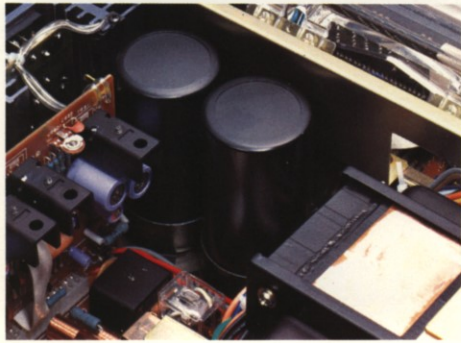
SA-800

FM/AM Stereo Receiver



125 watts per channel
minimum continuous "RMS" into 4 or 8 ohms,
both channels driven, from 20-20,000 Hz, with
no more than **0.04%** total harmonic distortion.

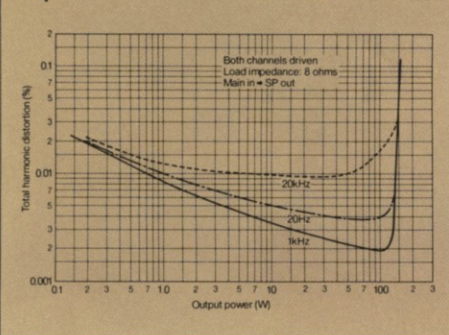
SA-800 FM/AM Stereo Receiver



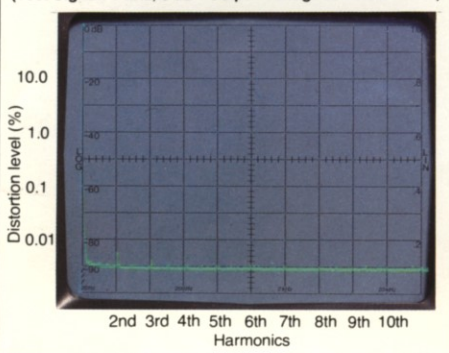
125 watts per Channel

The SA-800 will deliver 125 watts per channel, minimum continuous "RMS" power into 4 or 8 ohms, both channels driven, from 20–20,000 Hz, with no more than 0.04% total harmonic distortion. At less than full power, the THD figure is even lower: half-power distortion is a scant 0.015% (8 ohms, 20–20,000 Hz) with 0.005% at 1 kHz. And on a short-term basis, it can deliver more than its rated power for handling high-intensity musical peaks.

Output Power vs Total Harmonic Distortion



Power Output Distortion Spectrum
(Test Signal: 1 kHz, 0 dB = Output Voltage at Rated Power)



0.04% Total Harmonic Distortion

To achieve such high power output without exceeding 0.04% total harmonic distortion required careful design of every element in the SA-800's power supply and power amplifier section:

Large, well-regulated power supply. Use of a large, low-impedance power transformer contributes to the SA-800's excellent stability

under highly dynamic conditions. Two 15,000 μ F electrolytic capacitors, one on each side of the power supply, help maintain regulation and provide reserve power for handling high-amplitude musical peaks and deep bass signals.

Current-mirror loaded differential stage.

In the differential stage, current-mirror loading doubles signal gain without increasing noise and distortion. A newly designed single-packaged transistor pair combines important qualities of high voltage tolerance and precise thermal tracking despite changing ambient temperature. All of these factors play an important part in the distortion-reduction functions of the differential stage.

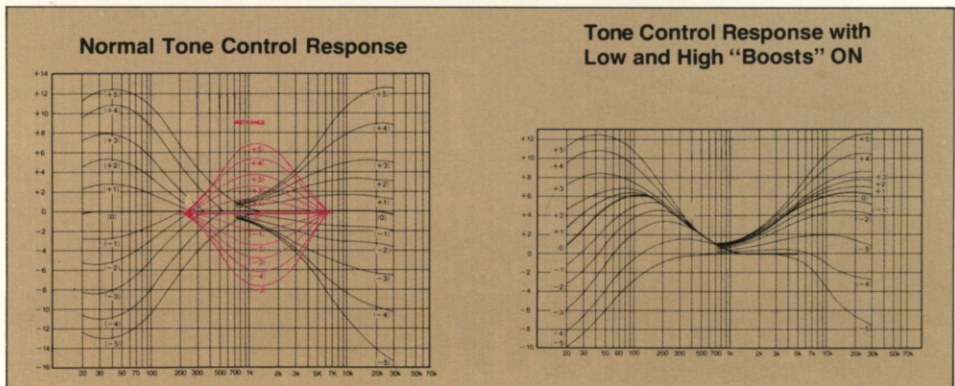
Parallel push-pull, pure complementary output stage.

