National Technics SA-5560

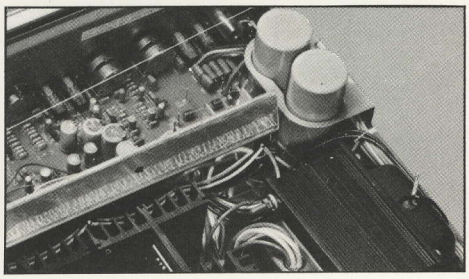
FM/AM Stereo Receiver

When the predecessor of the SA-5560, the prestigious SA-5550, was introduced, it won widespread praise from impartial test laboratories reporting in leading audio magazines. "In every respect, a first-rate receiver," ... "more than good enough to satisfy the requirements of even a critical hi-fi enthusiast," ... "definitely stands out as one of the more distinguished entries," went some of the comments. The SA-5560 combines retention of the finest virtues of its forerunner with substantial improvements in all areas.

The SA-5550 combined substantial power output and low distortion with superb FM performance, involving "Flat Group Delay" ceramic filters in the IF section and sophisticated PLL stereo multiplex circuitry. Even oft-neglected AM performance was exceptional. Niceties included click-stop tone controls, multiple protection circuitry, two tuning meters and both high- and low-frequency cutoff filters.

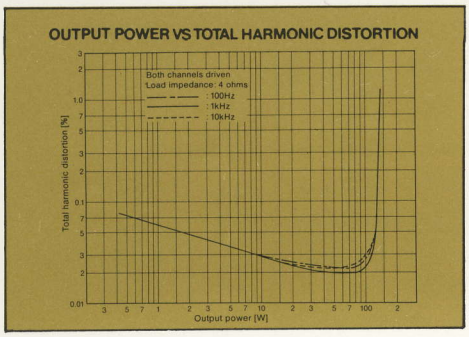
The SA-5560 has even greater power output at still lower distortion. There are improvements in the power supply and phonograph equalizer and in the FM section. An accurately resettable, 41-position click-stop volume control has been added, as well as an FM multiplex high-blend switch, lower-distortion detection and more sophisticated muting. An already superb receiver has been surpassed.

SA-5560 FM/AM Stereo Receiver



Amplifier Section

Massive Power Output
The SA-5560 will serve as the powerful backbone for any stereo system. It delivers 90 watts per channel, minimum RMS, into 4 ohms from 20 Hz to 20 kHz, with no more than 0.1% total harmonic distortion (both channels driven). At 1,000 Hz, this figure rises to 108 watts per channel at 4 ohms.



Massive Power Supply
Power-output performance ultimately depends on the power supply. The UL approval accorded the SA-5560 is partial testimony to the generous design of its power supply and more than sufficient to meet the demands of the amplifier. A bridged rectifier circuit helps assure excellent regulation of DC voltage in the face of changes in line voltage or signal input. A 15,000 microfarad filter capacitor is used in either side of the balanced power supply for the unusual total of 30,000 microfarads capacity. This not only contributes to the excellent regulation, but also keeps hum and noise low and improves power availability at the low-frequency end, where it is most often needed.

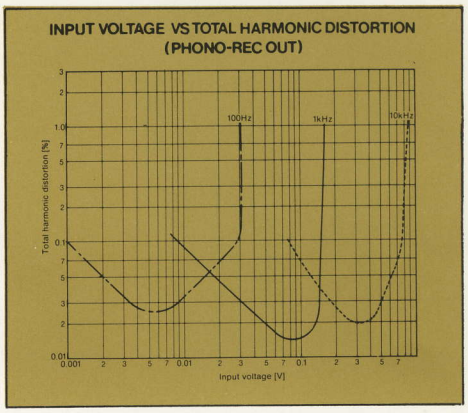
Sophisticated Amplifier Design
Like every Technics receiver ever made, the SA-5560 employs direct-coupled OCL (output capacitor-less) design. This helps assure solid power output and high damping factor not merely in the midrange around the rated frequency of 1,000 Hz, but also extending into the range of the lowest audible frequencies. This results in clean, well-defined bass with plenty of punch and freedom from blurring. For example, there is still substantial output at 5 Hz. A differential amplifier in the first stage employs a single-packaged, matched transistor pair, to ensure stable performance against DC voltage and temperature fluctuations. A pure complementary design, large gain and sufficient negative feedback ensure extremely low 0.1% distortion.

