Equipment Profiles

Kenwood KR-6340 "Two-Four" Receiver

MANUFACTURER'S SPECIFICATIONS

FM TUNER SECTION:

IHF Sensitivity (Mono): 2.0 μV. **S/N Ratio**: 63 dB. **THD**: Mono, 0.5%; Stereo, 0.8%. **Selectivity**: 50 dB. **AM Suppression**: 60 dB. **Capture Ratio**: 3.0 dB. **Image Rejection**: 60 dB. **IF Rejection**: 90 dB. **Spurious Response**: 90 dB. **Sub-Carrier Rejection**: 45 dB. **Frequency Response**: 20 Hz to 15,000 Hz ± 1.2 dB.

AM TUNER SECTION:

IHF Sensitivity: 25 μV. **S/N**: 45 dB. **Image Rejection**: 45 dB. **Selectivity**: 30 dB. **IF Rejection**: 35 dB.

AMPLIFIER SECTION:

Continuous Power Output: 4-Channel Mode, 20 watts/channel @ 1 kHz; 15 watts/channel, 20-20,000 Hz, 8 ohm loads; 2-Channel Mode,: 50 watts/channel @ 1 kHz, 40 watts/channel, 20-20,000 Hz, 8 ohm loads. **Rated THD**: 0.8%. **Rated IM**: 0.8%. **Power Bandwidth**: 20-40,000 Hz. **Damping Factor**: 20. **Input Sensitivity**: Phono, 1.5 mV; Aux, 150 mV; Tape Play, 150 mV. **Hum and Noise**: Phono, —60 dB; Aux, —75 dB; Tape Play, —75 dB. **Frequency Response**: Phono, RIAA ± 1 dB; Tuner, Aux, Tape, 20 Hz to 20,000 Hz ± 1 dB. **Tone Control Range**: ± 10 dB @ 100 Hz; ± 10 dB @ 10,000 Hz.

GENERAL SPECIFICATIONS:

Maximum Power Consumption: 320 watts. **Dimensions**: 21⅞ in. w. x 6 5/16 in. h. x 14 3/16 in. d. **Weight**: 33 lbs. **Price**: $489.95 (Optional CD-4 Demodulator Plug-In Unit, Model KCD-2: $79.95).

If you've been concerned about the possibility of degraded performance in the new breed of quadraphonic receivers because of pricing and circuitry considerations (a four-channel receiver, after all, has so many more circuits, controls and features compared to a stereo receiver), fear no more! If Kenwood's model KR-6340 is any indication of the quality to be expected from their entire series of "2-4" receivers (there are four announced thus far, with the top-of-the line Model KR-9340 promising to be a real powerhouse), that company should have nothing to worry about.

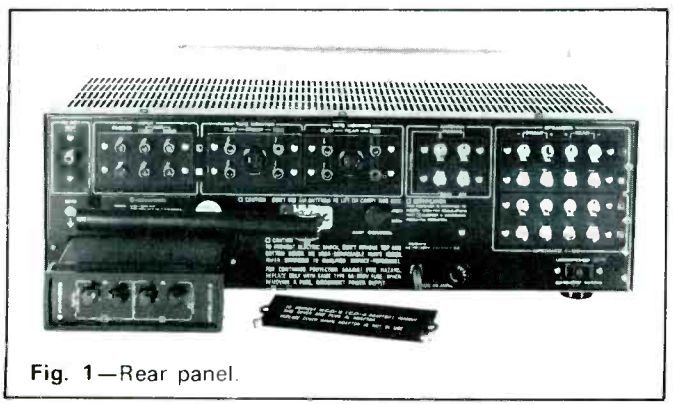


Fig. 1—Rear panel.

The KR-6340, as pictured above, is actually somewhat smaller than competitive four-channel receivers we have examined to date. A giant of a dial-scale area occupies more than half of the panel surface at the left end of the panel and, besides the well calibrated, almost linear FM scale and AM scale, the area contains a signal strength meter, indicator lights to tell you whether the set is being operated in the two-channel or four-channel amplifier mode, lights that tell you what kind of programming has been selected (SQ, RM, Discrete), lights that tell you when a CD-4 record is being played, plus the usual stereo-FM indicator light, when a stereo FM station is received. In addition, the dial pointer lights up in bright red when the selector is switched to either AM or FM.

