

Equipment Profiles

This Month:

- Fisher Model 200-T Stereo FM Receiver
- KLH Model Twelve Speaker System
- AKG Model K-60 Stereo Headphones
- Heathkit Model TOA-67-1 Organ "Band Box"

Fisher Model 200-T Stereo FM Receiver



Fig. 1—Seventy-watt (IHF) stereo FM receiver.

MANUFACTURER'S SPECIFICATIONS—(FM TUNER SECTION) Usable Sensitivity (IHF): 2.0 μ V. Harmonic Distortion (400 Hz, 100% Mod.): 0.5%. Signal-to-Noise Ratio: 65 dB. Alternate Channel Selectivity: 40 dB. Spurious Response Rejection: 90 dB. Image Frequency Rejection: 60 dB. I.F. Frequency Rejection: 90 dB. FM Stereo Separation @ 1 kHz: greater than 35 dB. Capture Ratio (IHF): 2.5 dB.

(AMPLIFIER SECTION) Total Music Power (IHF): 50 watts (8 ohms). Total Harmonic Distortion (@ 1 kHz): 0.8%. IM Distortion: 1%. Power Bandwidth (8 ohms): 22 to 30,000 Hz. Hum & Noise: Volume (at min.): -80 dB; Phono low (6 mV ref.): -55 dB. Frequency Response (Aux.): 25 to 20,000 Hz \pm 2 dB. Bass Control Range (@ 50 Hz): 17 dB. Treble Control Range (@ 10 kHz): 16 dB. Subsonic Filter: 12 dB/octave below 20 Hz. Dimensions: 15 $\frac{1}{8}$ in. W x 4-13/16 in. H. x 11 $\frac{1}{2}$ in. D. Weight: 22 lbs. Price: \$299.95. (Optional walnut cabinet, \$24.95.)

Fisher Radio's Model 200-T, a moderately priced (\$299.95) receiver, offers a measure of flexibility often associated with more costly units. As shown in Fig. 1, major controls located along the lower half of the front panel include

the usual selector switch (four position), a ganged bass control as well as a ganged treble control, a balance control and the volume control which, in its counter-clockwise position, turns off power to the receiver. There are, in addition, four "rocker" switches on this part of the panel as well as a stereo headphone jack at lower left.

The upper portion of the panel contains the very precisely calibrated dial scale, expanded to about six in. from 88 MHz to 108 MHz. There is also a complementing "logging scale" numbered from 0 to 100 for those people who just can't memorize their favorite station's actual frequency in megahertz. Overall calibration was found to be extremely accurate from one end of the band to the other. A peak-reading tuning meter and the familiar stereo indicator light are also located under the softly illuminated dial glass. While we generally take exception to "peak reading" tuning meters, in this case the meter proves to be effective as a center-of-channel type. The least de-tuning away from center-of-channel causes a decrease in the maximum reading. Insofar as its usefulness as a signal-strength meter however, its exponential action is such that all signals in excess of about 50 μ V cause almost full-scale deflection.

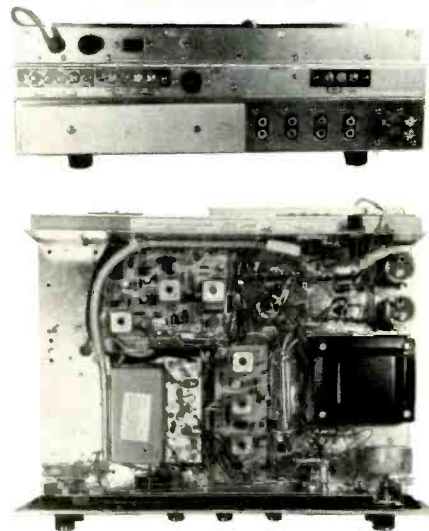
To the left of the dial scale is a speaker selector switch, enabling the listener to select main, remote or both sets of speakers, as well as an "off" position that would be used to disconnect all speaker systems while listening to stereo headphones, if desired. At the upper right of the panel is the tuning knob.