Multiple Circuit/Speaker Protection
The care used in component selection and circuit design makes speaker-damaging breakdown most unlikely, but many audiophiles are nevertheless concerned about possible damage to their valued speakers in the event of amplifier failure or DC leakage through the direct-coupled output. To set their minds at rest, both an automatic electronic circuit with relays and fusing are used to safeguard speakers and amplifier circuitry. In addition, an anti-shock timing circuit helps eliminate annoying thumps in the speaker after turn-on by delaying turn-on of the speaker terminals.

Click-Stop Volume Control
This control offers 41 discrete steps, providing accurate resetting, at any future time, of adjustments found to be most suitable for any particular source or recording.

Low-Distortion Click-Stop Tone Controls
Click-stop settings guard against inadvertent misadjustment, making it possible to return precisely to any previously used setting, without guesswork. Bax-andall type NF tone control circuits are employed, utilizing specially-selected variable resistors, to obtain flat frequency response at center positions. Distortion is kept to minimum, too.

Low-Noise Phono Equalizer
This is a direct-coupled circuit consisting of three stages. Thus low distortion and wide dynamic range (relative immunity to high-amplitude signals) are assured. This carefully worked-out design has been incorporated into an integrated circuit for the usual IC reliability and precision. Specially-selected low-noise IC is employed to obtain superb phono S/N ratio of 65 dB. Precision metal-film resistors (1% tolerance) and polypropylene capacitors (2% tolerance) rigidly keep equalization within ±0.2 dB of the RIAA curve.



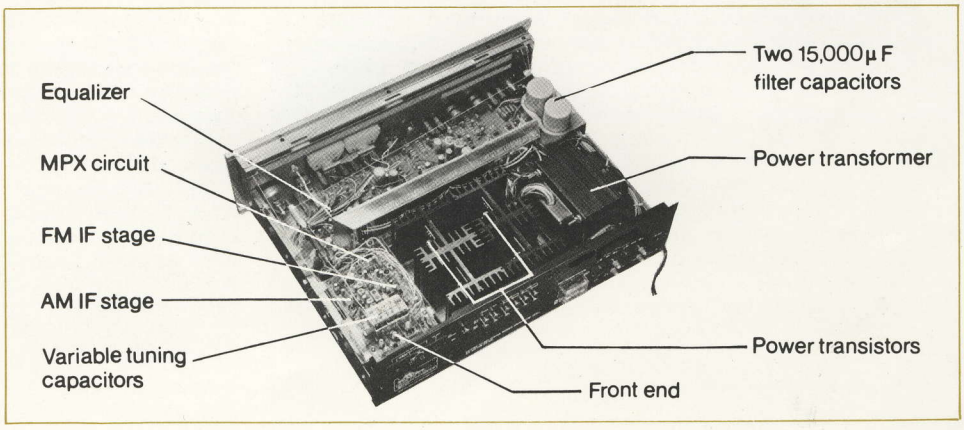
High-Cut and Low-Cut Filters
These filters eliminate or, at least, reduce annoying hiss and scratch noises as well as hum that afflict some records and tapes.

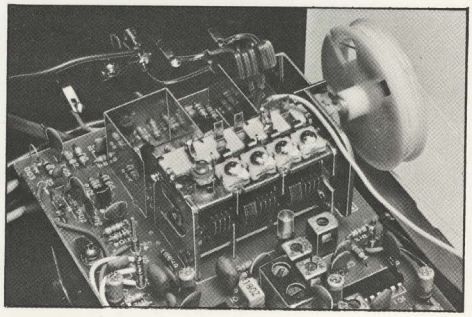
Loudness Switch
At low listening levels, sensitivity of the human ear to low frequencies tends to fall off, throwing the bass out of balance. With the loudness switch engaged, low frequencies are boosted proportionately as volume is reduced to restore a natural, audible balance.

Two Tape Monitors
Complete input/output terminals are provided for two tape decks, with front-panel pushbutton switches for instant monitoring of either one. Both may be activated at the same time for simultaneous copying of the same source material, or the user may dub from the Tape 1 to the Tape 2 position.

Mode Switch
Stereo or monophonic mode may be selected by a front-panel pushbutton.

