Equipment profiles

Armstrong Model 625 Stereo FM Receiver

MANUFACTURER'S SPECIFICATIONS

FM Tuner Section
IHF Sensitivity (75 ohms): 1.5 μV (14.7 dBf).
Frequency Response: 30 Hz to 14 kHz (−3 dB).
THD: Mono, 1 kHz, 40 kHz deviations, 0.2 per cent.
S/N @ 100 μV (100% Modulation): 65 dB.
Image Rejection: 50 dB.
I.F. Rejection: 100 dB.
AM Suppression: 50 dB.
Selectivity: 56 dB.
Capture Ratio: 1.75 dB.
Stereo Separation @ 1 kHz: 40 dB.
38-kHz Rejection: 65 dB.

Amplifier Section
Power Output: 40 watts per channel continuous, into 8 ohms, 20 Hz to 20 kHz.
Rated THD: 0.18 per cent.
IM Distortion @ 35 watts: 0.08 per cent.
Frequency Response: Phono, 20 Hz to 20 kHz, ±1 dB; High Level, 20 Hz to 25 kHz, ±1 dB.
Damping Factor: 50.
Hum and Noise (all inputs): Better than 65 dB, unweighted.
Input Sensitivity: Phono, 3.0 mV/6.0 mV; Tuner & AUX, 120 mV, Tape, 250 mV.
Phono Overload: 75 mV/150 mV.
Bass Control: ±15 dB @ 70 Hz.
Treble Control: ±13 dB @ 15 kHz.

General Specifications
Power Consumption: 180 watts.
Dimensions: 19¾ in. (50 cm) W × 3¼ in. (8.3 cm) H × 11¼ in. (28.6 cm) D.
Weight: 15 lbs. (6.8 kg).
Price: $495.00.

The very good looking Armstrong 625 stereo FM receiver tested for this report is part of a family of products distributed in this country by the Sindell Organization, of Los Angeles. The British firm of Armstrong Audio Ltd., located in London, has developed an entire family of high-fidelity component products, all of which use one or more identical circuit modules, as required. From these basic design modules, the company has created five similarly styled, low-profile units housed in rosewood-finished wood cabinets and graced by matte black front panels equipped with contrasting silver control knobs. Included in the 600 series are an integrated amplifier (Model 621 selling for around $359.00), an AM-FM tuner (Model 623 at $359.00), an FM tuner (Model 624 at $249.00) an FM-AM receiver (Model 626 at $585.00) and the FM receiver, Model 625, which we evaluated for this report. As is the case with so many good sounding British and European high fidelity products, the emphasis seems to be less on impressive printed specifications and more on

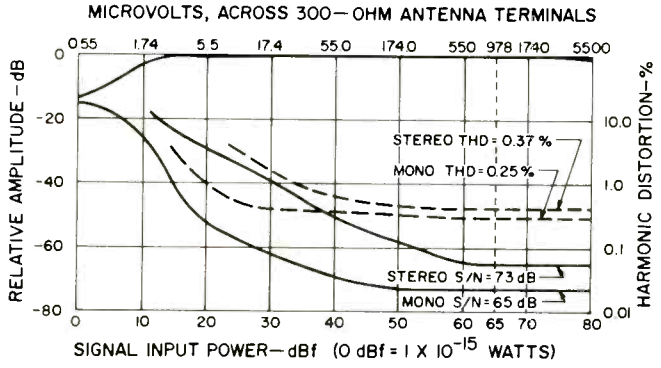


Fig. 1—Mono and stereo quieting and distortion characteristics.