Below the dial area are a power on-off push-button and speaker selector buttons for one or both quartets of speakers. Quadraphonic headphone jacks are provided—one for front and the other for rear channel connection. Additional push-buttons along the bottom of the panel include an FM muting switch, a loudness control switch, and a tape monitor switch. At the upper right of the panel are the tuning knob, the program source selector switch and a dual-concentric friction pair of volume controls—one for front channels, one for rear. If turned as a single control, volume to all four channels is altered uniformly. Below these controls are four somewhat smaller knobs, the first of which selects the mode of operation (MONO, 2-CH, RM, SQ, and DISCRETE). Dual bass and treble controls also employ dual knobs, so that tonal settings for rear channels can be set differently from front channels if desired. Mid settings are cleverly defined by a "click-stop" action built into the controls, insuring flat response when the knobs are set to the easily defined click position. The pair of dual-concentric balance controls (one knob for rear left-right balance, the other for front) at the extreme lower right of the panel is also equipped with this mechanical "click-stop" arrangement for easy balancing (assuming all signal sources

The rear panel of the KR-6340 is shown in Fig. 1. In addition to the usual input and output jacks for phono, aux (four of these, of course), tape out and tape in, there is an FM detector output jack, in anticipation of an as yet to be approved system for discrete four-channel FM broadcasting. Well-separated screw terminals—enough for two full sets of quadraphonic speaker arrays (eight speakers in all) are located at the right, in the photo, and similar terminals are used for connection of either 75 ohm or 300 ohm FM transmission line and an external AM antenna, if required. A pivotable AM ferrite bar antenna is included, as is an unswitched convenience outlet for record changer connection, etc. An "amp control" located at the center of the back panel is used to change amplifier mode from four-channel, to paralleled or

"strapped" two-channel operation. This control does *not* duplicate the function of the front panel control (mode) discussed earlier. In other words, it is possible to leave this rear control in the four-channel setting and still select 2-channel operation by means of the front-panel mode control. Sound would then be heard from the front speakers only, but at a power level corresponding only to the per-channel rating in quadraphonic use. Only if both controls are set to "2-Ch" will the higher power rating per channel be realized.

A plastic cover plate, located at the lower left in the photo of Fig. 1, can be removed by loosening two screws. The slot that is then disclosed is intended for the KCD-2 CD-4 (Quadradisc) adaptor which Kenwood makes available separately. We were supplied with this demodulator for our tests and promptly inserted it in the beckoning slot. The nice thing about this arrangement (which is carried over into Kenwood's next more expensive receiver, the KR-8340) is the fact that it can be added at any time in the future, permitting the purchaser to economize somewhat at first if he is not prepared to spend another $80.00 (plus the cost of a new CD-4 cartridge) at the time he purchases the receiver. The demodulator unit plugs in—connections are made by simply pushing the module all the way into the slot, where its printed circuit board connector engages a properly oriented matching connector automatically.

Ordinarily, with separate demodulators previously offered, the user would end up with a *separate* accessory box and the need to handle controls on the main receiver as well as on the demodulator. Kenwood worked things out so that all controls (other than initial calibrating controls which are adjusted to match the CD-4 cartridge used) are on the receiver's front panel. This makes good sense and other manufacturers who plan to offer receivers with and without demodulators "built in" would do well to follow Kenwood's example. This bit of magic is accomplished by equipping the front panel selector switch with what amounts to two phono settings. The first, labelled PHONO is used for playing stereo records or matrix four-channel discs. With the switch set to CD-4, the phono input jacks are transferred over to the inputs of the demodulator module, the outputs of which are then simultaneously switched over to the succeeding voltage amplifier and power amplifier circuits in the usual manner. Very clever! With no CD-4 module connected, of course, no sound will be heard if the selector is set to the CD-4 position.

As can be seen from Fig. 2, Kenwood engineers must have really worked hard to get all that circuitry into the confines of this chassis. Yet, the amount of point-to-point interwiring is kept to a minimum, with all critical parts on sturdily supported p.c. boards. Identical power output modules are used for front and rear amplifier pairs. Each employs a semi-complementary direct-coupled output circuit. The outputs are monitored by a speaker protection circuit which includes a positive-acting multi-pole relay. This relay introduces a time-delay on turn-on, preventing popping transients from being heard, too.

