

# Equipment Profiles

This Month:

- Sony STR-6060FW AM/FM Stereo Receiver
- Sony TA-2000 Stereo Preamplifier
- TEAC A-4010S Stereo Tape Deck
- Stanton 681EE Stereo Cartridge
- JBL SE400S Stereo "Energizer"

(Also see Bose 901 Speaker Systems, page 10)

## Sony Model STR-6060 FW AM/FM Stereo Receiver

### MANUFACTURER'S SPECIFICATIONS—

FM Tuner Section—IHF Usable Sensitivity: 1.8  $\mu$ V. S/N Ratio: 65 dB. Capture Ratio: 1.5 dB. IHF Selectivity: 80 dB. Antenna: 300 ohm & 75 ohm. Frequency Response: 20 to 20,000 Hz  $\pm$ 1 dB. Image Rejection: 80 dB. IF Rejection: 90 dB. Spurious Rejection: 90 dB. AM Suppression: 50 dB. Total Harmonic Distortion: Mono, 0.3%; Stereo, 0.5%. FM Stereo Separation: More than 40 dB @ 1 kHz. AM Tuner Section—Sensitivity: 160  $\mu$ V (built-in antenna); 10  $\mu$ V (external antenna). S/N Ratio: 50 dB @ 5 mV input. Amplifier Section—Dynamic Power Output: 110 watts (total), 8 ohms. RMS Power Output: 45 watts per channel, 8 ohms. THD: Under 0.2% at rated output; under 0.08% at 0.5 watt output. IM: Under 0.2% at rated output; under 0.15% at 0.5 watts output. Frequency Response: Aux, Tape: 20 Hz to 60 kHz  $\pm$ 0, -3 dB. S/N Ratio: Aux, Tape: 100 dB; Phono: 70 dB; Tape Head; 60 dB. Tone Control Range: Bass:  $\pm$ 10 dB @ 100 Hz; Treble:  $\pm$ 10 dB @ 10 kHz. General—Dimensions: 17 $\frac{3}{8}$  in. W x 5-5/16 in. H x 13-13/16 in. D. Price: \$399.95.

This new receiver from Sony has a clean, smart-looking appearance. Perhaps it's the sight of a gold-anodized front panel that has only two metal-turned gold knobs plus three neat lever-activated switches. Maybe it's because the expansive dial scale has calibration

marks at every MHz on FM, and they're all *equally spaced!* The impression is confirmed permanently as one starts to use this receiver for, despite outward panel simplicity, it has everything one could ask for in an integrated AM/FM-stereo receiver. It all gets back to "functional design" again. The secret of this layout is the hinged "trap door" which, when opened, discloses the properly arranged additional controls that you might have thought were missing at first glance. But let's not get ahead of ourselves.

To begin with, Fig. 1 shows the front panel layout, including a master volume control, tandem mounted with a fully separate balance control. Wisely, the balance control is operated by a small lever mounted behind the handsome volume control knob. Instead of the usual 300 degrees of rotation, it can only be moved to either side of center for about 45 degrees. When you think of it, most conventional balance controls don't do much for the first quarter of rotation in each direction anyway, so why build in the wasted motion? The huge dial scale is complemented on the right hand side by a tuning knob fully as massive and "comfortable" as the volume control at the left. The flywheel action is superb! The three levers along the lower section of the panel are used for "power on/off," "tape monitor" and a three-position "selector" switch. Yes, we said *three*—just FM/AM, Phono, and Tape Head/Aux.

How can you have a position that reads AM and FM at the same time? Easy, if you examine what's behind that little "closed door," as shown in Fig. 2. Starting at the left are two little lever switches (miniature replicas of their bigger mates on the front panel proper). They turn on (or off) either the main or remote speakers. Next come the expected bass and treble controls (ganged, in each case). The not-so-often-used loudness contour switch (another lever) comes next, followed by levers for mono-stereo automatic (in FM), choice of tape-head or aux inputs and choice of muting, in or out. Finally, there is a two-position, small rotary switch knob which selects AM or FM. This "switching upon switching" ar-

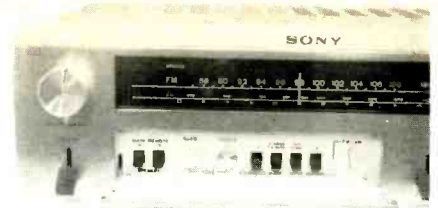


Fig. 2

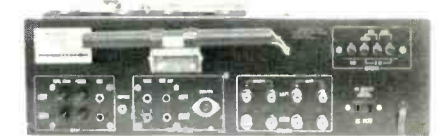


Fig. 3

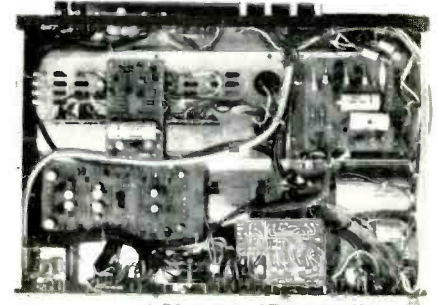


Fig. 4

Fig. 2 (top)—A "trapdoor" hides less-frequently-used controls, providing a less-cluttered appearance.