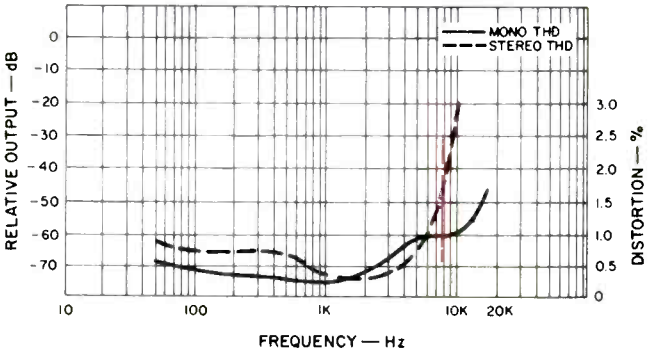
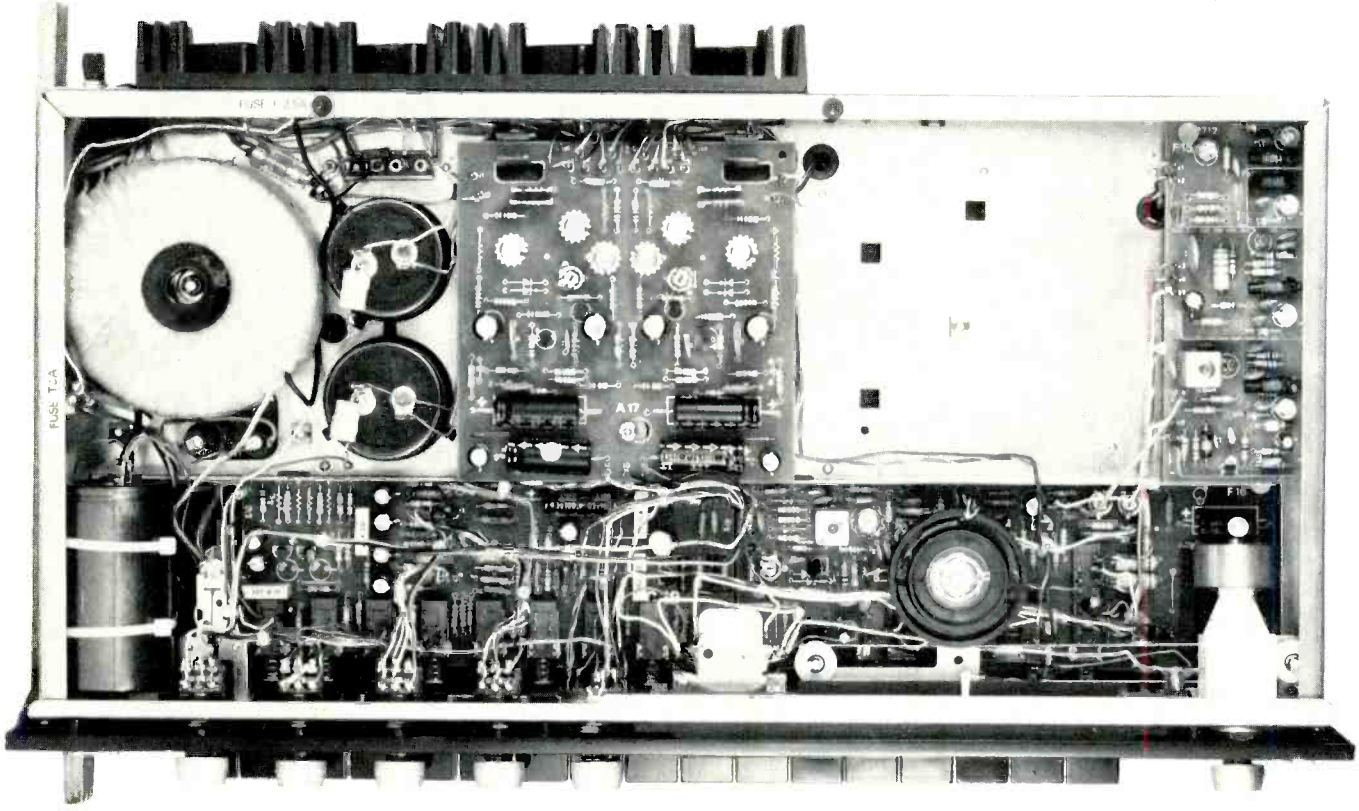