The tuner circuitry includes a 3-gang FM variable capacitor, an FET r.f. stage, solid-state i.f. filters and an IC limiter detector, as well as Kenwood's highly reputed "double-stereo-demodulator" multiplex decoder circuit. The matrix decoder section uses common circuitry for both RM (Regular Matrix) and SQ decoding, with necessary changes from one to the other accomplished by switching of matrix decode parameters. The matrix decoder is not equipped with logic circuitry of any kind.

Though not a part of the basic receiver, it is interesting to note that the optional CD-4 demodulator module contains 23 bipolar transistors, 3 FET's and 2 phase-lock-loop integrated circuits, not to mention a vast assortment of resistors and capacitors, plus four precision calibration controls. In all, $79.95 doesn't seem like an unfair price to pay for this neatly assembled option.

Laboratory Measurements

The FM performance of Kenwood's KR-6340 was measured in somewhat greater detail than is our usual practice, so as to include some of the suggested additions in the proposed new Measurement Standards of the Institute of High Fidelity. These additional measurements will be included in all future reports on stereo FM products reviewed by AUDIO. Figure 3 shows some of the monophonic FM measurements made, with separate stereo measurements graphed in Fig. 4. IHF sensitivity was 1.8 μV, a bit better than the 2.0 μV claimed. Ultimate mono S/N was a remarkable 72 dB compared with the conservative 63 dB claimed by Kenwood. Mono THD was a mere 0.16% as aganst 0.5% in the published specs. The 50 dB quieting sensitivity was 3.0 μV, with THD already down to 1.0% at that signal input.

With automatic stereo switching set to occur at 7.0 μV, that signal strength becomes, in effect, the stereo FM sensitivity, as shown in Fig. 4. The 50 dB quieting signal for stereo reception measured 30 dB, and distortion at that input signal strength was just over 0.3%. Ultimate THD in stereo measured 0.24% compared with 0.8% claimed in the published specs. By filtering out residual sub-carrier products (which are not audible as "noise"), ultimate S/N attained in stereo was 65 dB. These stereo readings have not been published by AUDIO

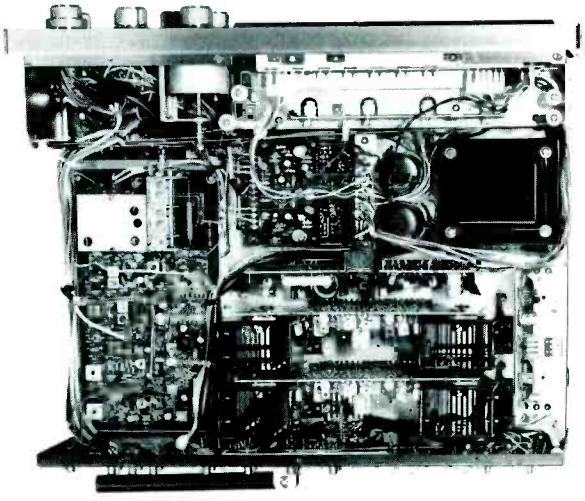


Fig. 2—Internal view of chassis.

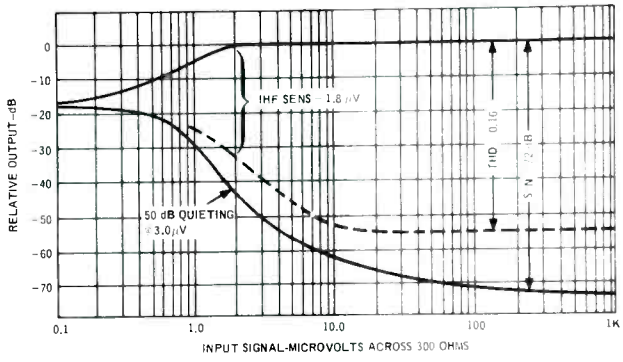


Fig. 3—Mono FM characteristics.