Main/Remote Speaker Facilities
Two pairs of speakers may be connected and fed separately or together. Two pushbutton selectors permit operation of main speakers only, remote speakers only, both pairs simultaneously, or both off (as for headphone listening)





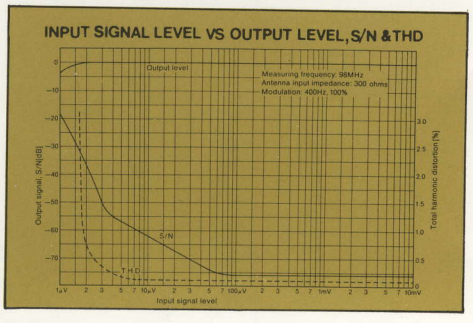
Tuner Section

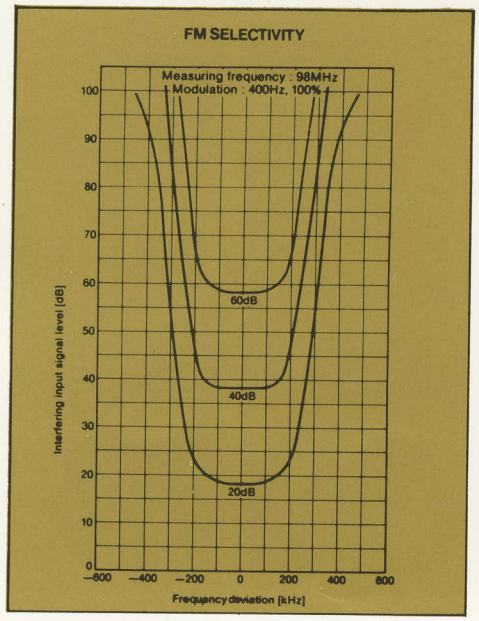
Two Tuning Meters
A zero-center meter indicates precise center-of-channel tuning on FM. A signal-strength meter functions for both FM and AM. In conjunction with the carefully calibrated dial scales, they facilitate tuning for lowest distortion and best noise rejection. In addition, the innovative signal-strength meter exhibits linear indication relative to signal strength on signals below the highest levels, for particularly accurate tuning and as an aid in antenna adjustment or orientation.

Floating Wire in Local Oscillator
This frees the FM oscillator circuit from unwanted coupling through the printed-circuit board, which would produce some degradation in performance. Highly-stable aluminum core coil and temperature-compensating titanium capacitor are employed to keep frequency drift to minimum.

FM IF with IC and "Flat Group Delay" Ceramic Filter
Of the seven stages in the IF section (which include six differential amplifiers), three are 2-element ceramic filters of the new Flat Group Delay type. Flat Group Delay means that phase inaccuracies (and the resultant sound distortions) have been avoided. The result is clarity, transparency and definition of FM sound. AM suppression is large enough to eliminate external noise, thanks to the limiter effect of seven IF stages.

Sensitive 3-Gang FM Tuning
The Technics-developed 4-pole dual-gate MOS FET is used in the front end for high sensitivity and selectivity. In combination with a 3-gang variable tuning capacitor for FM, this results in a selectivity figure of 70 dB and a high sensitivity of 1.8 microvolts (S/N 30 dB, 300 Ω).





FM Muting Switch
When engaged, this switch suppresses annoying inter-station hiss as you tune from one station to another. Its basically smooth action is enhanced further by an AND circuit to eliminate the harsh, transitional noises heard in some muting circuits as they change from the mute to non-mute conditions, or back again. A switch permits defeat of the mute action for reception of distant, marginal transmissions.

Quality FM Discriminator
To preserve the exceptional quality of FM signal processed through the high-performance IF section, a comparably improved detector is used. It is a quadrature discriminator with excellent linearity and broader peak-to-peak range. It thus contributes to full audio-frequency bandwidth, lower distortion and tolerance to high-level signal modulation.

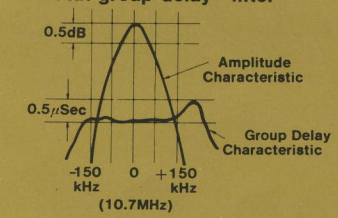
FM MPX Section with PLL IC
In stereo FM, PLL (Phase Locked Loop) circuitry helps maintain precise phasing between the pilot signal and the sub-carrier. This results in low distortion and the maintenance of desired separation throughout the entire spectrum of audible sound. In addition, the PLL circuit maintains stable performance despite changes in temperature, humidity and the passage of time. It has been incorporated into a high-reliability IC that replaces 57 transistors and 4 diodes. Double differential switching circuit ensures stable and excellent separation.