Fig. 2—Distortion vs. frequency of the Armstrong 625.

listening quality and elegance of styling. What Japanese or American manufacturer would dare come up with an amplifier THD rating as high as 0.18 per cent in a receiver expected to sell for nearly $500.00 these days? And how many high-quality tuner sections would admit to a roll-off of 3 dB at 15 kHz? Well, don't let the seemingly "poor but honest" published specs fool you. This line is "high end" all the way.

The very slim front panel has rotary control knobs for volume, balance, treble, bass, and program source selection. To the right of these are two meter scales which, contrary to expectations are *not* just center-of-channel and signal strength meters. The *lower* meter actually performs both of these functions (depending upon the setting of the AFC control), while the upper meter actually serves to indicate *relative* frequency settings when the six-station preselect facilities are employed. More about that in a moment. A nonlinear FM frequency scale and dial pointer area comes next, with a stereo indicator light integrated into the dial area, and a manual tuning knob with flywheel-assist is at the extreme right of the front panel.

Along the bottom of the control panel are 17 piano-key pushbuttons. The first of these turns on power to the receiver. There are a pair of speaker selector buttons, loudness and tape monitor buttons, a button marked "slope" which determines the high-cut filter slopes of the two adjacent high-cut buttons, a low-cut filter button, mono/stereo selector, local-distant switch, AFC switch, a "tune" button (for manual tuning via the tuning knob), and three additional buttons numbered 1, 2, and 3 plus a fourth button identified by a square symbol. These last four buttons permit the user to preselect up to six favorite stations. A plastic cover below the tuning knob, when removed, exposes six tiny screwdriver adjustments, each of which relates to one of the three numbered pre-select buttons. With the square-symbol button depressed, the three similarly identified screwdriver slots are used so that three numbered buttons allow for six station selections. This is where the second meter comes in. When a desired station is tuned to manually, this meter indicates a relative tuning voltage (this tuner section is varactor tuned), which makes it easier to find the desired station to be preset



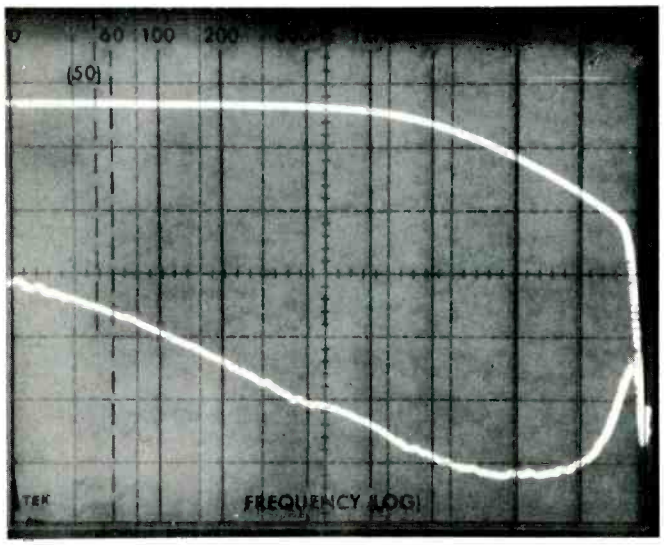


Fig. 3—Stereo separation vs. frequency.

when using one of the multi-turn screwdriver adjustable variable resistors to set the proper pre-tuned varactor voltage.