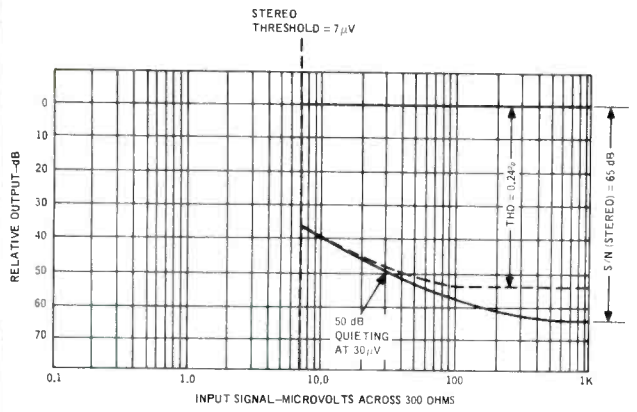


Fig. 4—Stereo FM characteristics.

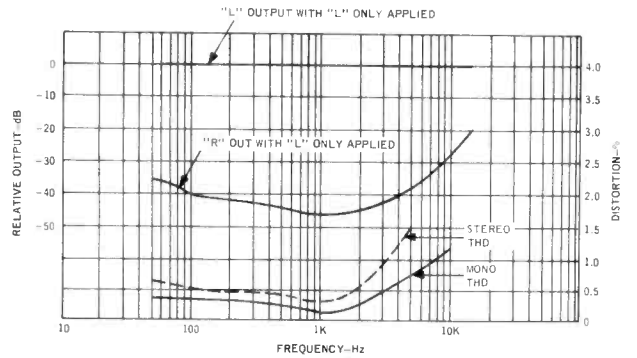


Fig. 5—Stereo separation and distortion characteristics.

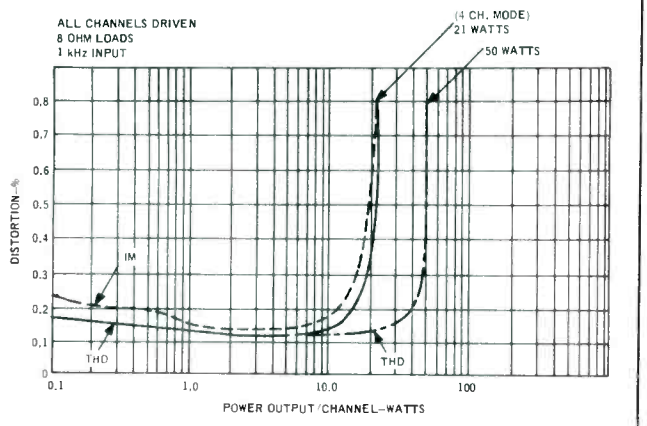


Fig. 6—THD and IM characteristics.

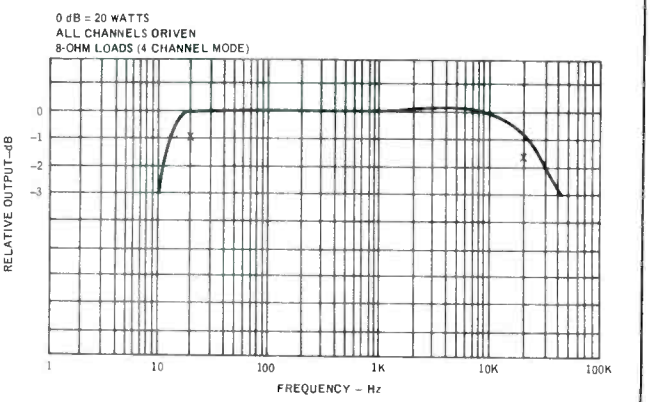


Fig. 7—Power bandwidth.

in previous reviews and readers may therefore be wondering just how "good" they are, since there is no basis for comparison. Well, they are very good *indeed*, as you will learn in future months as we continue to publish these more complete and meaningful FM readings.

Measured capture ratio was 2.5 dB while selectivity measured a bit better than the 50 dB claimed—about what one would expect from a three-tuned circuit front end and a three-stage i.f. system. Mono and stereo distortion at various audio frequencies, as well as stereo separation are plotted in Fig. 5. Mid-band separation measured about 46 dB, with a gradual reduction to 28 dB at 10 kHz. Stereo distortion readings were taken only to 5 kHz, at which frequency stereo THD measured 1.5% for full modulation.