Four high-power transistors are used in each channel in a parallel push-pull, pure-complementary configuration. The output stage is OCL (output capacitor-less) which helps to achieve tight, low-distortion deep bass response.

Quality control and circuit techniques Large-scale, intensive analysis is continually conducted in Technics' labs to discover the best and most efficient circuit configurations, whether in discrete or IC formats. And when electronic elements of specific values and tolerances are needed, Technics can design them to exact standards and maintain strict quality control in their manufacture. To a very large extent, such extensive research and sophisticated manufacturing facilities make it possible for us to design and produce a superb power amp like the SA-800's, while maintaining reasonable cost to the consumer.

Automatic Load Impedance Detector

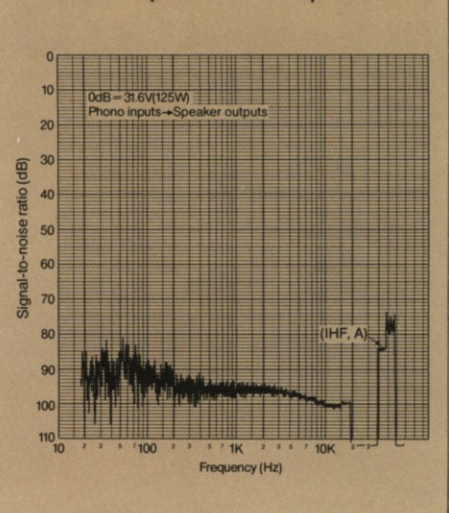
This Technics-developed device uses IC logic to optimize power transfer depending on the load impedance of the connected speakers. When the power is turned on, a very low-level signal is generated into the speakers to detect their impedance. Then, depending on whether the load is closer to 4 or 8 ohms, a relay selects the appropriate power supply voltage, via taps of the transformer windings. By balancing the related factors of voltage and current for different loads, the automatic load impedance detector maintains low distortion and reduces heat build-up in the transistors when 4-ohm loads are connected. At the same time, it allows the necessary voltage for high power when 8-ohm loads are connected.



Phono Equalizer Stage— Accuracy Combined with Very Wide Dynamic Range 95 dB S/N Ratio

With a reference signal of 10 mV, the phono signal-to-noise ratio is an extraordinary 95 dB (IHF, A). Which means that for all practical purposes, the circuit is silent. It is made possible largely by the use of a Technics developed low-noise transistor (M47LP), which has the noise-reduction properties of several conventional transistors connected in parallel. Maximum input at 1 kHz, RMS is 200 mV. This voltage-handling capacity is aided by use of a separate positive/negative power supply for the phono stage. It is unlikely that even the most sensitive magnetic cartridges will overload the phono section. Finally, RIAA equalization is kept within a tolerance of ± 0.2 dB, thanks to use of 1% tolerance metal-film resistors and 2% tolerance polypropylene capacitors.

Phono Equalizer Noise Spectrum



Acoustic Control

The SA-800's Acoustic Control combines the functions of low-distortion, Baxandall-type bass, midrange and treble controls with "Boost/Filter" switches for the bass and treble ranges. Together, these controls give much greater flexibility in tone-tailoring than is

possible with conventional tone controls:

Low and High Boost/Filter Switches

With the bass control left "flat", the "low boost" switch injects a peak at about 100 Hz which accentuates drums and bass instruments. Then, if you adjust the bass control, the location and amplitude of the peak changes. You can therefore get a very wide range of bass tonalities. The "high boost" creates a shelved response in the upper midrange and treble, which brightens the overtones of voices and instruments. Again, adjustment of the regular treble control will further change tone balance in this range. In the filter positions, 6 dB/oct roll-offs are created, beginning respectively at 100 Hz and 7 kHz. You would use these to suppress subsonic signals from warped records, or high-frequency noise in the program material.