As is true of many other European produced hi-fi products, all of the connections to the rear panel are made by means of special polarized plugs (for speaker systems 1 and 2) and multi-pin (DIN) plugs for the AUX inputs, phono inputs, and tape-in and out connections. In the case of the Model 625, proper plugs for speaker connection are supplied with the unit and stripped wires from speaker cables can be assembled to these plugs without soldering. As for the other inputs and outputs, our sample was supplied with the necessary phono-plug to DIN adaptor cables so that ordinary pin-plug terminated audio cables could be used with the receiver. Beneath the chassis are a pair of small output level controls which can be used to vary the level of signals at the tape-out terminals to match requirements of any connected tape deck. This under-the-chassis control group also contains a slide switch which varies the phono input sensitivity from 3 mV to 6 mV to suit the phono cartridge used with the receiver.

Circuit Highlights

The FM tuner section of the receiver uses a pair of dual-gate FETS for r.f. and mixer stages and, as mentioned earlier, four varactor diodes whose effective capacitance varies in accordance with d.c. voltages applied and constitute the "C" of the tuning circuits in the front end. Fixed ceramic bandpass filters are used between stages of the i.f. section, and a CA-3012 IC serves as the final amplifier-limiter of this section, driving a full Foster-Seeley discriminator FM detector circuit. The stereo decoder section utilizes a CA3090 phase-lock-loop MPX IC with frequency lock accomplished by means of a single adjustable coil. Outputs are passed through a low-pass filter for suppression of sub-carrier products.

Program input selection is achieved by a new form of non-mechanical switching which Armstrong calls Electronic Gate switching. This diode switching arrangement makes it possible to switch from one program source to another without any audible clicks or pops. The phono low-level preamp circuit consists of two transistors per channel with an appropriate RIAA feedback network applied from collector of the second stage to the emitter of the input stage. Tone control circuitry is of the familiar Baxandall negative feedback type and, interestingly, the tape output terminals are located after the tone control stage so that signals applied to the tape deck can be "equalized" by means of the bass and treble controls before they are recorded. Low- and high-cut filters are all of RC circuit configuration.

The two n-p-n power output transistors are powered from a single + 82 volt supply, so that the audio take-off center point between the pair must be capacitor isolated. A 4700-μF coupling capacitor is used to isolate between this point and the speaker terminals. In terms of protection circuitry, the 625 has individual fuses in the voltage supply lines feeding the output stages of each channel as well as a thermal cutout in the ordinary circuit of the power supply transformer. The power transformer, clearly visible in the internal view of the receiver, is toroidally wound. Circuit layout within the chassis was orderly and well executed.

FM Performance Measurements

Even a cursory reading of the published specifications for the tuner section reveals that the British have not as yet adopted the new IHF/IEEE FM tuner measurement standards which we use in this country. For one thing, they quote usable sensitivity as 1.5 μV (with a parenthetical reference to the 75-ohm input), which is actually equivalent to 3.0 μV referred to 300 ohms. This is exactly why the term dBf was invented and, in this case works out to a value of 14.7. The 50-dB quieting sensitivity in mono was 4.5 μV (18.3 dBf), while for stereo, 50 μV (39.2 dBf) was needed for 50 dB of quieting. Usable stereo sensitivity measured 10 μV (25.0 dBf). Ultimate S/N in mono was 73 dB, 65 dB for stereo. Quieting characteristics, as well as the distortion of a 1-kHz modulating signal versus signal input strength, are plotted for stereo and mono performance in the graphs of Fig. 1. At 65 dBf, THD in mono for a 1 kHz signal was 0.25 per cent, a bit poorer than the 0.2 per cent claimed. In stereo, THD was a bit higher, measuring 0.37 per cent. Capture ratio was almost exactly 1.75 dB, as claimed, while alternate channel selectivity was 55 dB. AM suppression was 54 dB, better than claimed, while image and i.f.

Fig. 4—Harmonic and intermodulation distortion characteristics.