Amplifier Measurements

Because of the fact that in the "strapped" mode there is no "common ground" connection at any of the speaker terminals, it becomes a bit difficult to measure performance using conventional test equipment hook-ups (generators, scopes and meters all share a common ground in most lab set-ups). We were able to plot "strapped" power output versus distortion, however, as shown in Fig. 6, and the rated THD of 0.8% was reached at a power output of 50 watts per channel. In quadraphonic mode, power output per channel was 21 watts for rated THD. At 15 watts and below, THD measured 0.2% or better, and IM also hovered around the 0.2% mark for all power levels below 10 watts per channel, reaching its rated value of 0.8% at exactly 21 watts per channel, all channels driven, using 8 ohm loads in all cases. Power bandwidth extended from 10 Hz to 40 kHz, a full octave better at the low end than claimed by Kenwood. Distortion versus frequency is plotted for outputs of 15 watts and 7.5 watts in Fig. 8 and reached 0.4% at 20 Hz in the case of the higher power output. At half power, distortion did not exceed 0.2% at any audible frequency. Tone control range and loudness characteristics are plotted in Fig. 9 and are seen to conform nicely with published information supplied by the manufacturer.

Listening Tests

Most of our listening tests concerned themselves with four-channel program sources. Our primary interest was with the CD-4 performance, and using a limited number of CD-4 discs available we can report that Kenwood's demodulator performs well. We particularly appreciated the availability of *two separate* 30 kHz carrier adjust controls—one for the left side and one for the right. Most previous demodulators we had used contained only one common adjustment of this critical parameter. With two carrier adjustment controls available, it becomes possible to compensate for unequal outputs from the left and right terminals of a given cartridge—a situation which occurs all too frequently.

Reproduction of CD-4 discs was clean and as distortion-free as we have heard them to date. It's always a delight to see the "Radar" light on the front panel go on when such a disc is played, even though the circuitry needed to perform this trick is no more complicated than that used to trigger the "stereo indicator" in the case of stereo FM reception. We're probably still intrigued by the novelty of it! In an overall sense, sound was clean, crisp and solid, and more than adequate power was available for our medium efficiency speaker systems. The benefits of strapping were apparent when we connected less efficient speakers for stereo testing. Fifty watts per channel is a lot of receiver power—even compared to "stereo only" receivers selling in this price range.

We've seen just about every combination of volume/balance controls on quadraphonic equipment and, in the absence of a

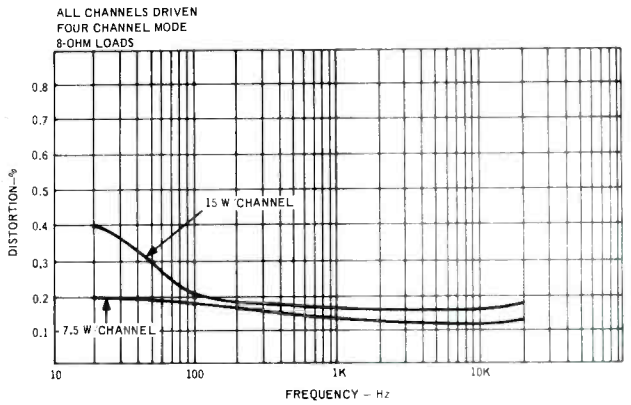


Fig. 8—Distortion vs. frequency.

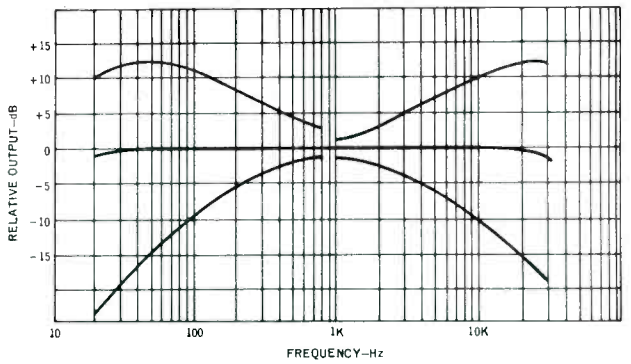


Fig. 9—Frequency response, tone control range and loudness control range.