Combinations

You can use any of these controls independently, or none at all if you wish. But very often, you'll find that you can achieve subjectively better sound with combinations of settings—e.g. high "boost" in, regular treble control decreased. The accompanying chart will give you an idea of the possibilities. The entire Acoustic Control action can be defeated with a switch for instant comparison with unmodified, "flat" response.

LED Peak-Power Indicators

A string of 24 LED's, 12 per stereo channel, light up to indicate peak power output being generated by the receiver. LED's were used instead of mechanical power meters because they are faster-acting, and can therefore give a more accurate indication of power peaks. For higher power levels, orange and red lights are used. When the red lights are flashing, this indicates that you are approaching clipping levels, so care should be taken with any further increase in volume. By using the range switch, you can cause the LED's to read ten times the level actually being generated. At this more sensitive setting, channel balance and separation can be readily checked. And even when you're not using the LED's for a specific purpose, you can still enjoy their beautiful visual effect.

Protection Circuitry

A specially developed circuit-protection IC immediately shuts off input to the main amp if the speaker terminals become short circuited or a speaker load of dangerously low

impedance is connected. This remains in effect until the AC power is shut off. Should DC voltage appear at the speaker terminals, relays isolate the speakers from the circuit. In both cases, a green LED goes out on the front panel, indicating that the protection circuitry is operational.

Two-Way Tape Dubbing

The SA-800 includes record out/playback facilities for two tape decks or external processors. With two decks connected, you can record from either deck to the other with a front-panel selector. In addition, you can listen to another source, such as a record or the tuner, while dubbing is in progress.

Amp/Preamp Convenience and Operating Features

- Pre-Out/Main-In terminals. Permits separate use of preamplifier or power amplifier sections. External processors can be placed here to avoid using up a tape monitor.
- Main and remote speaker connections.
- Stereo/mono mode switch.
- Audio muting switch cuts output by 20 dB without changing the volume control setting.
- Loudness switch.
- Front-panel program-source indicators.
- Click-stop volume, balance and tone controls.
- "Pop-Noise Muting" eliminates pops or thumps in speakers when power is turned on or off.

TUNER SECTION

Waveform Fidelity

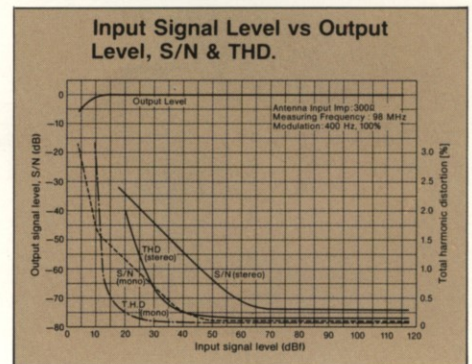
The SA-800's tuner section exhibits excellent specifications for conventionally measured parameters such as sensitivity, selectivity, interference rejection, distortion and so forth. But even more significantly, it is also designed for waveform fidelity. In other words, it can receive, process and transmit signals with minimal alteration of the audio waveform. This quality shows up in square wave and tone burst testing. The square wave shows very little sagging, and the tone bursts are well damped with very little ringing. These kinds of tests demonstrate both frequency response and phase integrity of the signal, and are reliable predictors of the kind of high-frequency response and transient response that the tuner

will achieve with normal musical signals. To get such impressive results with these demanding tests, the tuner must be extraordinarily well designed throughout. For example, we used a 19 kHz pilot signal canceller, instead of the more common low-pass filter, to optimize high-frequency response. After listening to this tuner, we think you'll agree that the results are well worth our efforts.