The rear connection panel is illustrated in Fig. 2. Pairs of input jacks are

provided for magnetic phono, low-level and high-level auxiliary sources, and tape recorder output and monitor inputs. The magnetic phono input is associated with a slide switch which varies magnetic input sensitivity, thus accommodating a greater range of magnetic cartridges than might otherwise be possible. There was no evidence of input overload or incompatibility of levels between phono and internal FM or FM Stereo gain. At the left are located the speaker terminal strips, the line fuse, and an auxiliary power receptacle. Speaker terminals are rather closely spaced. Therefore, we would recommend using spade lugs to ensure that frayed ends of speaker lead wires do not cause shorts.

Unlike many manufacturers who provide a "local" and "distant" antenna connection scheme by "padding" or attenuating the input signal resistively, the Fisher 200-T provides a "Local FM" position on the main selector switch for use when a very strong station causes interference with a desired,

Figs. 2 and 3—Rear-connection panel of Fisher 200-T. Tube socket at center is for test points. Bottom photo shows circuit-board construction.



weaker station. This switch position alters the r.f. gain electronically, varying the gain of the first FET stage in the front end. This approach strikes us as a preferred one, since impedance match between antenna and input is always maintained.

Figure 3 shows the Model 200-T receiver's internal construction. In addition to the fully sealed front end, which employs two FET's and a 2N3588 local oscillator, there are six printed circuit

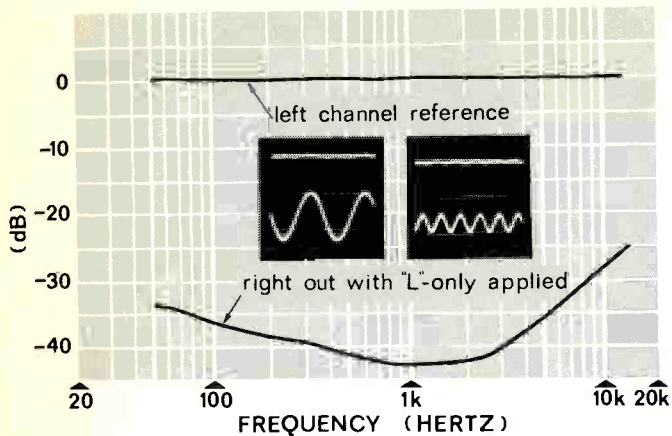


Fig. 4—Stereo FM separation of Fisher 200-T.

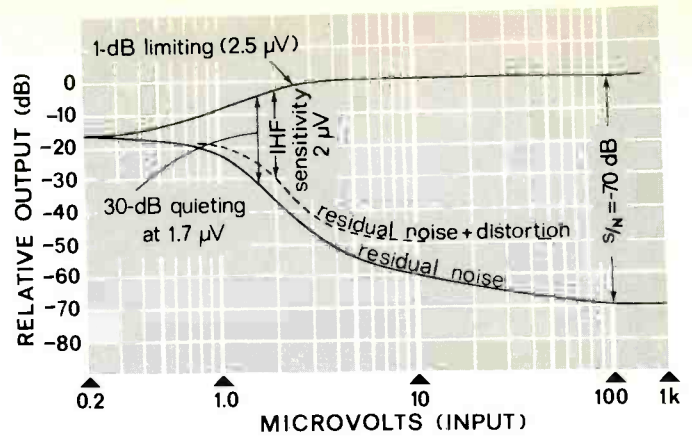


Fig. 5—FM quieting characteristics.

modules. The output transistors themselves are, of course, separately mounted on the rear of the chassis to provide adequate heat-sinking.

Measurements

Fisher specifications have long been noted for their conservatism, and the 200-T does not upset this tradition. IHF sensitivity was measured as 2.0 μ V, as claimed by the manufacturer. Harmonic distortion on FM was a very low 0.3% at full modulation, bettering the 0.5% claimed. Ultimate signal-to-noise exceeded manufacturer's claims by fully 5 dB, measuring 70 dB. No evidence of spurious responses was observed during listening tests at any point on the dial. Capture ratio corresponded nicely to the 2.5 dB claimed, while stereo separation (see Fig. 4) exceeded claims at 1 kHz, measuring 38 dB on both channels. Figure 5 tells the story about limiting and FM quieting characteristics.