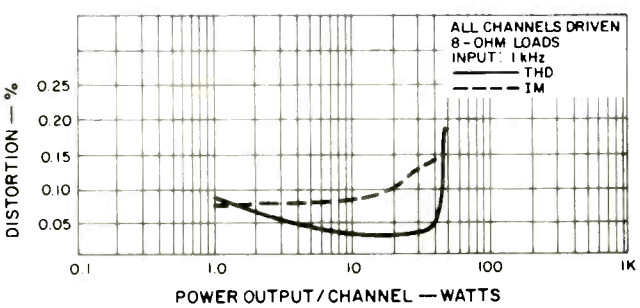
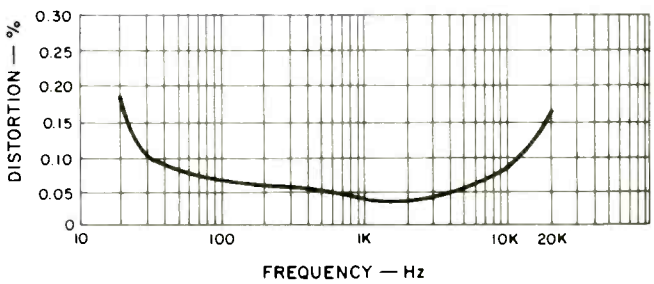


Fig. 5—Distortion vs. frequency.



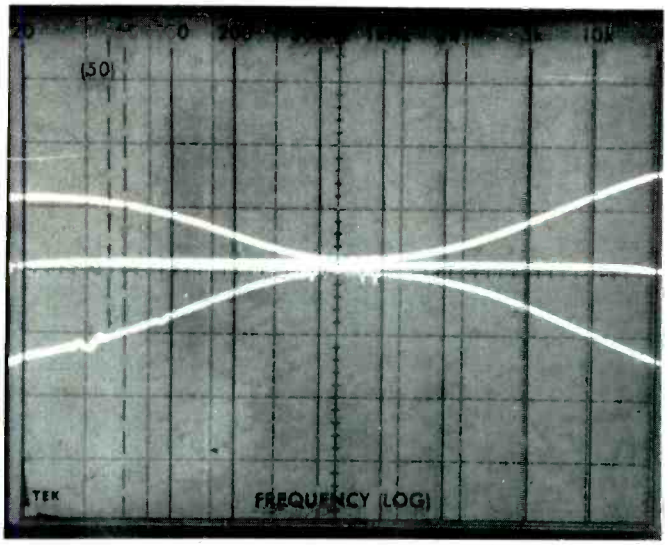


Fig. 6—Bass and treble control range.

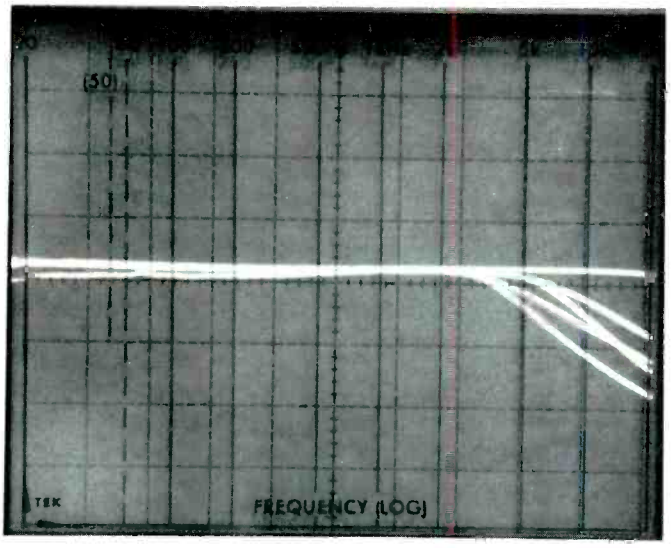


Fig. 7—High-cut filter characteristics.

rejection were measured as 55 dB and 95 dB respectively. Mono and stereo THD as a function of modulating frequency is plotted in Fig. 2.

The 'scope photo of Fig. 3 illustrates the stereo FM separation characteristics of the tuner section. At 100 Hz, separation measured 32 dB, increasing to 45 dB at 1 kHz and then decreasing to a very acceptable 32 dB at 10 kHz.