FM Circuit Configurations

MOS FET FM Front End

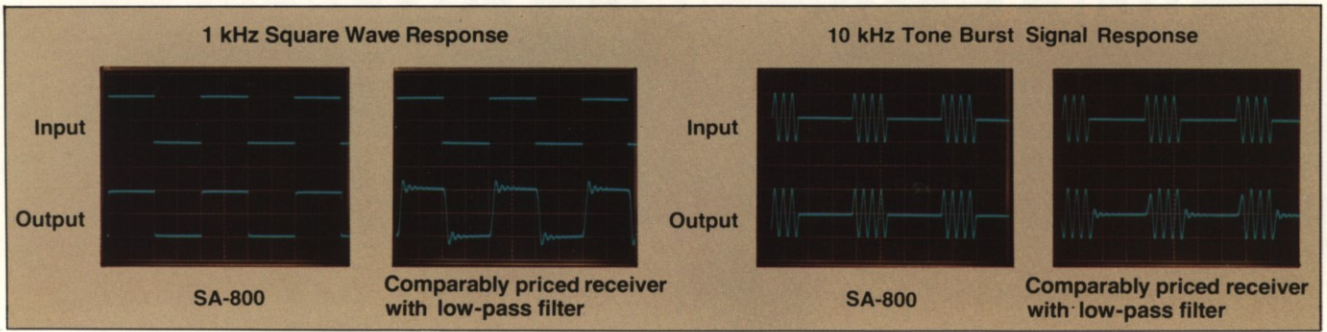
A 4-pole dual-gate MOS FET is used for RF amplification. Not only does this MOS FET exhibit the usual qualities of high sensitivity and high tolerance to strong signals; it is extremely low-noise as well (noise figure of less than 4.5 dB) with low internal capacitance (less than 0.05 pF). A junction FET is used as a buffer amp between the mixer and local oscillator to prevent mutual interference between them. The FM front end elements are contained in a 4-gang linearly variable tuning capacitor which achieves superb sensitivity, selectivity, quieting and interference rejection.



IF Stage Employing "Flat Group Delay" Ceramic Filters

The five-stage IF section includes three 2-element "Flat Group Delay" ceramic filters. These filters contribute significantly to the tuner's 80 dB selectivity. At the same time, they exhibit excellent phase characteristics, which is important for audio quality, particularly in the high frequencies. Differential amplifiers, incorporated into high-linearity IC's provide uniform gain and excellent AM suppression.





High-Linearity Quadrature Detector

A high-linearity quadrature detector with broad peak-to-peak range plays a key role in obtaining wideband, linear frequency response and low distortion. It can easily handle excessively modulated broadcast signals (up to 3 times the modulation levels permitted by the FCC) without significant distortion or loss of high frequencies. This wide tolerance assures linear operation with virtually any signal you're likely to receive.

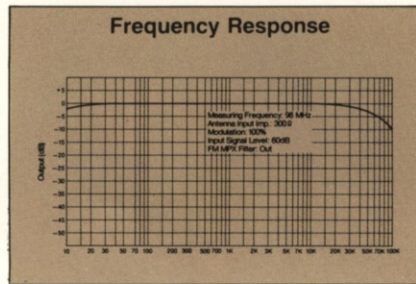
Phase-Locked-Loop (PLL) Multiplex Stage

A PLL IC keeps the switching signals generated by the tuner in precise phase with the pilot and subcarrier signals generated by the broadcast station. The result is very stable FM stereo performance, with wide separation maintained well into the high audio frequencies for a very striking stereo image. The PLL helps maintain low distortion as well, and its performance will not deteriorate with changing ambient temperature and humidity conditions. Use of an IC removes the need for periodic realignment of the MPX stage.

Pilot-Signal Canceller Permits Frequency Response of 20—18,000 Hz, +0.2, -0.8 dB

While it is true that the high-frequency extension of FM broadcasts usually does not exceed 15 kHz, it is nevertheless important to optimize response even past this point for best results. Low-pass filters, which are normally used to attenuate the pilot signal, can introduce some frequency roll-off and phase shift beginning even as low as 10 kHz. As a much better alternative, the SA-800 uses a pilot-signal cancel circuit which attenuates the pilot signal with a 180° out-of-phase 19 kHz signal. This results in very sharp attenuation of the pilot signal,

with virtually no effect in the audio range. When taping an FM broadcast, it may be preferable in some cases to use a low-pass filter. For these situations, the SA-800 is equipped with a low-pass filter that can be introduced into the circuit with a front-panel switch.