Fig. 3—Rear panel layout.

Fig. 4—Chassis (with bottom cover removed) discloses a neat, modular layout and husky components.

range-ment lets you set up the receiver to favor your most-often-used services behind the trap door and then allows you to select them by means of the simple, three-position main lever selector switch.

The dial glass area also contains the usual stereo indicator light, plus individual lights denoting AM or FM operation. To the right of the numerals is a dual-purpose tuning meter: zero centered for FM, and perfectly calibrated (we checked its centering against a signal generator, using sweep alignment techniques), and "peak-reading" for AM. Few receivers we have seen provide tuning meter operation for AM as well as for FM.

The rear panel contains the requisite number of inputs and outputs, a useful ground terminal, a special jack for imported tape recorders, one convenience a.c. outlet (unswitched), and antenna terminals for 75- and 300-ohm connection in FM as well as provision for an external AM antenna to supplement the AM adjustable loopstick antenna that comes as part of the receiver. Since the output stages include protective circuitry that is self resetting, there is no need for external

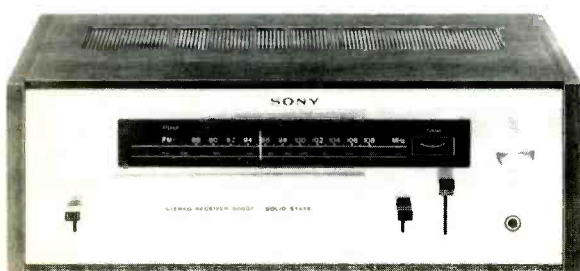


Fig. 1—Sony STR-6060FW FM stereo/FM/AM solid-state receiver.

replaceable fuses. Rear panel layout is shown in Fig. 3.

While the front panel may look simple, the circuit is as advanced as any we have seen. The FM front end uses 2 field-effect transistors (FET's) and a five-gang variable capacitor, which accounts in part for the high sensitivity, extremely high overload capacity and excellent cross-modulation characteristics noted during measurement.

Eighty dB of FM selectivity is achieved, thanks to newly designed crystal i.f. filters which replace conventional tuned transformers in the i.f. section. We found that the muting circuit silenced interstation noise (as well as signals under  $5 \mu\text{V}$ , as specified) while contributing *no* increase in distortion for slightly stronger signals which were able to "break through" the muting feature.

Circuit layout is excellent; major parts examined seem quite rugged and of good quality. An underneath look at the chassis, including several of the printed circuit modules, can be seen in Fig. 4.

## Performance

With receivers getting more and more sensitive, we have started a new procedure in "counting" stations re-

ceived. We now use both the indoor dipole (usually supplied by the manufacturer) and our regular outdoor FM antenna, and state results for both. In this case we received 37 acceptable signals (12 stereo) with just the dipole, while the outdoor antenna raised the total to 39 (13 stereo).

This came as no great surprise, for we had already examined sensitivity and other FM traits, as plotted in Fig. 5. Our plot shows an average sensitivity of  $2.0 \mu\text{V}$  against the claimed 1.8, which is really splitting hairs, since we *did* measure  $1.8 \mu\text{V}$  at 88 MHz and  $2.1$  at 106 MHz. This variation is negligible, as production tolerances go. S/N measured 65 dB as claimed, while THD was 0.3% in mono and only 0.4% in stereo. Stereoc separation for FM measured 40 dB at 1 kHz, with figures at other frequencies plotted in Fig. 6. While Sony claims separation of "better than 40 dB" at 1 kHz, you couldn't prove it by us, for our equipment is only capable of measuring down to 40 dB!

If Sony wants to rate the power output of each channel at 45 watts (referenced to 0.2% THD at 8 ohms) that's very nice of them, but how conservative can you get? We can report that they do reach 0.2% THD at *exactly* 45 watts per channel, as shown in Fig. 7, but

look beyond 45 watts and you find that they don't reach 1% THD per channel until 55 watts per channel! In the case of IM, while it also reaches 0.2% at 45 watts, it's only up to 0.38% at 50 watts per channel!