Power Amplifier Section

The power amplifier sections of the 625 delivered 47 watts per channel at mid-frequencies for rated harmonic distortion of 0.18 per cent. IM distortion measured 0.13 per cent for 35 watts of equivalent output per channel, both channels driven. As can be seen in Fig. 4, harmonic and IM distortion are well below the rated values at all power levels below clipping. Figure 5 is a plot of harmonic distortion versus frequency for 40 watts output per channel, and it is clear that the 40 watt rating (for 0.18 per cent THD) is the highest that could have been legally applied to this receiver's power section since, at the frequency extremes of 20 Hz and 20 kHz, the 0.18 per cent THD point is very nearly what we measured. Damping factor using an 8-ohm reference was 53 at 1 kHz.

Preamplifier Section Measurements

Phono input sensitivity measured exactly 3.0 mV or 6.0 mV, depending upon the setting of the input sensitivity switch. For the high-sensitivity setting, phono overload was 97 mV, while for the lower sensitivity setting, it was 180 mV. RIAA equalization was accurate to within 0.2 dB over the entire audio range, and signal to noise (measured for the more sensitive input setting) was 72 dB referred to actual input sensitivity and unweighted. Surprisingly, the high-level input also measured 72 dB of S/N, referred to rated output (we would have expected better).

Frequency response of the high level input circuits was flat within 1 dB from 15 Hz to 28 kHz and the −3 dB roll-off points occurred at 10 Hz and 38 kHz. Residual hum and noise (at minimum volume, with only the power amplifier in the circuit) was 92 dB below full rated output.

Tone control range is depicted in the 'scope photo of Fig. 6, while the various combinations of high-end filter roll-off are displayed in the 'scope photo of Fig. 7. The action of the subsonic filter is not visible in this photo because roll-off begins below 20 Hz, the lower limit of the sweep used to produce the results shown in Fig. 7.

Listening and Use Tests

All of which brings us to a dilemma faced by many an audio product tester. If you have read this report carefully to this point, you may have concluded that the Armstrong 625 receiver is really nothing special. Indeed, competitive products selling for considerably less have more impressive "measured" specs and even a few control features (such as twin phono inputs, double tape-monitor circuits, etc.) that the 625 lacks. All these logical and rational observations hold up well—until you start listening to the receiver. Reproduction in phono is absolutely superb. Given a decent outdoor antenna connection, FM reception is great, too. Dial calibration is very precise and, unlike other pre-set tuners and receivers that depend upon voltages applied to varactors for tuning, we detected absolutely no drift, regardless of whether we pushed the buttons for our six favorite pre-set stations or used the manual tuning mode (which is really nothing more than a precision potentiometer that picks off a varying d.c. voltage for application to those varactor diodes). Control operation is smooth and precise and, as claimed, there are no pops and clicks either at turn on or when switching from one program source to another.

According to a letter we received from the Sindell Organization, the U.S. distributors of the Armstrong line, the tuner section of this receiver (which is identical in the entire line) is used as a separate tuner for monitoring purposes by the BBC in Great Britain. Certainly, they could have chosen a tuner that "measures" better for that purpose—and so could you. But in terms of *audible* performance, we can fully understand the choice. The tuner *does* offer excellent FM reproduction when presented with signals of stations whose program practices are good. We do wish that Armstrong had elected to incorporate a more powerful amplifier in this line, since 40 watts of output does restrict one's choice of loudspeaker somewhat, but so long as higher efficiency speakers are chosen to work with the 625, this is not a serious limitation these days.

As for why the receiver sounds so good but "measures" just average, if I knew the answer to that question, many of the daily and weekly frustrations I experience in the course of testing equipment might be a thing of the past. For the moment, I can only judge by what I hear—and what I heard in the case of the Armstrong 625 was very good indeed.

Leonard Feldman

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