Double-Action FM Muting Function

FM muting is applied at two points, in the IF stage and after the MPX stage. In the IF stage, an AND-type circuit is used to sense signal-strength and provide positive activation of muting function to suppress inter-station noise. At the same time, muting is applied after the MPX stage to suppress the transitional "pulse" noise as muting is switched in and out.

FM Hi-Blend

When receiving a weak, distant FM stereo broadcast, background hiss can be greatly reduced by using FM hi-blend. This circuit blends the higher audio frequencies into essentially a monophonic audio signal, but as a result, much of the noise components

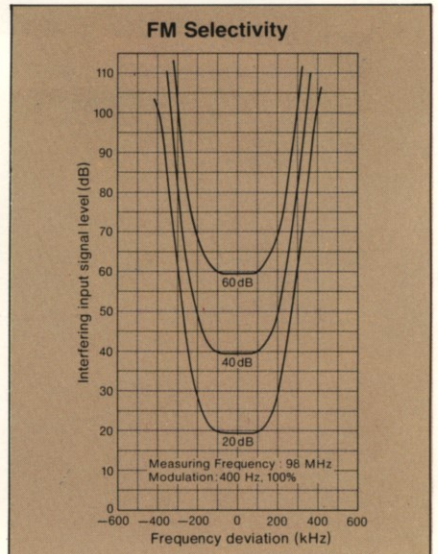
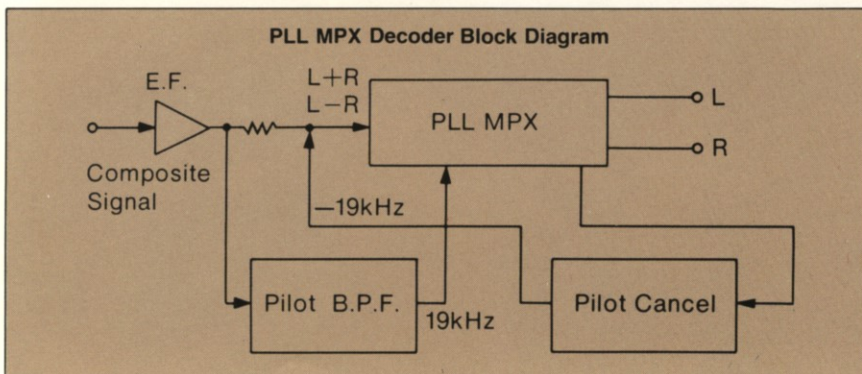
in the sound are cancelled out. And full stereo separation is still maintained in the midrange and lower frequencies.

Quality AM Section with IC

Although you will probably prefer FM for serious listening, you can also expect good AM performance from the SA-800. Most of the important circuitry is incorporated into a reliable IC. Triple-tuned coils in the IF section provide good selectivity. While AM won't match FM in terms of clarity and frequency response, the SA-800's AM section will nonetheless provide very good performance.

Tuner Convenience and Operating Features

- Mirror-reflection FM/AM tuning scale and smoothly operating flywheel dial facilitate pinpoint tuning.
- Two tuning meters: signal-strength for FM and AM, center-of-channel for FM. Unlike many signal-strength meters, the SA-800's shows maximum readings only with very strong (65 dBf) signals. This makes it an excellent aid for orienting your antenna.
- Jacks for adding future FM quad and AM stereo adaptors.
- Terminals for 75 and 300 ohms FM antennas. AM bar antenna.



Massive Power, with the Subtleties that Define Sonic Excellence

The SA-800 is a very powerful receiver, and it delivers its power with astonishing cleanness. On the basis of power alone, it will appeal to the serious audiophile, because it can deliver dynamic range that lesser-powered receivers aren't capable of.