As for amplifier power output, we reached rated total harmonic distortion

(THD) at an output (per channel) of 21.8 watts as against the 20 watts claimed for 8-ohm load operation. At 20 watts (rated output), distortion was a mere 0.5%. THD and IM distortion curves are shown in Fig. 6. Power bandwidth is plotted in Fig. 7 and is seen to correspond very neatly with the manufacturer's specifications. All hum and noise figures exceeded published claims by anywhere from 3 dB (volume at minimum) to 8 dB ("Phono Low," with 6 mV reference).

Bass and treble control range, while not great (see Fig. 8), were certainly adequate for the moderate amounts of compensation that the average music listener might want.

As for frequency response, the design philosophy of the 200-T was obviously that of the school which believes that response should not extend much beyond the 20 and 20,000 Hz limits. This accounts for the somewhat more rounded square-wave response shown in Fig. 9 (at 10 kHz). Nevertheless, transient response is noted to be excellent, as there is no evidence of over-

shoot or "ringing" at either 100 or 10,000 Hz application of square-wave signals.

When we tried measuring the action of FM, with the muting circuit "in," it was realized that here was a really unique muting circuit. Not a trace of added distortion was detected with the introduction of "muting." The "threshold point" is absolute—either the signal is muted (below about 10 μ V), or it comes "popping" in, fully listenable and free of distortion. Few, if any, muting circuits we have seen have performed so flawlessly.

This remarkable muting circuit was even more effective under actual listening tests. When "in-circuit," the mute maintains silence until the desired station is almost tuned in to the center of the channel. Then sound comes in, with no noticeable crash or transition—it is suddenly just *there*. Furthermore, we didn't sacrifice too many stations with the circuit in. In a close-to-New York location, 38 usable stations were received without muting; 36 with the muting "in." No less than 14 stations

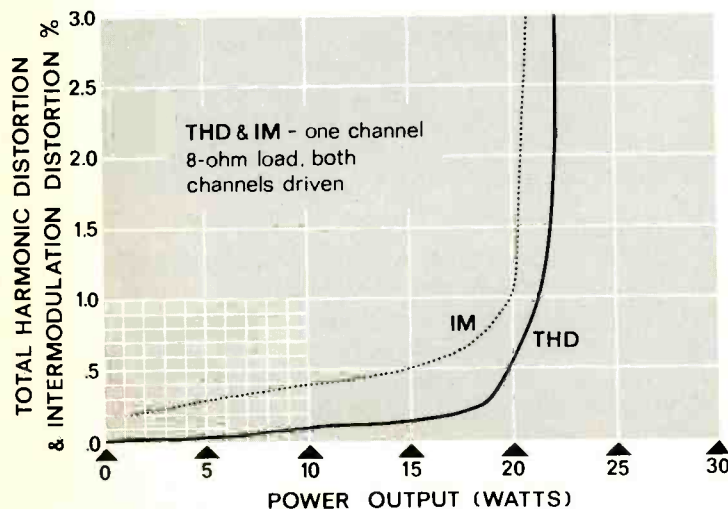
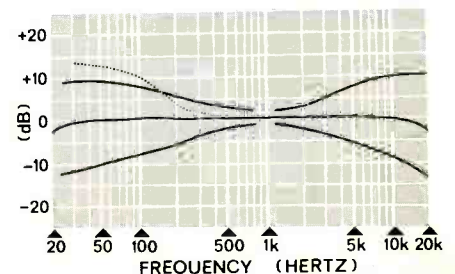


Fig. 6—Harmonic and IM-distortion curves.

Fig. 7—Power bandwidth with 8-ohm load.



Fig. 8—Tone-control range. Dotted line shows loudness compensation for bass region at 1/4 rotation of volume control.

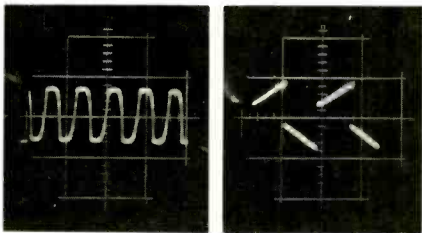


were received in stereo FM, with muting either "in" or "out." One of these was marginal, and now and again the "Stereo Beacon" would go on and off, but there was no accompanying "switching noise" associated with this periodic transition, simply a return to and from mono reception.

Sound quality on both FM and recordings was quite "transparent." The amplifier was able to handle the many percussive and wide dynamic musical passages to which it was subjected (for example, "Pictures At An Exhibition," Mussorgsky-Ravel, London Tape LCK-80054).