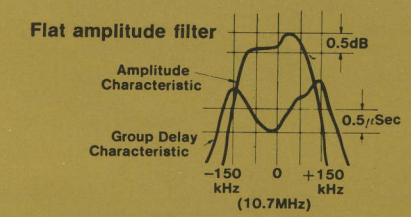
Other Premium FM Features
Overall care in circuit design has resulted in exceptionally flat audio-frequency response right up to the uppermost limits of standard signal transmissions. Chebyshev-type low-pass filters suppress pilot and subcarrier signals without impairing performance at the higher audio frequencies. Phase delay at 15 kHz is a mere 5.5 microsec. Response is +0.2 dB, −0.8 dB over the full bandwidth from 20 to 15,000 Hz. An MPX high-blend switch reduces noise on marginal signals in the FM mode, without essential sacrifice of audible separation. The audio output circuit is designed for quality performance not only under properly modulated signals, but even under 300% modulation. This is particularly important as overmodulated FM transmissions are not unusual.

Quality AM section with IC
We of Technics feel that, when the owner of a good high-fidelity system turns to AM listening for any reason, he is entitled to the reasonable sound quality of which AM, at its best, is indeed capable. Although the results cannot match FM, in any case, the SA-5560 boasts of double tuned LC filter in the IF circuit, along with a precise and stable IC incorporating most of the important circuitry. The result is better sensitivity, noise figure and interference rejection than found in perfunctory "add-on" AM sections.

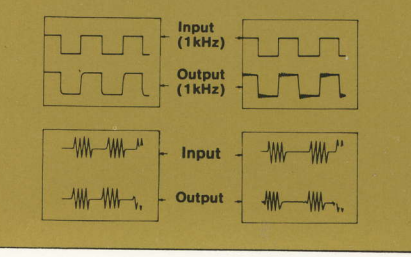
Other Features
- Wide Linear FM Dial Scale
- FM MPX Output Terminal
  For adaptor for future discrete 4-channel broadcasting.

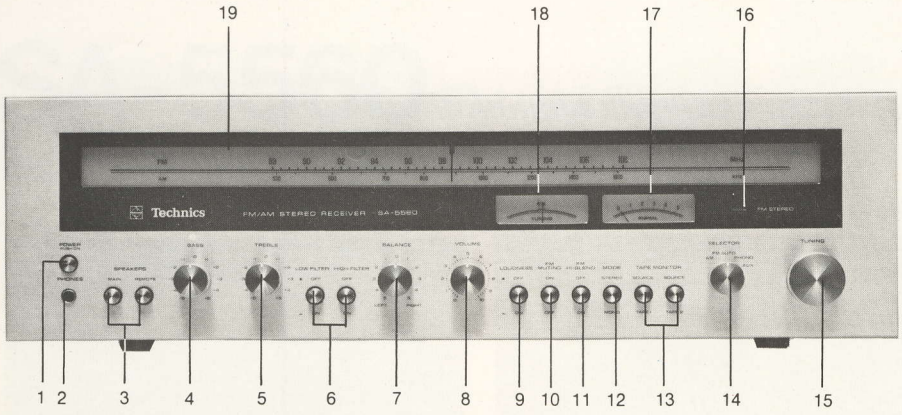
Comparison Between "Flat Group Delay" Filter and Flat Amplitude Filter



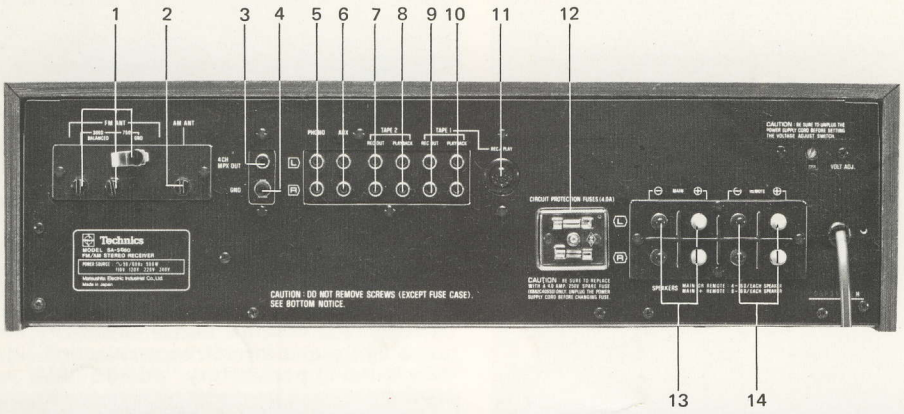


Square Wave and Tone Burst Response





1. Power on/off switch
2. Phone jack
3. Speaker selectors (main, remote)
4. Bass control
5. Treble control
6. High/low filter switches
7. Balance control
8. Volume control
9. Loudness switch
10. FM muting switch
11. FM high blend switch
12. Mode switch
13. Tape monitor switches (Tape 1, 2)
14. Program selector
15. Tuning control
16. FM stereo indicator
17. Signal strength meter
18. FM tuning meter
19. FM/AM tuning dial