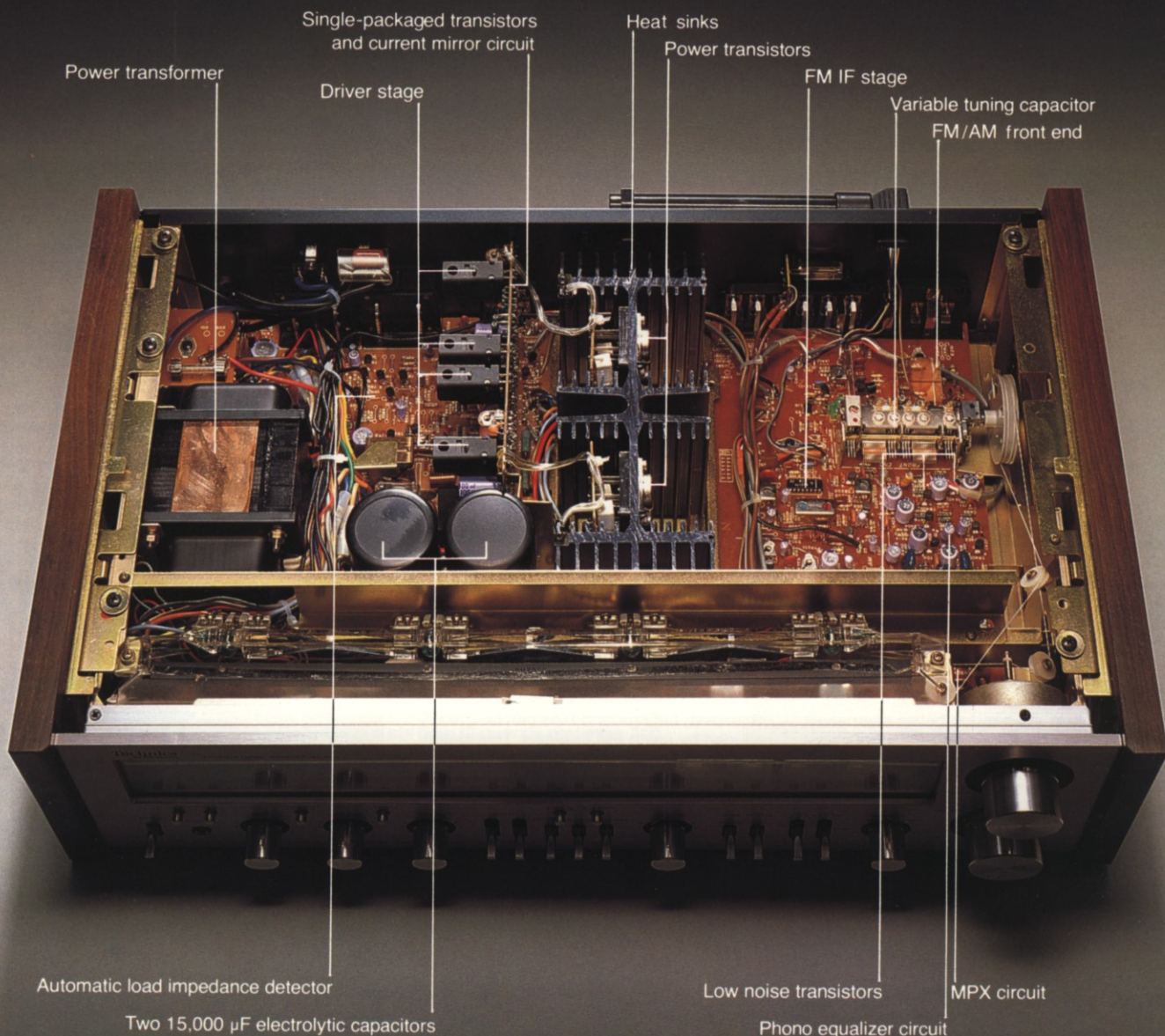
But the SA-800's sonic excellence goes beyond the clarity and dynamic range that high power can provide. For example, the phono equalizer stage is extremely accurate and quiet, as demonstrated by its ± 0.2 dB RIAA equalization and its 95 dB signal-to-noise ratio.