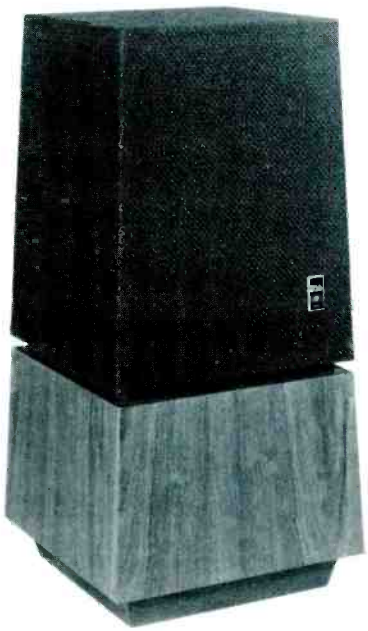
"joystick" control, the arrangement chosen by Kenwood—tandem balance controls and tandem volume controls—makes balance adjustment in quadraphonic listening quite simple.

The absence of any logic circuitry in this receiver makes listening to matrix discs a bit of a let-down after the wide-separation of CD-4, but this, of course, is not the fault of the receiver. No four-channel receiver that we know of offers logic *plus* CD-4 capability even at the combined price of $560.00. Using this simple matrix format, there was little qualitative difference between the RM and SQ decode positions—just a slight shift of instrument location, as would be expected.

Tuner section performance was quite good, with muting effective for all signals of less than 7 microvolts. FM calibration was just about perfect and the transition from mono to stereo reception was positive with no switching back and forth—even at weak signal conditions. With the aid of our outdoor directional Yagi we were able to receive some 52 usable signals, 24 of them in stereo. Signal strength meter indications were not too helpful, however, since the first few microvolts of signal cause the meter to deflect nearly all the way. If Kenwood could not afford dual meters on this unit, we would have preferred a center-of-channel type instead of the peak reading one supplied.

Just to convince ourselves of the significance of "strapping" (and because the control flexibility of this receiver let us experiment) we tried listening to stereo two ways: first simply selecting the "2-channel" position on the selector (without setting the rear panel switch to the "strapped 2-ch" position) and then by paralleling the pairs of amplifiers, as recommended. We can honestly say that, in the case of our low-efficiency air-suspension speakers, the strapping feature (and the resultant increase in power output of more than two to one) made all the difference. While quadraphonic operation at about 20 watts per channel "fills the room" nicely because of the multiplicity of speakers in use, trying to make do with "half the receiver" in stereo left us with a feeling that we needed more power. Fortunately, the strapping circuit used by Kenwood (and others) affords the hesitant and undecided purchaser with the best of both the stereophonic and quadraphonic worlds. *Leonard Feldman*

Check No. 60 on Reader Service Card



ESS amt-1 Speaker System

MANUFACTURER'S SPECIFICATIONS

System Type: Two way, floor standing, ported enclosure. **Drivers**: Heil air-motion transformer tweeter; 10-in. woofer. **Crossover**: 600 Hz. **Frequency Response**: 45 to 24,000 Hz ± 2 dB in a controlled field environment. **Power Requirements**: 30 watts rms minimum per channel. **Power Handling**: Greater than 350 watt musical peaks without distortion. **Nominal Input Impedance**: 4 ohms (minimum). **Finish**: Hand-rubbed oiled walnut. **Dimensions**: 31 in. H. x 14½ in. D x 14½ in. W. **Price**: $300.00 each.

Very few recent loudspeaker designs have created the interest that has surrounded the recent introduction by ESS, Inc. of the amt-1. The singular factor which sets this apart from more conventional loudspeaker systems is its high frequency driver. Sitting on top of a reasonably conventional ducted-port enclosure is a small rectangular unit which ESS calls the Heil air-motion transformer. While this unconventional tweeter is designed to radiate through an acoustically transparent grille, ESS has wisely made the grille itself readily removable—not certainly for maintenance or hookup reasons but for the natural curiosity of the dedicated audiophile who might otherwise claw it open in order to see what is inside.

All speakers must set air in motion to reproduce sound. In the air-motion transformer, developed by Dr. Oskar Heil, of Heil Scientific Labs. Inc., this is accomplished by changing