1. FM antenna terminals (75Ω, 300Ω)
2. AM antenna terminal
3. 4-channel MPX output
4. Ground terminal
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. REC/PLAY terminal
12. Circuit protection fuses
13. Speaker terminals (main)
14. Speaker terminals (remote)

Technical Specifications (DIN 45 500)

AMPLIFIER SECTION

1 kHz continuous power	
both ch. driven, 4 Ω	2 × 108 W
8 Ω	2 × 93 W
20 Hz ~ 20 kHz continuous power	
both ch. driven, 4 Ω	2 × 90 W
8 Ω	2 × 85 W
Power bandwidth	
(both ch. driven at 4 Ω)	10 Hz ~ 40 kHz. −3 dB
Total harmonic distortion	
(rated power at 40 Hz ~ 16 kHz, 4 Ω)	0.1%
Intermodulation distortion	
(rated power at 250 Hz:8,000 Hz = 4:1, 4 Ω)	0.1%
Damping factor	55 (8 Ω), 27.5 (4 Ω)
Input sensitivity & impedance	
PHONO	2.5 mV/47 kΩ
AUX, TAPE 2 PLAYBACK	150 mV/35 kΩ
TAPE 1 PLAYBACK, REC/PLAY input	180 mV/40 kΩ
PHONO maximum input voltage (1 kHz, RMS)	150 mV
S/N	
rated power	
PHONO	65 dB (IHF A, 78 dB)
AUX	80 dB (IHF A, 90 dB)
50 mW power output	
PHONO	50 dB
	50 dB
Frequency response	20 Hz ~ 20 kHz, ±0.5 dB
(IHF PHONO: RIAA standard curve	±0.2 dB
AUX: 20 Hz ~ 20 kHz,	±0.5 dB)
Tone controls	
BASS	50 Hz, +13 dB ~ −13 dB
TREBLE	10 kHz, +12 dB ~ −12 dB
Loudness control (volume at −30 dB)	
	50 Hz, +9 dB
Low filter	100 Hz, −6 dB/oct.
High filter	7 kHz, −6 dB/oct.
Output voltage	
TAPE 1 REC OUT	180 mV
TAPE 2 REC OUT	150 mV
TAPE 1 REC/PLAY output	30 mV

FM TUNER SECTION

Frequency range	88 ~ 108 MHz
Sensitivity	(IHF 1.8 μV)
S/N 30 dB, 300 Ω	1.8 μV
S/N 20 dB, 300 Ω	1.5 μV
S/N 30 dB, 75 Ω	1.3 μV
S/N 20 dB, 75 Ω	0.9 μV
Total harmonic distortion	
(400 Hz, 100% modulation)	
Stereo	0.25%
Mono	0.15%
S/N at ±40 kHz deviation	
Stereo	54 dB (IHF 72 dB)
Mono	56 dB (IHF 75 dB)
Frequency response	20 Hz ~ 15 kHz, +0.2 −0.8 dB
Alternate channel selectivity	70 dB
Capture ratio	1.5 dB
Image rejection at 98 MHz	53 dB
IF rejection at 98 MHz	80 dB
Spurious response rejection at 98 MHz	78 dB
AM suppression	55 dB
Stereo separation	
1 kHz	45 dB
10 kHz	35 dB
Leak carrier	
19 kHz	−65 dB
38 kHz	−75 dB
Limiting point	1.0 μV
Bandwidth	
IF amplifier	250 kHz
FM demodulator	1000 kHz

AM TUNER SECTION

Frequency range	525 ~ 1605 kHz
Sensitivity	30 μV, 260 μV/m
Selectivity	22 dB
Image rejection at 1,000 kHz	47 dB
IF rejection at 1,000 kHz	40 dB

GENERAL

Power consumption	650 W
Power supply	110 V/120 V/220 V/240 V
Dimensions (W × H × D)	500 × 150 × 420 mm ($19\frac{11}{16}$" × $5\frac{29}{32}$" × $16\frac{17}{32}$")
Weight	16 kg (35.3 lb.)

National **Technics**
Matsushita Electric

(All specifications according to DIN. Where different, IHF values given in brackets.)

Specifications are subject to change without notice. Printed in Japan.