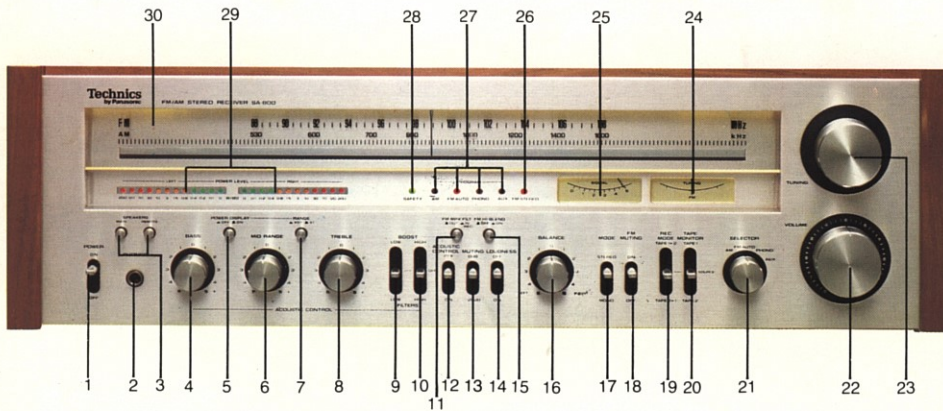
The tuner section's specifications are just as impressive. But more important, it exhibits

excellent waveform fidelity, as evidenced by square wave and tone-burst response. This is made possible by careful overall design, and particularly by use of a pilot-signal cancel circuit and "flat group delay" ceramic filters in the IF section.

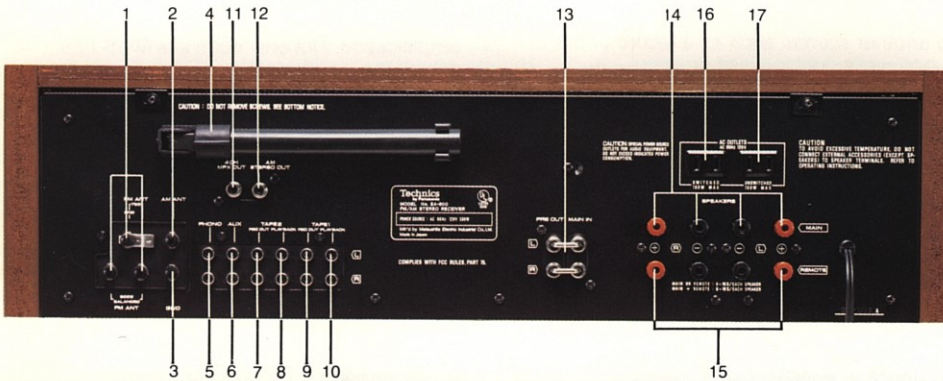
The Acoustic Control gives you possibilities for sound tailoring that conventional tone controls don't provide. And such features as two-way tape dubbing, an LED power display, FM hi-blend and others give you considerable flexibility.

Tremendous, clean power. Meticulous overall design. And a generous complement of features. The SA-800 combines all of these in one package, at a surprisingly manageable price.





1. Power on/off switch
2. Headphone jack
3. Speaker selectors (main, remote)
4. Bass control
5. Power indicator on/off switch
6. Midrange control
7. Power indicator range selector ($\times 0.1$, $\times 1$)
8. Treble control
9. Low boost/filter switch
10. High boost/filter switch
11. FM MPX filter switch
12. Acoustic control on/off switch
13. Muting switch
14. Loudness switch
15. FM hi-blend switch
16. Balance control
17. Mode selector (stereo/mono)
18. FM muting switch
19. REC mode selector
20. Tape monitor switch (Tape 1, 2)
21. Program selector
22. Volume control
23. Tuning control
24. FM center-of-channel tuning meter
25. Signal strength meter
26. FM stereo indicator
27. Program indicators
28. Safety indicator
29. LED peak-power indicator
30. FM/AM tuning dial



1. FM antenna terminals (75Ω , 300Ω)
2. AM antenna terminal
3. Ground terminal
4. AM ferrite bar antenna
5. Phono inputs
6. AUX inputs
7. Tape deck 2 REC outputs
8. Tape deck 2 PLAY inputs
9. Tape deck 1 REC outputs
10. Tape deck 1 PLAY inputs
11. 4ch MPX output
12. AM stereo output terminal
13. Pre-out/main-in terminals
14. Speaker terminals (main)
15. Speaker terminals (remote)
16. AC outlet (switched)
17. AC outlet (unswitched)

Technical Specifications

POWER AMPLIFIER SECTION

Rated minimum sine wave
 RMS power output
 20 Hz~20 kHz
 both channels driven
 0.04% total harmonic distortion
 125W per channel (8 ohms)
 125W per channel (4 ohms)