In view of a "modest" damping factor (around 10), this raised the old question as to how much importance damping factor really is in relation to

Fig. 9—Square-wave response of Fisher 200-T receiver at 10 kHz (left) and 100 Hz.



transient response. It should be noted, too, that low-efficiency type speaker systems were used and yet there was more than adequate volume in an average-size living room (around 15 by 20 ft.). As one audio wag put it years ago, "What this country needs is not more powerful amplifiers but an honest amplifier that can produce its rated output down to 20 cycles." (He said this before "cycle" was converted to "hertz".) The Fisher 200-T certainly fills that need and then some. If it lacks separate tone controls for each channel, consider that its ganged controls are tracked perfectly down to -50 dB (within 2 dB). If it doesn't have switchable hi- and lo-cut filters, consider how rarely these features are really used. If input level adjustments are absent it does take the trouble to provide alternate inputs (high and low) for both phono cartridges and auxiliary sources.

All in all, Fisher Radio's specifications for the Model 200-T FM stereo receiver tell it like it is. And though the receiver is not laden with various controls, it offers more than sufficient operating versatility for music lovers who are not enamoured with ultra control flexibility.

Check No. 36 on Reader Service Card

KLH Model Twelve Speaker System

MANUFACTURER'S DESCRIPTION: Type: Three-way, four-speaker system. Speaker Complement: One 12" woofer, two small-cone mid-range drivers, one 1 3/4" tweeter. Crossover Freq.: Nominally 600 & 2500 Hz. Controls: Four three-position switches. Housing: Floor-standing cabinet, oiled walnut. Dimensions: 29" H x 22 1/2" W x 15" D. Price: \$275.00.

The Model Twelve speaker system, which at \$275 is the most expensive unit in the KLH line of moving-coil systems, belies the small-enclosure image of acoustic-suspension speakers. The "Twelve" is a floor-standing unit as contrasted to the familiar bookshelf-sized systems which often employ the acoustic-suspension principle.

As readers know, until the adoption of acoustic-suspension designs, an enclosure had to be large in size to produce deep-bass frequencies. Acoustic-suspension speaker systems changed all that by making it possible to reproduce very low frequencies in a small enclosure. However, proponents of this type of system have long insisted that the principle of design does not necessarily require that a unit be small in size.

The Model Twelve's walnut console houses four direct-radiator, cone-type speakers. The woofer, designed to handle frequencies below 600 Hz, is a long-throw acoustic-suspension design with heavy cone and magnet assemblies. It works into four cubic feet of space. The manufacturer's intent here is to extend low-frequency coverage while retaining the acoustic-suspension principle of operation, which replaces conventional mechanical springiness of the speaker's outer suspension with spring action of the air trapped within a sealed enclosure. The two three-in. mid-range units operate in their own acoustic suspension sub-enclosures. These are the same speakers as wide-range units used in some of KLH's compact music systems. With the Model Twelve, they cover the range of frequencies between 600 and 2500 Hz. A 1 3/4-in. tweeter covers the range above 2500 Hz.

The unique feature of the Model Twelve is its frequency-contour control. This box, 12-in. x 9-in. x 2 1/2-in., can be attached to the back of the speaker with self-contained "Velcro" (a hook and pile fastener), or it can be positioned remotely at the listening station. It has four 3-position selector-type switches, is finished in walnut just like the



Fig. 1—KLH Twelve, including frequency contour control.

speaker, and contains circuitry for frequency shaping as well as for the speaker system's crossover network. The power amplifier's output is connected to the box. Either of two lengths of color-coded 4-conductor wire supplied are used to connect the control box to the speaker system. One length is short, mounted to the rear of the speaker, the other length, about 40 ft., is used if the unit is placed at a remote location. Each switch controls the specific range of frequencies described earlier. In center positions the speaker system is flat. In up positions, we found that about a 3-dB boost in the center of the specific frequency range is accomplished. In the down positions, a 3-dB cut can be effected. We liked the flexibility afforded by the contour control—especially when used at the listening place. Since its controls are

Fig. 2—The KLH Twelve's contour control box, showing crossover, filter and attenuator components. The hefty attenuator resistor in the bass range (lower left) only became luke warm while listening to music at high levels.