While Sony doesn't mention power bandwidth, we found it to extend from 20 Hz to 45 kHz, as shown in Fig. 8, while frequency response was within 1.5 dB from 20 Hz to 60 kHz—again better than published claims. Tone control range is just about average, as shown in Fig. 9.

Using the Sony STR-6060 FW receiver for a couple of weeks was a very pleasant experience. While record reproduction was as good as any we had heard, there's something about the FM action that's just a bit better than most. Maybe it's those crystal filters—but whatever it is, FM sounded more "live" than usual—imparting a very crisp, natural-sounding equalization to several of the better stations in our area that we seldom hear quite that good. Even the AM section, which we don't usually measure with instrumentation, seems particularly "wide-band" and almost of "high fidelity" quality. Such excellent receiver performance at a \$400 list price is not so very common these days.

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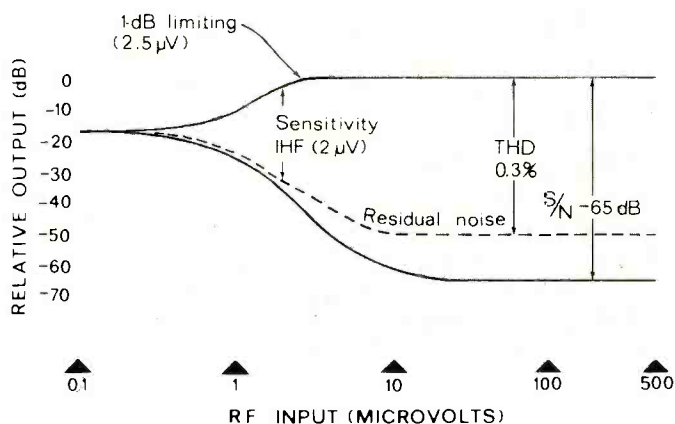


Fig. 5—FM characteristics of the Sony STR-6060FW receiver.

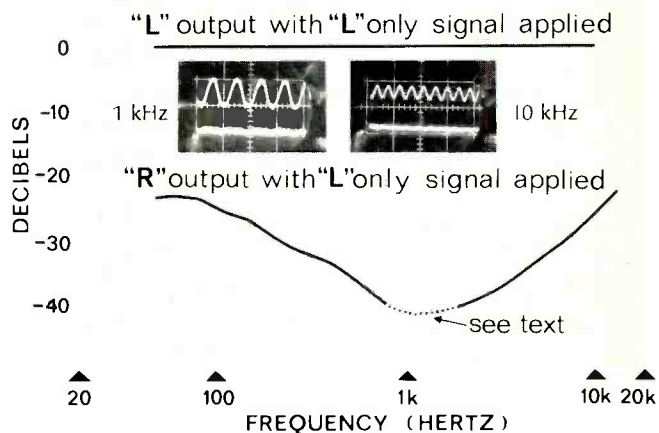


Fig. 6—Stereo FM separation measurements. Dual 'scope traces shown at 1 kHz and 10 kHz.

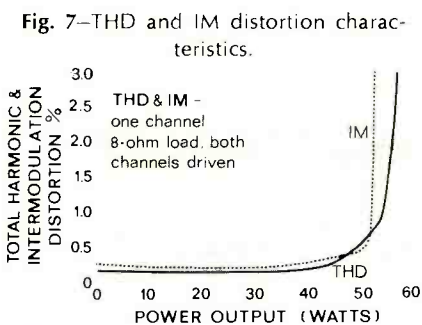


Fig. 7—THD and IM distortion characteristics.

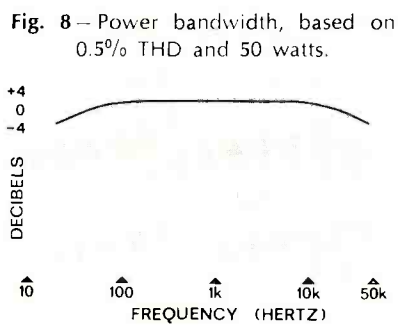


Fig. 8—Power bandwidth, based on 0.5% THD and 50 watts.

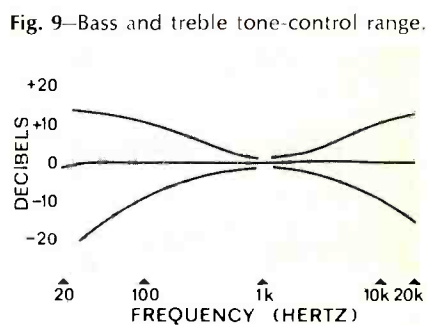


Fig. 9—Bass and treble tone-control range.