1 kHz continuous power output
 both channels driven
 0.04% total harmonic distortion
 135W per channel (8 ohms)
 135W per channel (4 ohms)

Total harmonic distortion 0.04% at rated power
 (20 Hz~20 kHz, 8 ohms, 4 ohms)
 0.015% at half power
 (20 Hz~20 kHz, 8 ohms)
 0.025% at half power
 (20 Hz~20 kHz, 4 ohms)
 0.005% at half power
 (1 kHz, 8 ohms, 4 ohms)

Intermodulation distortion 0.04%

Frequency response 5 Hz~90 kHz,
 -1 dB

S/N (IHF, A) 112 dB

Residual hum & noise 0.4 mV

Damping factor 50 (8 ohms) 25 (4 ohms)

Input sensitivity and impedance 1V/100 kilohms

Load impedance
 MAIN or REMOTE 4~16 ohms
 MAIN+REMOTE 8~16 ohms

PREAMPLIFIER SECTION

Input sensitivity and impedance

PHONO 2.5mV/47 kilohms

AUX 150mV/47 kilohms

TAPE 1, 2 PLAYBACK 150mV/47 kilohms

PHONO maximum input voltage (1 kHz, RMS) 200mV

S/N (IHF, A)
 PHONO 95 dB (at 10mV)
 83 dB (at 2.5mV)

AUX 97 dB

PLAYBACK 97 dB

Frequency response
 PHONO RIAA standard curve ± 0.2 dB

AUX 20 Hz~20 kHz +0 dB, -0.3 dB
 10 Hz~40 kHz -1 dB

Tone controls
 BASS 50 Hz, +12 dB~-12 dB

MID 1 kHz, +7 dB~-7 dB

TREBLE 20 kHz, +12 dB~-12 dB

Acoustic control (at tone "0" position)
 LOW BOOST 100 Hz, +6 dB

HIGH BOOST 10 kHz, +6 dB

Low filter 100 Hz, -6 dB/oct.

High filter 7 kHz, -6 dB/oct.

Loudness control (volume at -30 dB) 50 Hz, +9 dB

Muting -20 dB

Output voltage and impedance
 PRE OUT rated 1V/3.9 kilohms
 maximum 3V/3.9 kilohms

TAPE 1, 2 REC OUT 150mV

FM TUNER SECTION
 Frequency range 88~108 MHz

Sensitivity 10.3 dBf (1.8 μ V IHF '58)

50 dB quieting sensitivity
 MONO 13.2 dBf (2.5 μ V IHF '58)

STEREO 36.2 dBf (35.4 μ V IHF '58)

Total harmonic distortion
 100 Hz 0.15% (mono), 0.3% (stereo)

1 kHz 0.1% (mono), 0.2% (stereo)

6 kHz 0.3% (mono), 0.4% (stereo)

S/N
 MONO 77 dB

STEREO 73 dB

Frequency response 20 Hz~18 kHz,
 +0.2, -0.8 dB

Alternate channel selectivity 80 dB

Capture ratio 1.0 dB

Image rejection at 98 MHz 85 dB

IF rejection at 98 MHz 100 dB

Spurious response rejection at 98 MHz 100 dB

AM suppression 60 dB

Stereo separation
 1 kHz 45 dB

10 kHz 35 dB

Carrier leak -70 dB (19 kHz)
 -50 dB (38 kHz)

Antenna terminals 300 ohms (balanced)
 75 ohms (unbalanced)

AM TUNER SECTION

Frequency range 525~1605 kHz

Sensitivity 30 μ V, 250 μ V/m

Selectivity 35 dB

Image rejection at 1000 kHz 50 dB

IF rejection at 1000 kHz 45 dB

GENERAL

Power consumption 330W

Power supply AC 120V 60 Hz

Dimensions 6-31/32" \times 22-29/32" \times 15-15/32"
 (H \times W \times D) (177 \times 582 \times 393 mm)

Weight 41.9 lb. (19 kg)

Simulated wood cabinet

Technics
 by Panasonic

Panasonic Company

Division of Matsushita Electric Corporation of America

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